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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	898/2/3 UTIL
	Application Number	
Title of Invention	THE CONTROL OF DISTRIBUTED DATABASES	

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.
This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.

Secrecy Order 37 CFR 5.2:

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Inventor Information:

Inventor 1 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Martin		MCCONNACHIE	

Residence Information (Select One) US Residency ● Non US Residency Active US Military Service

City	Country of Residence [i]
Paradise Point, QLD	AU

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Address 2	
City	Paradise Point, QLD
State/Province	
Postal Code	4216
Country [i]	AU

Inventor 2 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Helen		JOHNSON	

Residence Information (Select One) US Residency ◉ Non US Residency Active US Military Service

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Country [i]	AU

Inventor 3 Remove

Legal Name

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Prefix	Given Name	Middle Name	Family Name	Suffix
	Geoffrey		TOOGOOD	

Residence Information (Select One) US Residency ◉ Non US Residency Active US Military Service

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Mailing Address of Inventor:

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City	Forest Lake, QLD	State/Province	
Postal Code	4078	**Country** [i]	AU

Inventor 4 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Daniel	Paul	RUUL	

Residence Information (Select One) US Residency ◉ Non US Residency Active US Military Service

City	Labrador, QLD	Country of Residence [i]	AU

Mailing Address of Inventor:

Address 1	35 McMillan Street
Address 2	Unit 6

City	Labrador, QLD	State/Province	
Postal Code	4215	**Country** [i]	AU

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the **Add** button. Add

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below.
For further information see 37 CFR 1.33(a).

☐ **An Address is being provided for the correspondence Information of this application.**

Customer Number	115007		
Email Address	docket@nkpatentlaw.com	Add Email	Remove Email

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Application Information:

Title of the Invention	THE CONTROL OF DISTRIBUTED DATABASES		
Attorney Docket Number	898/2/3 UTIL	**Small Entity Status Claimed** ☒	
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	12	**Suggested Figure for Publication (if any)**	1

Filing By Reference:

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

☐ **Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32).
Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Please Select One:	● Customer Number	US Patent Practitioner	○ Limited Recognition (37 CFR 11.9)
Customer Number	115007		

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	898/2/3 UTIL
	Application Number	
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Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim information in the Application Data Sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.
When referring to the current application, please leave the "Application Number" field blank.

Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
	Continuation of	16150799	2018-10-03
Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
16150799	Continuation of	14877669	2015-10-07
Prior Application Status	Abandoned		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
14877669	Continuation in part of	12227451	2009-12-18
Prior Application Status	Expired		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
12227451	a 371 of international	PCT/AU2007000684	2007-05-18

Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button. Add

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)[i] the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

Remove

Application Number	Country[i]	Filing Date (YYYY-MM-DD)	Access Code[i] (if applicable)
2006902685	AU	2006-05-18	

Additional Foreign Priority Data may be generated within this form by selecting the **Add** button. Add

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Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.
NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

PTO/AIA/14 (11-15)
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Authorization or Opt-Out of Authorization to Permit Access:

When this Application Data Sheet is properly signed and filed with the application, applicant has provided written authority to permit a participating foreign intellectual property (IP) office access to the instant application-as-filed (see paragraph A in subsection 1 below) and the European Patent Office (EPO) access to any search results from the instant application (see paragraph B in subsection 1 below).

Should applicant choose not to provide an authorization identified in subsection 1 below, applicant **must opt-out** of the authorization by checking the corresponding box A or B or both in subsection 2 below.

NOTE: This section of the Application Data Sheet is **ONLY** reviewed and processed with the **INITIAL** filing of an application. After the initial filing of an application, an Application Data Sheet cannot be used to provide or rescind authorization for access by a foreign IP office(s). Instead, Form PTO/SB/39 or PTO/SB/69 must be used as appropriate.

1. Authorization to Permit Access by a Foreign Intellectual Property Office(s)

A. Priority Document Exchange (PDX) - Unless box A in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the State Intellectual Property Office of the People's Republic of China (SIPO), the World Intellectual Property Organization (WIPO), and any other foreign intellectual property office participating with the USPTO in a bilateral or multilateral priority document exchange agreement in which a foreign application claiming priority to the instant patent application is filed, access to: (1) the instant patent application-as-filed and its related bibliographic data, (2) any foreign or domestic application to which priority or benefit is claimed by the instant application and its related bibliographic data, and (3) the date of filing of this Authorization. See 37 CFR 1.14(h)(1).

B. Search Results from U.S. Application to EPO - Unless box B in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the EPO access to the bibliographic data and search results from the instant patent application when a European patent application claiming priority to the instant patent application is filed. See 37 CFR 1.14(h)(2).

The applicant is reminded that the EPO's Rule 141(1) EPC (European Patent Convention) requires applicants to submit a copy of search results from the instant application without delay in a European patent application that claims priority to the instant application.

2. Opt-Out of Authorizations to Permit Access by a Foreign Intellectual Property Office(s)

☐ A. Applicant **DOES NOT** authorize the USPTO to permit a participating foreign IP office access to the instant application-as-filed. If this box is checked, the USPTO will not be providing a participating foreign IP office with any documents and information identified in subsection 1A above.

☐ B. Applicant **DOES NOT** authorize the USPTO to transmit to the EPO any search results from the instant patent application. If this box is checked, the USPTO will not be providing the EPO with search results from the instant application.

NOTE: Once the application has published or is otherwise publicly available, the USPTO may provide access to the application in accordance with 37 CFR 1.14.

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	898/2/3 UTIL
	Application Number	
Title of Invention	THE CONTROL OF DISTRIBUTED DATABASES	

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Applicant 1 — Remove

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

Clear

● Assignee	Legal Representative under 35 U.S.C. 117	Joint Inventor
Person to whom the inventor is obligated to assign.	Person who shows sufficient proprietary interest	

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor:

If the Applicant is an Organization check here. ☒

Organization Name	Allotz.com Limited		
Mailing Address Information For Applicant:			
Address 1	Level 5, 128 Bundall Road		
Address 2			
City	Bundall	**State/Province**	
Country	AU	Postal Code	4217
Phone Number		Fax Number	
Email Address			

Additional Applicant Data may be generated within this form by selecting the Add button. Add

Assignee Information including Non-Applicant Assignee Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

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	Application Number	
Title of Invention	THE CONTROL OF DISTRIBUTED DATABASES	

Assignee 1

Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication. An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.

Remove

If the Assignee or Non-Applicant Assignee is an Organization check here. ☐

Prefix	**Given Name**	Middle Name	**Family Name**	Suffix

Mailing Address Information For Assignee including Non-Applicant Assignee:

Address 1			
Address 2			
City		**State/Province**	
Country i		Postal Code	
Phone Number		Fax Number	
Email Address			

Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button. Add

Signature:

Remove

NOTE: This Application Data Sheet must be signed in accordance with 37 CFR 1.33(b). **However, if this Application Data Sheet is submitted with the INITIAL filing of the application and either box A or B is not checked in subsection 2 of the "Authorization or Opt-Out of Authorization to Permit Access" section, then this form must also be signed in accordance with 37 CFR 1.14(c).**

This Application Data Sheet **must** be signed by a patent practitioner if one or more of the applicants is a **juristic entity** (e.g., corporation or association). If the applicant is two or more joint inventors, this form must be signed by a patent practitioner, **all** joint inventors who are the applicant, or one or more joint inventor-applicants who have been given power of attorney (e.g., see USPTO Form PTO/AIA/81) on behalf of **all** joint inventor-applicants.

See 37 CFR 1.4(d) for the manner of making signatures and certifications.

Signature	/Gregory M. Evans/			Date (YYYY-MM-DD)	2020-07-09
First Name	Gregory	Last Name	Evans	Registration Number	72169

Additional Signature may be generated within this form by selecting the Add button. Add

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	Application Number	
Title of Invention	THE CONTROL OF DISTRIBUTED DATABASES	

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1 The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3 A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent CooperationTreaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

THE CONTROL OF DISTRIBUTED DATABASES

FIELD

Various exemplary embodiments of a method of controlling distributed databases are described herein. Various exemplary embodiments of a computer system for controlling distributed databases are also described herein.

RELATED APPLICATIONS

The present application is a continuation of United States patent application number 16/150,799, filed October 3, 2018, which is a continuation of United States patent application number 14/877,669, filed October 7, 2015, which is continuation-in-part patent application of United States patent application number 12/227,451, filed December 18, 2009, which is a national stage of international patent application no. PCT/AU2007/000684, filed May 18, 2007, which claims the benefit of Australian provisional patent application 2006902685, filed May 18, 2006, the contents of all of which are herein incorporated by reference.

BACKGROUND OF THE INVENTION

Applicant has identified a particular problem when selling inventory, such as travel services including accommodation allotments, flights and other transport services. The problem is a result of the manner in which such inventory is allocated to various re-sellers, referred to as distribution channels ("Channels"), which can be ad hoc and thus inefficient.

It will be appreciated that efficient selection of Channels for such inventory can allow vendors to achieve a selling price that corresponds with demand for the inventory in the Channels. In this way, an optimum price for, and supply of the inventory in each Channel could be achieved with such correct selection.

While this invention is intended to cover a wide variety of inventory-types, Applicant has discovered that particularly the travel and accommodation industries would benefit greatly from efficient allocations of inventory to various Channels. A primary reason for this is that the traveling public is now able to book and pay online for practically all of its travel and accommodation needs via various online travel/accommodation reseller portals and agencies, which can be regarded as Channels. The online reseller market is particularly large in this field and the various Channels have the potential to be extremely successful.

The particular problem discovered by the Applicant is that the market has forced vendors to commit physical inventory to particular Channels in a relatively ad hoc manner.

Furthermore, where the inventory is accommodation which needs to be sold between particular dates, any attempt to achieve efficiency by selecting the most efficient Channels can become extremely difficult. In particular, Applicant has found that most independent hotels and accommodation properties lack the resources to have members of staff dedicated to managing allocations to Channels. Applicant has found that it is practically impossible for them to manage this inventory in multiple Channels while still maintaining their businesses.

SUMMARY

Various exemplary embodiments of a method of using a central computer system, which has a central relational database, systematically to refresh a distributed database that is distributed over a plurality of distributed computer systems and that includes distributed database fields that are for storing contingent values that are contingent on sporadic interactions between terminal computer systems and the distributed computer systems and that are affiliated with central database fields in the central relational database, comprise:

recurrently, at receiving times,

receiving contingent values of the distributed database fields from the distributed computer systems; and

storing, in the central relational database, the received contingent values of the distributed database fields in succession with previously received and stored contingent values of the distributed database fields, so as to build, for each distributed computer system an associated series of successive contingent values, and;

recurrently, at refreshing times and temporally independent of the receiving times,

determining fresh initial distribution values for the distributed database fields, based on the successive contingent values for the distributed computer systems and based on required initial distribution conditions; and

distributing the fresh initial distribution values to the distributed database fields of the distributed computer systems.

Receiving the contingent values of the distributed database fields from the distributed computer systems may include, at some receiving times, prompting at least some of the distributed computer systems to send the contingent values of their distributed database fields to the central computer system.

Receiving the contingent values of the distributed database fields from the distributed computer systems may include, at some receiving times, automatically and periodically receiving the contingent values of the distributed database fields from at least some of the distributed computer systems.

Uber Exhibit 1002 - p. 12
Uber Technologies, Inc. v. SurgeTech, LLC

Receiving the contingent values of the distributed database fields from the distributed computer systems may include, at some receiving times, automatically receiving the contingent values of the distributed database fields from at least some of the distributed computer systems, only when a change in the contingent values is caused in response to interactions between independent terminal computer systems and the at least some distributed computer systems.

The distributed database that is distributed over the plurality of distributed computer systems may include distributed database fields that are for storing non-contingent values that are associated with the contingent values in the distributed database fields. The method may then include, at the refreshing times, determining the non-contingent values based on the successive contingent values in the database fields of the distributed computer systems and based on required non-contingent conditions and distributing the non-contingent values to said database fields to refresh said database fields of the distributed computer systems.

Determining the fresh initial distribution values for the distributed database fields may include determining individual control indicators for respective distributed computer systems, each individual control indicator being a function of a previously stored initial distribution value and a most recent contingent value, such that each of the individual control indicators are a measure of a rate at which the contingent value is caused to change by sporadic interactions between terminal computer systems and respective distributed computer systems.

Determining the fresh initial distribution values for the distributed database fields may include determining, for each of the distributed computer systems of a group of the distributed computer systems, an associated group control indicator as a function of the respective individual control indicators of the group.

The method may include determining, for each of the distributed computer systems, an associated group control indicator as a function of successive non-contingent values for said each of the distributed computer systems.

The method may include, at the refreshing times, determining whether or not to proceed with determining the fresh initial distribution values for each one of the respective distributed computer systems.

The method may include a prior step of determining whether or not to determine the fresh initial distribution values for one of the distributed computer systems as a function of the individual control indicator for that distributed computer system.

Uber Exhibit 1002 - p. 13
Uber Technologies, Inc. v. SurgeTech, LLC

The method may include a prior step of determining whether or not to determine fresh initial distribution values for one of the distributed computer systems as a function of the group control indicator for that distributed computer system.

The method may include a prior step of determining whether or not to determine fresh non-contingent values for one of the distributed computer systems as a function of the individual control indicator for that distributed computer system.

The method may include the prior step of determining whether or not to determine fresh non-contingent values for one of the distributed computer systems of the group of distributed computer systems as a function of the group control indicator.

Determining the fresh initial distribution values for the distributed database fields may include allocating number values to the database fields of the respective distributed computer systems, said number values being related to rates of change of the contingent values associated with said respective computer systems.

Determining the fresh non-contingent values for the non-contingent database fields may include allocating number values to the database fields of the respective distributed computer systems, said number values being related to rates of change of the non-contingent values associated with said respective computer systems.

Various exemplary embodiments of a central computer system having a central relational database that is used systematically to refresh a distributed database that is distributed over a plurality of distributed computer systems and that includes distributed database fields that are for storing contingent values that are contingent on sporadic interactions between independent terminal computer systems and the distributed computer systems and that are affiliated with central database fields in the central relational database, the central computer system being configured to:

recurrently, at receiving times,

receive contingent values of the distributed database fields from the distributed computer systems; and

store, in the central relational database, the received contingent values of the distributed database fields in succession with previously received and stored contingent values of the distributed database fields, so as to build, for each distributed computer system an associated series of successive contingent values, and;

recurrently, at refreshing times and temporally independent of the receiving times,

Uber Exhibit 1002 - p. 14
Uber Technologies, Inc. v. SurgeTech, LLC

determine fresh initial distribution values for the distributed database fields, based on the successive contingent values for the distributed computer systems and based on required initial distribution conditions; and

distribute the fresh initial distribution values to the distributed database fields of the distributed computer systems.

Various exemplary embodiments of a non-transitory, computer-readable medium comprising instructions stored thereon that, when executed by a central computer system having a central relational database that is used systematically to refresh a distributed database that is distributed over a plurality of distributed computer systems and that includes distributed database fields that are for storing contingent values that are contingent on sporadic interactions between independent terminal computer systems and the distributed computer systems and that are affiliated with central database fields in the central relational database, causes the central computer system to perform the steps of:

recurrently, at receiving times,

receiving contingent values of the distributed database fields from the distributed computer systems; and

storing, in the central relational database, the received contingent values of the distributed database fields in succession with previously received and stored contingent values of the distributed database fields, so as to build, for each distributed computer system an associated series of successive contingent values, and;

recurrently, at refreshing times and temporally independent of the receiving times,

determining fresh initial distribution values for the distributed database fields, based on the successive contingent values for the distributed computer systems and based on required initial distribution conditions; and

distributing the fresh initial distribution values to the distributed database fields of the distributed computer systems.

Various exemplary embodiments of a method of managing inventory allocations include the steps of:

receiving, in a data processing apparatus, data relating to the sale of items of inventory allocated to respective re-sellers;

processing, in the data processing apparatus, said data to obtain data relating to sales performance of at least one of said respective re-sellers; and

carrying out at least one of the following steps in the data processing apparatus:

adjusting a price for which inventory allocated to at least that said respective re-seller is to be sold by that respective re-seller depending on said data relating to the sales performance of the respective re-sellers; and

re-allocating inventory items from at least that said respective re-seller to other respective re-sellers.

The step of processing the data may include the step of calculating a performance indicator for each re-seller in the form of a function of a ratio of a number of items sold to the number of items allocated to the re-seller for sale.

The step of processing the data may include the step of comparing the performance indicator for a particular re-seller of inventory items to the performance indicators of other re-sellers of inventory items, the inventory items associated with respective re-sellers having at least one common characteristic.

The step of comparing the performance indicators may include the step of comparing the performance indicator of said particular re-seller to an average of the performance indicators of said other re-sellers.

The step of comparing the performance indicators may include the step of obtaining a percentage change (PC) of the performance indicator of said particular re-seller relative to said average of the performance indicators and applying the following equation to PC:

$Z_j = \frac{PC_j - Mean(PC)}{St.Dev(PC)/\sqrt{n}}$, where n is the number of re-sellers having said at least one common characteristic, j = 1 *to* n, and Z is an adjustment rate to a price of the inventory item.

The method may include the step of adjusting a price of the inventory allocated to said particular re-seller by a factor of Z.

The step of processing said data may include the step of carrying out a statistical analysis of said data relating to sales performance.

Various exemplary embodiments of a system for managing inventory allocations include a data processing apparatus that is configured to carry out the following steps:

receiving data relating to the sale of items of inventory allocated to respective re-sellers;

processing said data to obtain data relating to sales performance of at least one of the respective re-sellers; and

carrying out at least one of the following steps:

adjusting a price for which inventory allocated to at least that said respective re-seller is to be sold by that respective re-seller depending on said data relating to the sales performance of the respective re-sellers; and

re-allocating inventory items from at least that said respective re-seller to other respective re-sellers.

The data processing apparatus may be configured to calculate a performance indicator for each re-seller in the form of a function of a ratio of a number of items sold to the number of items allocated to the re-seller for sale.

The data processing apparatus may be configured to compare the performance indicator for a particular re-seller of inventory items to the performance indicators of other re-sellers of inventory items, the inventory items associated with respective re-sellers having at least one common characteristic.

The data processing apparatus may be configured to compare the performance indicator of said particular re-seller to an average of the performance indicators of said other re-sellers.

The data processing apparatus may be configured to obtain a percentage change (PC) of the performance indicator of said particular re-seller relative to said average of the performance indicators and to apply the following equation to PC:

$Z_j = \frac{PC_j - Mean(PC)}{St.Dev(PC)/\sqrt{n}}$, where n is the number of re-sellers having said at least one common characteristic, j = 1 *to* n, and Z is an adjustment rate to a price of the inventory item.

The data processing apparatus may be configured to adjust a price of the inventory allocated to said particular re-seller by a factor of Z.

The data processing apparatus may be configured to carry out a statistical analysis of said data relating to sales performance.

Various exemplary embodiments of a non-transitory, computer-readable medium comprise instructions stored thereon that, when executed by a data processing apparatus, perform the steps of:

receiving data relating to the sale of items of inventory allocated to respective re-sellers;

processing said data to obtain data relating to sales performance of at least one of said respective re-sellers; and

Uber Exhibit 1002 - p. 17
Uber Technologies, Inc. v. SurgeTech, LLC

carrying out at least one of the following steps:

adjusting a price for which inventory allocated to at least that respective re-seller is to be sold by that respective re-seller depending on said data relating to the sales performance of the respective re-sellers; and

re-allocating inventory items from at least that said respective re-seller to other respective re-sellers.

The software product, when executed by a data processing apparatus, may cause the data processing apparatus to calculate a performance indicator for each re-seller in the form of a function of a ratio of a number of items sold to the number of items allocated to the re-seller for sale.

The software product, when executed by a data processing apparatus, may cause the data processing apparatus to compare the performance indicator for a particular re-seller of inventory items to the performance indicators of other re-sellers of inventory items, the inventory items associated with respective re-sellers having at least one common characteristic.

The software product, when executed by a data processing apparatus, may cause the data processing apparatus to compare the performance indicator of said particular re-seller to an average of the performance indicators of said other re-sellers.

The software product may, when executed by a the data processing apparatus, cause the data processing apparatus to obtain a percentage change (PC) of the performance indicator of said particular re-seller relative to said average of the performance indicators and to apply the following equation to PC:

$$Z_j = \frac{PC_j - Mean(PC)}{St.Dev(PC)/\sqrt{n}}$$, where n is the number of re-sellers having said at least one common characteristic, $j = 1 \text{ to } n$, and Z is an adjustment rate to a price of the inventory item.

The software product, when executed by a data processing apparatus, may cause the data processing apparatus to adjust a price of the inventory allocated to said particular re-seller by a factor of Z.

The software product, when executed by a data processing apparatus, may cause the data processing apparatus to carry out a statistical analysis of said data relating to sales performance.

Uber Exhibit 1002 - p. 18
Uber Technologies, Inc. v. SurgeTech, LLC

In this specification, the word “allocation” is used to describe an allocation of an item or an “allotment”. It follows that they should be considered interchangeable for the purposes of clarity.

DESCRIPTION OF THE DRAWINGS

In the drawings:

Figure 1 shows a schematic view of an exemplary embodiment of a system for managing the allocation of inventory.

Figure 2 shows a flowchart indicating an exemplary embodiment of a method for managing the allocation of inventory.

Figure 3 shows a flowchart indicating an exemplary embodiment of a method for managing the allocation of inventory when supply of that inventory exceeds demand for that inventory.

Figure 4 shows a flowchart indicating an exemplary embodiment of a method for collecting data relating to different re-sellers.

Figure 5 shows a schematic flowchart of an exemplary embodiment of a method for managing inventory allocations.

Figure 6 shows a schematic drawing of a central server and a central database that are in communication with an affiliated distributed database that is distributed over a plurality of distributed servers;

Figure 7 shows a functional flow diagram of a method in accordance with an embodiment;

Figure 8 shows a functional flow diagram of part of the diagram in figure 7, in more detail;

Figure 9 shows a functional flow diagram of part of the diagram in figure 7, in more detail;

Figure 10 shows a schematic diagram of a central database and a distributed database of the embodiment shown in figure 6;

Figure 11 shows a functional flow diagram of part of the diagram in figure 7, in more detail;

Figure 12 shows a functional flow diagram of part of the diagram in figure 7, in more detail.

Uber Exhibit 1002 - p. 19
Uber Technologies, Inc. v. SurgeTech, LLC

DESCRIPTION OF EMBODIMENTS

In Figure 1, reference numeral 10 broadly illustrates an exemplary embodiment of a system for managing inventory allocated to respective re-sellers.

In the following description, reference is made to the inventory items in the form of accommodation allotments and in further descriptions as Rooms. It is to be understood that such accommodation allotments or Rooms are allotments of property for the purposes of short term rental, such as holiday apartments, hotel rooms, etc.

The system 10 includes a data processing apparatus in the form of a computer 12 that is connectable to a network. In this case, the network can be the Internet indicated at 14 or a private network indicated at 16. It will readily be appreciated that the private network 16 can be a virtually private network (VPN) which could form part of the World Wide Web indicated at 14.

The computer 12 is programmed or configured with to receive data relating to accommodation allotments allocated to respective re-sellers stored on servers that are referred to as distribution channels or channels, indicated schematically at 18, via the World Wide Web 14.

The computer 12 is configured to process the data to obtain data relating to sales performance in each channel 18 and referred to as performance data that provides an indicator of the performance in the sales channel. On receipt of the performance data, the computer is configured to adjust characteristics or parameters relating to inventory allocated to respective channels 18 depending on the performance data, and/or re-allocate inventory in respective channels 18 to other channels 18.

The computer 12 is configured to store data representing inventory that is required to be sold online by third party online resellers using the channels 18. The system 10 allows a vendor of the inventory, in the form of a member or subscriber, indicated at 20, to place all or part of their inventory required to be sold online in a database 22 of the computer 12. Thus, the computer 12 is configured so that it generates a database 22 and uses a subroutine 24 that can be stored in a non-transitory, computer-readable medium, to manipulate the data representing the inventory, as described below.

In particular, the computer 12 is configured to associate the channels 18 with inventory data in the database 22. The computer 12 receives data relating to the transfer of inventory in the form of data relating to one or more of the following: sale price of each item of inventory, rate of commission and number of items sold over a pre-determined length of

time. The subroutine 24 is configured to calculate a rate index, in the form of an indicator, for each channel 18 in the form of a ratio of the number of items of inventory transferred in a pre-determined time ("S") to the number of inventory items available ("A") in that distribution channel 18. That gives (S/A) or (S:A) that can be used as an indicator for whether or not the computer 12 is required to make certain decisions.

The computer 12 is configured to calculate a performance rating, which is also an indicator, for each channel 18. The performance rating can reflect a determination of whether or not supply of inventory to each channel 18 exceeds demand or vice versa per channel 18.

By using the performance rating and the calculated index, S/A, the subroutine 24 can calculate the number of inventory items, in the form of a distribution value, to allocate or distribute to one or more particular channels 18, and the price at which those items can be sold to maximize a profit for the items.

The subroutine 24 is configured so that, when executed by the computer 12, the computer can set a minimum price of items and can adjust the price up from or back to that minimum based on the performance rating of the channel 18 in which the relevant inventory is placed.

Furthermore, the subroutine 24 is configured also so that, when executed by the computer 12, the computer increases the price in channels with a relatively high outward transfer rate and high costs, such as commissions, when compared with other channels, so that their performance rating can be equal to or higher than other channels 18 with lower outward transfer rates and costs. It follows that the system 10 can be used to maximize profit on a range of competing channels. It follows also that a rate at which a particular channel is selling compared to its performance rating is directly proportional to a surplus of supply and the outward transfer rate in that channel.

It is to be understood that supply of inventory items and extent of commission can control the rate at which inventory is sold in each channel 18, at a basic level. It follows that if a shortage of supply should occur, a price of inventory in all the channels 18 will increase. However, in the event that there is over-supply, the price will decrease relative to the performance rating.

It follows that the vendors or an administrator of the system of the invention can set a rate of change that could be used to increase or decrease a price at which an inventory item is sold. An example of a suitable rate is 10%. In a particular example, performance of the

channels 18 will be calculated per hour, i.e. recurrently, and related to previous statistical analysis of a particular targeted date range. That analysis can provide a tool for adjusting the rate upwardly or downwardly. In other words, the performance of the channels is calculated recurrently.

In figure 2, reference numeral 30 generally indicates a broad overview of the operation of the system 10.

Reference numeral 32 indicates any channel 18 associated with a user-selected third party re-seller that stocks real-time inventory availabilities or allocations that are represented by values in database fields of computers associated with the channels 18. The subroutine 24 is configured dynamically to allocate or reallocate or update or query inventory allocations associated with the channel 32. This can be done, for example, using an XML standard.

The operation 30 is initiated with inventory being transferred out from the channel 32 at a predetermined price. At 34, the subroutine 24 calculates the rate index, as explained above. In particular, the subroutine 24 is configured to calculate the rate index by calculating an amount sold in a predetermined period of time divided by the amount allocated to the channel 32 (A/S). The value returned is then multiplied by 100 to get a percentage. The percentage is used as a parameter or indicator by the subroutine 24 to calculate whether or not particular channels are to be allocated inventory. The parameter is used in a function to make that calculation. It will also be appreciated that channels could be performing equally well, even though the value (A/S) is higher for one than the other. This would occur where one of the channels has been allocated more inventory than the other.

In that case, imaginary inventory allocations are generated in order to provide the necessary equalization in the form of initial distribution conditions. Alternatively, a suitable statistical equation (described in more detail below) can be applied using a comparison to average values for A/S over the channels being compared. The statistical equation can use a Standard Deviation parameter to adjust for the different starting amounts or initial distribution conditions.

At 36, the subroutine 24 queries whether or not demand has exceeded supply in the channel 32. If a negative answer is returned, the subroutine decreases the price by a percentage, such as about 10%, at 38 and updates data representing the channel 32. In other words, the steps taken by the computer executing the subroutine are contingent on the query carried out by the subroutine.

This step is more clearly shown in Figure 3. If that supply exceeds demand at 40, then the subroutine 24 queries at 42 whether any other channel requires inventory. If a negative answer is returned, then the price, in the form of a non-contingent value, can be decreased as at 38. Once the price has been decreased, the subroutine 24 updates the data relating to the channel 32, at 44.

If the query at 42 is positive, then the subroutine 24 allocates inventory, at 46, to another channel by distributing a fresh distribution value to said another channel. Subsequently, the subroutine 24 queries whether or not the inventory allocated to the other channel exceeds a previous demand at 48. If that query returns a positive, then the subroutine 24 carries out the step of decreasing the price, at 38. If the query returns a negative, then the channel 32 is updated, as at 44.

The subroutine 24 includes a calculation at 38 that involves what is known as "Minimum Rack Rate", a "Current Rate" and a "Surplus Percentage". As is known in the accommodation industry, for example, the term "rack rate" is used to refer to a fixed rate for a room. It follows that a Minimum Rack Rate would be a minimum price for a particular accommodation or room allocation. In this case "room" is interchangeable with "item" for the sake of understanding. The current rate, or price of a room per night, for example, would be a rate at a particular snap shot in time. The Surplus Percentage would indicate a percentage of surplus room allocations in a particular distribution channel.

The step of decreasing a price by the calculation at 38 is effectively a step of decreasing the performance rating of that particular channel. Accordingly, in this example, the subroutine 24 adjusts the performance rating down by 10%. Thus, if the channel 32 had a performance rating of X rooms selling at $Y each with a commission of $Z and the performance rating is to be reduced by 10%, then the following calculation is carried out by the subroutine 24 to obtain the rate (R):

$0.9Y + Z = R$

If the Minimum Rack Rate was below the R, then $R would be the new sale price per room. Otherwise, the minimum rack rate would be the price. It is thus to be appreciated that the subroutine 24 would not continually lower the prices of rooms below a predetermined minimum, which could be represented as minimum non-contingent value.

Reverting back now to figure 2, if the query at 36 returns a positive, then the computer 12 compares the performance rating, or control indicator, of the channel 32 with control indicators or performance ratings of other channels to provide a group control

indicator relating to the group of channels. As set out earlier, the performance rating can be in the form of a number of parameters. For example, it could be related to a surplus or deficit percentage related to supply and demand of particular inventory items. At 52, the subroutine 24 queries whether or not the performance rating of the channel 32 is greater than the other channels. This can be done using the "imaginary rooms" or the statistical analysis mentioned above.

If the query returns a positive, then the computer 12 removes inventory items at 54 from the lower performing channels and adds them to the channel 32 by refreshing distribution values. Alternatively, if the query at 52 returns a negative result, then the computer 12 serves to increase the inventory item price at 56 by a particular percentage. In this example, the percentage is 10%.

Using a calculation similar to the one used for decreasing the price, if a channel with a performance rate of X allotments selling at $Y with a commission of $Z is increased by 10% the following calculation would be used to obtain the rate (R):

$1.1Y + Z = R$

As can be seen in Figure 2, once the steps at 54 and 56 are completed, the channel 32 is updated or refreshed.

The inventor has conceived two methods for receiving the data from respective channels 18. These are referred to as the "real-time" and "request-based" methods.

In this example, all calculations are done hourly per item or allocation and each calculation per item is started apart from the others' calculations. In other words, the times at which calculations are made for respective items are temporally independent. It follows that item A calculations would, for example, start at 12:00 and item B calculations would, for example, start at 12:01 and so on. The computer 12 is configured such that the interval is decided by the amount of items and channels 18 on which the items reside and where the channels 18 communicate with the computer 12 via the World Wide Web 14.

Channels that report values in real-time back to the computer 12 store their data in the database 22 until it is called or polled by the subroutine 24. On the other hand, request-based channels are polled by the subroutine 24 before the calculations are made to determine fresh values.

An example of the manner in which the data is collected from the channels is shown in figure 4. In figure 4, the computer 12, executing the subroutine 24, carries out hourly

Uber Exhibit 1002 - p. 24
Uber Technologies, Inc. v. SurgeTech, LLC

calculations at 60 for each item in the various distribution channels. At 62, the computer 12 cycles through a list of channels where the items are stored in the database 22.

The subroutine 24 then queries or determines, at 64, for each channel, whether or not the list of channels has been cycled through. In the event that a negative response is returned, the subroutine 24 queries whether or not the respective channel is “real-time”. In the event that the response is negative, the subroutine 24 requests a report at 68 from the relevant server.

On the other hand, if the query at 66 is positive, the subroutine 24 continues to cycle through the list of channels at 62.

If the query or determination at 64 is positive, the subroutine 24 carries out various calculations to obtain the indicators in the form of sale rate indices and performance rating, at 70, as described earlier. At 72, a number of allotments or items to be allocated are calculated. At 74, the subroutine 24 calculates the prices for those allotments. At 76, the subroutine 24 allocates the allotments to various channels, in accordance with the tests and parameters described with reference to Figures 2 and 3. At 78, the subroutine 24 queries whether or not the respective channel is a real-time channel. In the event that this query returns a negative result, the subroutine 24 polls the relevant server of the channel at 80. The server for the channel then transmits the report to the database 22. The subroutine 24 stores the report values in the database 22 at 82.

At 84 there is schematically indicated a real-time channel. The channel 84 provides, on a regular basis, real-time reports and requests of sales to the database 22 at 82.

In the event that the query at 78 returns a positive, the subroutine 24 serves to re-set allocations to various Channels 18 and the respective prices at 86.

EMBODIMENT FOR APPLICATION OVER A PREDETERMINED PERIOD

A further embodiment is now described with reference to an algorithm defined by the subroutine 24. The algorithm can be applied in the framework of the system 10, described above. However, this algorithm is an alternative to the algorithmic process described above, while still falling within the broader scope of the preceding material.

The description is with reference to the operation of the algorithm over a 5 day period. Reference is made to Tables 1 to 5 which appear at the end of the description of this embodiment. It is to be appreciated that the embodiment can readily be applied to longer or shorter periods without technical difficulty.

Uber Exhibit 1002 - p. 25
Uber Technologies, Inc. v. SurgeTech, LLC

As is generally known, tables are represented within computer systems as relational databases. In this specification, the word “table” is used to facilitate an understanding of the embodiments described herein.

In this example, it is assumed that there are five channels operating servers. This example takes into account that two of the channels have negotiated blocks of 50 allotments, something which is conventional in the field. The negotiated blocks are indicated by the row entitled “blocked allocation” in the tables. It is to be understood that since those allotment allocations have been negotiated, it is not possible for the system 10 to act freely on those allocations.

For ease of reference only, the allotments are referred to as “Rooms”.

It should be noted that the Rooms are those associated with a particular property (Property). The Property is to be understood as a characteristic of the Rooms that makes comparison between the Rooms meaningful. For example, the Rooms could be sourced from a common hotel franchise or from a particular geographical area or from a particular star rating etc. This could be given a value for use in a function to be applied to values in database fields of the various channels.

Set out below is a list of Notations used with their meanings in the Tables and in the following description:

Notation	Definition
A	Number of Rooms Allotted
S	Number of Rooms Sold
I	An indicator variable to depict whether a Channel has a negotiated blocked allocation
T	Total Number of Rooms Sold
P	Proportion of Rooms Sold
NS_CR	Number of Rooms that are Not sold and CAN be redistributed
NS_CNR	Number Rooms that are Not sold and CANNOT be redistributed
TNS	Total Number of Rooms Not Sold
NAA	New Allocation Amount
Aadj	Allocation Adjustment Amount
FAA	Final Allocation Amount
RA	Redistribution Adjustment from Unblocked Rooms
FAA_UB	Final Allocation Amount After Unblocking

Uber Exhibit 1002 - p. 26
Uber Technologies, Inc. v. SurgeTech, LLC

The following totals are used throughout and are calculated over all the Channels during a predetermined time period:

Notation	Definition
Sum_S	Total Rooms Sold Overall (per stated time period)
Sum_NSR	Total Rooms Not Sold (per time period) that CAN be redistributed

If a blocked allocation of Rooms has been negotiated (i.e. it is not possible to transfer those Rooms from one channel to another), wholesalers generally release unsold Rooms back to the associated Property, usually 7 days from the end of a negotiated time-period.

It is thus necessary to monitor each of the Rooms within each step of the algorithm to ensure that any adjustments are made using only those Rooms that are free to be sold through channels and transferred from one channel to another. The reason is that the blocked Rooms can be considered as sold.

This five day example assumes that on day four any Rooms obtained in a previously negotiated blocked sale that are not sold are then released into a general domain for selling in any of the other channels to sell, and re-allocated accordingly. This reallocation will be a function of a channel's relative performance in the market.

Day 4 is therefore analogous to the start of a final 7-day period when rooms are released to the general domain as mentioned above.

Furthermore, it is assumed that adjustments are made only once a day.

For each channel, the number of Rooms sold is recorded and a total is calculated in the final column. In order to obtain a measure of how well a re-seller is performing in the market, a ratio between the Rooms sold per Channel and the total number of Rooms sold at each time point is calculated to provide a suitable indicator. This provides a measure of how well a channel is selling the Rooms for a predetermined time period. This is then used to ascertain any price adjustments that should be made for the associated channel.

For j = 1,…n, where j represents the Channel Number, the ratio is defined by

$P_j = \frac{S_j}{\sum_{j=1}^{n} S_i}$, S_j being the number sold per Channel. In this case, n = 5.

In order to evaluate any redistribution of room allocations (when necessary), it is also

Uber Exhibit 1002 - p. 27
Uber Technologies, Inc. v. SurgeTech, LLC

necessary to record the number of rooms that are not sold. In general, if there are some channels that have negotiated room blocks for a given room type in a given property (as is the case in this example), then this amount needs to be further broken down into a count of rooms that can be redistributed to other channels and a count of rooms that cannot be redistributed to other channels.

However, it is assumed that if a Room is sold from a channel with a negotiated allocation, this will be deducted from their initial block of Rooms rather than any redistributed allocation that may occur at a stage when a channel is depleted of all Rooms. This will be discussed in more detail below.

In order to set up the algorithm in the subroutine 24, Rooms are artificially allocated to each channel depending on each P calculated above. This allocation is considered to be artificial since the main consideration is not whether a channel is selling a large proportion of its Rooms, only that it is selling a larger proportion of Rooms relative to its competitors in that Property.

However, it is necessary for the number of Rooms to be factored into the algorithm used by the subroutine 24. The reason is that an accommodation provider can choose to allocate, at the outset, a block of Rooms (through negotiation based on a business decision) to a Channel or even select Channels through which to sell Rooms. In the associated relational database, these could be set up as initial distribution conditions.

In any event, the following example illustrates why the number of Rooms should not play a role in price adjustments.

Assume there are only two Channels for Rooms in a particular Property. Assume that Channel 1 has 20 Rooms and Channel 2 has 10 Rooms and they each sell 5 Rooms. Comparatively, they are performing equally well, but if the price changes are based on a contingent value, in this example, the ratio of sold Rooms to allocated Rooms, then Channel 1 appears to be doing worse and its prices, which are non-contingent values, would be required to drop compared to Channel 2 that appears to be doing better and its prices would invariably go up.

Consequently, in order to calculate any adjustment of non-contingent values, in this example price adjustments, the proportion of total Rooms sold by a channel is compared to the average proportion over all channels. This is done through a percentage change (PC) calculation relative to the average proportion of Rooms sold. Furthermore, a scale is derived

Uber Exhibit 1002 - p. 28
Uber Technologies, Inc. v. SurgeTech, LLC

to project these percentage changes onto a comparative measure, which is done in the following way:

$$Z_j = \frac{PC_j - Mean(PC)}{St.Dev(PC)/\sqrt{n}}$$

Again, the value for n should be replaced with 5 since five channels are being considered. Using this, it is possible to apply the following adjustments:

Z score	**Adjustment to price**
Greater than 3	Increase by 5%
Between 2 and 3	Increase by 2%
Between 1 and 2	Increase by 1%
Between -1 and 1	No change
Between -2 and -1	Decrease by 1%
Between -3 and -2	Decrease by 2%
Greater than -3	Decrease by 5%

The description given in the above paragraphs covers the general issues and calculations required to adjust the price of a Room for a respective Property.

The following paragraphs go into more detail regarding each step to be carried out and the order in which each of the steps must proceed.

Referring to the Tables mentioned earlier, Tables 1 to 4 are named “Base Case” and represent the situation on each day respectively when a given channel that has no blocked Rooms is depleted of all of its inventory at the end of Day 1. Thus, a number of Rooms in the respective channels needs to be adjusted.

Tables 5 to 8 are named “Inventory Depleted before Unblock” and represent the situation on each day respectively when a channel is depleted of its Rooms on Day 2, prior to when its unsold Rooms in blocked channels are released for general distribution.

Tables 9 to 12 are named “Inventory Depleted after Unblock” and represent the situation when a channel is depleted of its Rooms after any Rooms that have not been sold during the blocked period are released (on Day 4).

Uber Exhibit 1002 - p. 29
Uber Technologies, Inc. v. SurgeTech, LLC

Three steps are to be noted when the subroutine 24 is executed. There are an initial set of steps for a first time period or recurrence. These are described first. In a second and in subsequent time periods, a number of minor changes are applied depending on if and when Room numbers in respective channels need to be readjusted. These are described in turn. Thirdly, prior to the blocked Rooms being released to the general domain, a number of steps are required to adjust the number of Rooms in respective channels at the beginning of the next time period (i.e. at the beginning of Day 4 in this worked example).

Note that the notation used for logical statements in an Excel (such as If) are written below exactly as they would appear in an Excel spreadsheet, except that rather than using cell Identifiers (for example, A1), a description of what the cell contains, defined by the notation provided above, is given. It will be appreciated by those of ordinary skill in the field that an Excel spreadsheet is effectively a relational database. It is therefore to be appreciated that the following steps described with reference to an Excel spreadsheet can just as well be carried out with any number of relational database applications.

Initial steps to be carried out:

Per channel, compute the following:

1. Record Rooms Allotted (A) and Rooms Sold (S).

2. If (I = 1, NS_CNR = A-S, 0).

3. If (I = 0, NS_CR = A-S, 0).

4. T = A-S.

Steps 2 and 3 ensure that those Rooms not sold are recorded correctly as to whether they can be redistributed at a later stage or not.

Next,

5. Calculate Sum_S and Sum_NSR using the values from the previous 4 steps.

Per channel,

6. Calculate P as T/Sum_S.

Compare each of the amounts obtained at part 6 to the average proportion sold per channel.

7. Compute the average of the P's.

Again, per channel,

8. Work out the percentage change (%C) of each P relative to the average P.

Now, compute the average percentage change and the standard deviation of this percentage change (see equations above). Using these values, per channel,

9. Subtract the mean Percentage Change from each %C; and;

10. Divide through by (Standard Deviation of the Percentage Change/Square Root (Number of channels)).

This returns a Standardised Score for measuring each of the scores to each other and therefore adjusted according to the scales for Z provided above.

Per channel, the subroutine 24 checks whether any Rooms need to be transferred to other channels. This will only be the case if the channel has sold all of its Rooms. Therefore,

11. Check to see if A>S. If so, then NAA = 0 and there are still rooms left to sell for this channel. If A=S, then multiply the proportion of rooms sold for this channel (P) by Sum_NSR to get a value for NAA (this should only give a value for where A=S);

12. Compute any relevant adjustment of Room numbers for all other channels (Aadj) by multiplying NS_CR by each P.

13. Compute the FAA at the next time period by adding AAdj to NS_CNR.

Note that Steps 12 and 13 only need to be carried out if one of the channels has been depleted of Rooms. Furthermore, note that if a Room is transferred to another channel and if a channel has a Room block, it cannot have any Rooms taken away from it, but it is can be allocated more Rooms. However, this step is unavoidable since a transfer of Rooms is based on a ratio of Rooms sold per channel to all Rooms sold and this total will include those blocked channels and therefore cannot be ignored. However, any extra Rooms that are allocated to a blocked channel can be redistributed if another channel becomes depleted.

<u>Subsequent steps to be carried out:</u>

For further time periods, the following adjustments at steps 2 and 3 must be made per channel.

At step 2: If (I=1, NS_CNR = NS_CNR (Day 1) S (Day 2), 0). After the calculations for Day 1 have taken place initially, this becomes a count over each time period of how many Rooms from the original blocked count are available. In other words, this is carried out recurringly. Therefore, if (I=0), NS_CNR = 0.

This next step ensures that if all of the Rooms from the block are sold (where it is assumed that if an accommodation provider has a blocked deal, then it will sell Rooms from that block first and then any other Rooms sold at a given time period will come out of its Rooms that CAN be redistributed, as mentioned above), and NS_CNR becomes negative in the step above, then this will not affect the calculation of the total Rooms not sold. The algorithm is capable of dealing with this. However, it means that the calculation for NS_CR must be altered so that the negative value does not affect totals that are otherwise correct.

Consequently, per channel, at step 3: If (NS_CNR>0, A-S-NS_CNR, A-S). Therefore, if NS_CNR is negative, the count of Rooms that have not yet been sold and that can be redistributed is simply (A-S) because all Rooms now are available to be redistributed. If NS_CNR is not negative, then the count of rooms that can be redistributed must be (A-S-NS_CNR) as there are still some available from the original blocked amount that cannot be classed as being able to be redistributed.

Note that in the initial loops (times when the algorithm is executed) performed by the subroutine using the algorithm, NS_CNR is unlikely to be negative because not many Rooms will be transferred and, therefore, each channel will keep selling Rooms from its initial allotted amount of Rooms.

However, it will be appreciated that a negative value for NS_CNR is possible since a blocked channel can be allocated more Rooms when a transfer occurs and therefore sell its original blocked amount of Rooms while still having some Rooms left over to sell. As such, this step needs to be included so as to ensure that all totals are correct for sold and not sold Rooms and consequently prices are adjusted correctly.

The Release of Unsold Blocked Rooms:

Assume that at Day 4 in this artificial example, any Rooms not sold from a block can be redistributed for ALL channels to sell. Therefore, prior to Day 4, at Step 11 a redistribution of the newly available Rooms must be made to all channels, depending on how well they are currently performing in the market. Therefore, the following steps are carried out per channel.

At step 11 a new row is created that will convert any negative values of NS_CNR to zero. Recall that negative values in NS_CNR indicate that a Room sold has come from a count that CAN be redistributed rather than the blocked count. Next, calculate the total for this new row.

At step 12 the remaining Rooms that have not been sold by the blocked channels can now be redistributed to all of the channels depending on how well they are performing,

Uber Exhibit 1002 - p. 32
Uber Technologies, Inc. v. SurgeTech, LLC

measured through P. Therefore, multiply P by the total calculated in part 11 for each channel. This is defined as RA.

At step 13, the Final Allocation Adjustment after Unblocking (FAA_UB) is determined. This is equal to RA + NS_CR for each channel.

At step 14, in defining the new Room totals per channel, this new variable, FAA_UB will flow through into Day 4 to represent the new Room totals per channel.

Note that after these blocked Rooms have been released, then the only total of Rooms not sold required is the absolute total per channel and not the breakdown into those that can be redistributed and those that cannot. Therefore, there are two less rows after Day 4 in the tables in Excel.

Three cases will now be described in more detail:

Three separate scenarios are described to consider a number of eventualities that are represented by the attached Tables.

Tables 1 to 4: Base Case:

In this situation, the algorithm is configured so that only a channel that has no blocked Rooms can have its Rooms to sell depleted. This is a case where the only complication arises when the total number of Rooms to be reallocated changes from those that can be redistributed to a different term in the spreadsheet after any unblocked Rooms are released into the general domain.

Therefore, prior to Day 4, steps 11 to 13 remain as described above. However, after Day 4, when checking for whether any Room transfers are necessary steps 11 to 13 are altered as follows.

Step 11: Check to see if A>S. If so, then NAA = 0 and there are still Rooms left to sell for this Channel. If A=S, then multiply the proportion of Rooms sold per Channel (P) by TNS to get a value for NAA (only for where A=S).

Step 12: Compute the FAA at the next time period for all other channels by multiplying TNS by each P.

Tables 9 to 12: Inventory Depleted After Unblock:

In this situation, the algorithm is configured for the case when a previously blocked Channel is depleted after the blocked Channels have redistributed their allocations (if they

had not sold all of their allocations). Therefore, after Day 4, when checking for whether any Room transfers are necessary, steps 11 and 12 are changed slightly as follows.

Step 11: Check to see if A>S. If so, then NAA = 0 and there are still Rooms left to sell for this channel. If A=S, then multiply the proportion of Rooms sold per channel (P) by TNS to get a value for NAA (only for where A=S).

Step 12: Compute the FAA at the next time period for all other channels by multiplying TNS by each P.

Tables 5 to 9: Inventory Depleted Before Unblock:

In this situation, the algorithm is configured for when a blocked channel is depleted of its Rooms before the blocked channels are required to redistribute their Rooms. Therefore, prior to Day 4, when checking for whether any Room transfers are necessary in steps 11 to 13, these are carried out in the same way as described in the initial step

The algorithm is preferably configured to make adjustments once a day. That serves to inhibit frequent fluctuations in price, which could occur in potentially large jumps upwards and/or downwards if the algorithm is used to update the prices more than once a day.

The time of day can be selected to take advantage of yield management theories indicating when a buyer is more likely to make a purchase of a Room over the Internet.

However, the situation arising as a result of a channel selling all of its Rooms before re-adjustment would mean that the channel could not sell any more Rooms until any re-adjustment takes place at the specified time.

For this eventuality, a loop is fed in to the algorithm to allow immediate updating and reallocation when a channel sells all of its Rooms. Therefore, if S=A, then the algorithm updates immediately to reallocate some Rooms to that channel to maintain the efficacy of the algorithm.

The algorithm is also configured to accommodate a situation where another channel enters at any stage of a particular time-period. The algorithm incorporates a step that will allow for this to happen and each step in the algorithm can be generalised so that resulting calculations reflecting any new information entered as inputs are correct.

The invention is intended to cover an embodiment in which rather than using the number of Rooms sold to evaluate how a particular re-seller compares to its competitors, the total revenue generated out of the total amount of revenue for that time period is considered.

Uber Exhibit 1002 - p. 34
Uber Technologies, Inc. v. SurgeTech, LLC

This can readily be implemented in the framework described in the above paragraphs, in the event that information was made available.

Furthermore, there is provided an embodiment in which instead of making comparisons of channels at time points, comparisons are made over a predetermined time period. Seven days would be an example.

Still further, the embodiment provides a valuable opportunity to process data for the purposes of developing an evaluation tool. That could be done by recording historical data, analyzing the data statistically and monitoring the progress of the algorithm and of the market in general. This would inevitably lead to changes in the process described above and likely deliver a more efficient tool.

A FURTHER EXAMPLE OF A CALCULATION FOR CHANGING A RATE

The first calculation below determines the percentage of rooms booked, via the channel, out of rooms allocated to the channel for the property. This value is calculated for each day in a 30 day period assessed.

A = the total number of allotments given to the channel for the property per day
S = the number of total sold allotments via the channel for the property per day
Z1 to Z30 = the percentage sold from a channel per day.

Z1 = (A / S) x 100
Z2 = (A / S) x 100
…
Z29 = (A / S) x 100
Z30 = (A / S) x 100

The second calculation below determines the average percentage of rooms sold over the entire 30 day period for that property via that channel.

M = Average percentage of rooms booked via that channel for the property over 30 days.

M = (Z1+Z2…+Z29+Z30) / 30

The next calculation determines how each day's percentage of rooms sold compare against an average percentage of rooms sold over the whole month. This will return a positive or negative number.

R1 to R30 = a positive or negative number showing how a day's trade compares against the monthly average of percentage of rooms sold.

R1 = (Z1 – M)

R2 = (Z2 – M)

R3 = (Z3 – M)

R4 = (Z4 – M)

…

R5 = (Z4 – M)

R6 = (Z4 – M)

The next calculation is designed to get the average number of rooms sold across all channels using an embodiment of the invention for each day in the 30 day period assessed.

In the case of a property distributing to three Channels (i.e Channel 1, Channel 2 and Channel 3) the formula is:

C1 = (Channel 1 - Z1 + Channel 2 - Z1 + Channel 3 - Z1) / 3

C2 = (Channel 1 - Z2 + Channel 2 - Z2 + Channel 3- Z2) / 3

…

C29 = (Channel 1-Z29 + Channel 2-Z29 + Channel 3-Z29) / 3

C30 = (Channel 1-Z30 + Channel 2-Z30 + Channel 3-Z30) / 3

The final calculation is done to determine the number (average percentage sold with controlling factors) between -100 and 100. This calculation is done for each day in the 30 day period assessed. This value is used to increase or decrease the rate according to a ledger of thresholds that can readily be determined by the Property.

N1 = (C1 + R1) / 2

N2 = (C2 + R2) / 2

…

N29 = (C4 + R4) / 2

N30 = (C5 + R5) / 2

TABLE 1

BASE CASE

Day 1									
Channel	**Notation**	**C1**	**C2**	**C3**	**C4**	**C5**	**Total**	**Av**	**Dev**
Blocked Allocation	**I**	**1**	**1**	**0**	**0**	**0**			
Rooms Allotted	**A**	**50**	**50**	50	50	50	250		
Room Sold	**S**	**8**	**20**	50	10	5	93		
Rooms Not Sold (that cannot be redistributed)	**NS_CNR**	42	30	0	0	0	72		
Rooms Not Sold (that can be redistributed)	**NS_CR**	0	0	0	40	45	85		
Total Rooms Not Sold	**TNS**	42	30	0	40	45	157		
Rooms Sold per Channel/Total Rooms Sold (P)**	**P**	0.086	0.2151	0.5376	0.1075	0.0538	1	0.2	
Percentage Difference in (P) (relative to average)		-57	7.55	168.8	-46.25	-73.1		-2.8422E-15	99.0986
Scaled Value	**Z**	-1.29	0.17	3.81	-1.04	-1.65			
New Allocation Amount	**NAA**	0	0	46	0	0	46		
New Allocation Adjustment	**Aadj**	7	18	46	9	5	85		
Final Allocation Amount	**FAA**	49	48	46	9	5	157		

TABLE 2

BASE CASE

Day 2									
Channel		**C1**	**C2**	**C3**	**C4**	**C5**	**Total**		
Rooms Allotted	**A**	**49**	**48**	**46**	**9**	**5**	157		
Room Sold	**S**	5	20	4	4	2	35		
Rooms Not Sold (that cannot be redistributed)	**NS_CNR**	37	10	0	0	0	47		
Rooms Not Sold (that can be redistributed)	**NS_CR**	7	18	42	5	3	75		
Total Rooms Not Sold	**TNS**	44	28	42	5	3	122		
Rooms Sold per Channel/Total Rooms Sold (P)**	**P**	0.1429	0.5714	0.1143	0.1143	0.0571	1	0.2	
Percentage Difference in (P) (relative to average)	**%C**	-28.55	185.7	-42.85	-42.85	-71.45		-5.6843E-15	104.973
Scaled Value	**Z**	-0.64	4.19	-0.97	-0.97	-1.61			
New Allocation Amount	**NAA**	0	0	0	0	0	0		
New Allocation Adjustment	**Aadj**	0	0	0	0	0	0		
Final Allocation Amount	**FAA**	0	0	0	0	0	0		

TABLE 3

BASE CASE

Day 3									
Channel		**C1**	**C2**	**C3**	**C4**	**C5**	**Total**		
Rooms Allotted	**A**	**44**	**28**	**42**	**5**	**3**	122		
Room Sold	**S**	10	4	2	2	2	20		
Rooms Not Sold (that cannot be redistributed)	**NS_CNR**	27	6	0	0	0	33		
Indicator Variable for a negative number of rooms		27	6	0	0	0	33		
Rooms Not Sold (that can be redistributed)	**NS_CR**	7	18	40	3	1	69		
Total Rooms Not Sold	**TNS**	34	24	40	3	1	102		
Rooms Sold per Channel/Total Rooms Sold (P)**	**P**	0.5	0.2	0.1	0.1	0.1	1	0.2	
Percentage Difference in (P) (relative to average)		150	1.388E-14	-50	-50	-50		1.42109E-14	86.6025
Scaled Value	**Z**	3.38	0.00	-1.13	-1.13	-1.13			
New Allocation Amount	**NAA**	0	0	0	0	0	0		
New Allocation Adjustment	**Aadj**	0	0	0	0	0	0		
Final Allocation Amount	**FAA**	0	0	0	0	0	0		
Redistribution adjustment from unblocked rooms	**RA**	17	7	3	3	3	33		
Final Allocation Amount_After Unblocking	**FAA_UB**	24	25	43	6	4	102		

In this worked example, after this time point, blocked rooms have been redistributed

TABLE 4

BASE CASE

Day 4									
Channel		**C1**	**C2**	**C3**	**C4**	**C5**	**Total**		
Rooms Allotted	**A**	**24**	**25**	**43**	**6**	**4**	102		
Room Sold	**S**	4	6	3	6	1	20		
Total Rooms Not Sold	**TNS**	20	19	40	0	3	82		
Rooms Sold per Channel/Total Rooms Sold (P)**	**P**	0.2	0.3	0.15	0.3	0.05	1	0.2	
Percentage Difference in (P) (relative to average)		0	50	-25	50	-75		-8.5265E-15	53.033
Scaled Value	**Z**	0.00	1.13	-0.56	1.13	-1.69			
New Allocation Amount	**NAA**	0	0	0	25	0	25		
Final Allocation Amount	**FAA**	16	25	12	25	4	82		
Day 5									
Channel		**C1**	**C2**	**C3**	**C4**	**C5**	**Total**		
Rooms Allotted	**A**	**16**	**25**	**12**	**25**	**4**	82		
Room Sold	**S**	10	0	2	2	1	15		
Total Rooms Not Sold	**TNS**	6	25	10	23	3	67		
Rooms Sold per Channel/Total Rooms Sold (P)**	**P**	0.6667	0	0.1333	0.1333	0.0667	1	0.2	
Percentage Difference in (P) (relative to average)		233.35	-100	-33.35	-33.35	-66.65		8.52651E-15	133.341
Scaled Value	**Z**	5.27	-2.26	-0.75	-0.75	-1.50			
New Allocation Amount	**NAA**	0	0	0	0	0	0		
New Allocation Adjustment	**Aadj**	0	0	0	0	0	0		
Would stop here in this example									

TABLE 5

INVENTORY DEPLETED BEFORE UNBLOCK

Day 1 Channel	Notation	C1	C2	C3	C4	C5	Total	Av.	Dev
Blocked Allocation	**I**	**1**	**1**	**0**	**0**	**0**			
Rooms Allotted	**A**	**50**	**50**	50	50	50	250		
Room Sold	**S**	**8**	**20**	8	10	5	51		
Rooms Not Sold (that cannot be redistributed)	**NS_CNR**	42	30	0	0	0	72		
Rooms Not Sold (that can be redistributed)	**NS_CR**	0	0	42	40	45	127		
Total Rooms Not Sold	**TNS**	42	30	42	40	45	199		
Rooms Sold per Channel/Total Rooms Sold (P)**	**P**	0.1569	0.3922	0.1569	0.1961	0.098	1.0001	0.20002	
Percentage Difference in (P) (relative to average)		-21.557844	96.080392	-21.557844	-1.959804	-51.0049		-1.3E-14	56.4939457
Scaled Value	**Z**	-0.85	3.80	-0.85	-0.08	-2.02			
New Allocation Amount	**NAA**	0	0	0	0	0	0		
New Allocation Adjustment	**Aadj**	0	0	0	0	0	0		
Final Allocation Amount	**FAA**	0	0	0	0	0	0		

TABLE 6

INVENTORY DEPLETED BEFORE UNBLOCK

Day 2									
Channel		**C1**	**C2**	**C3**	**C4**	**C5**	**Total**		
Rooms Allotted	**A**	**42**	**30**	**42**	**40**	**45**	199		
Room Sold	**S**	5	20	4	4	2	35		
Rooms Not Sold (that cannot be redistributed)	**NS_CNR**	37	10	0	0	0	47		
Rooms Not Sold (that can be redistributed)	**NS_CR**	0	0	38	36	43	117		
Total Rooms Not Sold	**TNS**	37	10	38	36	43	164		
Rooms Sold per Channel/Total Rooms Sold (P)**	**P**	0.1429	0.5714	0.1143	0.1143	0.0571	1	0.2	
Percentage Difference in (P) (relative to average)	**%C**	-28.55	185.7	-42.85	-42.85	-71.45		-5.7E-15	104.972544
Scaled Value	**Z**	-1.13	7.35	-1.70	-1.70	-2.83			
New Allocation Amount	**NAA**	0	0	0	0	0	0		
New Allocation Adjustment	**Aadj**	0	0	0	0	0	0		
Final Allocation Amount	**FAA**	0	0	0	0	0	0		

TABLE 7
INVENTORY DEPLETED BEFORE UNBLOCK

Day 3 Channel		C1	C2	C3	C4	C5	Total		
Rooms Allotted	**A**	**37**	**10**	**38**	**36**	**43**	164		
Room Sold	**S**	10	4	2	2	2	20		
Rooms Not Sold (that cannot be redistributed)	**NS_CNR**	27	6	0	0	0	33		
Indicator Variable for a negative number of rooms		27	6	0	0	0	33		
Rooms Not Sold (that can be redistributed)	**NS_CR**	0	0	36	34	41	111		
Total Rooms Not Sold	**TNS**	27	6	36	34	41	144		
Rooms Sold per Channel/Total Rooms Sold (P)**	**P**	0.5	0.2	0.1	0.1	0.1	1	0.2	
Percentage Difference in (P) (relative to average)		150	1.388E-14	-50	-50	-50		1.42E-14	86.6025404
Scaled Value	**Z**	5.94	0.00	-1.98	-1.98	-1.98			
New Allocation Amount	**NAA**	0	0	0	0	0	0		
New Allocation Adjustment	**Aadj**	0	0	0	0	0	0		
Final Allocation Amount	**FAA**	0	0	0	0	0	0		
In this worked example, after this time point, blocked rooms have been redistributed									
Redistribution adjustment from unblocked rooms	**RA**	17	7	3	3	3	33		
Final Allocation Amount_After Unblocking	**FAA_UB**	17	7	39	37	44	144		

TABLE 8
INVENTORY DEPLETED BEFORE UNBLOCK

Day 4									
Channel		**C1**	**C2**	**C3**	**C4**	**C5**	**Total**		
Rooms Allotted	**A**	**17**	**7**	**39**	**37**	**44**	144		
Room Sold	**S**	17	6	3	2	1	29		
Total Rooms Not Sold	**TNS**	0	1	36	35	43	115		
Rooms Sold per Channel/Total Rooms Sold (P)**	**P**	0.5862	0.2069	0.1034	0.069	0.0345	1	0.2	
Percentage Difference in (P) (relative to average)		193.1	3.45	-48.3	-65.5	-82.75		0	112.661234
Scaled Value	**Z**	7.64	0.14	-1.91	-2.59	-3.28			
New Allocation Amount	**NAA**	67	0	0	0	0	67		
Final Allocation Amount	**FAA**	67	24	12	8	4	115		
Day 5									
Channel		**C1**	**C2**	**C3**	**C4**	**C5**	**Total**		
Rooms Allotted	**A**	**67**	**24**	**12**	**8**	**4**	115		
Room Sold	**S**	10	18	2	2	1	33		
Total Rooms Not Sold	**TNS**	57	6	10	6	3	82		
Rooms Sold per Channel/Total Rooms Sold (P)**	**P**	0.303	0.5455	0.0606	0.0606	0.0303	1	0.2	
Percentage Difference in (P) (relative to average)		51.5	172.75	-69.7	-69.7	-84.85		-1.1E-14	111.142381
Scaled Value	**Z**	2.04	6.84	-2.76	-2.76	-3.36			
New Allocation Amount	**NAA**	0	0	0	0	0	0		
New Allocation Adjustment	**Aadj**	0	0	0	0	0	0		

TABLE 9

INVENTORY DEPLETED AFTER UNBLOCK

Day 1 Channel	Notation	C1	C2	C3	C4	C5	Total	Av.	Dev
Blocked Allocation	**I**	**1**	**1**	**0**	**0**	**0**			
Rooms Allotted	**A**	**50**	**50**	50	50	50	250		
Room Sold	**S**	**8**	**20**	8	10	5	51		
Rooms Not Sold (that cannot be redistributed)	**NS_CNR**	42	30	0	0	0	72		
Rooms Not Sold (that can be redistributed)	**NS_CR**	0	0	42	40	45	127		
Total Rooms Not Sold	**TNS**	42	30	42	40	45	199		
Rooms Sold per Channel/Total Rooms Sold (P)**	**P**	0.1569	0.3922	0.1569	0.1961	0.098	1.0001	0.20002	
Percentage Difference in (P) (relative to average)		-21.557844	96.080392	-21.557844	-1.959804	-51.0049		-1.3E-14	56.4939457
Scaled Value	**Z**	-0.85	3.80	-0.85	-0.08	-2.02			
New Allocation Amount	**NAA**	0	0	0	0	0	0		
New Allocation Adjustment	**Aadj**	0	0	0	0	0	0		
Final Allocation Amount	**FAA**	0	0	0	0	0	0		

TABLE 10

INVENTORY DEPLETED AFTER UNBLOCK

Day 2									
Channel		**C1**	**C2**	**C3**	**C4**	**C5**	**Total**		
Rooms Allotted	**A**	**42**	**30**	**42**	**40**	**45**	199		
Room Sold	**S**	5	20	4	4	2	35		
Rooms Not Sold (that cannot be redistributed)	**NS_CNR**	37	10	0	0	0	47		
Rooms Not Sold (that can be redistributed)	**NS_CR**	0	0	38	36	43	117		
Total Rooms Not Sold	**TNS**	37	10	38	36	43	164		
Rooms Sold per Channel/Total Rooms Sold (P)**	**P**	0.1429	0.5714	0.1143	0.1143	0.0571	1	0.2	
Percentage Difference in (P) (relative to average)	**%C**	-28.55	185.7	-42.85	-42.85	-71.45		-5.7E-15	104.972544
Scaled Value	**Z**	-1.13	7.35	-1.70	-1.70	-2.83			
New Allocation Amount	**NAA**	0	0	0	0	0	0		
New Allocation Adjustment	**Aadj**	0	0	0	0	0	0		
Final Allocation Amount	**FAA**	0	0	0	0	0	0		

TABLE 11
INVENTORY DEPLETED AFTER UNBLOCK

Day 3 Channel		C1	C2	C3	C4	C5	Total		
Rooms Allotted	A	37	10	38	36	43	164		
Room Sold	S	10	4	2	2	2	20		
Rooms Not Sold (that cannot be redistributed)	NS_CNR	27	6	0	0	0	33		
Indicator Variable for a negative number of rooms		27	6	0	0	0	33		
Rooms Not Sold (that can be redistributed)	NS_CR	0	0	36	34	41	111		
Total Rooms Not Sold	TNS	27	6	36	34	41	144		
Rooms Sold per Channel/Total Rooms Sold (P)**	P	0.5	0.2	0.1	0.1	0.1	1	0.2	
Percentage Difference in (P) (relative to average)		150	1.388E-14	-50	-50	-50		1.42E-14	86.6025404
Scaled Value	Z	5.94	0.00	-1.98	-1.98	-1.98			
New Allocation Amount	NAA	0	0	0	0	0	0		
New Allocation Adjustment	Aadj	0	0	0	0	0	0		
Final Allocation Amount	FAA	0	0	0	0	0	0		
In this worked example, after this time point, blocked rooms have been redistributed									
Redistribution adjustment from unblocked rooms	RA	17	7	3	3	3	33		
Final Allocation Amount_After Unblocking	FAA_UB	17	7	39	37	44	144		

TABLE 12
INVENTORY DEPLETED AFTER UNBLOCK

Day 4									
Channel		**C1**	**C2**	**C3**	**C4**	**C5**	**Total**		
Rooms Allotted	**A**	**17**	**7**	**39**	**37**	**44**	144		
Room Sold	**S**	17	6	3	2	1	29		
Total Rooms Not Sold	**TNS**	0	1	36	35	43	115		
Rooms Sold per Channel/Total Rooms Sold (P)**	**P**	0.5862	0.2069	0.1034	0.069	0.0345	1	0.2	
Percentage Difference in (P) (relative to average)		193.1	3.45	-48.3	-65.5	-82.75		0	112.661234
Scaled Value	**Z**	7.64	0.14	-1.91	-2.59	-3.28			
New Allocation Amount	**NAA**	67	0	0	0	0	67		
Final Allocation Amount	**FAA**	67	24	12	8	4	115		
Day 5									
Channel		**C1**	**C2**	**C3**	**C4**	**C5**	**Total**		
Rooms Allotted	**A**	**67**	**24**	**12**	**8**	**4**	115		
Room Sold	**S**	10	18	2	2	1	33		
Total Rooms Not Sold	**TNS**	57	6	10	6	3	82		
Rooms Sold per Channel/Total Rooms Sold (P)**	**P**	0.303	0.5455	0.0606	0.0606	0.0303	1	0.2	
Percentage Difference in (P) (relative to average)		51.5	172.75	-69.7	-69.7	-84.85		-1.1E-14	111.142381
Scaled Value	**Z**	2.04	6.84	-2.76	-2.76	-3.36			
New Allocation Amount	**NAA**	0	0	0	0	0	0		
New Allocation Adjustment	**Aadj**	0	0	0	0	0	0		

EMBODIMENT FOR APPLICATION WITHOUT A PREDETERMINED PERIOD

The following paragraphs relate to the schematic flowchart set out in Figure 5 and referred to generally with reference numeral 100. The schematic flowchart 100 represents an embodiment of a software product in the form of instructions stored on a non-transitory computer-readable medium executable by a computer and a method for managing inventory allocated to respective re-sellers. In particular, the product provides flexibility in the application of the generated performance indicator referred to with the variable Z in the previous embodiment to current and future "Yield Management" techniques (i.e. techniques relating to maximizing the financial yield from inventory allocations). It is to be appreciated that the performance indicator can also be referred to as a control indicator, since it is used to control non-contingent values. These can include values of "price" referred to above.

In the following description, the variable symbols used correspond with those defined in the description of the previous embodiments, unless otherwise indicated.

The software product 100, comprising computer-readable instructions, is also configured to separate various processes and calculations into stages to limit the amount of processing needed when applying the indicator (Z) to "Yield Management" techniques and to cache the data for appropriate re-use (e.g. statistical analysis). This allows operations to be performed on the indicator without the need to calculate it every time. A person of ordinary skill in the field would appreciate that such a product, when executed, can reduce data-processing load on the computer 12, when compared with load that would result in calculations having to be carried out across all databases for each operation.

For convenience, the allocation of inventory will be referred to as a Room, with the understanding that this embodiment can be applied to any allocation of inventory. Furthermore, the Rooms can be associated with a particular Property to envisage the situation of, for example, a resort attempting to obtain the best yield from the Rooms it has available. "Property" could also be understood to be more than particular geographical location. For example, it could be a certain category of properties, or a chain of resorts. In other words, the Rooms are grouped into Properties to provide a meaningful comparison between performances achieved by different Channels. In addition, the embodiment can be applied to relational databases that could carry any form of data, not necessarily relation to sale of inventory.

Each logical progression is numbered and explained below and refers to the program flow depicted by Figure 5.

Uber Exhibit 1002 - p. 49
Uber Technologies, Inc. v. SurgeTech, LLC

Processes Initiated by a Channel / Booking Engine

The software product 100 defines a remote booking engine 102 that uses a suitable communications protocol to receive booking data at 104 for a property and room type when made via a channel.

Processes that Feed Data into a Data Storage Function.

When a booking is processed and the booking data is entered into the system, the software product 100 calls a data storage function 108 for storing the booking data in a Data Processing Table 110. The function 108 writes an appropriate date range (arrival date and departure date less one day) and associated room identification data (Room ID) to the table 110.

When a cancellation is processed at 106, the software product 100 calls the function 108 for storing a record in the table 110. The function 108 stores the date and Room ID in the table 110.

Allocation allotment changes are processed at 112 in a suitable allotment interface. The function 108 is called and the appropriate date range (Date Range) and associated Room ID is passed to the function 108 which stores the Date Range and Room ID in the table 110. If more than one Room is chosen for allocation changes then more than one record of the change is created in the table 110.

It will be understood that certain Rooms in a particular property could be locked or unlocked from processing by the software product 100 due to a previous negotiation with a specific channel, as envisaged in the previous embodiment. When Rooms for a channel are locked or unlocked at 114 via an interface referred to as a Channel Connection Interface, a section of the Rooms available on a given date for the associated channel is removed from or added to a re-distribution pool of Rooms by the function 108. When this occurs, all cached records for Rooms from an associated property are re-calculated based on a resultant re-distributable pool. The appropriate date ranges (from a day the Rooms are locked until a last allotment date for that Property), as well as all the Room ID's for that Property, are passed to the function 108 which stores the records in the table 110.

Calculating a Performance Indicator from the Data Processing Table

This is a process that runs constantly. Steps 1 and 2 below are repeated as long as there is data to select from the table 110.

Uber Exhibit 1002 - p. 50
Uber Technologies, Inc. v. SurgeTech, LLC

1. The records are selected by a function 116 consecutively from the table 110 in the order of entry.

2. An algorithm defined by the function 116 is then processed for each day and associated Room ID in the date range stored in the table 110.

A difference between this embodiment and the previous embodiment for a predetermined timeline is that a concept of a "re-distribution timeline" (the five days in the Tables) is not introduced at this stage. This means that a value of "Sum_A" only includes the allotments from channels participating in the re-distribution process for a Room Type (i.e. a Room in a particular Property) and date of a particular record.

In order to participate in this embodiment, a channel must not be holding blocked inventory. Also, the channel must at least have an "allotment value" for the Room via the channel on the given date in the record. An "allotment value" is an entry in a database table used by the product 100 to associate channels with Rooms, Room types, available dates and other characteristics usually associated with a booking.

"Sum_NSR" therefore only includes rooms that are sold from a re-distributable pool.

Per channel, the function 116 computes the following:

1. Record Rooms Allotted (A) and Rooms Sold (S).

2. NS_R = A-S (The C is dropped since C & CN are indicators of whether or not a particular Room can be sold and as that differentiator is not applicable in this embodiment).

3. T = A-S.

Next,

4. Calculate Sum_S and Sum_NSR using the values from the previous 3 steps.

Per channel,

5. Calculate P as S/Sum_S.

Now, the function 116 compares each of the amounts obtained at step 5 to the average proportion sold per channel.

6. Compute the average of the P's.

Again, per channel,

7. Compute a percentage change (%C) of each *P* relative to the average *P*.

Uber Exhibit 1002 - p. 51
Uber Technologies, Inc. v. SurgeTech, LLC

8. Compute the average percentage change and the standard deviation of this percentage change.

Using these values, per channel,

9. Subtract the mean Percentage Change from each %C; and;

10. Divide the result returned by the previous step through by (Standard Deviation of the Percentage Change)(Square Root (Number of Channels)).

The results of these calculations are then recorded or updated for each date processed and for each Channel that has a Room allocated on the respective date, for the Room Type being processed, into a cache table 118.

Re-Distributing Rooms Triggered by Booking and Cancellation Processes

When the booking processing is complete and it has been calculated that a Channel has run out of Rooms for a Room Type then an Allotment Re-Distribution Date Storage function 120 is called to store the Room ID and date where re-allocation is required into an Allotment Re-Distribution Table 122 that carries or stores distribution values.

If it is determined that there are no more Rooms to re-distribute for a particular Room ID and date then the data is not entered into the table 122 as no re-distribution is required.

When the cancellation processing is complete and a new Room exists for the Room Type then an Allotment Re-Distribution Date Storage function 124 is called to store the Room ID and date where re-allocation is required in the table 122.

Each record is selected from the table 122 and processed by the function 122 one by one in order of entry into the table 122.

The channels that participate in a re-distribution process described above for a particular Room Type and date are selected from a channels table 126. To satisfy "participation" criteria they must not be holding inventory that is "locked" in the channel. They must also at least have an allotment value, as described above for the Room via the channel on the given date. In other words there must be an entry in the table 126 that associates the channel and the Room.

They must also be currently linked to the Property via an active ClientChannels table record. An active ClientChannels table record is a record in a ClientChannels table that links to an interface used by a vendor to select a particular Channel. Thus, the table record contains a list of channels available for selection by the vendor. In order for the particular record to be active, that channel should have been selected by a vendor to participate in the

Uber Exhibit 1002 - p. 52
Uber Technologies, Inc. v. SurgeTech, LLC

reselling of the vendor's inventory (Rooms for this particular example). It will be appreciated that "vendor" is used broadly and can be interchanged with "Property" as that word has been defined earlier.

Once the participant channels have been determined, the function 120 uses the performance indicator (Z) for the channel to order a list in the channels table 126 from highest performing Channel first to lowest performing channel last. If there are channels in the list that have the same performance rating then the function 120 uses a randomizing algorithm to order those channels.

After the order has been determined, the function 120 counts the number of Rooms in the re-distributable pool for the day in question and loops through the list of channels assigning one Room to each channel in the list in turn until the number of re-distributable Rooms is exhausted. If the list of channels is exhausted and there are still Rooms to be distributed, the looping process is repeated until there are no more Rooms to distribute.

Once a count of Rooms to be allotted has been determined, the function 120 generates the necessary script to facilitate allotment with OTA XML and communicates it to the channels via the protocol used by OTA. OTA stands for the Open Travel Alliance. That organisation has developed an XML standard (OTA XML) that facilitates online bookings and allocations.

Price Modification

A price or rate calculation function 128 is called and executed every 24 hours by a time-based scheduling device or cron. The function 128 adjusts non-contingent values in the form of prices for 30 days into the future from the date on which it is executed for all channels that have rooms with allotments on the days in question.

The function 128 initiates by uploading a list of the dates to process. Next it selects all the Room and channel combinations from the table 122 that actually have an allotment value for the respective dates. The allotment value must be greater than 0 as there is no reason to increase the price of a room if there is nothing to sell.

Then it selects a performance or control indicator Z for a Room and channel combination from the cache 118.

The function 128 then selects a current price for the room via that channel on the date it is executed as well as a minimum rate (the rate it cannot go below) for that date / Room / Channel combination.

Uber Exhibit 1002 - p. 53
Uber Technologies, Inc. v. SurgeTech, LLC

It then carries out an adjustment on the rate according to Z and the corresponding adjustment value from an adjustment table referred to in the previous embodiment making sure it does not drop below the minimum rate.

A Rates table 130 is then adjusted accordingly and the OTA XML created for transfer of the respective rate to the Channel.

Linking and Unlinking Rooms

At 136, the software product 100 provides an interface to permit the Property to lock inventory (Rooms) out of the algorithms of the software product in the event that a Property has negotiated a block of the Rooms with a particular vendor. In the event that Rooms are to be released back for participation in the software product 100, the interface 100 allows the Rooms to be “unlocked”.

Statistical Analysis

A particular advantage of exemplary embodiments is that they provide the cache 118 that is accessible with a statistical analysis engine 132. The engine 132 is configured to perform statistical analyses on the data collected in the cache 118 to assess the performance of the algorithms used by the software product of the invention.

The statistical assessment can be carried out manually. However, it is preferable that the assessment be carried out with a suitable application such as that known as a genetic or self-learning algorithm.

In order to achieve that, a statistics table 134 is provided to receive data from the statistical analysis engine 132.

Database Management

As envisaged in paragraphs [0074], [0079], [0170], [0181], [0228] and elsewhere in the published parent application, the embodiments described above lead to increased efficiencies in the operation of the data processing apparatus. The following description is intended further to clarify the manner in which the increased efficiencies are achieved without the addition of new material to the description as set out in the Parent Application. As set out in paragraph [0080] two methods in which data can be received from respective Channels have been conceived. These are “real time” and “request-based” (also known as polling) methods. Use is made of the word “temporal” in the following description to characterize the time-based nature of operation of the computer 12. Furthermore, the “real-time” and “request-based” data are described as being received at “receiving times” for convenience.

Uber Exhibit 1002 - p. 54
Uber Technologies, Inc. v. SurgeTech, LLC

At an independent time, for example as described in paragraph [0115] of the Parent Application, the subroutine 24 is executed to readjust distribution values (number of rooms) at “refreshing times”.

Reference is made to “relational database fields”. These are previously described and shown as entries or records in spreadsheets, for example, Excel spreadsheets. It is to be appreciated that such spreadsheets are effectively relational databases with a collection of database fields that are capable of being updated by the computer 12 when executing the computer readable instructions of the software product. As described above, execution of the software product allows the computer 12 to make efficient use of a processor when handling the databases.

For the purposes of this description, figures 6 to 12 have been added further to clarify the steps described above that lead to efficient collection of data. Furthermore, the following description makes use of the word “values” to describe, generically, the parameters set out in the above tables. This is for clarity in describing the method of using the computer 12 to manage or control a distributed database.

Reference is also made to a “relational database”. As is commonly known in the art, a relational database is a collection of data items organized as a set of formally-described tables in which data is structured to recognize relations between stored data entries and that can be accessed or reassembled in many different ways without having to reorganize the database tables. In the above embodiments, and as set out above, it can be said that the tables are relational databases. Furthermore, throughout the above description, reference is made to tables with changing cell values. It follows that the use of the term “relational database” is for convenience and for a proper understanding of the role of the various components shown in figure 1, for example.

As set out above, the tables are updated if and when certain conditions apply. See, for example, the description of the manner in which the tables are established. It follows that values in the tables are contingent upon certain conditions. These are referred to as contingent values. These conditions arise out of sporadic interactions between the subscribers 20, clearly making use of terminal computer systems indicated in figure 1 and the servers 18, which are distributed computer systems. The term “sporadic” has been introduced to reflect, in the examples provided above, the necessarily sporadic nature of bookings or consumption by the public. The values can therefore also include non-contingent values, such as the price of an allotment or allocation, which are related to the contingent values.

Uber Exhibit 1002 - p. 55
Uber Technologies, Inc. v. SurgeTech, LLC

In the above description, reference is made to various ratings and indices to reflect the performance of Channels. See, for example, paragraph [0067] of the published parent application. Those are referred to as control indicators in the following description since they can be used to control the manner in which fresh initial values are determined for sending to the contingent and non-contingent distributed database fields. Those control indicators are also used, in some instances, to control priorities for refreshing of distributed databases field.

The computer 12 can be considered to be a central computer system in the form of a server 200 (shown in figure 6 as a further example). The server 200 has a central relational database 202. The server 200 is in data communion with a data communication network 204, such as the Internet. A plurality of distributed computer systems (servers) 206.1 to 206.3 (also represented as the channels 18 in figure 1) are connected to the network 204 and include a distributed database 208 that has database fields 212.1 to 212.3. In the above example, these would be necessary for receiving and sending information such as the sale price, rate of commission, and number of items sold, as described in paragraph [0057] of the Parent Application.

Terminal computer systems, such as PCs, tablets, phones, and the like (also represented as members or subscribers 20 in figure 1) interact with the distributed servers 208 sporadically in ways that alter some of the values of the database fields 212 in the distributed database 208. It is envisaged that the terminal computer systems can incorporate, wholly or in part, the distributed servers. In the drawings, the distributed servers are shown separately for clarity only. In other embodiments, the distributed servers can be cloud-based so as not necessarily to be represented by separate physical servers. For example, the servers can be virtual servers distributed across networks.

Each distributed database 208 is affiliated with the central relational database 202 in the sense that the central sever 200 and central relational database 202 determine values for the distributed database fields 212 according to predefined relationships or conditions that have to be met. Those values are then used to populate the associated distributed database fields 212 of the distributed database 208. A difficulty occurs when the values of the distributed database fields 212 are contingent on sporadic interaction between terminal computer systems and the distributed servers 210, which varies the values of the database fields 212 sporadically and unpredictably out of their relationship. This would clearly be the case where the values depended on, for example, booking rates, as envisaged above.

Consequently, the central server 200 and central database 202, from time-to-time, have to update or refresh the values in the distributed database fields 212 to restore their

appropriate relationships as per the allowable relationships or conditions reflected in the central database 202. Some of these allowable relationships or conditions are reflected in the above description with reference to various types of tables.

Monitoring those sporadic changes and refreshing the values accordingly in the distributed database with the central server and database, poses practical difficulties to ensure a sufficient degree of the reliability of the data which, in turn, requires efficient updates, redundancy, and the like.

In accordance with an embodiment, as further described below, various techniques are provided for refreshing the distributed database 208 as required by the central server 200 and central database 202 to maintain a sufficient degree of data reliability over and above the unpredictable interactions of the terminal computer systems 210 with the distribution servers 206, so as still to enable many useful applications.

In figure 7, reference numeral 216 indicates generally a method of using a central server 200 having the central database 202 systematically to refresh the distributed database 208 that is distributed over the plurality of distributed servers 206. The distributed database 208 includes a least some database fields 212.1A to 212.3A that store contingent values. In other words, they store values that vary subject to sporadic interactions between the terminal computer systems 110 and the distributed servers 208.

Broadly, the method 216 includes executing computer instructions, at 218, which cause two separate parallel processes, 220, 222, to execute on the central server.

One process, a receiving process 216, broadly includes recurrently, at receiving times, noting, at 224, the receiving time for receiving contingent values of the distributed database fields 212.1A to C from the distributed servers 208, and storing, at 226, the received values in the central relational database 202 in succession with previously received and stored contingent values of the distributed database fields, so as to build, for each distributed server an associated series of successive contingent values 214.1A to C. This process can result in the generation of one or more of the tables described herein.

The other process, a refreshing process 220, broadly includes recurrently, at refreshing times, noting the refreshing time, at 230, determining, at 232, fresh initial distribution values for the distributed database fields based on the successive contingent values 214.1A to C of the distributed servers 206 and based on required initial distribution conditions, and distributing, at 234, the fresh initial distribution values to the distributed database fields of the distributed servers 206.

Uber Exhibit 1002 - p. 57
Uber Technologies, Inc. v. SurgeTech, LLC

The two processes can run in parallel and are temporally independent in a way that the receiving process 220 controls receiving of data, say values, from the distributed database 208 in its own time, and the refreshing process 222 controls refreshing of the distributed database 208 in its own time, without the one process interfering with the other process.

An example of this process is shown in figure 4, where a real-time and a polled distribution channel are shown operating independently.

Regarding the receiving process 216, in this embodiment, three techniques are provided further to reduce temporal dependency and therefore to increase the applied diversity of the system.

Referring to figure 8, three processes 236, 238, and 240 are provided, in which, generally, process 236 is used for the case in which a distributed server 206 needs to be prompted (polled) at times, to send the contingent values of its database fields 212 to the central server 200 for storing in the central database 202. Processes 238 and 240 are for cases in which the central server is configured to wait for automatic responses from the distributed servers 206 that send the contingent values at times. The three processes described here are reflected somewhat in figure 4, with figure 5 providing further clarification.

When process 236 executes, then, at 242, the central server selects a distributed server. At 244, a check is performed to determine if that distributed server 208 needs to be prompted for receiving the contingent values or if the distributed server 208 is configured automatically to send the contingent values to the central server 200. If the distributed server needs to be prompted, then, at 246, the central server determines if it is time (a receiving time) to receive the contingent values from that distributed server, and if it is, then prompt the distributed server 208, at 248. At 250, the contingent values are received from the distributed server 208, and the central database is updated at 252. The process then returns to 242 to select another distributed server and to repeat the process 236. If, at 244, the central server determines that the distributed server need not be prompted, then the process returns to 242 to select another distributed server 208 and to repeat the process 236. The same applies at 246.

Process 238 is for controlling the case when a distributed server is configured to send the contingent values to the central server periodically and automatically. When the process 238 executes, the central server receives, at 254, contingent values from a distributed server. At 256 the central server determines which server sent the contingent values, and, at 258, the central server updates the central database 202.

Uber Exhibit 1002 - p. 58
Uber Technologies, Inc. v. SurgeTech, LLC

Process 240 is similar to process 238, except that process 240 is for controlling the case when a distributed server is configured to send the contingent values only once a change in the contingent values occurs. When the process 240 executes, the central server receives, at 260, contingent values from a distributed server. At 262 the central server determines which server sent the contingent values, and, at 264, the central server updates the central database 202.

In this embodiment, process 220 is also further split into temporally independent processes. Referring to Figure 9, process 266 is for determining, at refreshing times, fresh initial values for the distributed database, and process 268 is for distributing, at distributing times, those fresh initial values to the distributed database 208.

Broadly, when process 266 is executed, then, at 270, the central server 200 times the refreshing process, and at 272 checks if it is time to determine fresh initial values for the distributed database fields, and if so, then determines, at 274, the fresh initial values for the distributed database based on successive contingent values of the distributed servers and based on required initial conditions and relationships. Otherwise the process returns to 270. At 274, the fresh initial values are stored in the central database 202 ready for distribution to the distributed database 208.

Process 268, when executed, broadly involves timing, at 276, when it is time to distribute the fresh initial values to the distributed servers 206, and to check if it is time, at 278, to refresh or update the distributed database 208. If so, at 280, a relevant distributed server is selected, and the fresh values are sent to the distributed server at 282. At 284, the computer 12 checks if there are other servers that still need updating, and if so, proceeds to 280 to select and update the relevant distributed server. Otherwise, the process proceeds to 276.

In order to explain more specifically how the central database is updated at 252, 258, 264, in the above processes, and how the fresh initial values are determined, at 274, for the distributed database, reference is first made to figure 10 that shows a simplified version of a central database and an affiliated distributed database to assist with the explanation.

The central database 202 includes a set of database fields 214 that make provision for storing series of values. As can be seen, this can readily be shown in table format and is, effectively, a generic form of either of the tables described above. In particular, the series of central database fields 214.1, 214.2, 214.3 are respectively affiliated with distributed database fields 212.1. 212.2, and 212.3. These include fields 212.1A, 212.2A and 212.3A

Uber Exhibit 1002 - p. 59
Uber Technologies, Inc. v. SurgeTech, LLC

for storing contingent values and 212.1B to 212.3B for storing non-contingent values that do not vary directly by interaction of the terminal computer systems with the distributed servers.

When any one of the processes 252, 258, 264, updates the central database, the recently received contingent values are added to their affiliated series of contingent values that represent a history of the database fields. See, for example, successively received contingent values 214.1B, 214.1D, 214.1F, 214.1H, 214.1I, which are affiliated with distributed database field 212.1. Also, when, at times, the fresh initial values are determined and the affiliated distributed database field is successfully updated, then the initial values are also stored within the series of values at their appropriate times. See for example, 214.1C, 214.1E, 214.1G.

In some cases, at refreshing times, it might be necessary for the central database also to determine fresh values for refreshing the non-contingent database fields at the same time as their related contingent fields are refreshed. For that reason, if a fresh non-contingent value is determined then it is also stored in the database set in relation to its related contingent value. See for example, 214.1V, 214.1W, 214.1X, 214.1Y and 214.1Z that are stored in relation to 214.1A, 214.1C, 214.1E, 214.1G, 214.1H.

The central database also includes conditional or relational fields 214.4 that are used, at least in part, to define relationships between the fresh initial values when being determined for the contingent database fields. Similarly, the central database also includes conditional or relational fields 214.5 that are used, at least in part, to determine a non-contingent value in relation to an associated fresh initial value for the contingent database field.

Referring to figure 11, one embodiment of the process 268 is shown in more detail. Process 268 executes, and monitors, at 276, refreshing times for the initial values of the database fields 212 of the distributed servers 206. These refreshing times can be predefined, or dependent on variables. When it is time, decided at 288, to determine fresh initial values for the distributed database, then, at 290, one of the distributed servers is selected, and an individual control indicator is determined, at 292, for that distributed server based on selected past initial- and contingent values for that distributed server.

At 294, the central server 200 determines a relationship between the individual control indicator and some predefined conditions, and if those conditions are not met then a fresh non-contingent value is determined, at 298. However, if those conditions are met, then a group control indicator is determined, at 296. At 300, the central server 200 determines a relationship between the individual control indicator and some predefined conditions, and if those conditions are not met then a fresh non-contingent value is determined at 302.

Uber Exhibit 1002 - p. 60
Uber Technologies, Inc. v. SurgeTech, LLC

Otherwise, if those conditions are met, then fresh initial distributed values are determined, at 304.

At 305, the central database is updated with the fresh initial distributed values, and the distributing process can now update the distributed database in its own time.

Referring to figure 12, another process 310 is shown that is used to supplement or expand process 268. In particular, process 310 is used to expand process 268 in the case that it is determined, at 294, by the central server 200 that the relationship between the individual control indicator and predefined conditions, are not met. In that case, at 312, the central server selects a distributed server and determines, at 314, an individual control indicator (and/or) a group control indicator. At 316, a check is performed to determine if there are more servers that need considering and, if so, the process returns to 312 in which the next server is selected, and an individual control indicator and/or a group control indicator is determined also for that server, until an individual control indicator and/or group control indicator is determined for each distributed server.

At 318, the central server determines if a fresh initial value has to be determined for any of the distributed database fields that are for storing contingent values and, if so, then, at 320, fresh initial values are determined as needed for the distributed database.

Thereafter, a further check is performed, at 322, to determine if any one of the fresh initial values meets some predefined conditions, and if so, then the central server 200 proceeds to 324, to determine a fresh non-contingent value that is related to the contingent value, and the central database is updated at 326. Otherwise, at 322, the process proceeds directly to updating the central database

The fresh initial values for the contingent database fields and the related non-contingent values, once determined and stored in the central database, need to be sent to the distributed database. Regarding updating or refreshing of the distributed database, there are a few techniques that this embodiment provides, that enable updating or refreshing of the distributed database fields at the distributed servers.

In one embodiment, the central server is configured to detect only those fields in the central database within a set of database fields that have been updated with fresh initial values or fresh non-contingent values, and then systematically only to update those fields in the affiliated distributed database field over time as opposed to rolling out entire set of values of the set of database fields.

Uber Exhibit 1002 - p. 61
Uber Technologies, Inc. v. SurgeTech, LLC

In another embodiment, or in addition to the above, the central server is configured to make use of the individual, and/or group control indicators to determine priorities for updating the various distributed database fields, and update those distributed database fields with higher priorities first.

In this specification the following definitions apply:

"Inventory" is any item, whether tangible or intangible, that is capable of being transferred or distributed from one party, entity, apparatus, or consumption source to another and in respect of which it may be required to control and monitor quantity, rate of consumption and other parameters. The definition is not limited to items that are sold. For example, it can encompass items or measures of fluid that are fed from one apparatus to another and where is may be desired to monitor, measure or otherwise determine characteristics of the inventory and the manner in which is it transferred, such as a rate of transfer.

"Computer" is any apparatus capable of carrying out data processing functions and includes a computer system, or a collection of one or more apparatus, including mobile apparatus, such as smart phones, tablets and other hand-held devices.

"Allocations" are representations of items of inventory that are allocated to portals, channels, and other distribution agents for allocation or re-allocation to other portals, channels and distribution channels. These are also referred to as "allotments" in this specification.

"Distribution Channels" are portals, outlets, channels and other distribution agents that are configured for the distribution of inventory to consumers or sources consumption.

"Server" is a computer or other data processing apparatus that is capable of carrying out server-side operations.

It is submitted that the various embodiments described above can provide a means whereby an efficient distribution of inventory can be made between various distribution channels for that inventory. This is particularly important where significant data is generated that could place undue load on data processors. In such cases, administrators, for example, servers, can find it difficult to investigate the performance of connected distribution channels and, in response, make changes to parameters of inventory. As is clear from the above description, the method of using a central computer system can provide a means whereby the administrators can maintain control of inventory parameters such as supply rates with a

Uber Exhibit 1002 - p. 62
Uber Technologies, Inc. v. SurgeTech, LLC

processor load that would not be possible without the steps of the embodiments of the method.

The database management techniques described above, such as independent processing, in particular for processes that involve interaction between the central server and the distributed servers, and also processes that execute only central server side, provide embodiments that are diverse and suitable, for controlling overall efficiency, reliability, and redundancy, as uniquely required by different applications.

Further, incorporating the use of individual- and group indictors, as explained in these embodiments, facilitates those kinds of applications described by maintaining a sufficient degree of conditional relationships between distributed database fields, while also reaping the efficiency and redundancy benefits.

The appended claims are to be considered as incorporated into the above description.

Throughout the specification, including the claims, where the context permits, the term “comprising” and variants thereof such as “comprise” or “comprises” are to be interpreted as including the stated integer or integers without necessarily excluding any other integers.

It is to be understood that the terminology employed above is for the purposes of description and should not be regarded as limiting. The described embodiments are intended to be illustrative of the invention, without limiting the scope thereof. The invention is capable of being practised with various modifications and additions as will readily occur to those skilled in the art.

Various substantially and specifically practical and useful exemplary embodiments of the claimed subject matter, are described herein, textually and/or graphically, including the best mode, if any, known to the inventors for carrying out the claimed subject matter. Variations (e.g., modifications and/or enhancements) of one or more embodiments described herein might become apparent to those of ordinary skill in the art upon reading this application. The inventors expect skilled artisans to employ such variations as appropriate, and the inventors intend for the claimed subject matter to be practiced other than as specifically described herein. Accordingly, as permitted by law, the claimed subject matter includes and covers all equivalents of the claimed subject matter and all improvements to the claimed subject matter. Moreover, every combination of the above described elements, activities, and all possible variations thereof are encompassed by the claimed subject matter

Uber Exhibit 1002 - p. 63
Uber Technologies, Inc. v. SurgeTech, LLC

unless otherwise clearly indicated herein, clearly and specifically disclaimed, or otherwise clearly contradicted by context.

The use of any and all examples, or exemplary language (e.g., "such as") provided herein, is intended merely to better illuminate one or more embodiments and does not pose a limitation on the scope of any claimed subject matter unless otherwise stated. No language in the specification should be construed as indicating any non-claimed subject matter as essential to the practice of the claimed subject matter.

Thus, regardless of the content of any portion (e.g., title, field, background, summary, description, abstract, drawing figure, etc.) of this application, unless clearly specified to the contrary, such as via explicit definition, assertion, or argument, or clearly contradicted by context, with respect to any claim, whether of this application and/or any claim of any application claiming priority hereto, and whether originally presented or otherwise:

there is no requirement for the inclusion of any particular described or illustrated characteristic, function, activity, or element, any particular sequence of activities, or any particular interrelationship of elements;

no characteristic, function, activity, or element is "essential";

any elements can be integrated, segregated, and/or duplicated;

any activity can be repeated, any activity can be performed by multiple entities, and/or any activity can be performed in multiple jurisdictions; and

any activity or element can be specifically excluded, the sequence of activities can vary, and/or the interrelationship of elements can vary.

The use of the terms "a", "an", "said", "the", and/or similar referents in the context of describing various embodiments (especially in the context of the following claims) are to be construed to cover both the singular and the plural, unless otherwise indicated herein or clearly contradicted by context. The terms "comprising," "having," "including," and "containing" are to be construed as open-ended terms (i.e., meaning "including, but not limited to,") unless otherwise noted.

Moreover, when any number or range is described herein, unless clearly stated otherwise, that number or range is approximate. Recitation of ranges of values herein are merely intended to serve as a shorthand method of referring individually to each separate value falling within the range, unless otherwise indicated herein, and each separate value and each separate subrange defined by such separate values is incorporated into the

Uber Exhibit 1002 - p. 64
Uber Technologies, Inc. v. SurgeTech, LLC

specification as if it were individually recited herein. For example, if a range of 1 to 10 is described, that range includes all values therebetween, such as for example, 1.1, 2.5, 3.335, 5, 6.179, 8.9999, etc., and includes all subranges therebetween, such as for example, 1 to 3.65, 2.8 to 8.14, 1.93 to 9, etc.

Words indicating direction or orientation, such as “front”, “rear”, “back”, etc, are used for convenience. The inventor(s) envisages that various embodiments can be used in a non-operative configuration, such as when presented for sale. Thus, such words are to be regarded as illustrative in nature, and not as restrictive.

Accordingly, every portion (e.g., title, field, background, summary, description, abstract, drawing figure, etc.) of this application, other than the claims themselves, is to be regarded as illustrative in nature, and not as restrictive, and the scope of subject matter protected by any patent that issues based on this application is defined only by the claims of that patent.

Uber Exhibit 1002 - p. 65
Uber Technologies, Inc. v. SurgeTech, LLC

CLAIMS

1. A method of managing inventory allocations, the method including the steps of:

receiving, in a data processing apparatus, data relating to the sale of items of inventory allocated to respective re-sellers;

processing, in the data processing apparatus, said data to obtain data relating to sales performance of at least one of said respective re-sellers; and

carrying out at least one of the following steps in the data processing apparatus:

adjusting a price for which inventory allocated to at least that said respective re-seller is to be sold by that respective re-seller depending on said data relating to the sales performance of the respective re-sellers; and

re-allocating inventory items from at least that said respective re-seller to other respective re-sellers.

2. A method as claimed in claim 1, in which the step of processing the data includes the step of calculating a performance indicator for each re-seller in the form of a function of a ratio of a number of items sold to the number of items allocated to the re-seller for sale.

3. A method as claimed in claim 2, in which the step of processing the data includes the step of comparing the performance indicator for a particular re-seller of inventory items to the performance indicators of other re-sellers of inventory items, the inventory items associated with respective re-sellers having at least one common characteristic.

4. A method as claimed in claim 3, in which the step of comparing the performance indicators includes the step of comparing the performance indicator of said particular re-seller to an average of the performance indicators of said other re-sellers.

5. A method as claimed in claim 4, in which the step of comparing the performance indicators includes the step of obtaining a percentage change (PC) of the performance indicator of said particular re-seller relative to said average of the performance indicators and applying the following equation to PC:

$$Z_j = \frac{PC_j - Mean(PC)}{St.Dev(PC)/\sqrt{n}}$$, where n is the number of re-sellers having said at least one common characteristic, $j = 1$ *to* n, and Z is an adjustment rate to a price of the inventory item.

Uber Exhibit 1002 - p. 66
Uber Technologies, Inc. v. SurgeTech, LLC

6. A method as claimed in claim 4, which includes the step of adjusting a price of the inventory allocated to said particular re-seller by a factor of Z.

7. A method as claimed in claim 2, in which the step of processing said data includes the step of carrying out a statistical analysis of said data relating to sales performance.

8. A system for managing inventory allocations, the system including a data processing apparatus that is configured to carry out the following steps:

receiving data relating to the sale of items of inventory allocated to respective re-sellers;

processing said data to obtain data relating to sales performance of at least one of the respective re-sellers; and

carrying out at least one of the following steps:

adjusting a price for which inventory allocated to at least that said respective re-seller is to be sold by that respective re-seller depending on said data relating to the sales performance of the respective re-sellers; and

re-allocating inventory items from at least that said respective re-seller to other respective re-sellers.

9. A system as claimed in claim 8, in which the data processing apparatus is configured to calculate a performance indicator for each re-seller in the form of a function of a ratio of a number of items sold to the number of items allocated to the re-seller for sale.

10. A system as claimed in claim 8, in which the data processing apparatus is configured to compare the performance indicator for a particular re-seller of inventory items to the performance indicators of other re-sellers of inventory items, the inventory items associated with respective re-sellers having at least one common characteristic.

11. A system as claimed in claim 10, in which the data processing apparatus is configured to compare the performance indicator of said particular re-seller to an average of the performance indicators of said other re-sellers.

12. A system as claimed in claim 11, in which the data processing apparatus is configured to obtain a percentage change (PC) of the performance indicator of said particular

Uber Exhibit 1002 - p. 67
Uber Technologies, Inc. v. SurgeTech, LLC

re-seller relative to said average of the performance indicators and to apply the following equation to PC:

$$Z_j = \frac{PC_j - Mean(PC)}{St.Dev(PC)/\sqrt{n}}$$, where n is the number of re-sellers having said at least one common characteristic, $j = 1$ *to* n, and Z is an adjustment rate to a price of the inventory item.

13. A system as claimed in claim 12, in which the data processing apparatus is configured to adjust a price of the inventory allocated to said particular re-seller by a factor of Z.

14. A system as claimed in claim 9, in which the data processing apparatus is configured to carry out a statistical analysis of said data relating to sales performance.

15. A software product for managing inventory allocations, the software product being executable by a data processing apparatus and being configured so that, when executed, the data processing apparatus carries out the following steps:

receives data relating to the sale of items of inventory allocated to respective re-sellers;

processes said data to obtain data relating to sales performance of at least one of said respective re-sellers; and

carries out at least one of the following steps:

adjusts a price for which inventory allocated to at least that respective re-sellers is to be sold by that respective re-seller depending on said data relating to the sales performance of the respective re-sellers; and

re-allocates inventory items from at least that said respective re-seller to other respective re-sellers.

16. A software product as claimed in claim 15, which, when executed by a data processing apparatus, causes the date processing apparatus to calculate a performance indicator for each re-seller in the form of a function of a ratio of a number of items sold to the number of items allocated to the re-seller for sale.

17. A software product as claimed in claim 16, which, when executed by a data processing apparatus, causes the data processing apparatus to compare the performance indicator for a particular re-seller of inventory items to the performance indicators of other re-

Uber Exhibit 1002 - p. 68
Uber Technologies, Inc. v. SurgeTech, LLC

sellers of inventory items, the inventory items associated with respective re-sellers having at least one common characteristic.

18. A software product as claimed in claim 17, which, when executed by a data processing apparatus, causes the data processing apparatus to compare the performance indicator of said particular re-seller to an average of the performance indicators of said other re-sellers.

19. A software product as claimed in claim 18, which, when executed by a the data processing apparatus, causes the data processing apparatus to obtain a percentage change (PC) of the performance indicator of said particular re-seller relative to said average of the performance indicators and to apply the following equation to PC:

$Z_j = \frac{PC_j - Mean(PC)}{St.Dev(PC)/\sqrt{n}}$, where n is the number of re-sellers having said at least one common characteristic, $j = 1$ *to* n, and Z is an adjustment rate to a price of the inventory item.

20. A software product as claimed in claim 19, which, when executed by a data processing apparatus, causes the data processing apparatus to adjust a price of the inventory allocated to said particular re-seller by a factor of Z.

21. A software product as claimed in claim 9, which, when executed by a data processing apparatus, causes the data processing apparatus to carry out a statistical analysis of said data relating to sales performance.

Uber Exhibit 1002 - p. 69
Uber Technologies, Inc. v. SurgeTech, LLC

ABSTRACT

A method of managing inventory allocations includes the step of receiving, in a data processing apparatus, data relating to the sale of items of inventory allocated to respective re-sellers. The date is processed to obtain data relating to sales performance of one or more of the respective re-sellers. The method includes adjusting a price for which inventory allocated to that respective re-seller is to be sold by depending on said data relating to the sales performance of the respective re-sellers and/or re-allocation inventory items from that said respective re-seller to other respective re-sellers. The invention extends to a software product and to a system.

Uber Exhibit 1002 - p. 70
Uber Technologies, Inc. v. SurgeTech, LLC

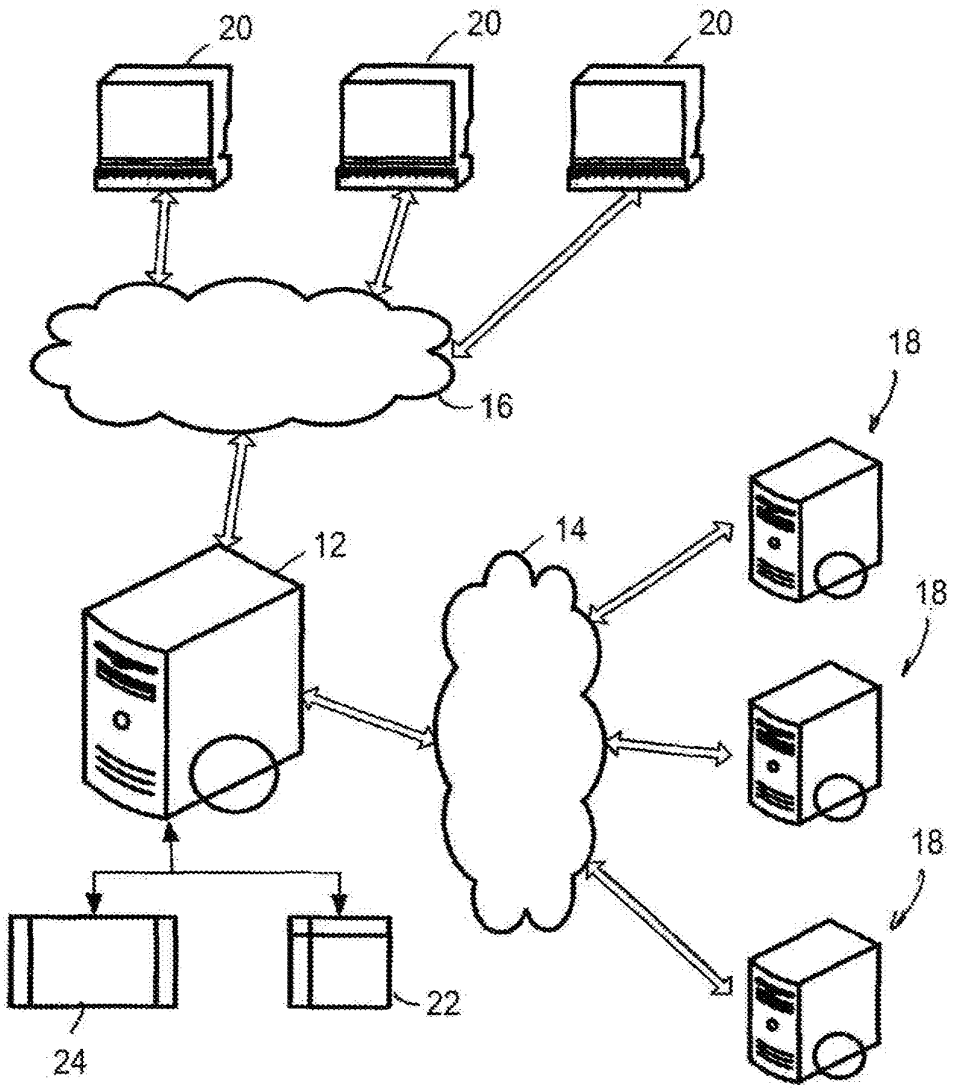


FIG. 1

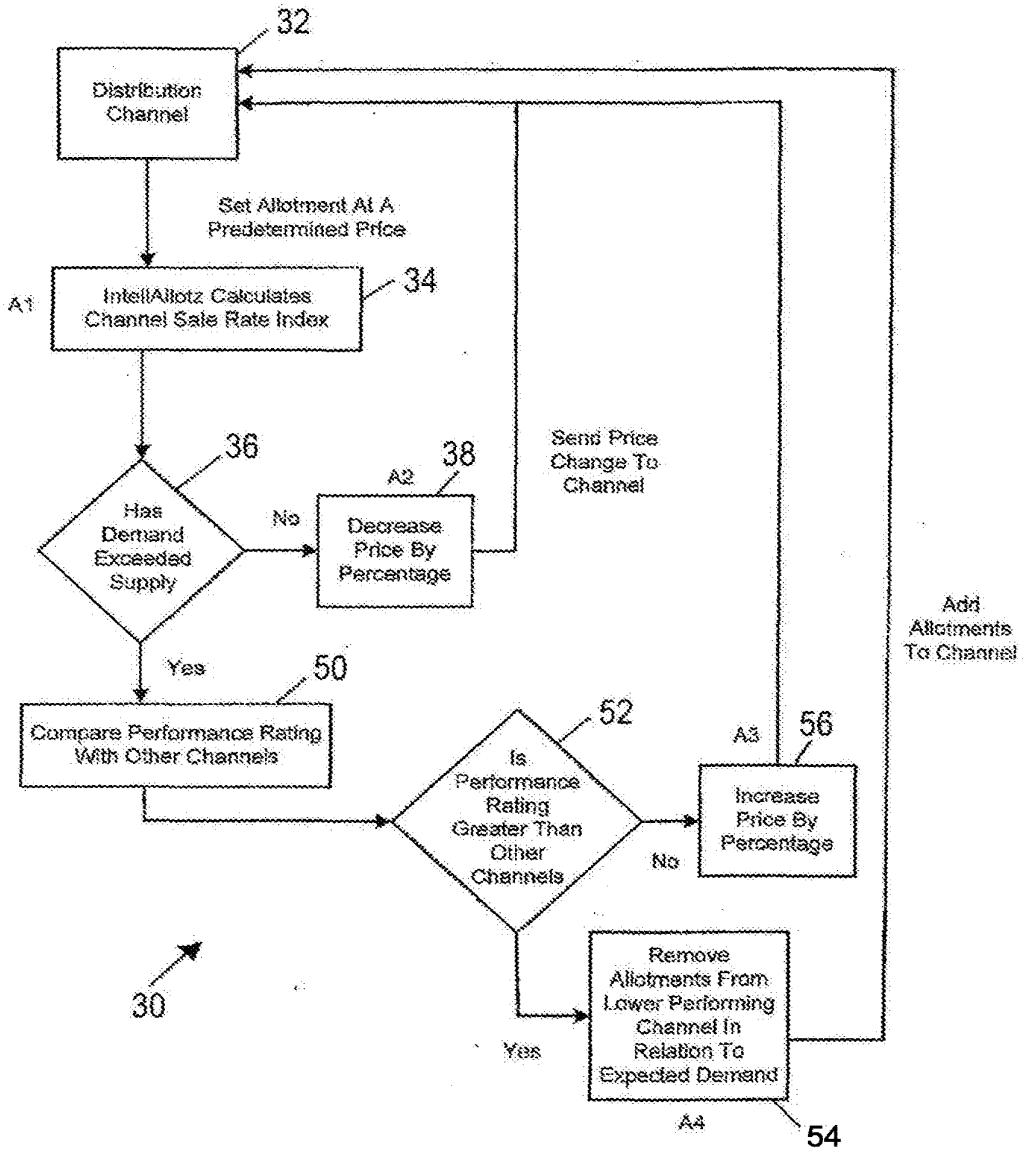

32
Distribution Channel
Set Allotment At A Predetermined Price
A1
IntelliAllotz Calculates Channel Sale Rate Index
34
36
Has Demand Exceeded Supply
No
A2
38
Decrease Price By Percentage
Send Price Change To Channel
Add Allotments To Channel
Yes
50
Compare Performance Rating With Other Channels
52
Is Performance Rating Greater Than Other Channels
A3
56
Increase Price By Percentage
No
Yes
Remove Allotments From Lower Performing Channel In Relation To Expected Demand
A4
54
30

FIG. 2

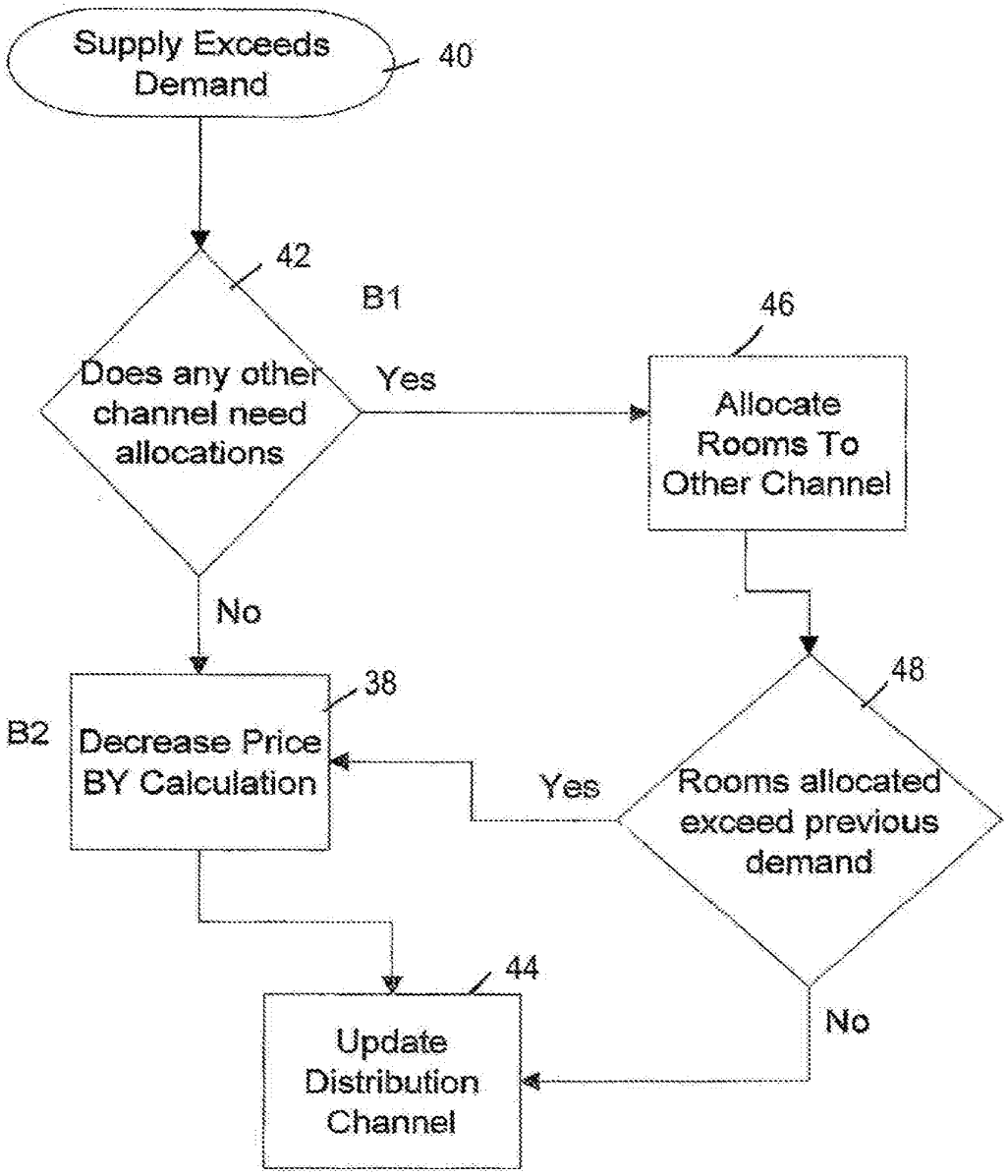

Supply Exceeds Demand
40
42
B1
Does any other channel need allocations
Yes
46
Allocate Rooms To Other Channel
No
48
38
B2
Decrease Price BY Calculation
Yes
Rooms allocated exceed previous demand
44
No
Update Distribution Channel

FIG. 3

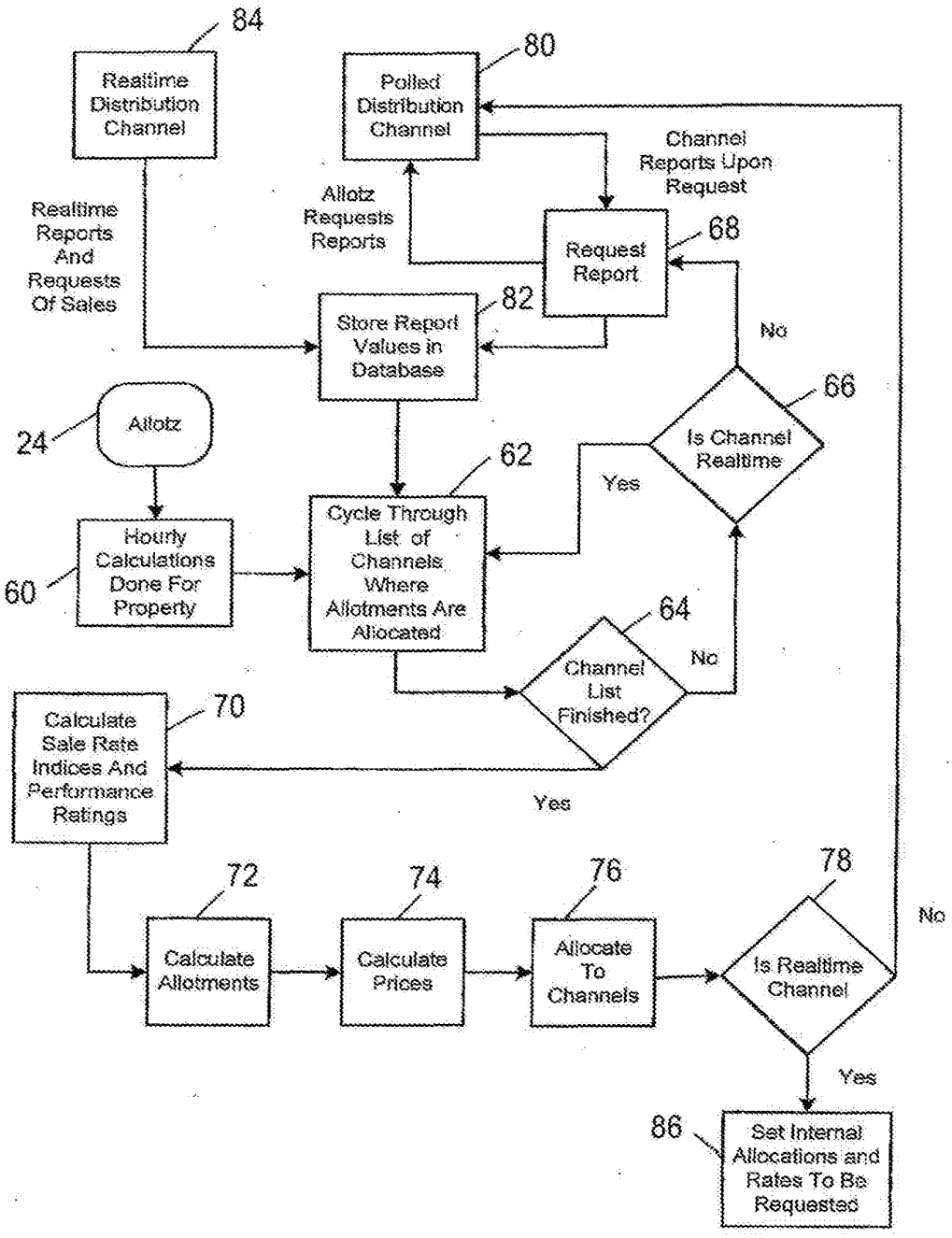

84
Realtime Distribution Channel
80
Polled Distribution Channel
Channel Reports Upon Request
Allotz Requests Reports
Realtime Reports And Requests Of Sales
Request Report
68
82
Store Report Values in Database
No
66
Is Channel Realtime
24
Allotz
62
Yes
Cycle Through List of Channels Where Allotments Are Allocated
Hourly Calculations Done For Property
60
64
No
Channel List Finished?
70
Calculate Sale Rate Indices And Performance Ratings
Yes
72
74
76
78
No
Calculate Allotments
Calculate Prices
Allocate To Channels
Is Realtime Channel
Yes
86
Set Internal Allocations and Rates To Be Requested

FiG. 4

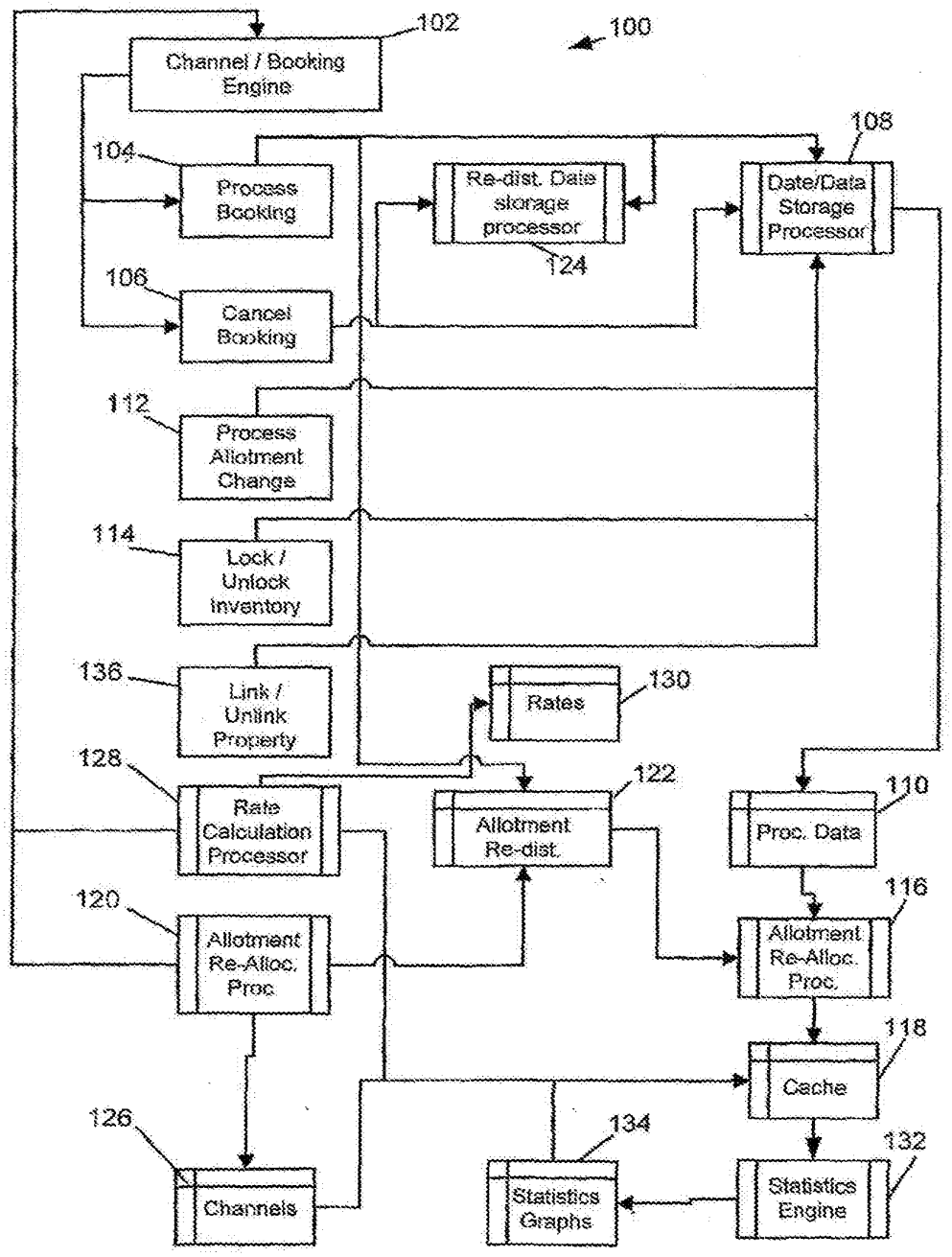

100
102
Channel / Booking Engine
104
Process Booking
106
Cancel Booking
108
Date/Data Storage Processor
Re-dist. Date storage processor
124
112
Process Allotment Change
114
Lock / Unlock Inventory
136
Link / Unlink Property
Rates
130
128
Rate Calculation Processor
122
Allotment Re-dist.
110
Proc. Data
120
Allotment Re-Alloc. Proc
116
Allotment Re-Alloc. Proc.
118
Cache
126
Channels
134
Statistics Graphs
132
Statistics Engine

FIG. 5

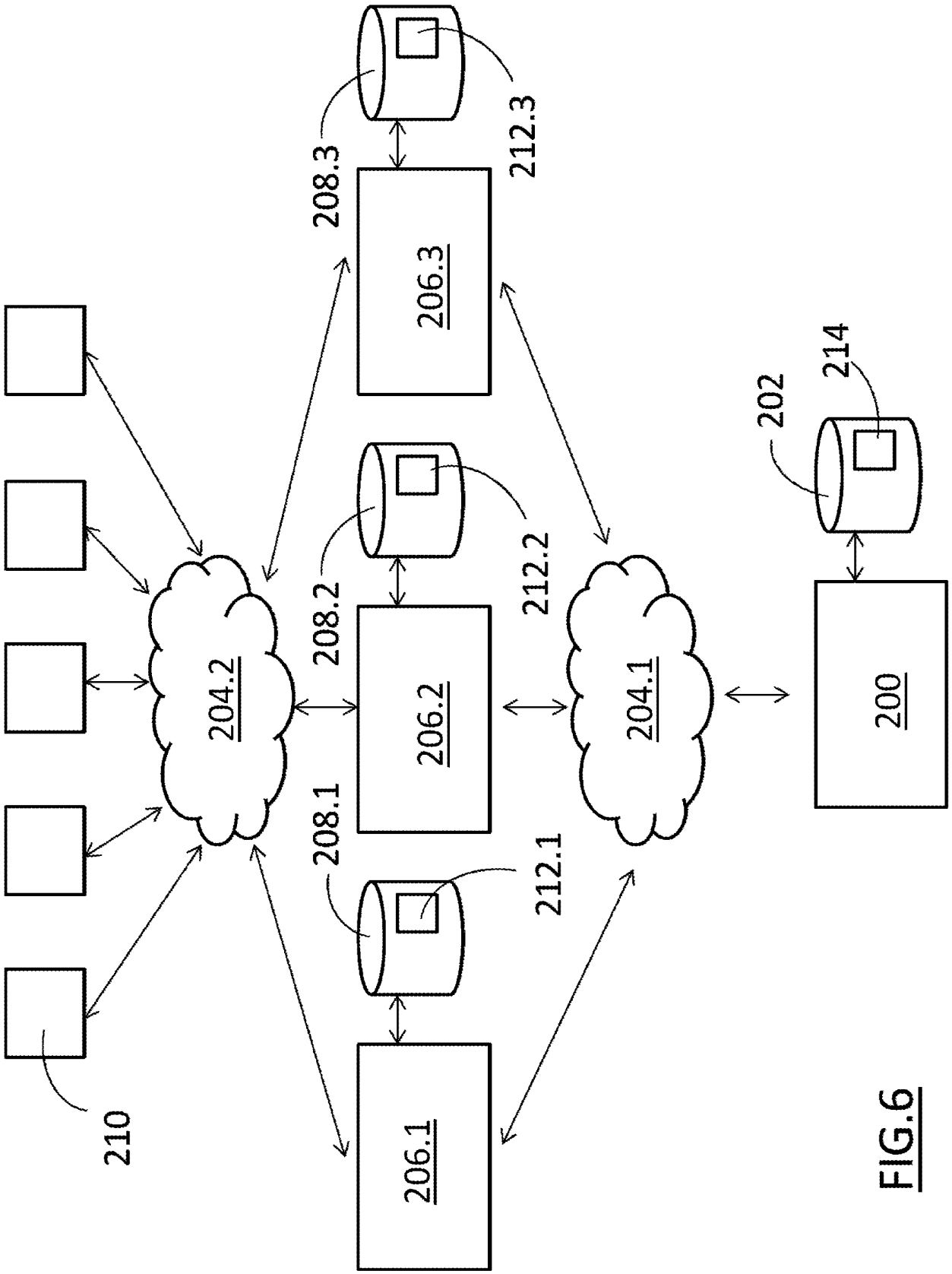

208.3
212.3
206.3
214
202
208.2
212.2
204.2
206.2
204.1
200
208.1
212.1
206.1
210

FIG.6

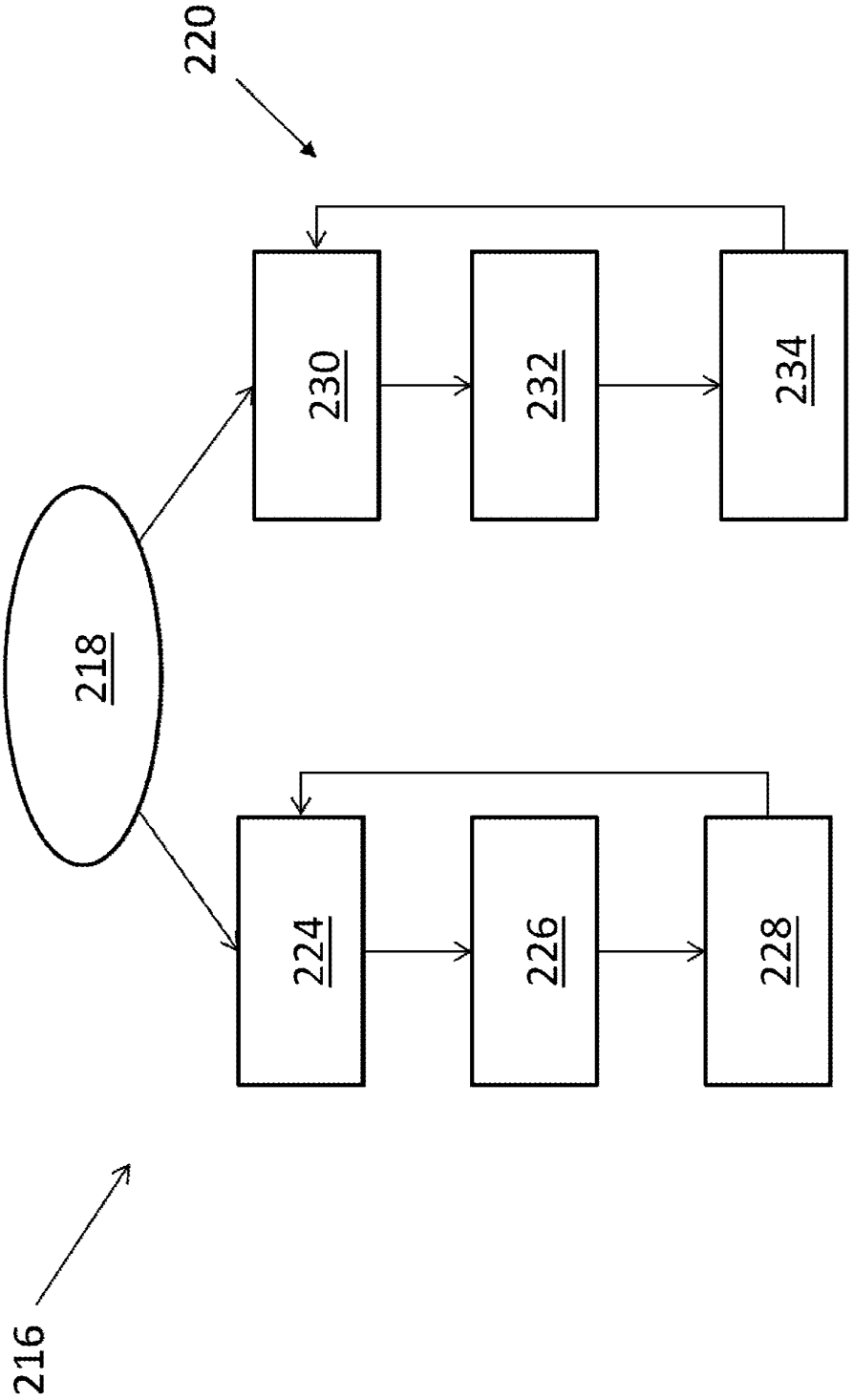


FIG.7

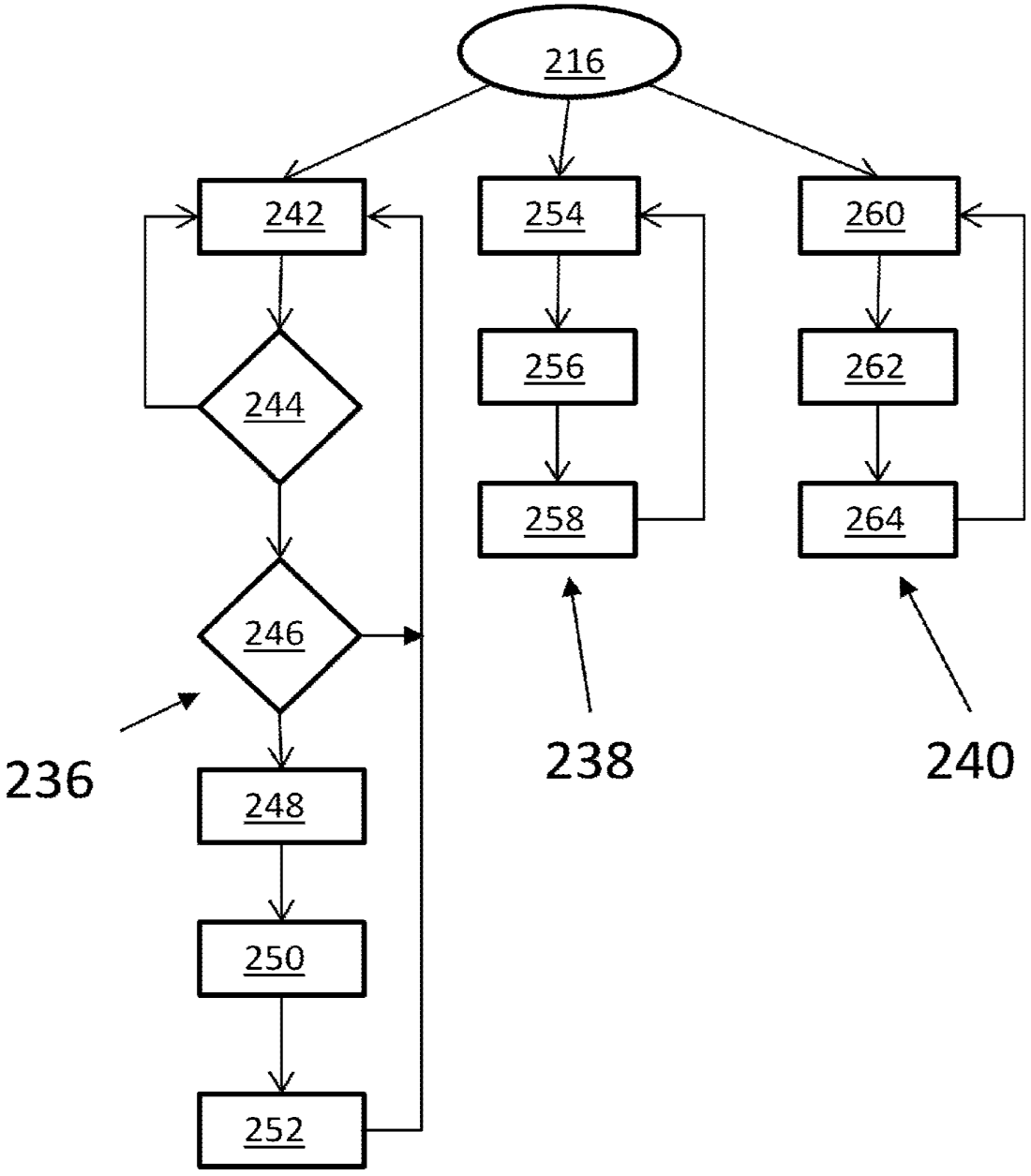


FIG.8

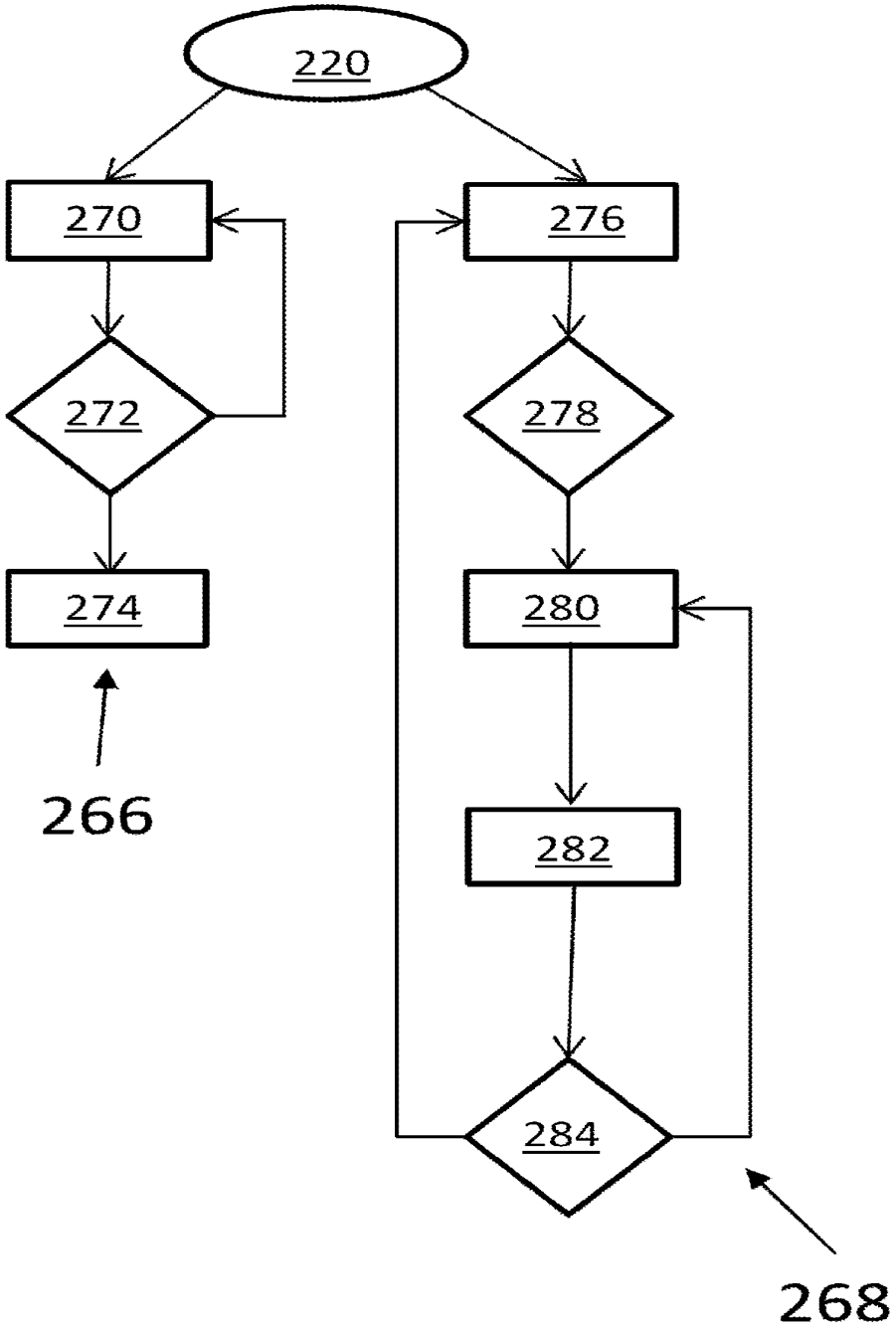


FIG.9

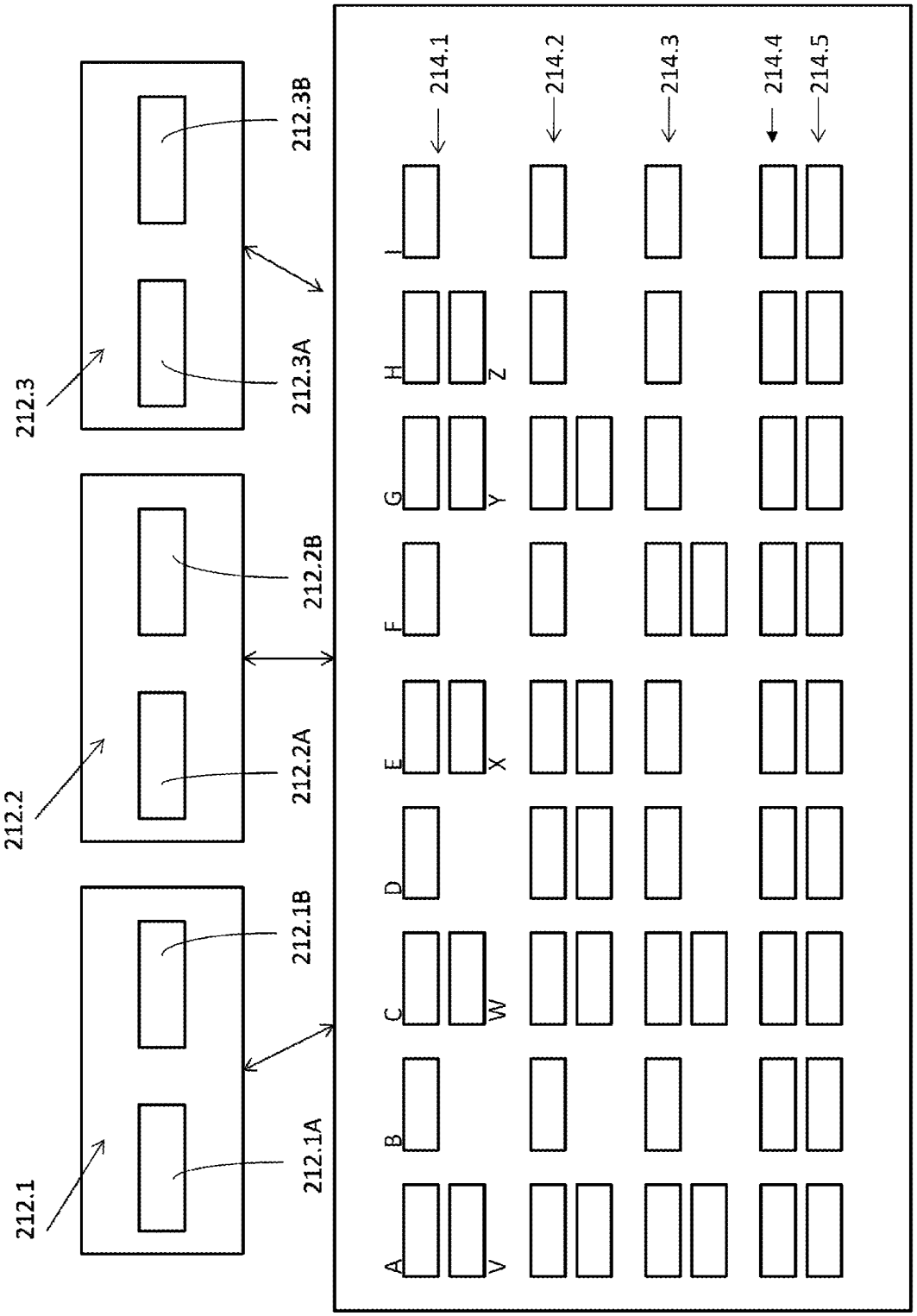

212.3
212.3B
212.3A
212.2
212.2B
212.2A
212.1
212.1B
212.1A
214.1
214.2
214.3
214.4
214.5
A
V
B
C
W
D
E
X
F
G
Y
H
Z
I

FIG.10

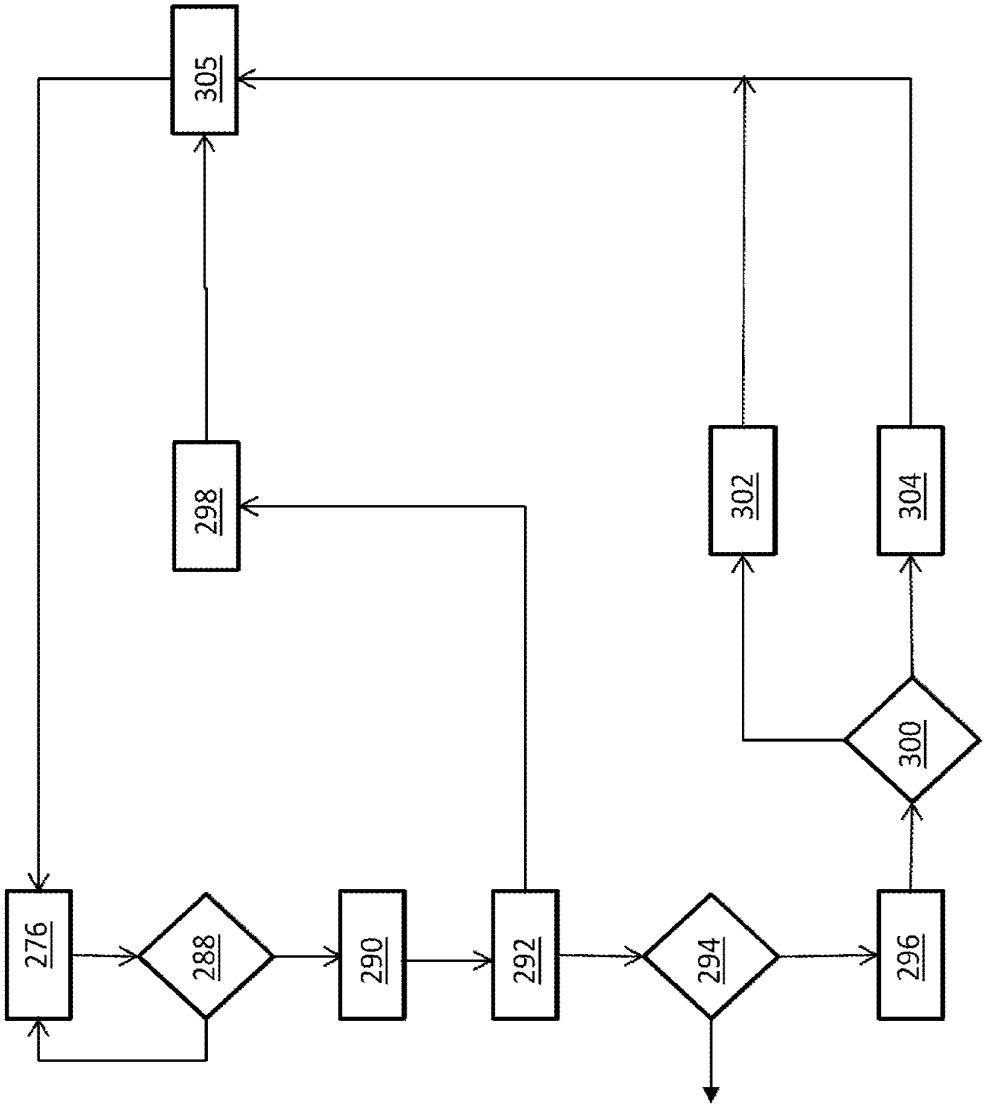


FIG.11

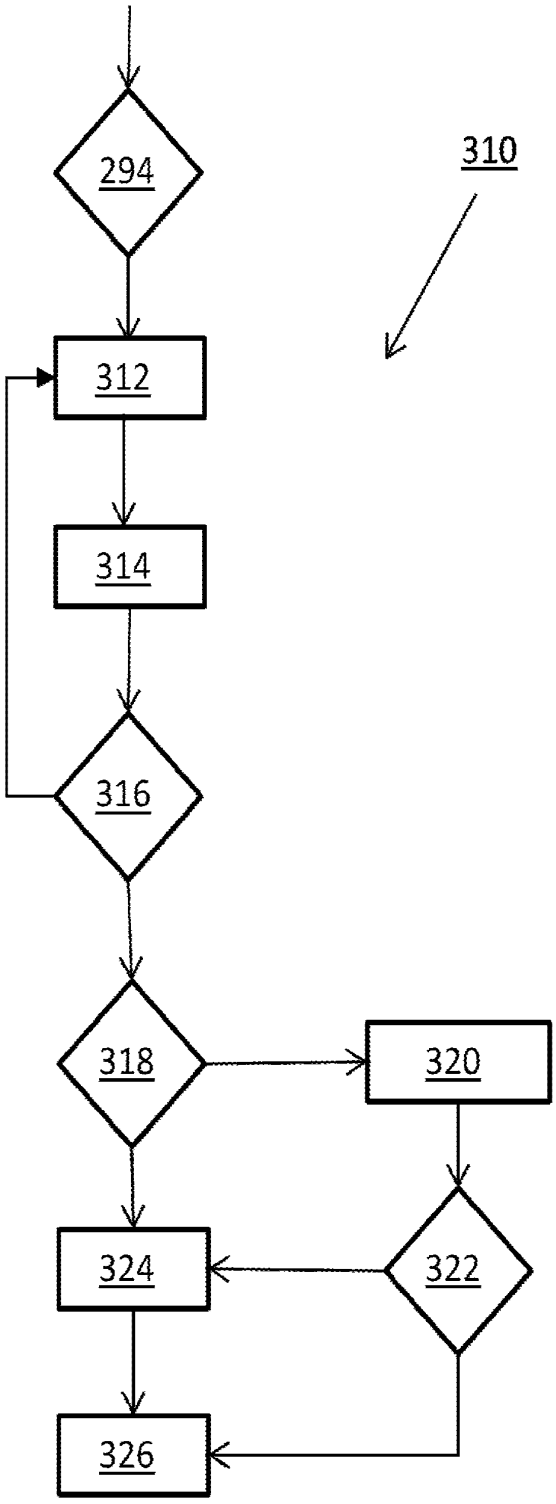


FIG.12

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DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

Title of Invention	The Management Of Inventory Allocations

As the below named inventor, I hereby declare that:

This declaration is directed to:

- [x] The attached application, or
- [ ] United States application or PCT international application number _____ filed on _____.

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

WARNING:

Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

LEGAL NAME OF INVENTOR

Inventor: Martin McCONNACHIE Date (Optional): 23rd/11/15

Signature: _____

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.

This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 1 minute to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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LEGAL NAME OF INVENTOR

Inventor: Helen JOHNSON Date (Optional): 12/14/15

Signature: HJ

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This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 1 minute to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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LEGAL NAME OF INVENTOR

Inventor: Geoffrey TOOGOOD Date (Optional): 9/11/2015

Signature: _____

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.

This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 1 minute to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Doc code: Oath
Document Description: Oath or declaration filed

PTO/AIA/02 (07-13)
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SUBSTITUTE STATEMENT IN LIEU OF AN OATH OR DECLARATION FOR UTILITY OR DESIGN PATENT APPLICATION (35 U.S.C. 115(d) AND 37 CFR 1.64)

Title of Invention	The Management of Inventory Allocations

This statement is directed to:

☐ The attached application.

OR

☒ United States application or PCT international application number 14/877,669 filed on October 7, 2015.

LEGAL NAME of inventor to whom this substitute statement applies:

(*E.g.*, Given Name (first and middle (if any)) and Family Name or Surname)

Daniel Paul Ruul

Residence (except for a deceased or legally incapacitated inventor):

City	State	Country
Labrador	QLD	AU

Mailing Address (except for a deceased or legally incapacitated inventor):

35 McMillan Street

City	State	Zip	Country
Labrador	QLD	4215	AU

I believe the above-named inventor or joint inventor to be the original inventor or an original joint inventor of a claimed invention in the application.

The above-identified application was made or authorized to be made by me.

I hereby acknowledge that any willful false statement made in this statement is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

Relationship to the inventor to whom this substitute statement applies:

☐ Legal Representative (for deceased or legally incapacitated inventor only),

☐ Assignee,

☒ Person to whom the inventor is under an obligation to assign,

☐ Person who otherwise shows a sufficient proprietary interest in the matter (petition under 37 CFR 1.46 is required), or

☐ Joint Inventor

This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 1 minute to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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SUBSTITUTE STATEMENT

Circumstances permitting execution of this substitute statement:

- ☐ Inventor is deceased,
- ☐ Inventor is under legal incapacity,
- ☒ Inventor cannot be found or reached after diligent effort, or
- ☐ Inventor has refused to execute the oath or declaration under 37 CFR 1.63.

If there are joint inventors, please check the appropriate box below:

- ☒ An application data sheet under 37 CFR 1.76 (PTO/AIA/14 or equivalent) naming the entire inventive entity has been or is currently submitted.

OR

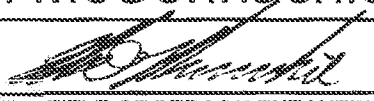
- ☐ An application data sheet under 37 CFR 1.76 (PTO/AIA/14 or equivalent) has not been submitted. Thus, a Substitute Statement Supplemental Sheet (PTO/AIA/11 or equivalent) naming the entire inventive entity and providing inventor information is attached. See 37 CFR 1.64(b).

WARNING:

Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

PERSON EXECUTING THIS SUBSTITUTE STATEMENT:

Name: Martin McConnachie | Date (Optional):

Signature: 

APPLICANT NAME AND TITLE OF PERSON EXECUTING THIS SUBSTITUTE STATEMENT:

If the applicant is a juristic entity, list the applicant name and the title of the signer:

Applicant Name: Allotz.com Limited

Title of Person Executing This Substitute Statement: Director

The signer, whose title is supplied above, is authorized to act on behalf of the applicant.

Residence of the signer (unless provided in an application data sheet, PTO/AIA/14 or equivalent):

City Paradise Point | State QLD | Country Australia

Mailing Address of the signer (unless provided in an application data sheet, PTO/AIA/14 or equivalent)

35 The Peninsula

City Paradise Point | State Qld | Zip 4216 | Country Australia

Note: Use an additional PTO/AIA/02 form for each inventor who is deceased, legally incapacitated, cannot be found or reached after diligent effort, or has refused to execute the oath or declaration under 37 CFR 1.63.

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The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Patent Application Fee Transmittal

Application Number:	
Filing Date:	
Title of Invention:	THE CONTROL OF DISTRIBUTED DATABASES
First Named Inventor/Applicant Name:	Martin McConnachie
Filer:	Gregory Morgan Evans/Donna Donovan
Attorney Docket Number:	898/2/3 UTIL

Filed as Small Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
UTILITY FILING FEE (ELECTRONIC FILING)	4011	1	75	75
UTILITY SEARCH FEE	2111	1	330	330
UTILITY EXAMINATION FEE	2311	1	380	380
Pages:				
Claims:				
CLAIMS IN EXCESS OF 20	2202	1	50	50
Miscellaneous-Filing:				
Petition:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**835**

Electronic Acknowledgement Receipt

EFS ID:	39951772
Application Number:	16924395
International Application Number:	
Confirmation Number:	5073
Title of Invention:	THE CONTROL OF DISTRIBUTED DATABASES
First Named Inventor/Applicant Name:	Martin McConnachie
Customer Number:	115007
Filer:	Gregory Morgan Evans/Donna Donovan
Filer Authorized By:	Gregory Morgan Evans
Attorney Docket Number:	898/2/3 UTIL
Receipt Date:	09-JUL-2020
Filing Date:	
Time Stamp:	11:32:04
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$835
RAM confirmation Number	E202079B32367647
Deposit Account	506191
Authorized User	Donna Donovan

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

37 CFR 1.21 (Miscellaneous fees and charges)

37 CFR 1.20 (Post Issuance fees)

37 CFR 1.19 (Document supply fees)

37 CFR 1.17 (Patent application and reexamination processing fees)

37 CFR 1.16 (National application filing, search, and examination fees)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Application Data Sheet	898-2-3UTIL-20200709-ADS.pdf	1823640 98f857db2a13917c72ede96a0494f985e3983ac3	no	10
Warnings:					
Information:					
2		898-2-3UTIL-20200709-Specificaton.pdf	1338250 d89579dfbb7aa3d21738f1a42333902c215dcf86	yes	60

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Specification	1	55
	Claims	56	59
	Abstract	60	60

Warnings:					
Information:					
3	Drawings-other than black and white line drawings	898-2-3UTIL-20200709-Drawings.pdf	4936602 4246dfeedc63b9495653dc95630db73d22318c70	no	12
Warnings:					
Information:					
4	Oath or Declaration filed	898-2UTIL-20180816-Executed-Declarations.pdf	3532623 fa35c151be8d7eb38c91900c1637df95cef07ae9	no	6
Warnings:					
Information:					
5	Fee Worksheet (SB06)	fee-info.pdf	36599 9cb4c0023873f782b2095a34ee0bd78acbd6e0aa	no	2

Warnings:	
Information:	
Total Files Size (in bytes):	11667714

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	16924394
Filing Date	2020-07-09
First Named Inventor	Martin McConnachie
Art Unit	-
Examiner Name	-
Attorney Docket Number	898/2/3 UTIL

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	5787415	A	1998-07-28	Jacobson et al.	
	2	7275131	B2	2007-09-25	Goodman	
	3	7912748		2011-03-22	Rosenberg et al.	
	4	9280591		2016-03-08	Kharatishvili et al.	
	5	9430541		2016-08-30	Johnson et al.	

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U.S.PATENT APPLICATION PUBLICATIONS Remove

Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20020174000	A1	2002-11-21	Katz et al.	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16924394
	Filing Date	2020-07-09
	First Named Inventor	Martin McConnachie
	Art Unit	-
	Examiner Name	-
	Attorney Docket Number	898/2/3 UTIL

	2	20020174103	A1	2002-11-21	Hsiao Hui-I et al.	
	3	20030033179	A1	2003-02-13	Katz et al.	
	4	20030033205	A1	2003-02-13	Nowers D.K. et al.	
	5	20030088616		2003-05-08	Etessami, et al.	
	6	20030105684		2003-06-05	Dunn, et al.	
	7	20030200006		2003-10-23	Penkar, et al.	
	8	20040153359		2004-08-05	Ho, et al.	
	9	20040230503		2004-11-18	Lucas	
	10	20050004818	A1	2005-01-06	Liman	
	11	20050060270	A1	2005-03-17	Ramakrishnan	
	12	20070143155	A1	2007-06-21	Whitsett et al.	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16924394
	Filing Date	2020-07-09
	First Named Inventor	Martin McConnachie
	Art Unit	-
	Examiner Name	-
	Attorney Docket Number	898/2/3 UTIL

	13	20070208630	A1	2007-09-06	Chatter et al.	
	14	20080086449	A1	2008-04-10	Matsuzawa et al.	
	15	20110231363	A1	2011-09-22	Rathod	
	16	20120078847	A1	2012-03-29	Bryant et al.	
	17	20050144052	A1	2005-06-30	Harding, et al.	
	18	20060200370	A1	2006-09-07	Ratliff, et al.	
	19	20020116281	A1	2002-08-22	Costello, et al.	

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Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1	2302427	GB	A	1997-01-15	Brian M. Kennedy		
	2	2001350826	JP	A	2001-12-21	Hayashi Hiroshi		

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16924394
	Filing Date	2020-07-09
	First Named Inventor	Martin McConnachie
	Art Unit	-
	Examiner Name	-
	Attorney Docket Number	898/2/3 UTIL

	3	03048893	WO	A2	2003-06-12	Neal, Michael		
	4	03094068	WO	A1	2003-11-13	Ikeuchi, Kiyokazu		
	5	2001067356	WO	A1	2003-09-13	Lucas, Michael		
	6	2001082135	WO	A1	2001-11-01	Newell, et al.		
	7	2001084278	WO	A2	2001-11-08	Kohn, et al.		
	8	2005001615	WO	A2	2005-01-06	Ramakrishnan, Vishwamitra, S		
	9	2005010675	WO	A2	2005-02-03	Ramakrishnan, Vishwamitra, S		

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NON-PATENT LITERATURE DOCUMENTS Remove

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1	PCT, International Preliminary Report on Patentability in International Application No. PCT/AU2007/000684 dated November 18, 2008	
	2	PCT, International Search Report and Written Opinion in International Application No. PCT/AU2007/000684 dated August 3, 2007	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16924394
	Filing Date	2020-07-09
	First Named Inventor	Martin McConnachie
	Art Unit	-
	Examiner Name	-
	Attorney Docket Number	898/2/3 UTIL

	3	USPTO, Non-Final Office Action in U.S. Patent Application No. 16/250,799 dated February 5, 2020	

If you wish to add additional non-patent literature document citation information please click the Add button Add

EXAMINER SIGNATURE

Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16924394
	Filing Date	2020-07-09
	First Named Inventor	Martin McConnachie
	Art Unit	-
	Examiner Name	-
	Attorney Docket Number	898/2/3 UTIL

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Gregory M. Evans/	Date (YYYY-MM-DD)	2020-07-09
Name/Print	Gregory M. Evans	Registration Number	72169

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

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6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

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9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

(12) UK Patent Application (19) GB (11) 2 302 427 (13) A

(43) Date of A Publication 15.01.1997

(21) Application No 9611770.0

(22) Date of Filing 05.06.1996

(30) Priority Data
(31) 08491167 (32) 16.06.1995 (33) US

(71) Applicant(s)
i2 Technologies Inc

(Incorporated in USA - Delaware)

909 East Las Colinas Boulevard, Suite 1600, Irving, Texas 75039, United States of America

(72) Inventor(s)
Brian M Kennedy

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(52) UK CL (Edition O)
G4A AUXP

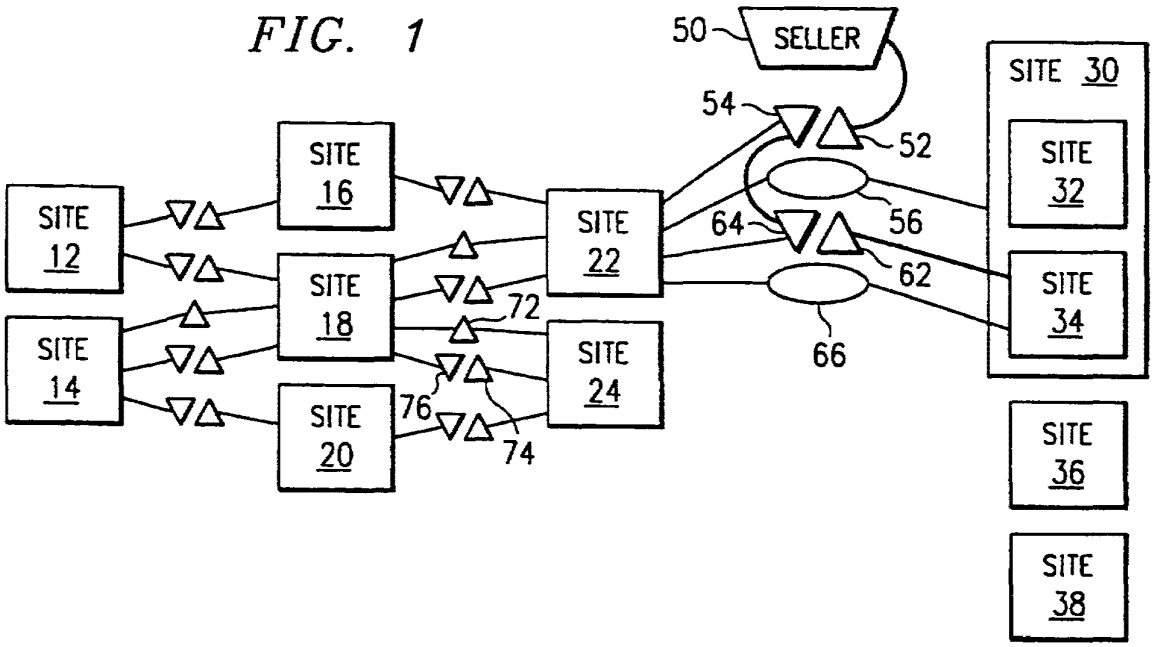
(56) Documents Cited
EP 0425405 A2 US 5128861 A

(58) Field of Search
UK CL (Edition O) G4A AUXF AUXP
INT CL^6 G06F

(54) **Managing available-to-promise in demand management**

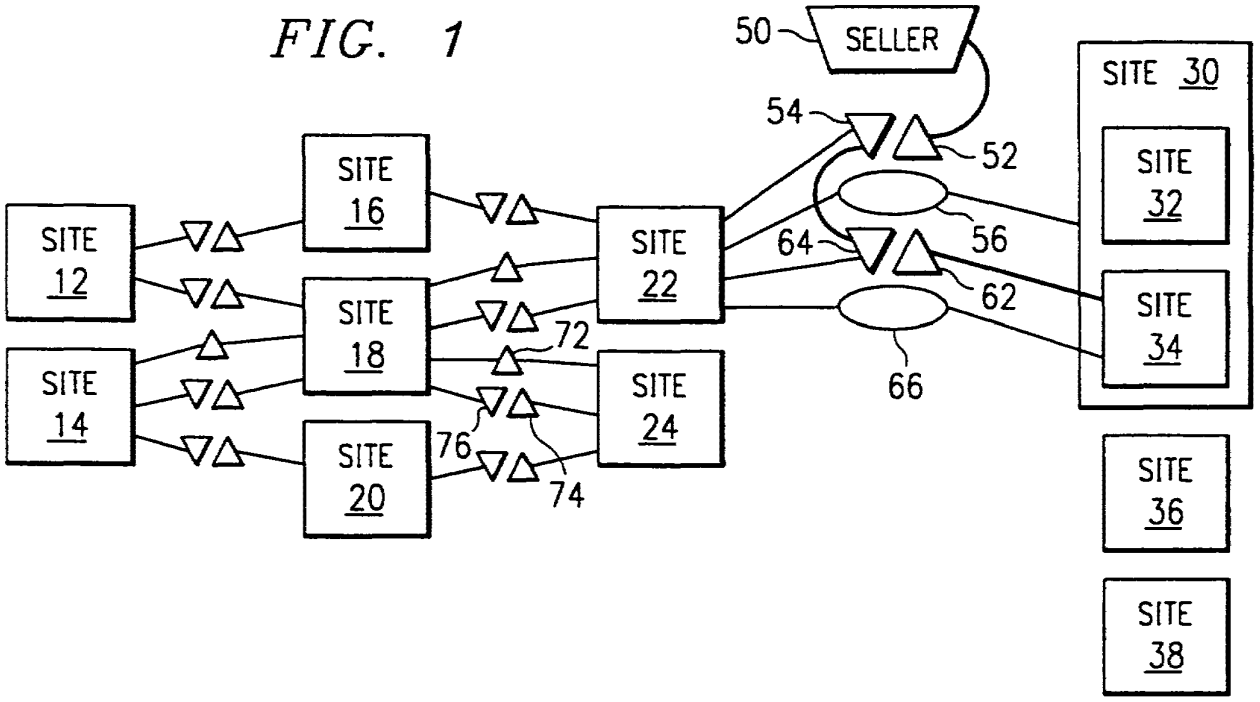
(57) A system for managing available-to-promise and making promises to fulfill customer requests includes a supply chain model representing a chain of supply. The supply chain model includes site models e.g. 12 that represent sites having capacity and that manage material flow. The supply chain model also includes seller models e.g. 50 that represent sellers and that manage forecasting and purchasing. Commitments between sites are modeled by requests e.g. 52 and promises e.g. 54, and the sellers can post requests on behalf of sites in anticipation of future requests from the sites.

FIG. 1



GB 2 302 427 A

FIG. 1


50
SELLER
SITE 30
54
52
SITE 16
SITE 12
SITE 22
SITE 32
64
56
SITE 18
62
SITE 34
72
SITE 14
SITE 24
66
76
74
SITE 20
SITE 36
SITE 38

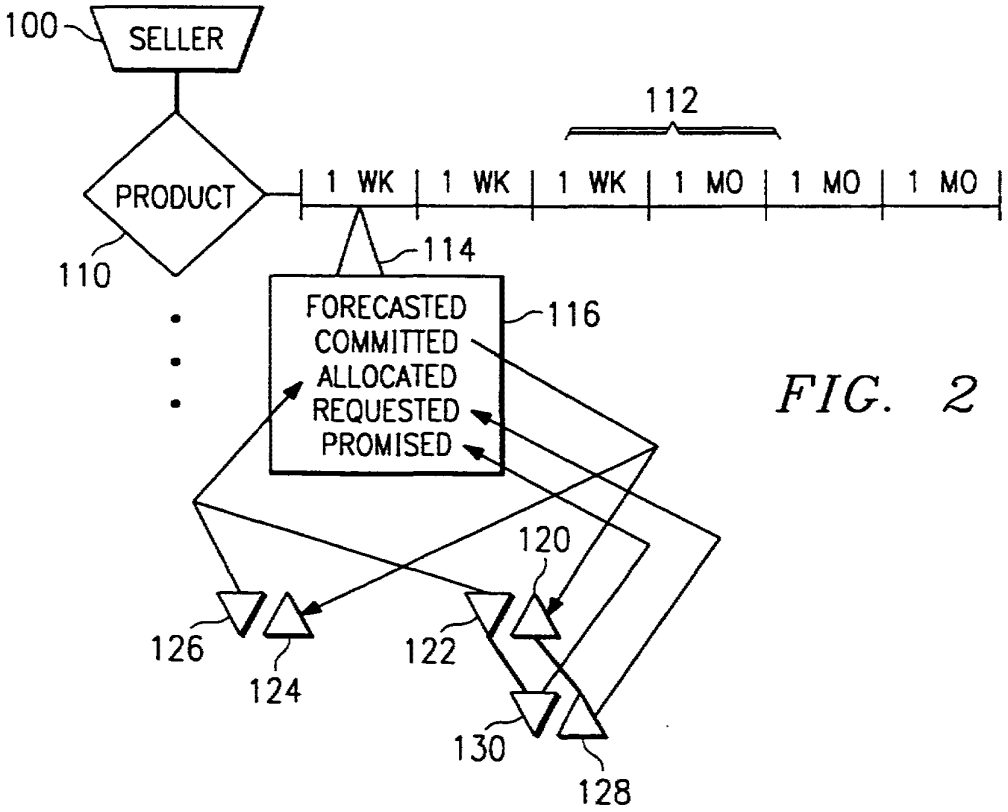

100
SELLER
112
PRODUCT
1 WK
1 WK
1 WK
1 MO
1 MO
1 MO
110
114
FORECASTED
COMMITTED
ALLOCATED
REQUESTED
PROMISED
116
120
126
122
124
130
128

FIG. 2

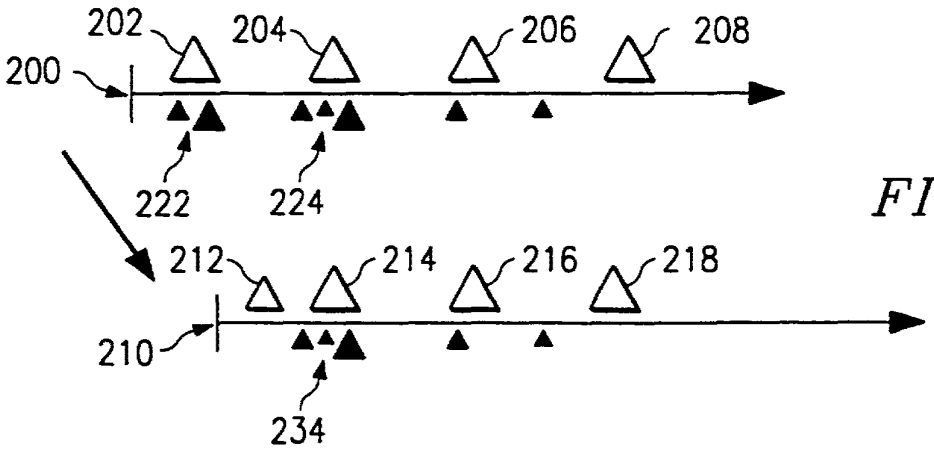
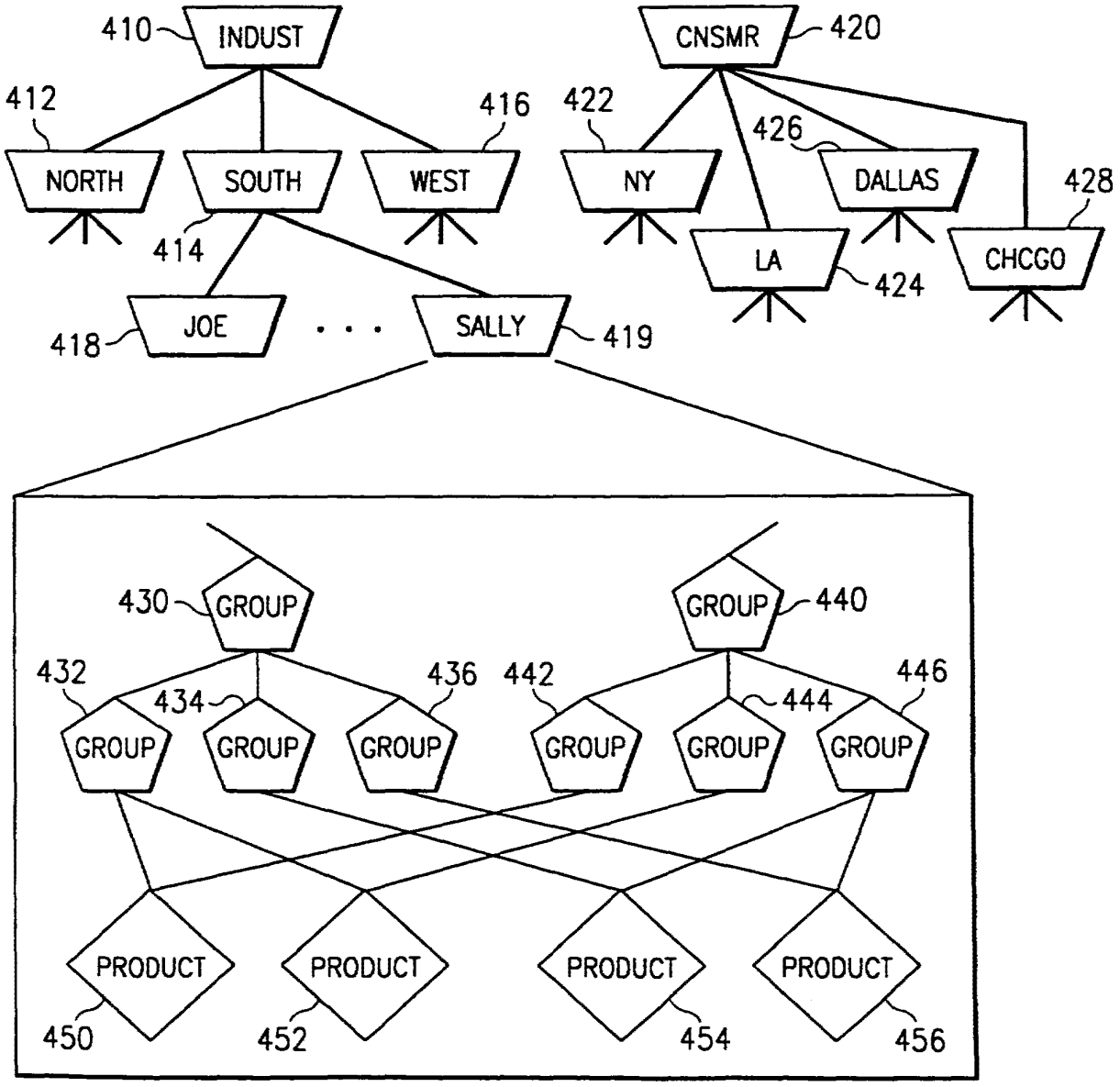

202
204
206
208
200
222
224
212
214
216
218
210
234

FIG. 3

FIG. 4


410
INDUST
CNSMR
420
412
416
422
426
NORTH
SOUTH
WEST
NY
DALLAS
428
414
LA
CHCGO
424
418
JOE
SALLY
419
430
GROUP
GROUP
440
432
434
436
442
444
446
PRODUCT
PRODUCT
PRODUCT
PRODUCT
450
452
454
456

SYSTEM AND METHOD FOR MANAGING ATP

This invention relates in general to the fields of demand management, supply chain management, and capacity management. More particularly, the present invention relates to a system and method for managing available-to-promise(ATP) and making promises to fulfill customer requests.

Manufacturers produce products for sale to customers. In the sales process, customers place demands on manufacturers. A customer demand may consist of a request for a particular quantity of a product by a specific date. This date and quantity information may be collectively referred to as the "customer request" or "request information".

Manufacturing and distribution facilities have limited resources (capacity)and limited inventories (materials). Therefore, every customer request may not be satisfiable in that some may receive no promise, others may receive an inadequate one. Planning and managing which customer requests to promise and fulfill, termed "demand management", is a fundamental and critical activity of most manufacturing and distribution organizations.

Due to material, capacity and other limitations, a manufacturer may not be able to meet a particular customer request. In this situation, the manufacturer typically negotiates with the customer to deliver a quantity of product by one or more dates agreeable to the customer. This date and quantity information may be referred to as the "manufacturer promise" or "promise information". Based on the manufacturer promise, the manufacturer creates operational plans to implement the promise information. Manufacturers may use a combination of diverse software tools in the negotiating and planning processes.

Traditional methods for demand management have several problems. First, such methods and systems are not integrated. Several different tools may be required to implement the entire demand management strategy.

Second, such traditional systems and methods are not dynamic. Once a plan is in place, it is difficult for the manufacturer to react to changing circumstances and update the plan. Third, order promising to customers is often done based upon an infeasible plan. Later attempts to find a feasible plan that will satisfy the promises are often futile.

The environment today requires more and more responsiveness. Customers require significant product diversity and want promises to be made to their requests immediately, while on the phone. The traditional way of promising in configure-to-order or make-to-order environments involves submitting the request to the planners and then, a few days or weeks later, after the planners have gone through a planning cycle, receiving a promise or rejection.

Many manufacturing and distribution organizations have several sales offices associated with each manufacturing factory. Each sales office independently promises to supply products from the factory to customers. This is referred to as a "distributed organization". Each sales person in each of the sales organizations needs to be able to make instantaneous promises, simultaneously with other sales people doing the same. In addition, each of those promises need to be fulfillable by a feasible plan.

To better meet customer demand, the manufacturer must build product and/or intermediate items before receiving customer orders. This production is based on projections called "forecast orders". A product produced based on these forecast orders is referred to as "available to promise" or "ATP". ATP consists of quantities of products with associated dates that the

products are scheduled to be available for delivery to the customer.

In distributed organizations a sales office may need approval from the factory before ATP may be promised to meet a customer request. This approval process may take up to a week under current practices. This delay is unacceptable in today's business environment.

SUMMARY OF THE INVENTION

In accordance with the present invention, a system and method for managing ATP is provided that substantially eliminate or reduce disadvantages and problems associated with previously developed systems and methods.

In accordance with one aspect of the invention, there is provided a system for managing available-to-promise and making promises to fulfill customer requests, the system comprising: at least one seller model representing a seller that is selling at least one product, the seller model operable to forecast for the at least one product and operable to choose commitment levels creating forecast requests; the forecast requests receiving promises made by supplier sites; and the promises available to the seller entity to promise to actual customer requests.

In accordance with another aspect of the invention, there is provided a system for managing available-to-promise and making promises to fulfill customer requests, the system comprising: a supply chain model representing a chain of supply, the supply chain model comprising: site models that represent sites having capacity and that manage material flow; and seller models that represent sellers and that manage forecasting and purchasing; wherein commitments between sites is modeled by requests and promises; and wherein the seller can post requests on behalf of sites in anticipation of future requests from the sites.

In accordance with a further aspect of the invention there is provided a system for managing available-to-promise and making promises to fulfill customer requests, the system comprising: a product model representing a product, the product model specifying a supplier site, an item produced by that site, a minimum quantity, a minimum order lead time, a list of customers allowed to purchase, and pricing for the product; wherein a customer request having desired characteristics matching the product can be fulfilled by a promise of the product; such that a list of all matching products and associated available promises can be displayed as available-to-promise for the request.

More particularly, one embodiment of the present invention provides a method for managing ATP in a distributed organization. The distributed organization comprises at least one supplying facility such as a factory. Additionally, the distributed organization comprises a plurality of requesting facilities for each supplying facility. The requesting facilities may comprise, for example, sales offices. The requesting facilities and the supplying facilities may be coupled by a computer network.

In this embodiment, the requesting facilities each store forecast orders in a memory of a computer at the requesting facility. The forecast orders include request information. As defined previously, the request information includes the quantity (or range of quantities) of product requested from the supplying facility and the date (or range of dates) it is needed. A master scheduling software system may be used to selectively plan use of, for example, manufacturing capacity of the supplying facility to meet selected forecast orders based on predetermined criteria. If a feasible and desirable plan can be devised that satisfies the request, then the supplier may make a

Uber Exhibit 1002 - p. 108
Uber Technologies, Inc. v. SurgeTech, LLC

promise to the customer that the supplier will satisfy the request. The promises to meet the selected forecast orders may be transmitted directly to the customers over a computer network.

In environments where customers are not willing to wait for a plan to be developed to get a promise, the supplying facility must create promises in advance that are available for immediate transfer to a customer. In this embodiment, future requests can be forecasted and a plan can be made to satisfy and promise those forecast requests. When an actual customer request is received, one or more (or a portion of) promises made to forecast requests may be instantly reassigned to the customer request.

An embodiment of the invention provides a technical advantage as a result of an ability in a distributed organization with distributed sales people to allocate some of the promises made to forecast requests to certain sales people, thereby preventing them from simultaneously using the same forecast promise as a promise to a customer, without requiring them to check with each other before making promises. In this embodiment, each sales organization or person can be modeled and each forecast request/promise can be allocated to one such sales entity.

The allocation of promises may also be done for business management reasons. For example, a sales organization may be allocated promises based upon how much they are willing to commit to selling. This embodiment allows each sales entity to create its own forecast of what it could sell and establish the level it is willing to commit to selling. Forecast requests are then generated from the committed levels. Promises made to those requests become allocated to that sales entity for it to use to form promises for customer requests.

An embodiment of the invention provides a technical advantage in that it allows these sales entities to be

organized into hierarchies (for example, sales person within sales office within marketing organisation). Promises that are allocated to a sales organization can be used by the sales people within that organization. Coordination is required in such cases to ensure that two sales people do not consume the same promises. But where such coordination is feasible, it is typically desirable to have some allocations that are common among them.

An embodiment of the invention provides a technical advantage in that customer requests that cannot currently be promised can be queued. As conditions change, the queued requests have the first opportunity to be promised. Without such a queuing mechanism, requests that cannot be promised are forgotten. When new capacity frees, the next customer that happens to make a request gets that newly freed capacity.

An embodiment of the invention provides an additional technical advantage in that an entire distributed organization of suppliers and customers can be modeled along with the requests and promises placed between them. In this way, planners can view, manage, and plan the activity of a whole network where the interfaces between elements must be formal (separate corporations).

An embodiment of the present invention also enables each sales entity to define the "products" it sells, where a product is an item priced based on the item, the quantity, the order lead time (time from accepting the order to the requested due date), and the customer. For each such product, an independent forecast and commitment can be made, independent forecast requests can be issued, and independent promises can be received. In this way,, promises can be allocated for requests with particular characteristics. For example, one product may sell an item for $5 if the order lead time is greater than 6 weeks. Another product may sell the same item for $10 but with as

short as 1 week lead time. Thus, a customer request with 6 week order lead time may be received when all allocations for that product have been consumed. However, if all the allocations for the 1 week order lead time product have not been consumed, then the customer can be given an option: the next available promise for the 6 week order lead time product would be 2 weeks later than your due date, or alternatively you may choose to pay $10 for the 1 week order lead time product and to receive it on time. Such management of products can prevent higher future profits for being sold at lower profits because they are promised first-come-first-served.

An embodiment of the invention provides a further technical advantage in that the forecast requests can specify how they expire. Some may shift out in time if they are not consumed; others may expire and disappear if not consumed. Such auto-maintenance of forecast requests can be very valuable in maintaining accurate forecasts and allocations for hundreds or thousands of products.

An embodiment of the present invention is described hereinafter, by way of example only, with reference to the accompanying drawings in which like reference numbers indicate like features, and wherein:

FIGURE 1 is a block diagram of one embodiment of a supply chain model, including site models and seller models, and requests and promises between them;

FIGURE 2 illustrates one embodiment of a forecast entry for one of several forecast periods for one of several products within a seller;

FIGURE 3 illustrates one embodiment of a time horizon with forecast requests and actual requests showing the time horizon moving as time passes and the forecast requests adjusting in response; and

FIGURE 4 illustrates one embodiment of a seller model hierarchy and a product group hierarchy within a seller.

The Supply Chain, Site, and Seller Models

Figure 1 is a block diagram of one embodiment of a supply chain model, including site models and seller models, and requests and promises between them. FIGURE 1 provides an example of a supply chain according to the present invention. The supply chain model of FIGURE 1 comprises twelve site models, 12, 14, 16, 18, 20, 22, 24, 30, 32, 34, 36, and 38. These site models represent organizational units that may have the capacity and materials to produce or consume items. Each site can place requests for items upon other sites. Requests are in general indicated in FIGURE 1 by triangles 52, 62, 72, and 74. For each request 52, 62, 72, and 74, the site 12, 14, 16, 18, 20, 22, 24, 30, 32, 34, 36, or 38 being requested can make a promise to fulfill (wholly or partially) that request. Promises are in general indicated by inverted triangles 54, 64, and 76.

Other primary members of a supply chain model are seller models. The embodiment of a supply chain of FIGURE 1 consists of a single seller model 50. The seller model 50 is partially depicted in FIGURE 2 and consists of a list of products 110 that seller 50 offers for sale. A product model 110 defines the supplier site, the item at that site, a minimum order lead time, a minimum quantity, and the allowed customer sites. If a customer request fits those criteria of a product, then that request is eligible to be filled by that product, at the pricing specified by that product.

FIGURE 2 illustrates one embodiment of a forecast entry for one of several forecast periods for one of several products within a seller. For each product 110, a forecast horizon 112 is laid out. Forecast horizon 112

can be broken up arbitrarily. In this embodiment, three 1-week periods (the first being 114) are followed by three 1-month periods. For each forecast period for each product, a forecast-entry 116 is generated. The 'forecasted' and 'committed' values can be filled in. The value 'forecasted' is the seller's estimate for how much could be sold of that product 110 during that period. The value 'committed' is the quantity the seller is willing to commit to selling.

The committed quantity results in 'forecast' requests being generated in an amount equal to the committed quantity, spread out through the corresponding forecast period according to a forecast policy specified by the product 110. In the embodiment of FIGURE 2, the committed amount results in generation of requests 120 and 124, spaced out in the period 114. The site on which the requests 120 and 124 were placed (specified by the product 110) can then issue promises. Assuming promises 122 and 126 are made for requests 120 and 124, respectively, the value of 'allocated' in the forecast entry 116 for period 114 will be the sum total of the promised quantities.

The allocated amount is the summary amount the seller has available to promise customer requests. When customer request 128 arrives to the seller for product 110 during period 114, the seller can take one or both (or part of one or both) promises that it has already received, break them up or combine them to form a promise for the customer request. The forecast requests are simultaneously adjusted down by the amount of the customer request. So, for example, if the committed value of forecast entry 116 was 500 units, the two forecast requests 120 and 124 were for 250 units each, the two promises 122 and 126 were received for 200 units,

and the customer request 128 was for 300 units, then the two forecast requests 120 and 124 will be adjusted to a total of 200 (i.e., 200 and 0 or 100 and 100 or some other combination, dependent upon the product's forecast policy). The two promises 122 and 126 will be adjusted to a total of 100, and a new promise 130 will be created for 300 units to satisfy request 128. The 'committed' and 'allocated' values of forecast entry 116 do not change as a result, but the 'requested' and 'promised' values do. When 'promised' is equal to 'allocated', then there are no more promises available for promising customer requests.

This process is also depicted in the supply chain model example of FIGURE 1. In FIGURE 1, seller 50 generates forecast request 52 on site 22 for delivery to site 30 (which need not be a physical site). Request 52 results in site 22 generating operation 56 to perform the activity involved in delivering the requested items to site 30. If operation 56 is feasible to perform, then site 22 may choose to create promise 54 to seller 50 that the item can be delivered as requested by request 52.

Site 34 then places request 62 through seller 50 for the same product as request 52. If that customer request 62 is consistent with what seller 50 was forecasting, then seller 50 can reduce request 52, promise 54, and operation 56 by the amount of request 62, and then add promise 64 and operation 66 to fulfill request 62. That simple action did not require replanning through site 22. Effectively, the ability of site 22 to satisfy request 62 had been pre-computed in the form of promise 54. Thus, that promise 54 can be split in order to form promise 64.

A primary caveat is that the load and times of the operation 56 may not be valid when split into operation 66. For example, if operation 56 involved using a truck

to transport the items, then splitting out operation 66 may result in an additional truck being used. If none was available, then operation 66 may have to wait. To compensate for this, each product defines criteria for splitting promises, which can include an amount of time with which to pad the due dates quoted.

Of the site models that make up a supply chain model (as in FIGURE 1), some of the sites can be under the control of that supply chain model, while others can be modeling sites which are planned independently. A field of the site model called 'managed' indicates which sites are managed by this supply chain model and which are not. Two sites that are both managed do not need to make formal promises between each other -- the request will generate an operation and all changes to the requests are immediately passed through the operation to the other site. Requests between a managed Site and an unmanaged site require formal promises. The promises must be made explicitly, and once accepted constitute a rigid agreement between two Sites. Changing that agreement requires both sites' consensus.

Adjustment as Time Passes

Forecasts are often, by their nature, wrong. Thus, as time passes and customer requests arrive faster or slower than expected, it is desirable to modify the forecasts as appropriate. Given a large number of products and numerous forecast periods, automated adjustment is highly desirable.

Thus, the product forecast policy can specify how the forecasted and committed quantities should be adjusted as time passes and actual Requests are received or not.

FIGURE 3 illustrates one embodiment of a time horizon with forecast requests and actual requests showing the time horizon moving as time passes and the forecast requests adjusting in response. The timeline 200 represents the initial state. Forecast requests 202, 204, 206, and 208 have been made in their respective forecast periods. Customer requests are indicated with triangles, as shown. The two customer requests 222 correspond to forecast request 202. The three customer requests 224 correspond to forecast request 204.

Time passes and no more requests are received. The timeline 210 represents that later state. Time has advanced beyond the forecast period of the forecast request 202. The customer requests 222 received during that period were less than that forecast request. One option is to assume the forecast was too high and simply expire the leftover forecast. Another option is to assume the forecast quantity is right, but that the timing is off -- that the total quantity will be requested soon. In the latter case, the forecast request should be moved forward in time and reduced in quantity. This is shown as forecast request 212. There are many other options for how to expire, reduce, or increase forecast requests based on the arrival rate of customer requests that can be encoded in the product's forecast policy.

Allocation to Sellers

FIGURE 4 illustrates one embodiment of a seller model hierarchy and a product group hierarchy within a seller. FIGURE 4 shows two Seller hierarchies. Seller 410 represents an Industrial Products marketing division, and seller 420 represents a Consumer Products marketing division. Within Industrial Products 410, there are

three sales offices that each handle a region: the North is handled by seller 412; the South is handled by seller 414; the West is handled by seller 416. Each sales office is made up of numerous sales people, who are each represented by a seller (for example, Joe is seller 418 and Sally is seller 419).

In many organizations, the sellers may own their own allocations against which they can promise to their customers without consulting the company. However, sellers need not own any allocations. For example, Joe 418 and Sally 419, along with the other sellers in the South sales office 414, may each forecast what they intend to sell. Those forecasts are aggregated up to the sales office seller 414, where they are used as an input. The seller 414 can independently forecast for the whole sales office. That, in turn, is allocated up to the Industrial Products 410 division.

Clearly, forecast requests should not be generated for the forecasts at all three levels -- that would result in triple the requests appropriate.

Instead, each seller can independently commit to selling some or all of the forecast. By committing, forecast requests are created in order to obtain promises which can be used to promise their customers. Those promises are owned by (or controlled by) that seller that committed to selling that amount.

However, it may be that some sellers do not commit at all. For example, none of the salespeople, including Joe 418 and Sally 419 commit to any of the forecast. Instead, the South sales office 414 commits as a whole. That results in allocations to the South Seller 414. Those allocations can be used by any of the sub-sellers, such as Joe 418 and Sally 419. However, such collective usage of the allocations requires coordination. They

must reserve the amount they need before they can actually promise it, since the other sales people may be considering using the same allocations.

A seller is committed to anything its sub-sellers commit to. However, a seller can commit to additional, beyond what the sub-sellers commit to. For instance, each sales person may make a conservative commitment. The sales office will know that some of the sales people will surely sell over their commitment, but it is not clear which sales people. So the sales office can commit to sell additional, and those additional allocations will be available to the first sales people who exceed their personal allocation.

Product Groups

Forecasts tend to be more accurate in aggregate. A monthly forecast will generally be more accurate than a weekly forecast. A forecast for North America will generally be more accurate than a forecast for Texas. Similarly, a forecast for milk will generally be more accurate than for skim milk in pint containers.

Thus, it is important to be able to aggregate up forecasts, modify the aggregated forecasts, and propagate the changes back down to the individual products. The product group model supports this functionality.

Product groups form hierarchies. A product group can have at most one parent product group, and thus can be in at most one product group hierarchy.

Products, on the other hand, can appear in numerous product groups; however, only in one product group of any one hierarchy. A product group defines one consistent hierarchy for aggregation. However, sellers will need to aggregate the products in many different ways. For example, milk products can be aggregated by their

container size (gallon, half gallon, quart, pint), by their fat content (whole, 2%, 1%, skim), by the customer grouping (grocery-store, restaurant, convenience-store), or by brand (ECONO-COW, PUREWHITE).

Various product groups are depicted in FIGURE 4. Products 450, 452, 454, and 456 are grouped into two product group hierarchies, rooted at product groups 430 and 440. Product group 430 is broken down into product groups 432, 434, and 436.

Advanced Available-To-Promise (ATP)

Each seller has allocation (promises) available for the various products sold. When a customer request comes in to a seller, there may be numerous products that match the request. If the lowest cost product can fully satisfy the request (has sufficient quantity by the requested due date), then the request can simply be promised. Otherwise, a decision may be needed. For example, the customer may be able to choose to have it for a low price but a week later than requested, or by the date requested but 10% higher price. It may be that half the order can be completed on time at the lowest price, but the other half can either be delivered later or for a higher price, and so on. Thus, the ATP can be a list of different products (pricings) with different order lead times, minimum quantities, availability dates, and availability quantities.

Extensible Product Model

The product model type has a forecast policy extension selector that allows additional fields and semantics to be added to a product model. Extension selectors are described in more detail in **U.K. Application No. _____, filed on the same date as the present application and entitled**

EXTENSIBLE MODEL NETWORK REPRESENTATION SYSTEM FOR PROCESS PLANNING (Attorney Docket No. N701-6), a copy of which has been placed on the UK Patent Office file for this application and the disclosure of which has been incorporated herein by reference.

In this way, additional forecast information such as forecast error or forecasted variance in either quantity or time or both can be input and used. Additional fields for expected skew during the month can affect how the committed quantity is split out into forecast requests. The expected variance or order arrival rates can affect how forecast requests expire or adjust as time passes, based on the customer requests that have been received.

Although an embodiment of the present invention has been described in detail herein, it should be understood that various changes, substitutions and alternations can be made hereto without departing from the scope of the invention.

For example, although an embodiment of the invention in the form of a computer software system has been described, it will be appreciated that at least some of the functionality of the described embodiment may be implemented by means of special purpose hardware (e.g. an ASIC).

CLAIMS

1. A system for managing available-to-promise and making promises to fulfill customer requests, the system comprising:

at least one seller model representing a seller that is selling at least one product, the seller model operable to forecast for the at least one product and operable to choose commitment levels creating forecast requests;

the forecast requests receiving promises made by supplier sites; and

the promises available to the seller entity to promise to actual customer requests.

2. The system of Claim 1, wherein the at least one seller model can comprise a hierarchy such that allocations to a seller can be used by the seller or any sub sellers and such that commitments made by a seller also commit the related sellers.

3. The system of Claim 1 or Claim 2, wherein the system is a software system located in and executed by a digital computer, the digital computer comprising:

a data storage device;

an execution memory operable to hold the software system; and

a processor coupled to the data storage device and the execution memory, the processor operable to execute the software system.

4. A system for managing available-to-promise and making promises to fulfill customer requests, the system comprising:

a supply chain model representing a chain of supply, the supply chain model comprising:

site models that represent sites having capacity and that manage material flow; and

seller models that represent sellers and that manage forecasting and purchasing;

wherein commitments between sites is modeled by requests and promises; and

wherein the sellers can post requests on behalf of sites in anticipation of future requests from the sites.

5. The system of Claim 4, further comprising a queue that allows rejected requests to be queued for consideration whenever capacity frees up.

6. The system of Claim 4 or Claim 5, wherein the system is a software system located in and executed by a digital computer, the digital computer comprising:

a data storage device;

an execution memory operable to hold the software system; and

a processor coupled to the data storage device and the execution memory, the processor operable to execute the software system.

7. A system for managing available-to-promise and making promises to fulfill customer requests, the system comprising:

a product model representing a product, the product model specifying a supplier site, an item produced by that site, a minimum quantity, a minimum order lead time, a list of customers allowed to purchase, and pricing for the product;

wherein a customer request having desired characteristics matching the product can be fulfilled by a promise of the product;

such that a list of all matching products and associated available promises can be displayed as available-to-promise for the request.

8. The system of Claim 7, wherein the product model

specifies an extension allowing different forecast information to be recorded and used to compute and distribute forecast requests.

9. The system of Claim 8, wherein the product model specifies expiration and adjustment semantics for forecasts as time passes and as actual customer requests arrive faster or slower than expected.

10. The system of any of Claims 7 to 9, wherein the system is a software system located in and executed by a digital computer, the digital computer comprising:

a data storage device;

an execution memory operable to hold the software system; and

a processor coupled to the data storage device and the execution memory, the processor operable to execute the software system.

11. A system substantially as hereinbefore described with reference to the accompanying drawings.

The Patent Office

22

Application No: GB 9611770.0 **Examiner:** Mike Davis
Claims searched: 4-6 **Date of search:** 24 October 1996

Patents Act 1977
Further Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.O): G4A (AUXP,AUXF)

Int Cl (Ed.6): G06F

Other:

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	EP 0425405 A2 (IBM)	4 at least

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

Uber Exhibit 1002 - p. 125
Uber Technologies, Inc. v. SurgeTech, LLC

The Patent Office

23

Application No: GB 9611770.0 **Examiner:** Mike Davis
Claims searched: 7-10 **Date of search:** 24 October 1996

Patents Act 1977
Further Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.O): G4A (AUXP,AUXF)

Int Cl (Ed.6): G06F

Other:

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
	None	

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

Uber Exhibit 1002 - p. 126
Uber Technologies, Inc. v. SurgeTech, LLC

The Patent Office

24

Application No: GB 9611770.0 **Examiner:** Mike Davis
Claims searched: 1-3 **Date of search:** 23 July 1996

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.O): G4A (AUXP,AUXF)

Int Cl (Ed.6): G06F

Other:

Documents considered to be relevant:

Category	Identity of document and relevant passage		Relevant to claims
X	EP 0425405 A2	(IBM)	1 at least
X	US 5128861	(KAGAMI ET AL)	1 at least

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

Uber Exhibit 1002 - p. 127
Uber Technologies, Inc. v. SurgeTech, LLC

(19) JAPANESE PATENT OFFICE

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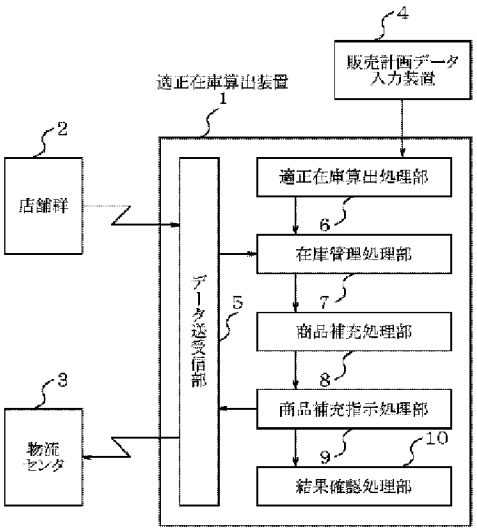
(54) **DEVICE FOR CALCULATING REASONABLE INVENTORY QUANTITY**

(57) Abstract:

PROBLEM TO BE SOLVED: To perform inventory control in accordance with a sales planning by calculating the reasonable inventory quantity of each store of chain stores on the basis of the sales planning of merchandise.

SOLUTION: The reasonable inventory quantity calculating device 1 for calculating the number of merchandise to be supplied of each store of a store group 2 from a relation among the sales quantity and period and inventory quantity and reasonable inventory quantity of the sales planning is provided with a reasonable inventory quantity calculation processing part 6 for calculating reasonable inventory quantity from the sales planning, a inventory control processing part 7 based on POS sales data from the store group 2, a merchandise supplying part for calculating the quantity of merchandise to be supplied from the rank and sales ratio and period of the store, a merchandise supply instruction processing part 9 for instructing the shipping to a physical circulation center, and a result confirmation processing part 10 for confirming the processed result.

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Uber Exhibit 1002 - p. 128
Uber Technologies, Inc. v. SurgeTech, LLC

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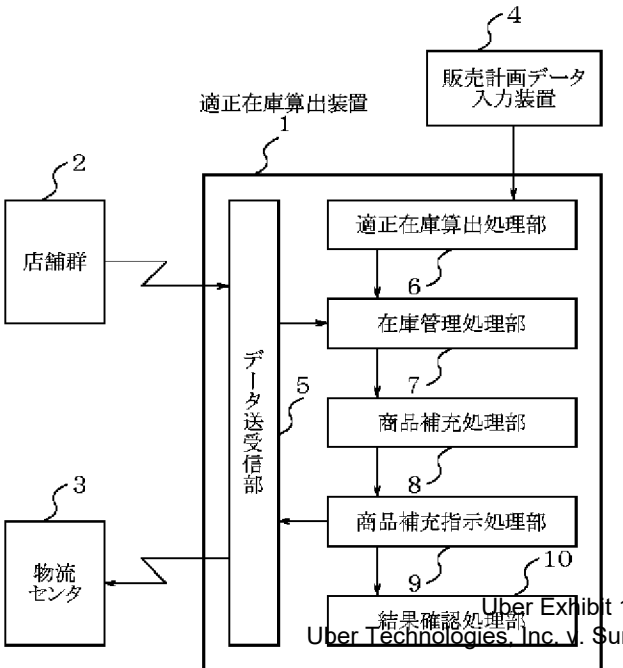
(22)出願日　平成12年６月９日(2000.6.9)

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Ｆターム(参考)　3E042 CD01 CD08 EA01
5B049 AA01 AA06 CC27 EE02 GG01

(54)【発明の名称】　適正在庫量算出装置及びそれの方法

(57)【要約】
【課題】　商品の販売計画より、チェーン店の各店舗の適正在庫を売り出し計画に合わせて算出し、計画に沿った在庫管理を行う。
【解決手段】　店舗群２の各店舗の商品補充数を、販売計画の売上数量と期間と在庫量と適正在庫量の関係より算出する適正在庫算出装置１には、販売計画から適正在庫を算出する適正在庫算出処理部６と、店舗群２からのＰＯＳ売り上げデータに基づく在庫管理処理部７と、店舗のランク及び売り上げ比率及び期間から補充数量を算出する商品補充部８と、物流センタに出荷指示する商品補充指示処理部９と、処理結果を確認する結果確認処理部１０と、を備える。



Uber Exhibit 1002 - p. 129
Uber Technologies, Inc. v. SurgeTech, LLC

【特許請求の範囲】
【請求項１】　チェーン店で販売する商品の商品補充数を、売り上げ量と在庫量と販売計画量とより算出する適正在庫算出装置において、
商品の販売計画を策定する販売計画処理手段と、
チェーン店における各店舗の規模、立地で定まる店舗ランクを設定する店舗ランク設定処理手段と、
販売計画の総販売数量と売り出し期間と店舗数と店舗ランクとから店舗毎の販売数量を算出する手段と、
前記販売数量に基づいて、各店舗毎の適正在庫量を算出する適正在庫算出処理手段と、
を含むことを特徴とする適正在庫量算出装置。
【請求項２】　前記販売計画は、
商品の売り出し計画で定める総販売数量と、
前記売り出し計画に基づいて、販売数量と期間を定める売り出しパターンと、
店舗の規模、立地で定まる店舗ランクで定める販売比率と、
を含むことを特徴とする請求項１記載の適正在庫算出装置。
【請求項３】　前記適正在庫量は、
前記売り出しパターンで定まる期間中の販売数量と、
店舗ランク毎の売り上げ比率と、
店舗ランク別の総店舗数と、
売り出し期間の日数と、
によって、前記販売数量に前記売り上げ比率を掛けて、前記総店舗数で割り、更に、前記日数で割って得られることを特徴とする請求項１記載の適正在庫算出装置。
【請求項４】　前記適正在庫算出装置は、
各店舗からＰＯＳ売り上げデータと、物流センタに対する出庫指示と、を送受するデータ送受信部と、
入力された販売計画に基づいて適正在庫量を店舗毎に算出する適正在庫算出処理部と、
前記ＰＯＳ売り上げデータと店舗毎の適正在庫量に基づいて、売り上げ数、在庫量、適正在庫量を算出する在庫管理処理部と、
前記在庫量及び適正在庫量に基づいて、商品補充する出荷指示量を算出する商品補充部と、
前記出荷指示量を前記物流センタに送付する商品補充指示処理部と、
処理結果を管理する結果確認処理部と、
を備えることを特徴とする請求項１記載の適正在庫算出装置。
【請求項５】　チェーン店で販売する商品の商品補充数を、売り上げ量と、在庫量と、販売計画量と、より適正在庫を算出する適正在庫算出方法において、
商品毎の売り出し計画に基づく総販売数を設定するステップと、
前記売り出し計画に基づく、売り出し期間中の売り上げパターンを設定するステップと、
店舗ランク別の店舗数及び売り上げ比率を算出するステップと、
日別の販売数量を算出するステップと、
日別の販売数量から店舗毎の適正在庫量を算出するステップと、
を含むことを特徴とする適正在庫算出方法。
【請求項６】請求項５の適正在庫算出方法を実行するプログラムを記憶するコンピュータ読み取り可能な記憶媒体。

【発明の詳細な説明】
【０００１】
【発明の属する技術分野】この発明は、一般小売業での商品在庫管理に関し、特に、チェーン店での売り出し計画に基づく、出庫指示業務、在庫管理業務を効率的に行う商品の適正在庫量を算出する装置及よびそれの方法に関する。
【０００２】
【従来の技術】従来技術の特開平９－２１８８９９号公報にあるように、各店舗の在庫管理は、売上げ量と在庫量によって補充量を算出し、発注量を決めている。また、チェーン店の特性を生かすため、同じ地区内のチェーン店内から、不足在庫を補充できるか否かを判定することを行っている。特開平７－２３９８８４号公報によれば、販売計画数と販売実績数とから、販売予測数を算出し、発注量を決めることが説明されている。これらの従来技術は、いずれも実績に基づいて、発注量を決め、在庫を適正に保つ方法である。
【０００３】最近の新商品には、大々的な販売キャンペーンで売り出し、顧客の関心を煽り、販売する場合がある。このような売り出し計画では、チェーン店が連携して、売り出し期間に集中して顧客を集め、新商品を売り上げることが戦略になる。このような新商品や販売戦略の基では、従来の実績に基づく、販売計画や在庫管理は適用できない。実績よりも、立地条件や規模による店舗ランクや売り出し期間が、顧客を集め、販売を伸ばす要因になり、実績に基づく販売計画だけでは不適切である。
【０００４】
【発明が解決しようとする課題】第１の問題点は、過去の販売実績データから適正在庫量を算出する事が難しくなっており、在庫を減らすタイミングが遅れる場合がまま生じ、結果的に余分な在庫を抱える事態が生じている。
【０００５】第２の問題点は、従来の技術では新商品の適正在庫量を算出できない為、各店舗ごとの適正在庫量を人手により設定する必要があった。
【０００６】これらが生じる理由は、チェーン店では、集中的な販売キャンペーンで売り出すため、販売期間を設定して、顧客を集中的に動員するなど、過去の販売データでは予測できないためである。また、チェーン店の

特質に合った適正在庫設定が必要になる。

【０００７】この発明の目的は、新商品の在庫量設定を過去販売データで予測するのではなく、売り出し計画に基づく、販売量や期間やチェーン店の店舗ランクに応じて、適正在庫を算出することにある。

【０００８】

【課題を解決するための手段】そのため、この発明には、チェーン店で販売する商品の商品補充数を、売り上げ量と在庫量と販売計画量とより算出する適正在庫算出装置において、商品の販売計画を策定する販売計画処理手段と、チェーン店における各店舗の規模、立地で定まる店舗ランクを設定する店舗ランク設定処理手段と、販売計画の総販売数量と売り出し期間と店舗数と店舗ランクとから店舗毎の販売数量を算出する手段と、前記販売数量に基づいて、各店舗毎の適正在庫量を算出する適正在庫算出処理手段と、を含む事を特徴とする。

【０００９】更に、前記販売計画は、商品の売り出し計画で定める総販売数量と、前記売り出し計画に基づいて、販売数量と期間を定める売り出しパターンと、店舗の規模、立地で定まる店舗ランクで定める販売比率と、を含むことを特徴とする。

【００１０】更に、前記適正在庫量は、前記売り出しパターンで定まる期間中の販売数量と、店舗ランク毎の売り上げ比率と、店舗ランク別の総店舗数と、売り出し期間の日数と、によって、前記販売数量に前記売り上げ比率を掛けて、前記総店舗数で割り、更に、前記日数で割って得られることを特徴とする。

【００１１】更に、前記適正在庫算出装置は、各店舗からＰＯＳ売り上げデータと、物流センタに対する出庫指示と、を送受するデータ送受信部と、入力された販売計画に基づいて適正在庫量を店舗毎に算出する適正在庫算出処理部と、前記ＰＯＳ売り上げデータと店舗毎の適正在庫量に基づいて、売り上げ数、在庫量、適正在庫量を算出する在庫管理処理部と、前記在庫量及び適正在庫量に基づいて、商品補充する出荷指示量を算出する商品補充部と、前記出荷指示量を前記物流センタに送付する商品補充指示処理部と、処理結果を管理する結果確認処理部と、を備えることを特徴とする。

【００１２】更に、チェーン店で販売する商品の商品補充数を、売り上げ量と、在庫量と、販売計画量と、より適正在庫を算出する適正在庫算出方法において、商品毎の売り出し計画に基づく総販売数を設定するステップと、前記売り出し計画に基づく、売り出し期間中の売り上げパターンを設定するステップと、店舗ランク別の店舗数及び売り上げ比率を算出するステップと、日別の販売数量を算出するステップと、日別の販売数量から店舗毎の適正在庫量を算出するステップと、を含むことを特徴とする。

【００１３】この発明によれば、販売期間が短期間の商品に対して、商品の初期出荷時の在庫量を店舗ごとに算出する必要がない。店舗の規模や立地に基づいた販売計画で在庫量が算出されるので、より正確な在庫管理が実現できる。また、店舗数が多いチェーン等では、販売計画を変更することで、在庫量の適正化を容易に図ることができる。

【００１４】

【発明の実施の形態】この発明の実施の形態について図面を参照して詳細に説明する。図１は、この発明の実施の形態を示している図である。適正在庫算出装置１は、チェーン店を形成する店舗群２と、商品を配送する流通センタ３と、販売計画を入力する販売計画データ入力装置４と、を備える。適正在庫算出装置１には、販売計画データ入力装置４より入力された販売計画データを基に、販売日ごとの適正在庫量を算出して、在庫情報に適正在庫量を反映させる適正在庫算出処理部５と、店舗群２からのＰＯＳ売り上げデータを送受信するデータ送受信部５と、そのＰＯＳ売り上げデータを在庫情報に反映させる在庫管理処理部７と、店舗群２の各店舗に出荷指示量を算出する商品補充処理部８と、店舗群２への出荷指示量に基づいて、物流センタ３への出荷指示量を送出する商品補充指示処理部９と、処理結果を確認する処理結果確認処理部１０と、を備える。

【００１５】図２は、この実施の形態における適正在庫算出処理部１の動作を示すフローチャートである。適正在庫算出装置１はプログラム手段で実行処理される。まず、商品の売り出し計画に基づく、総販売量や期間を販売計画データ入力装置４から入力する（ステップ２１）。入力された総販売量を、期間毎に売り上げ比率を作成し売り上げパターンを設定し、売り上げパターンごとの販売量を算出する（ステップ２２）。店舗群２の各店舗を、規模や立地条件で店舗ランクの設定を行い、ランク別店舗数と、ランク別の売り上げ比率を設定する。なお、各店舗の店舗ランク、売り上げ比率の設定は、商品対応に設定でき、更新も可能である（ステップ２３）。各店舗ランク毎、売り上げパターン毎の適正在庫量を算出する（ステップ２４）。その算出された適正在庫量を、販売期間中の毎日の在庫情報に反映させる（ステップ２５）。以上の手順で、売り出し期間中の各店舗の適正在庫量が自動で算出され、きめ細かな在庫管理及び出荷指示が行える。

【００１６】図３は、図２の手順に基づいた具体例である。販売計画における販売期間が３／１から４／３０の商品の総販売量２００万個に対して、商品発売から１０日間の適正在庫量の算出例である。まず、２００万個の販売計画量を設定する（ステップ３１）。次に、売り上げパターンを販売期間を設定して３パターン作成し、各パターンごとの販売計画量が算出される（ステップ３２、３３）。次に、店舗ランクを定め、店舗ランク毎の売り上げ比率を定める（ステップ３４）。売り上げパターン１の販売期間中の店舗ランク１で、設定された店舗

の適正在庫量は、１，０００，０００÷２，０００×０．６÷１０＝３０で、３０個と算出される（ステップ３５）。後は、ステップ３５で作成された適正在庫量を在庫情報に反映させる。

【００１７】

【発明の効果】第１の効果は、この発明によれば、商品の出荷指示数作成の作業効率が図れる。その理由は、大型チェーンでは、店舗数が多くまた新商品の初回出荷の為に過去販売実績データがない場合でも、売り出し計画に基づいて、売り上げパターンを作成し、適正在庫量を店舗ランク毎に算出することができる為、適正在庫量の算出が容易になる。

【００１８】第２の効果は、在庫量のより詳細なコントロールが実現可能である。その理由は、ＰＯＳ売り上げデータで在庫管理を実施した場合、販売期間が短い商品に対して、過剰在庫になる場合がままあったが、売り出し計画に基づく適正在庫量が算出されるので、過剰在庫を防ぐことができる。

【図面の簡単な説明】

【図１】この発明の実施の形態を示す図である。

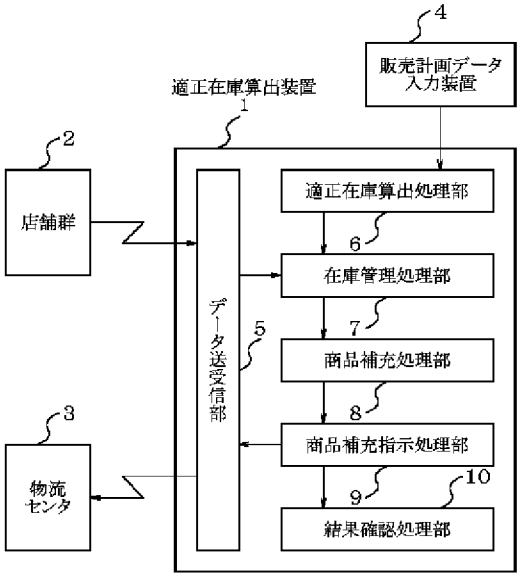
【図２】適正在庫算出装置の動作を示すフローチャートである。

【図３】適正在庫量算出の例示である。

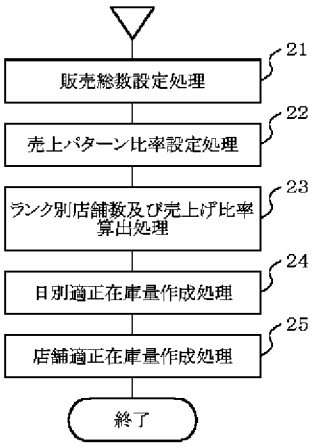
【符号の説明】

１　適正在庫算出装置
２　店舗群
３　物流センタ
４　販売計画データ入力装置
５　データ送受信部
６　適正在庫算出処理部
７　在庫管理処理部
８　商品補充処理部
９　商品補充指示処理部
１０　結果確認処理部

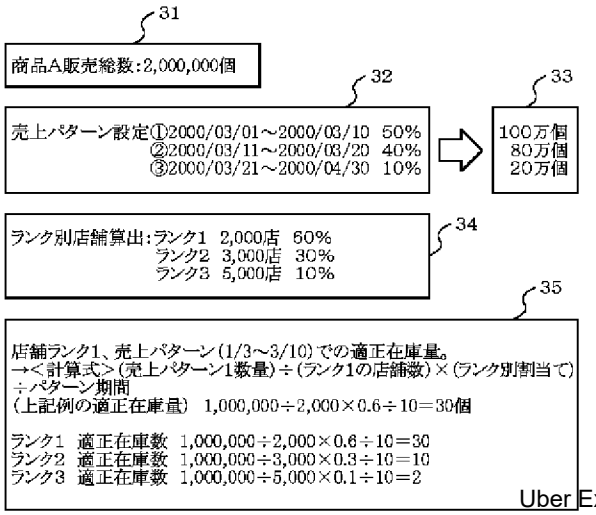
【図１】



【図２】



【図３】



Uber Exhibit 1002 - p. 132
Uber Technologies, Inc. v. SurgeTech, LLC

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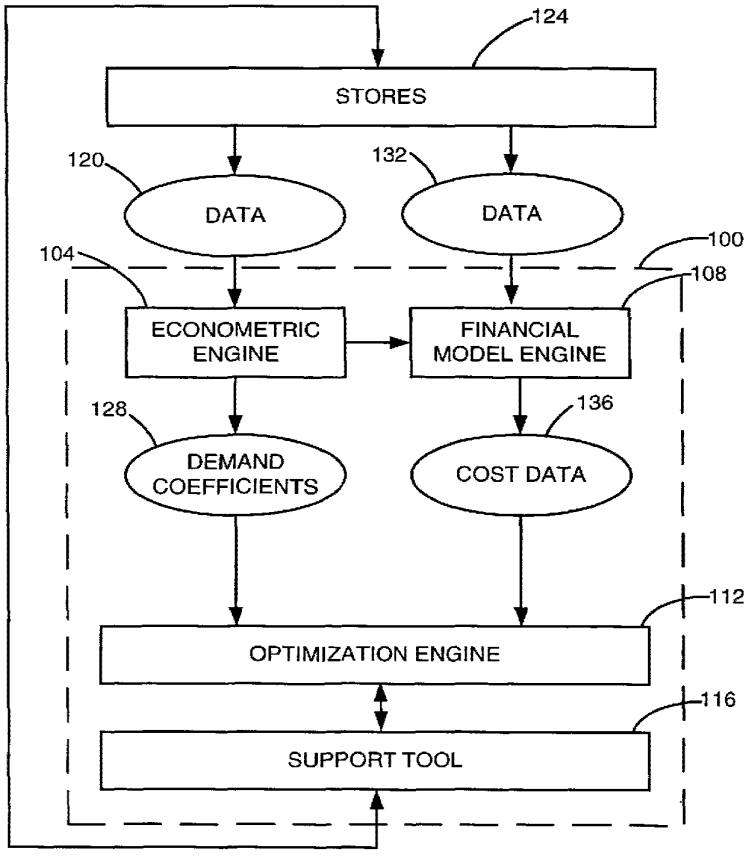
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[Continued on next page]

(54) Title: RULE RELAXATION AND SUBSET OPTIMIZATION SYSTEM



(57) Abstract: A method for computing a preferred set of prices for products in a subset of a plurality of products is provided. Generally, initial prices for a plurality of products are stored. A subset of products of the plurality of products is designated, where the number of products in the subset of products is less than the number of products in the plurality of products. Prices for the products in the subset of products are optimized, while maintaining the initial prices of products of the plurality of products that are not in the subset of products.

WO 03/048893 A2

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PATENT APPLICATION

RULE RELAXATION AND SUBSET OPTIMIZATION SYSTEM

CROSS-REFERENCE TO RELATED APPLICATIONS

This application relates to co-pending and concurrently filed Application No. 09/999,078 (Attorney Docket No. DT.0106) filed November 30, 2001, entitled "Selective Merchandise Price Optimization Mechanism", by Michael Neal, Krishna Venkatraman, Rob Parkin, Suzanne Valentine, Phil Delurgio, Hau Lee, and John Close, which is incorporated by reference herein for all purposes.

BACKGROUND OF THE INVENTION

The present invention relates to providing optimized pricing for a subset of a plurality of products for a plurality of stores.

In businesses, prices of various products must be set. Such prices may be set with the goal of maximizing profit or demand or for a variety of other objectives. Profit is the difference between total revenue and costs. Total sales revenue is a function of demand and price, where demand is a function of price. Demand may also depend on the day of the week, the time of the year, the price of related products, the location of a store, and various other factors. As a result, the function for forecasting demand may be very complex. Costs may be fixed or variable and may be dependent on demand. As a result, the function for forecasting costs may be very complex. For a chain of stores with tens of thousands of different products, forecasting costs and determining a function for forecasting demand are difficult. The enormous amounts of data that must be processed for such determinations are too cumbersome even when done by computer.

It is desirable to provide an efficient process and methodology for determining the prices of individual products such that profit (or whatever alternative objective) is optimized.

During optimization, it may be found that one of the plurality of rules is infeasible. Such a finding of infeasibility may stop the optimization process. It would

Uber Exhibit 1002 - p. 135
Uber Technologies, Inc. v. SurgeTech, LLC

be desirable to provide a method of handling optimization when a rule is found to be infeasible.

It is desirable to update prices as new information about the products and competitive environment is received. Examples of this type of information would include product cost updates, product addition or discontinuance, and new competitive price or base price data. Ideally, when a user receives new information, they would run a secondary optimization over a whole product category. This would allow the optimization to fully capture all of the complementary and substitution effects in selecting the new set of optimal prices. However, if the cost of changing prices is not negligible, optimization and changing prices of all products in a whole product category may not be desirable.

During a price optimization, the prices of hundreds of items may be set for hundreds of stores. It may be difficult to understand the effect of various price changes.

SUMMARY OF THE INVENTION

To achieve the foregoing and other objects and in accordance with the purpose of the present invention, a method for computing a preferred set of prices for a subset of a plurality of products is provided. Generally, initial prices for a plurality of products are stored. A subset of products of the plurality of products is designated, where the number of products in the subset of products is less than the number of products in the plurality of products. Prices for the subset of products are optimized, while maintaining the initial prices of products of the plurality of products that are not in the subset of products.

In another embodiment of the invention, an apparatus for computing a preferred set of prices for a subset of a plurality of products, comprising computer readable media, is provided. Generally, the computer readable media comprises computer readable code for storing initial prices for a plurality of products, computer readable code for designating a subset of products of the plurality of products, wherein the number of products in the subset of products is less than the number of products in the plurality of products, and computer readable code for optimizing prices for the subset of product, while maintaining the initial prices of products of the plurality of products that are not in the subset of products.

Uber Exhibit 1002 - p. 136
Uber Technologies, Inc. v. SurgeTech, LLC

In another embodiment of the invention, a method for setting prices for a subset of products of a plurality of products is provided. Optimized prices for a product category are received. Every item in the product category is priced according to the received optimized prices. New data is then provided. New prices for the subset of products of the product category are then received, where the subset is smaller than the product category, and where the received new prices are generated by storing initial prices for a plurality of products, designating a subset of products of the plurality of products, and where the number of products in the subset of products is less than the number of products in the plurality of products, and optimizing prices for products in the subset of products, while freezing the initial prices of products of the plurality of products in the product category that are not in the subset of products. Prices for the subset of products are then set according to the received new prices.

In another embodiment of the invention, computer data signal embodied in a carrier wave and representing sequences of instructions which when executed by a processor, causes the processor to compute a preferred set of prices for a subset of a plurality of products is provided. Initial prices for a plurality of products are stored. A subset of products of the plurality of products is designated, where the number of products in the subset of products is less than the number of products in the plurality of products. Prices for products in the subset of products are optimized, while maintaining the initial prices of products of the plurality of products that are not in the subset of products.

In another embodiment of the invention a price database is provided. Initial prices for a plurality of products are stored. A subset of products of the plurality of products is designated, where the number of products in the subset of products is less than the number of products in the plurality of products. Prices for products in the subset of products are optimized, while maintaining the initial prices of products of the plurality of products that are not in the subset of products.

In another embodiment of the invention, a method for obtaining optimized price data on a client system is provided. Sales data is sent to a server system for a plurality of products. Optimization preferences are selected. The optimization preferences are sent to the server system. Optimization prices for all of the plurality of products are received from the server system. Additional sales data is sent to the

Uber Exhibit 1002 - p. 137
Uber Technologies, Inc. v. SurgeTech, LLC

server system. A subset constraint is selected. The subset constraint is sent to the server system. A new set of optimization prices for a subset of the plurality of products is received, where the number of products in the subset is less than the number of the plurality of products.

In another embodiment of the invention, a method for forming a plurality of stores into a plurality of clusters is provided. An optimization is performed for the plurality of stores to obtain individual store prices. The individual store prices are used to create the plurality of clusters. An optimization for the plurality of clusters is performed to obtain cluster prices.

In another embodiment of the invention, an apparatus for forming a plurality of stores into a plurality of clusters is provided. Computer readable code for collecting store specific information is provided. Computer readable code for optimizing combinations for each individual store based on the store specific information is provided. Computer readable code for creating clusters based on the closeness of the optimal combinations is provided.

In another embodiment a method for providing prices for items is provided. At least one iteration in a price optimization is performed and a plurality of values is generated. The determined plurality of values is used to generate an indicator of significance of price change. At least one iteration in an indicator of significance of price using the price optimization is performed to obtain optimized prices for the items.

These and other features of the present invention will be described in more detail below in the detailed description of the invention and in conjunction with the following figures.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention is illustrated by way of example, and not by way of limitation, in the figures of the accompanying drawings and in which like reference numerals refer to similar elements and in which:

FIG. 1 is a high level schematic view of a price optimizing system.

Uber Exhibit 1002 - p. 138
Uber Technologies, Inc. v. SurgeTech, LLC

FIG. 2 is high level flow chart of a price optimization process.

FIG. 3 is a more detailed schematic view of an econometric engine.

FIG. 4 is a more detailed schematic view of an optimization engine and support tool.

FIG. 5 is a block diagram to illustrate some of the transaction costs that occur in retail businesses of a chain of stores.

FIG. 6 is a flow chart of a preferred embodiment of a rule relaxation process.

FIG. 7 is an overall flow chart of a process that uses subset optimization.

FIG. 8 is a more detailed flow chart of an embodiment of a step of optimizing product category within subset limits.

FIG.'S 9A and 9B illustrate a computer system, which forms part of a network and is suitable for implementing embodiments of the present invention.

FIG. 10 is a schematic illustration of an embodiment of the invention that functions over a network.

FIG. 11 is high level flow chart of how a clustering process might be used.

FIG. 12 is a more detailed flow chart of a clustering process.

FIG. 13 is graph illustrating item prices by store.

FIG. 14 is a flow chart of another embodiment of the invention.

FIG. 15 is a flow chart of another embodiment of the invention.

FIG. 16 is a generic flow chart of an embodiment of the invention.

FIG. 17 is high level flow chart of an optimization process.

FIG. 18 is a flow chart of a generation of a significance of price change indicator process.

FIG. 19 is a more detailed flow chart of the reoptimization decision process.

Uber Exhibit 1002 - p. 139
Uber Technologies, Inc. v. SurgeTech, LLC

FIG. 20 is a flow chart of an image metric generation process.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The present invention will now be described in detail with reference to a few preferred embodiments thereof as illustrated in the accompanying drawings. In the following description, numerous specific details are set forth in order to provide a thorough understanding of the present invention. It will be apparent, however, to one skilled in the art, that the present invention may be practiced without some or all of these specific details. In other instances, well known process steps and/or structures have not been described in detail in order to not unnecessarily obscure the present invention.

To facilitate discussion, FIG. 1 is a schematic view of a price optimizing system 100, which may be used in rule relaxation and subset optimization. The price optimizing system 100 comprises an econometric engine 104, a financial model engine 108, an optimization engine 112, and a support tool 116. The econometric engine 104 is connected to the optimization engine 112, so that the output of the econometric engine 104 is an input of the optimization engine 112. The financial model engine 108 is connected to the optimization engine 112, so that the output of the financial model engine 108 is an input of the optimization engine 112. The optimization engine 112 is connected to the support tool 116 so that output of the optimization engine 112 is provided as input to the support tool 116 and output from the support tool 116 may be provided as input to the optimization engine 112. The econometric engine 104 may also exchange data with the financial model engine 108.

To facilitate understanding, FIG. 7 is an overall flow chart of a process that uses subset optimization 700. First, a product category is optimized (step 701). A demand group is defined as a set of products that are substitutes or near substitutes for each other. A product can belong to only one demand group. A product category consists of one or more demand groups. FIG. 2 is a more detailed flow chart of a preferred embodiment of a process that utilizes the price optimizing system 100 to optimize prices for a product category (step 701). Data 120 is provided from the store

Uber Exhibit 1002 - p. 140
Uber Technologies, Inc. v. SurgeTech, LLC

computer systems 124 to the econometric engine 104 (step 204). Generally, the data 120 provided to the econometric engine 104 may be point-of-sale information, product information, and store information. The econometric engine 104 processes the data 120 to provide demand coefficients 128 (step 208) for a set of algebraic equations that may be used to estimate demand (volume sold) given certain marketing conditions (i.e. a particular store in the chain), including a price point. The demand coefficients 128 are provided to the optimization engine 112. Additional processed data from the econometric engine 104 may also be provided to the optimization engine 112.

The financial model engine 108 may receive data 132 from the store computer systems 124 (step 216) and processed data from the econometric engine 104. The data 132 received from the stores is generally cost related data, such as average store labor rates, average distribution center labor rates, cost of capital, the average time it takes a cashier to scan an item (or unit) of product, how long it takes to stock a received unit of product and fixed cost data. The financial model engine 108 may process the data to provide a variable cost and fixed cost for each unit of product in a store. The processing by the econometric engine 104 and the processing by the financial model engine 108 may be done in parallel. Cost data 136 is provided from the financial model engine 108 to the optimization engine 112 (step 224).

The optimization engine 112 utilizes the demand coefficients 128 to create a demand equation. The optimization engine is able to forecast demand and cost for a set of prices and promotion conditions such as store displays and ads to calculate net profit. The stores 124 may use the support tool 116 to provide optimization rules to the optimization engine 112 (step 228). The optimization engine 112 may use the demand equation, the variable and fixed costs, and the rules to compute an optimal set of prices that meet the rules (step 232). For example, if a rule specifies the maximization of profit, the optimization engine would find a set of prices that cause the largest difference between the total sales revenue and the total cost of all products being measured.

If a rule providing a promotion of one of the products by specifying a discounted price is provided, the optimization engine may provide a set of prices that allow for the promotion of the one product and the maximization of profit under that

Uber Exhibit 1002 - p. 141
Uber Technologies, Inc. v. SurgeTech, LLC

condition. The rules normally include an objective, such as optimizing profit or optimizing volume of sales of a product and constraints such as a limit in the variation of prices

When profit is maximized, it may be maximized for a sum of all measured products. Such a maximization, may not maximize profit for each individual product, but may instead have an ultimate objective of maximizing total profit. The optimization provides a plurality of values such as optimized prices. The demand equation may be used to provide the optimization and to provide a plurality of values such as elasticities, margins, cost, and revenues.

Other embodiments may use other types of optimization processes and other demand models and other methods to generate a plurality of values.

The optimal (preferred) set of prices may be sent from the optimization engine 112 to the support tool 116 so that the stores 124 may use the user interface of the support tool 116 to obtain the optimal set of prices. Other methods may be used to provide the optimal set of prices to the stores 124. The price of the products in the stores 124 is set to the optimal set of prices (step 236), so that a maximization of profit or another objective is achieved.

Each component of the price optimizing system 100 will be discussed separately in more detail below.

FIG. 3 is a more detailed view of the econometric engine 104. The econometric engine comprises an imputed variable generator 304 and a coefficient estimator 308. The data 120 from the stores 124 is provided to the imputed variable generator 304. The data 120 may be raw data generated from cash register data, which may be generated by scanners used at the cash registers. The raw data may be processed to create imputed variables. The imputed variables may be used to estimate parameters for a demand equation D(x), which may be used to estimate the amount of sales using variables such as price.

In a preferred embodiment of the invention, sales for a demand group (S) is calculated and a market share (F) for a particular product is calculated, so that demand (D) for a particular product is estimated by D=S•F. A demand group is defined as a

Uber Exhibit 1002 - p. 142
Uber Technologies, Inc. v. SurgeTech, LLC

collection of highly substitutable products. More preferably the creation of the demand model relies on a mixed-model framework, simultaneously utilizing information across all stores and products in a client category, where a category is defined as a collection of substitutable or complementary products. The mixed model methodology is also referred to as "Bayesian Shrinkage" Modeling, because by combining data from various stores and/or products, one can "shrink" individual parameter estimates towards the average estimate, dampening the extreme values that would result if traditional regression were used.

In developing product-level volume models for each store within a chain, one may be presented with a wide range of historical data in terms of modeling sufficiency. For some stores and/or products, the history will be quite rich, with many price changes and a variety of promotion patterns. For other stores and/or products, the history will be quite sparse, with very few price changes and little promotional activity. To maximize the stability of estimated model parameters, one might consider developing a single regression model across stores and/or products. This model might have stable parameter estimates; however, it would not fully leverage the store and/or product variability, and the resulting model would likely not predict well for a particular store and/or product. On the other hand, one might consider developing individual regression models for each store and/or product, to utilize the specific information contained in the data history. While these models might fit and predict well for the stores and/or products with substantial price variability, models would not be estimable for stores and/or products without a rich data history.

A mixed-model framework addresses the need for both highly predictive models and the existence of an estimable model for each store and product. In a mixed-effect model, information (in the form of data history) is leveraged across all stores and products, and a single cohesive model is built. Stores and products with little or no information in their data history default to an "average" (fixed-effect) model. Likewise, stores and products with a wealth of information in their data history will end up with unique parameter estimates tailored to their response pattern, via estimation of non-zero store and/or product-specific adjustment factors (random effects) which are added to the fixed-effect portion of the model.

Uber Exhibit 1002 - p. 143
Uber Technologies, Inc. v. SurgeTech, LLC

The financial model engine 108 receives data 132 from the stores 124 and may receive imputed variables and data from the econometric engine 104 to calculate fixed and variable costs for the sale of each item. To facilitate understanding, FIG. 5 is a block diagram to illustrate some of the transaction costs that occur in retail businesses of a chain of stores. The chain of stores may have a headquarters 504, distribution centers 508, and stores 512. The headquarters 504 may place an order 516 to a manufacturer 520 for goods supplied by the manufacturer 520, which generates an order placement cost. The manufacturer 520 may ship the goods to one of the distribution centers 508. The receiving of the goods by the distribution center 508 generates a receiving cost 524, a cost for stocking the goods 528, and a cost for shipping the goods 532 to one of the stores 512. The store 512 receives the goods from one of the distribution centers 508 or from the manufacturer 520, which generates a receiving cost 536 and a cost for stocking the goods 540. When a customer purchases the item, the stores 512 incur a check-out cost 544. With the large number of retail chains, different purchasing and delivery processes may be used. Even within a single chain, different manufacturers may provide different invoicing and delivery procedures and costing system, which may be different than the processes illustrated in FIG. 5.

The financial model engine 108 should be flexible enough to provide a cost model for these different procedures. These different costs may have variable cost components where the cost of an item is a function of the amount of sales of the item and fixed cost components where the cost of an item is not a function of the amount of sales of the item. The financial model engine 108 may use these fixed and variable costs to determine $C_{s,i,k,t}$, where $C_{s,i,k,t}$, is a cost for a particular product (k) given a store (s), demand group (i), and a day (t). The financial model engine 108 may use industry data to provide standard estimates. For example, instead of measuring how long it takes to stock a box of an item, an industry data may be used to estimate this time. The standard estimates helps to reduce the amount of data that must be collected. In a preferred embodiment of the invention, the stores may only need to supply labor costs of the stores and distribution centers, cost of capital, size of an item, and number of items in a case to allow a cost modeling. By using these estimations, costs may be more easily calculated on a store level, instead of being averaged over all of the stores. This is because if large amounts of data were

Uber Exhibit 1002 - p. 144
Uber Technologies, Inc. v. SurgeTech, LLC

measured by hand, measuring such data for each store would be difficult. The tailoring of costs per store allows the maximization of profits for each store.

FIG. 4 is a more detailed schematic view of the optimization engine 112 and the support tool 116. The optimization engine 112 comprises a rule tool 404 and a price calculator 408. The support tool 116 comprises a rule editor 412 and an output display 416.

In operation, the client (stores 124) may access the rule editor 412 of the support tool 116 and provides client defined rule parameters (step 228). If a client does not set a parameter for a particular rule, a default value is used. Some of the rule parameters set by the client may be constraints to the overall weighted price advance or decline, branding price rules, size pricing rules, unit pricing rules, line pricing rules, and cluster pricing rules. These rules will be discussed in more detail regarding a preferred embodiment of the invention. The client defined parameters for these rules are provided to the rule tool 404 of the optimization engine 112 from the rule editor 412 of the support tool 116. Within the rule tool 404, there may be other rules, which are not client defined, such as a group sales equation rule. The rule parameters are outputted from the rule tool 404 to the price calculator 408. The demand coefficients 128 and cost data 136 are also inputted into the price calculator 408. The client may also provide to the price calculator 408 through the support tool 116 a desired optimization scenario rules. Some examples of scenarios may be to optimize prices to provide the optimum profit, set one promotional price and the optimization of all remaining prices to optimize profit, or optimized prices to provide a specified volume of sales for a designated product and to optimize price. The price calculator 408 then calculates optimized prices. The price calculator 408 outputs the optimized prices to the output display 416 of the support tool 116, which allows the stores 124 to receive the optimized pricing (step 232).

The system can optimize for profit, revenue, and sales. For each type of objective, users can impose constraints on the values of the other two. For instance a user can optimize profit while ensuring that total sales and revenue do not fall below their original values, or he/she can optimize sales while requiring profit to increase by 1%.

Uber Exhibit 1002 - p. 145
Uber Technologies, Inc. v. SurgeTech, LLC

A preferred embodiment of the optimization engine uses the group sales equation S(x) and the market share equation F(x), previously described, to predict group sales and product market share, respectively. These two are then combined to predict product sales at the store level D(x)=S(x)•F(x).

If the objective is to maximize profit then the following equation sum is maximized:

$$\sum_{i \in G} \sum_{k \in Dem_i} \hat{D}_{s,i,k,t} (P_{s,i,k,t} - C_{s,i,k,t})$$
$$= \sum_{i \in G} \sum_{k \in Dem_i} \hat{F}_{s,i,k,t} \hat{S}_{s,i,t} (P_{s,i,k,t} - C_{s,i,k,t})$$

The above mentioned rules may be constraints forming boundaries. These constraints are rules that provide limitations to price or other changes. In a preferred embodiment such constraints may be used as follows:

1. Group price advance or decline.

Since demand groups are made up of like or substitutable products, managers often wish to constrain the overall weighted price advance or decline in price for them, where the weights are the market shares of the products that constitute the demand groups. The constraints are:

$$\forall s,i\ ,\ PMIN_{s,i} \le \sum_{k} F_{s,i,k} P_{s,i,k} \le PMAX_{s,i}$$

2. Brand Pricing Rules:

Products are described and categorized by attributes such as brand, size and flavor. Therefore, each product may be associated with a set of attributes and values. These attributes are useful to us for several reasons. The attributes may be used in the regression modeling in order to create a parsimonious set of regression coefficients. They may also be used in setting rules. For instance, category managers might wish to offer store brands at lower prices compared to the competing national brands. They might also wish to constrain some product brands to be less expensive than others, either for strategic considerations or to meet their contractual obligations. Specifically, a manager can create a set

Uber Exhibit 1002 - p. 146
Uber Technologies, Inc. v. SurgeTech, LLC

$\text{Brand}_{s,i} \equiv \{(p_{s,i,l_i}, p_{s,i,k_2}) : p_{s,i,k_1}$ must cost less than $p_{s,i,k_2}\}$, which leads to the following constraints:

$\forall s,i$ and $(p_{s,i,k_1}, p_{s,i,k_2}) \in Brand_{s,i}\ p_{s,i,k_1} \le p_{s,i,k_2}$

3. Size Pricing Rules:

Managers might also wish to create rules that relate the price of one product versus another based on their sizes. For instance, they might wish for products belonging to the same brand and sharing other attributes, but with different sizes to be priced such that the larger sized product costs less per equivalent unit of measure than a smaller one. Then $\text{c Size}_{s,i} \equiv \{(p_{s,i,l_i}, p_{s,i,k_2}) : p_{s,i,k_1}$ must cost less than $p_{s,i,k_2}\}$, and create a set , which leads to the following constraints:

$\forall s,i$ and $(p_{s,i,k_1}, p_{s,i,k_2}) \in Size_{s,i}\ p_{s,i,k_1} \le p_{s,i,k_2}$

4. Unit Pricing Rules:

Continuing in the same vein, managers might wish to ensure that two products that are identical in every respect but size should be priced such that the larger product costs more than the smaller one. This rule is closely related to the size pricing rule. To implement this rule, managers can create a set $\text{Unit}_{s,i} \equiv \{(p_{s,i,l_i}, p_{s,i,k_2}) : e_{s,i,k_1} p_{s,i,k_1}$ must cost less than $e_{s,i,k_2} p_{s,i,k_2}\}$, where $e_{s,i,k}$ is the multiplicative factor to convert equivalent units into whole product units. This leads to the following constraints:

$\forall s,i$ and $(p_{s,i,k_1}, p_{s,i,k_2}) \in Unit_{s,i}\ e_{s,i,k_1} p_{s,i,k_1} \le e_{s,i,k_2} p_{s,i,k_2}$

5. Line Pricing Rules:

Retail customers expect common prices for certain groups of products such as, for example, cough lozenges of the same brand but different flavors. These rules may be classified as line pricing rules and implement them as follows. Product groups called line price groups may be defined as $L_l l = 1,..\|L\|$, where every product within a line group must have the same price in a store; i.e.,

Uber Exhibit 1002 - p. 147
Uber Technologies, Inc. v. SurgeTech, LLC

$\forall L_l, l = 1,..\|L\|$, and $\forall k_1, k_2 \in L_l \; P_{s,i,k_1} = P_{s,i,k_2}$

6. Cluster pricing:

Retailers define geographic and other regions within which they maintain the same price for a given product. This may be translated to the notion of store clusters. A store cluster $Cluster_c$ is a set of stores such that the price of every product is invariant within the cluster. In other words, every product has the same price in every store within the cluster although each product may have a different price. In order to implement these constraints the set of stores may be partitioned into store clusters $Cluster_1,...,Cluster_{\|c\|}$ where $C \equiv \{\text{Cluster}_1,...,\text{Cluster}_{\|C\|}\}$, and a new price variable $P_{c,i,k}$ which represents the common price for product k in cluster $Cluster_c$ may be defined. This variable may be used in place of the original price variable $P_{s,i,k}$ whenever $s \in Cluster_c$.

Other rules may also be used. An example of such additional rules may be, but is not limited to, a gross margin rule, a store volume rule, or a competition rule.

A gross margin rule provides a constraint on the change of a mark up. A gross margin rule may provide a constraint on the change of the mark up of each individual item in a group or on the average mark up of the group or both. An example of a gross margin rule may be that the percentage change of the average gross margin of a group is not to exceed 5%.

A volume rule provides a constraint on the change or the volume of sales. The volume rule may provide a constraint on the change of volume of sales for each individual store or on the change of total volume of sales for a plurality of stores for an individual product or for a plurality of products. An example of a volume rule may be that for each store, the change of demand for a product is not to exceed 7%.

A competition rule provides a constraint on the difference between a competing store's prices and their prices. A competition rule may allow constraints for one or more competitors. An example of a multiple competition rule is that the price of each item must not exceed the price for the same item sold by competitor store X by more than 10% of the price and must not exceed the price of the same item

Uber Exhibit 1002 - p. 148
Uber Technologies, Inc. v. SurgeTech, LLC

sold by competitor store Y by more than 9% of the price. To implement these constraints a store may use monitors to check prices of items in competitor store X and competitor store Y.

The objective (such as profit) is then maximized. Such an objective would provide a maximized profit given the demand data and the constraints.

RULE RELAXATION

Given the objective and the plurality of constraints the solution may be infeasible due to a conflict between the objective and the plurality of constraints. The objective may be expressed as an equation. Each constraint may also be expressed as an equation. A feasible solution may not exist that satisfies all equations representing the objective and the constraints. A preferred embodiment of the invention uses a rule relaxation process to provide a feasible solution when a feasible solution does not exit which satisfies all constraints and objectives.

During an optimization, it may be found that a rule is infeasible. A rule is determined to be infeasible, if either it cannot be satisfied when all other rules are satisfied or if an optimization cannot be performed without violating the rule. Although, one method of dealing with an infeasible rule is to drop the rule found to be infeasible, the preferred embodiment of the optimization step uses the rule relaxation process described below:

FIG. 6 is a flow chart of a preferred embodiment of the rule relaxation process. The rules are prioritized (step 604). A default prioritization may be provided, with an interface, which may allow a user to change the prioritization from the default. A check is made to see if a rule is infeasible (step 608). A rule is deemed to be infeasible if the relationship expressed by the rule is not able to be satisfied. For instance a rule $X+Y \leq 10$, is violated for when X is 7 and Y is 7 since then $X+Y=14$ which is greater then 10. If no rule is found to be infeasible, the rule relaxation process is stopped (step 628). If at least one rule is found to be infeasible, the lowest priority infeasible (LPI) rule is found (step 612). A determination is made whether rules with lower priorities than the priority of the LPI rule may be relaxed to allow the LPI rule to become feasible (step 616). In the preferred embodiment the lower priority rules are checked before higher priority rules. If it is found that rules with

Uber Exhibit 1002 - p. 149
Uber Technologies, Inc. v. SurgeTech, LLC

lower priorities than that priority of the LPI rule may be relaxed to a point that allows the LPI rule to become feasible, then these rules with lower priorities are relaxed incrementally so that the LPI rule becomes feasible (step 620). In the preferred embodiment, lower priority rules are relaxed before higher priority rules. If it is found that rules with lower priorities than the priority of the LPI rule cannot be relaxed to allow the LPI rule to become feasible, then the LPI rule is relaxed until it becomes feasible (step 624). The rules are then rechecked to see if there are any remaining rules that are infeasible (step 608). This process is continued until all rules are feasible.

Example

To provide an example of rule relaxation, six categories of rules are provided. According to the method illustrated in the flow chart of FIG. 6, the categories of rules are prioritized (step 604) in the following order, with a ranking of 1 designating the category of rules with the highest priority and 6 designating the category of rules with the lowest priority.

1. Group price advance or decline rules. The user sets a maximum weighted group price advance or decline to 10%.

2. Size pricing rules. The user goes with the default that larger items cost less per equivalent unit than smaller identical items.

3. Brand pricing rules. For soft drinks, the user designates that the price of Brand A is never less than the price of Brand B. For juices the user designates that Brand C is always greater than Brand D.

4. Unit pricing rules. The user goes with the default that the overall price of larger items is greater than the overall price of smaller identical items.

5. Competition rules. The user designates that all prices must be at least 10% less than the prices of the same items sold by competitor X and are within 2% of the prices of the same items sold by competitor Y.

6. Line price rules. The user designates that different flavors of the same item are priced the same.

Uber Exhibit 1002 - p. 150
Uber Technologies, Inc. v. SurgeTech, LLC

In this example, Brand A is sold by competitor Y for $8, while Brand B is sold by competitor Y for $10. In addition competitor Y sells one flavor of item C for $9 and another flavor of the same item C for $10.

A determination is made if a rule is infeasible (step 608). It is found that one of the price branding rules is infeasible, since Brand A is supposed to always have a price greater than the price of Brand B and yet competitor Y sells Brand A for $8 and Brand B for $10, and since the competition rules designate that the same items must be within 2% of the prices of competitor Y. In addition, it is found that one of the line price rules is infeasible. This is because the line price rule constrains different flavors of the same item to be the same, but competitor Y is selling one flavor for $9 and another flavor for $10.

Since the branding rules have a priority of 3 and the line price rules have a priority of 6, it is found the line price rules are the lowest priority infeasible (LPI) rules (step 612). A check is made to see if rules with a priority lower than 6 may be relaxed so that the line price rules become feasible (step 616). Since the line price rules are the lowest priority rules, no rule with a lower priority may be relaxed so that the line price rule becomes feasible. As a result, the line price rule is relaxed allowing the different flavors to have different prices by about 10% (step 624).

The process then returns to step 608 to see if any rules are still infeasible. It is found that one of the price branding rules is infeasible, since Brand A is supposed to always have a price greater than the price of Brand B and yet competitor Y sells Brand A for $8 and Brand B for $10, and since the competition rules designate that the same items must be within 2% of the prices of competitor Y. Since the price branding rules are the only rules found to be infeasible, they are found to be the lowest priority infeasible (LPI) rules with a priority of 3 (step 612). A check is made to see if rules with priorities lower than the LPI rules may be relaxed to allow the LPI to be feasible (step 616). Preferably, the lower priority rules are checked first. So first the line price rules with a priority of 6 are checked to see if they may be relaxed to allow the branding price rules to be feasible. If not, then the next lowest priority rules, the competition rules are checked to see if they may be relaxed to allow the branding rules to be feasible. In this example, it is found by relaxing a competition rule with a priority of 5 the price branding rule becomes feasible. Therefore the

Uber Exhibit 1002 - p. 151
Uber Technologies, Inc. v. SurgeTech, LLC

competition rule is relaxed so that prices are within about 20% of the prices of competitor Y, which allows Brand A and Brand B to have the same price (step 620).

The process again returns to step 608 to see if any rules are still infeasible. It is found that all rules are now feasible, and the rule relaxation process is stopped (step 628).

In the preferred implementations, the specific infeasible solution at which the optimization process stops will depend on the optimization algorithm and the initial starting point. This means that specific rules that are relaxed in order to get to feasibility depend on both the optimization algorithm and the starting values These examples are merely illustrative and are not meant to limit the scope of the invention. In addition, rule priority was assigned by rule category. In other embodiments the rule priority may be assigned to individual rules instead of to rule categories.

Other specific methods of rule relaxation may be used. In general, rule relaxation methods provide for the prioritization of rules and cause lower priority rules to be relaxed before relaxing higher priority rules in order to make all resulting rules feasible. Another specific embodiment of this general rule relaxation method may allow different combinations of lower priority rules to be relaxed. These lower priority rules may be relaxed at the same rate or at different rates until the higher priority rule becomes feasible. Different combinations of the relaxation of lower priority rules may be specified in different embodiments.

Once the optimization (step 701) is completed, the prices of the products are sent to the stores. The prices of the products are then set to the optimized prices that are provided by the optimization.

SUBSET OPTIMIZATION

After an optimization, such as the optimization described above has been performed, new data may then be provided to the system (step 703). Such data may be provided through the Econometric Engine 104 (FIG. 1) or the Financial Model Engine 108, or through another source. If the entire product category was optimized using the new data, it is possible that all items in the product category would change because of the new data. To avoid an optimization that may cause a repricing of all

Uber Exhibit 1002 - p. 152
Uber Technologies, Inc. v. SurgeTech, LLC

products in the product category (since the cost of repricing is not negligible), the user is allowed to specify subset limits (step 705). An example of such subset limits would be a maximum number N of products that may be repriced. A new optimization is performed using the new data, where the optimization is constrained to comply with the subset limits (step 707). For example, if a maximum number N of products may be repriced, the optimization provides an optimization with price changes of no greater than N products. Since the price of no more than N products is changed, instead of possibly the price of all products of the category, only a subset of the product category is optimized. The subset optimization may use the results of the previous optimization as initial values.

The subset optimization may choose the products that comprise this subset in a way that has the largest impact on the client's objective function. If, for example, the client's objective is to maximize profit, it is desirable to populate the subset of products whose prices are allowed to change with those products that are most likely to have the largest impact on profit. In one way of doing this, all of the available products may be ranked by their marginal contribution to the objective and then the subset of products whose prices are allowed to change is selected via mixed integer program.. The prices of all of the products not in the "optimal" subset may be frozen to provide a variant of the original scenario to obtain a new set of optimized prices.

A restatement of the process in FIG. 7, is as follows: The optimization of a product category may performed as discussed in the previous sections (step 701) to provide optimal prices, demand functions and constraints for all of the products considered in the product category. All of the input data used in the initial optimization of the product category and $\overline{p}^{*}_{Cluster_c}$, the set of optimal prices derived from that data, may be used to provide initial conditions and parameters for the subset optimization.

Changes to the state of information that the user wishes to incorporate into the new optimization are also provided (step 703). For changes in costs, base price, or competitive prices, the change in the data from the original scenario measured as a percentage of base price is used. For discontinued or new products, the input data required to construct their demand functions and constraints as they would have been defined in the original optimization, as well as an initial starting base price, are used.

Uber Exhibit 1002 - p. 153
Uber Technologies, Inc. v. SurgeTech, LLC

The subset limits, such as the maximum number of products that the user wishes to allow in the subset optimization, are specified (step 705). One possible assumption for an algorithm may be that the maximum number is at least as large as the number of products with information changes. A new optimization is then performed within the subset limits (step 707).

FIG. 8 is a more detailed flow chart of an embodiment of the step of optimizing product category within subset limits (step 707). A first step constructs a set of products that will be considered as candidates for the subset to be optimized (step 801). A second step chooses which of the candidates will be members of the subset (step 803), for example, by solving a mixed integer problem. A third step finds the new optimal prices for the products in the subset while holding the prices of the other goods at their prior optimal level (step 805).

Construction of the Set of Candidates for Subset Optimization

The purpose of this step is to define a set of products, C, which will be candidates for subset optimization (step 805). In defining this set, priority is given to two distinct types of products: those products that have had changes in their state of information, and those products that have constraints that would allow their price to move if they are selected to be members of C.

Products with changes in state information are automatically included in C and in the subset of products to be optimized. The second group of products is chosen based on characteristics of their constraints and the direction of the gradient of the price variables with respect to the objective function at the incumbent optimal price. It is desirable to only choose products whose prices will actually be able to move in the subset optimization. If a product's price is at a bound in the original scenario and the gradient of the price variable indicates that the price will continue in the direction of the bound if the bound is relaxed, then the price will not move in the subset optimization since it will still hit that bound. If, however, the product's price was initially not at a bound or if it is at a bound but the gradient indicates that the price would move away from the bound if it were relaxed, then it would be expected that this price would change, if it is included in the subset optimization. In order to discover the direction of the gradient of prices at their previous optimal price, a simple model is formulated that evaluates the original objective function while

Uber Exhibit 1002 - p. 154
Uber Technologies, Inc. v. SurgeTech, LLC

allowing prices to vary slightly from their previous optimal level, $\bar{p}^*_{Cluster_c}$. This model consists of the fundamental model equations that define demand group sales, market share, the user-defined objective function, and simple bounds holding prices within a small neighborhood of their previous optimal values. For a profit-maximizing problem, the model might be formulated as:

$$\text{Max} \sum_{i \in Gk \in Dem_i} \hat{D}_{s,i,k,t}(P_{s,i,k,t} - C_{s,i,k,t})$$

$$\bar{p}^*_{Cluster_c} - \delta \le P_{s,i,k} \le \bar{p}^*_{Cluster_c} + \delta, \qquad \forall s,i,k$$

where δ is a small number.

λ^u_k and λ^l_k are defined as the marginal values on the upper and lower bounds defined in the final inequality constraints. These marginal values will be used as a measure of the price gradient as the price moves away from the incumbent optimal price. They, in concert with information about which bounds were active in the original problem, will determine which products are allowed to have price changes in the subset optimization.

Products for the second group should have the freedom to change prices during the subset optimization. To this end, all of the constraints in the initial model are evaluated and three operations are performed. First, a check is performed to see if that constraint was tight for the optimal price in the original scenario. Essentially, this just means that those store-product combinations where the right and left-hand sides of the constraint equations are the same are found. For example, suppose that there is an upper bound on optimal price:

$$P_{c,i,k} \le PMAX_{c,i,k}, \forall i,k$$

where c is the store cluster, i is the demand group, and k is the product. For this rule, all of the store-product combinations where

$$P_{c,i,k} = PMAX_{c,i,k}, \forall i,k$$

would be found.

Rule relaxation, discussed above, may have been utilized in the original optimization. As discussed above, rule relaxation allows the optimization to automatically relax constraints subject to a hierarchy defined by the user. Since the subset optimization is based on the original constraints of the initial scenario, it is possible to have optimal prices from the initial scenario that are infeasible with

Uber Exhibit 1002 - p. 155
Uber Technologies, Inc. v. SurgeTech, LLC

respect to some of the original constraints because those constraints were relaxed in the first scenario optimization. The second operation relaxes the bound on any store-product combinations for which the incoming optimal price is infeasible. Thus, for an upper price bound, we would set $PMAX_{c,i,k}$ equal to $P_{c,i,k}$.

The third procedure changes the initial bounds on those products which have had cost, base price or competitive price changes. If the cost, base price, or competitive price has increased, it is desirable to increase the upper bound constraints so that the optimal price is allowed to move. The upper price bound, for example, would become

$$P_{c,i,k} \le PMAX_{c,i,k}\ (1+\xi_{c,k}), \forall i,k$$

where $\xi_{c,k}$ is percentage change in cost or price with respect to base price. If the cost has increased, it is also desirable to raise the lower bound to prevent the price from flipping from the upper to the lower bound. The corresponding lower price bound would be

$$P_{c,i,k} \ge Max\left(PMAX_{c,i,k}\ (1-\lambda_{c,k}), \overline{p}^{*}_{Cluster_c}\right) \forall i,k$$

where $\lambda_{c,k}$ is a scaling factor for the allowable price region and $\overline{p}^{*}_{Cluster_c}$ is the optimal price for that product from the original scenario. If the cost or price has declined, then the lower price bound would become

$$P_{c,i,k} \ge PMIN_{c,i,k}\ (1-\xi_{c,k}), \forall i,k$$

and the upper bound becomes

$$P_{c,i,k} \ge Min\left(PMIN_{c,i,k}\ (1+\lambda_{c,k}), \overline{p}^{*}_{Cluster_c}\right) \forall i,k$$

For constraints on the average price of a demand group, the bound is changed by the market share weighted average change in the cost or price relative to initial base price.

The set of candidates for subset optimization, *C*, may now be constructed as follows:

For each store, product and constraint:

1. Initialize *C* to include all available products.
2. If $\lambda_k^l > 0$ or $\lambda_k^u < 0$, then $k \notin C$
3. If constraint is an active upper bound on price and $\lambda_k^u > 0$, then $k \notin C$

Uber Exhibit 1002 - p. 156
Uber Technologies, Inc. v. SurgeTech, LLC

4. If constraint is an active lower bound on price and $\lambda_k^l < 0$, then $k \notin C$
5. If product has change in the state of information, then $k \in C$

Selection of the Set of Products for Subset Optimization

In selecting the N products that will comprise the set of products, *R*, which are allowed to have price changes in the subset optimization, a simple mixed integer problem is solved. A binary variable, r_k, is created that indicates whether or not a given product is chosen to become a member of *R*. An objective function is the sum of these binary variables weighted by the maximum marginal value on each product's price obtained in the step of constructing the set of candidates for subset optimization. The only constraint is that the number of products chosen must be less than *n*, the user-defined maximum number of products allowed in the subset optimization minus the number of products with changes in the state of information. This problem can be written as

$$\underset{r}{Max}\left[\sum_{k\in C} r_k \cdot Max\left(\left|\lambda_k^l\right|,\left|\lambda_k^u\right|\right)\right]$$

subject to

$$\sum_{k\in C} r_k \le n .$$

The set of products, *R*, may be defined to be considered in subset optimization as $k \in R : \{(k \in C \mid r_k = 1) \cup (k \in C \mid k \text{ has change in state})\}$.

Optimize Prices over the Product Subset R

The price variables of products that are not members of *R* are fixed and this new problem is solved with a complete optimization, such as the initial optimization described above, except that prices not in the subset are held fixed. Regression models and the predictive equations from the econometrics models are used to construct the optimization model. For example, the objective may be to maximize profit:

$$\sum_{i\in G}\sum_{k\in Dem_i} \hat{D}_{s,i,k,t}\left(P_{s,i,k,t} - C_{s,i,k,t}\right)$$

Uber Exhibit 1002 - p. 157
Uber Technologies, Inc. v. SurgeTech, LLC

subject to constraining price changes to be within a given range of current prices.

$$PMIN_{s,i,k,t} \le P_{s,i,k,t} \le PMAX_{s,i,k,t}$$

To simplify notation, the time index may be removed from the equations. So the objective becomes:

Maximize: $\sum_{i \in G} \sum_{k \in Dem_i} \hat{D}_{s,i,k}(P_{s,i,k} - C_{s,i,k})$.

When the subset optimization is completed and prices are optimized over the subset (step 805) a unique subset optimized data package is provided. The data package of the new prices for the subset of products is provided to the stores. The prices for the products in the subset, which is a smaller set than all of the products, are changed (set) according to the optimized subset prices.

The subset optimization may be repeated several times between a complete optimization allowing all prices to change. For example, after subset optimization, new data may be provided. A user may specify new subset limits or use the previous subset limits. A new subset optimization may then be performed, using the specified subset limits and holding any frozen prices to the prices provided by the previous subset optimization.

In addition to the constraints listed above, the preferred embodiment may model several other business rules via constraints. These include limits on group price advance or decline, brand pricing rules, size pricing rules, and line pricing rules, as discussed above.

INTELLIGENT CLUSTERING SYSTEM

In examining purchase data, it is found that geographical price zones (clustering by geography alone) may reduce profits by as much as 60%.

To facilitate understanding FIG. 16 is a broad flow chart of an embodiment of the invention. Store specific information is collected (step 1604). Such store specific information may be individual store point-of-sales data, cost data, or customer survey data. The store specific information is used and processed to provide optimal combinations fore each individual store (step 1608). In the specification and claims, the use of the word "optimal" may mean a value or combination or selection that is

Uber Exhibit 1002 - p. 158
Uber Technologies, Inc. v. SurgeTech, LLC

determined through the use of an algorithm as the best result found by the algorithm. Since optimization may be a complex process, the optimal result may not be the absolute best result but may be a localized best result. Clusters of stores are then formed based on the closeness of the optimal combinations for each store (step 1612). New cluster based combinations are then provided (step 1616).

To facilitate discussion, FIG. 11 is a flow chart of a process intelligently clustering stores, which is an example of an embodiment of the invention. In this example store specific point-of-sales and cost data has already been collected. First, an optimization is performed using the point-of-sales and cost data(step 1104). Preferably, the same optimization is performed for all stores. In this preferred embodiment, the prices are provided on a store-by-store basis, instead of by groups of stores. In addition, in this example the prices are also provided on an item-by-item basis. The result of this optimization provides an optimal product and price combination for each store.

FIG. 12 is a more detailed flow chart of a preferred embodiment of step 1108 for creating clusters (groups) based on the closeness of the optimized product and price combinations for each store. Constraints may be provided (step 1204). Examples of such constraints are prohibiting certain stores from being within the same cluster, forcing certain stores to be in the same cluster, setting a maximum number of clusters, and setting a minimum cluster size. The forcing certain stores to be in the same cluster may be used to place geographically close stores in the same cluster or to place stores with similar traits, such as being in a downtown area or near a freeway exit, in the same cluster.

Stores with the closest prices and which meet the constraints are then grouped together in clusters (step 1208). There may be many different approaches to clustering stores with the closest prices. Such clustering may attempt to minimize the sum of differences or distances in prices between stores in a cluster.

FIG. 13 is a chart of an example of four stores, which are formed into two clusters, with each store carrying item X and item Y. Table 1 below provides a list of the prices for items X and Y per store.

Uber Exhibit 1002 - p. 159
Uber Technologies, Inc. v. SurgeTech, LLC

TABLE 1

STORE\ITEM	ITEM X	ITEM Y
STORE 1	$6.00	$10.00
STORE 2	$6.00	$9.00
STORE 3	$9.00	$7.00
STORE 4	$8.00	$6.00

The prices are plotted in FIG. 13 for store 1 (1304), store 2 (1308), store 3 (1312), and store 4 (1316) with the price of item X plotted along the horizontal axis and the price of item Y plotted along the vertical axis. A distance may be calculated by: $\text{Distance} = \sqrt{(\text{Price}_{s,x} - \text{Price}_{s,x})^2 + (\text{Price}_{s,y} - \text{Price}_{s,y})^2}$, where s is for one of the stores. This distance may be calculated between all possible store pair combinations. Table 2 illustrates the distances for all pairings.

TABLE 2

	DISTANCE
STORE 1 AND STORE 2	1
STORE 1 AND STORE 3	4.24
STORE 1 AND STORE 4	4.47
STORE 2 AND STORE 3	3.61
STORE 2 AND STORE 4	3.61
STORE 3 AND STORE 4	1.41

Therefore, the total distances for each possible cluster pairings are shown in Table 3.

Uber Exhibit 1002 - p. 160
Uber Technologies, Inc. v. SurgeTech, LLC

TABLE 3

CLUSTER	TOTAL DISTANCE
1 WITH 2 AND 3 WITH 4	2.41
1 WITH 3 AND 2 WITH 4	7.85
1 WITH 4 AND 2 WITH 3	8.08

The store pair combination with the lowest distance would be chosen as the best cluster pairing. From Table 3, it can be seen that by putting stores 1 and 2 in one cluster and stores 3 and 4 in another cluster, the total distances between stores within the same cluster are minimized, and therefore the stores are clustered accordingly.

These distances may be weighted according to volume sales by multiplying the distances by revenue.

Various algorithms may be used to actually form clusters. One example of such clustering is the k-means clustering method. The FASTCLUS procedure available in SAS, provided by the SAS Institute, Inc of Cary, North Carolina is one procedure that may be used to create the clusters.

If a store does not sell a particular product, an average price for the product may be calculated and used as the price of the product for the store that does not sell the product, so that the absence of the product does not affect the clustering of the stores. If a constraint requires that two or more stores be placed in the same cluster, their prices may be averaged together and the average price may be used as individual store prices for these stores, so that the clustering algorithm automatically places these stores in the same cluster, since their prices are identical.

After the clusters are created (step 1108), prices for items in the store are set by cluster so that stores within the same clusters have items with the same prices (step 1112). Setting the product and price combinations by cluster is an example of providing cluster based combinations (step 1616). Preferably, the new prices may be obtained by performing a new optimization, where prices are calculated by cluster instead of by store. Such an optimization might be weighted by volume of sales for each store. Table 4 is an example of such an optimization by cluster.

Uber Exhibit 1002 - p. 161
Uber Technologies, Inc. v. SurgeTech, LLC

TABLE 4

STORE\ITEM	ITEM X	ITEM Y
STORE 1	$6.00	$9.60
STORE 2	$6.00	$9.60
STORE 3	$8.50	$6.50
STORE 4	$8.50	$6.50

The prices for the items in store 1 are the same as the prices for store 2, since they are in the same cluster. Similarly, the prices for the items in store 3 are the same as the prices for store 4, since they are in the same cluster. In this example, the prices for the cluster are close to and in between the prices for the individual stores in the cluster derived when the optimization was done on a store-by-store basis. By providing clusters so the prices for each cluster are as close as possible to the prices for an optimization done on a store-by-store basis, the optimization by cluster is kept as close to the optimization on a store-by-store basis, which minimizes the loss of optimization opportunity.

Over time, as more sales data is collected, the new data may be added to iteratively change the clusters over time. Such iteration may limit the number of stores that can change clusters or may have a similar constraint.

In an embodiment of the invention, each store may have a plurality of product categories. Clustering may be according to product categories, so that a store may be in one cluster for one product category and in another cluster for another product category. This clustering may allow more constraints. For example, a product category with perishable items may have a constraint so that stores within a cluster are relatively close together, while a product category with non-perishable items may not have such a constraint.

In another embodiment of the invention, it may be found that for some product categories there may be more products available than what may be offered in each store. For example, there may be more than 500 different soap products, although the stores may only have room to sale 200 products. An optimization engine as described

Uber Exhibit 1002 - p. 162
Uber Technologies, Inc. v. SurgeTech, LLC

above may be used to determine the most profitable combination of products for each store. A chain of 100 stores may have a hundred product combinations. It may be desirable to provide five clusters of product combinations. This embodiment of the invention would provide clusters of stores according to product combinations (assortment zones) for an entire store or a product category. FIG. 14 is a flow chart on a broader embodiment of the invention. Store specific point-of-sales or survey data may be collected. Using the above example of soap products, an optimization may be performed using the store specific data to determine a combination of 200 products of the 500 soap products that would optimize sales on a store by store bases for each of the 100 stores (step 1404). The stores are then clustered into five clusters so that each cluster that a store is placed has the most similar combination of products (step 1408). Stores are then provided an assortment of products (product combinations) according to the cluster that the store is in (step 1412). As mentioned before, such clustering would have lower sales and/or profit than providing individual product combinations for each individual store, but would be designed to maximize sales and/or revenue for different combinations of five clusters. In one embodiment, the prices are set or optimized on a store by store basis. In another embodiment, an optimization may be done where stores in the same assortment zone form price clusters. Stores may be placed in an assortment cluster so that all stores in the same assortment cluster receive the same assortment and also in a price cluster so that all stores in the same price cluster have the same prices.

FIG. 15 is a flow chart of another embodiment of the invention. In this example store specific information may be collected by a survey (step 1554). The survey data is used to provide a store by store promotion combination optimization (step 1558). In one example, 200 products may discussed in the survey. A promotion combination may be a combination of 20 of the 200 products at different discounts and displays. It may be found that each store of 100 stores in a chain has a different promotion combination optimization. Promotion clusters are created to cluster the stores according to how close their promotion combinations are (step 1562). Promotion combinations for each store are then determined by the cluster that the store is in (step 1566)

Other embodiments may be generated according to margins or by metric or according to direction of movement.

Uber Exhibit 1002 - p. 163
Uber Technologies, Inc. v. SurgeTech, LLC

SIGNIFICANCE OF PRICE CHANGE INDICATOR

To facilitate discussion, FIG. 17 is a flow chart of a process providing a price optimization that uses an indicator of significance of a price change. First, an optimization for an objective is performed (step 1704). The optimization may determine optimal prices to obtain an objective, such as maximizing profit, maximizing sales volume, or providing a promotion. The plurality of values is used to generate an indicator of significance of price change (step 1708). In one embodiment, the indicator is a price image metric, which provides a measure of an image impact of a change in price. Preferably the image metric is based on price change, price elasticity and demand (or revenue as its proxy), so that the values provided by optimization and demand equation are optimized prices, elasticities, and the initial revenues of each item to be used in the image metric. In a preferred embodiment, an image metric equation is:

$$\text{Image Metric} = \%\Delta EqP_{i,s}\left(\left(\left(\frac{|\varepsilon_{i,s}|}{|\bar{\varepsilon}_s|}\right)w_\varepsilon\right)+\left(\left(\frac{R_{i,s}}{\bar{R}_s}\right)w_R\right)\right),$$

where EqP = equivalent price, ε = price elasticity, i = item, s = store, w = weight, and R = revenue (initial). The equivalent price of a product is defined as the price of a standardized unit of measure, which may be calculated based on the product description and the spread of sizes/counts that apply to that description. The metric uses the change in equivalent price (%ΔEqP) for a particular item (i) for a particular store (s), which is multiplied by the sum of two weighted index values. The first term of the sum is a normalized elasticity value, which in this example is the absolute value of the elasticity for an item in a store divided by the average elasticity for a range of items in the store multiplied by an elasticity weight value. The second term of the sum is a normalized revenue value, which in this example is the revenue for an item in a store divided by the average revenue for a range of items in the store multiplied by a revenue weight value.

In an example of the working of this equation, an item A may have an original price of $1.00. As a result of an optimization, a new price of $1.10 is provided. This would cause %ΔEqP=10%. Preferably, the elasticity of the item, the average elasticity, revenue of the item, and average revenue may be initial revenue determined from point-of-sale information. In this example, the magnitude of the elasticity of the

Uber Exhibit 1002 - p. 164
Uber Technologies, Inc. v. SurgeTech, LLC

item is 15% higher than the magnitude of the average elasticity, so that $\frac{|\varepsilon_{i,s}|}{|\bar{\varepsilon}_s|}=1.15$. If the weight of the elasticity w_ε is 0.4, then $\left(\frac{|\varepsilon_{i,s}|}{|\bar{\varepsilon}_s|}\right)w_\varepsilon=(1.15)(0.4)=0.46$. In this example, the revenue for the item at the store increases by 20% over the average revenue, so that $\left(\frac{R_{i,s}}{\bar{R}_s}\right)=1.20$. The weight of the revenue w_R is 0.6, so that $w_\varepsilon+w_R=1$. Therefore $\left(\frac{R_{i,s}}{\bar{R}_s}\right)w_R=(1.20)(0.6)=0.72$. Therefore,

$$\%\Delta EqP_{i,s}\left(\left(\left(\frac{|\varepsilon_{i,s}|}{|\bar{\varepsilon}_s|}\right)w_\varepsilon\right)+\left(\left(\frac{R_{i,s}}{\bar{R}_s}\right)w_R\right)\right)=10\%(0.46+0.72)=11.8\%.$$

This metric would then indicate that the increase in price would penalize the image metric of the store by 11.8%.

A large positive percentage change in price would more significantly increase the image metric than a smaller percentage, which indicates that the image would be hurt more. A negative percentage change in price would indicate an improved price image. In addition, a more highly elastic or higher revenue item also would provide a greater effect on the price image.

This metric may be averaged over all items in a range and over a store range to provide an average image metric. This average may be weighted by volume or revenue contribution. The range of items and stores may be the range of items and stores over which the optimization was performed. In the alternative, a select group of items and/or stores may be selected as the range used to provide the image metric.

A reoptimization decision step is then made (step 1712). FIG. 19 is a more detailed flow chart of the reoptimization decision step in an embodiment of the invention. In this embodiment, the indicator of significance of price change and the optimized prices are provided to a client, such as the stores (step 1904). The prices and indicator of significance of price change may be provided to the stores through the support tool 116. Feedback is then received from the client regarding the significance of price change (step 1908). Such feedback may be a request for a lower

Uber Exhibit 1002 - p. 165
Uber Technologies, Inc. v. SurgeTech, LLC

price image metric or that certain price changes be constrained. The feedback may be received through the support tool 116. A decision is made concerning whether or not the feedback requires reoptimization (step 1912). Generally, feedback requiring a reduction of the image metric in this example or a lowering of prices would require a reoptimization, where no change in the image metric and optimized prices would not require a reoptimization. Such feedback may also be used for the initial optimization.

If a reoptimization is desired, an optimization is performed using the significance of price change (step 1716), which includes using feedback regarding the significance of price change and price change in the reoptimization. The feedback may be used to provide a constraint for the reoptimization. A new indicator of significance of price change may be provided from the reoptimization (step 1708). The new indicator of significance of price change and prices may then be provided to the client through the support tool 116, until the client is satisfied with the significance of price changes and the optimized prices. The client may then set prices to the optimized prices (step 1720) and the process is completed.

In another embodiment, unit price may be used instead of the equivalent price to generate an image price metric. In another embodiment, category price may be used.

In another embodiment, a competitive image metric may be calculated as the indicator. The competitive metric provides a measure of a competitive impact of a change in price. Preferably, the competitive metric is based on price elasticity and revenue. In a preferred embodiment, a competitive metric equation is:

$$\text{Competitive Image Metric} = \%\Delta EqP_{i,s}\left(\left(\left(\frac{|\varepsilon_{i,s}|}{|\bar{\varepsilon}_s|}\right)w_\varepsilon\right)+\left(\left(\frac{R_{i,s}}{\bar{R}_s}\right)w_R\right)\right),$$

where EqP = equivalent price, ε = price elasticity, i = item, s = store, w = weight, and R = revenue (initial). The metric uses the difference between the equivalent price for a particular item (i) for a particular store (s) and for the same item for a competitor (%ΔEqP), which is multiplied by the sum of two weighted index values. The first term of the sum is a normalized elasticity value, which in this example is the absolute value of the elasticity for an item in a store divided by the average elasticity for a range of items in the store multiplied by an elasticity weight value. The second term of the sum is a normalized revenue value, which in this

Uber Exhibit 1002 - p. 166
Uber Technologies, Inc. v. SurgeTech, LLC

example is the revenue for an item in a store divided by the average revenue for a range of items in the store multiplied by a revenue weight value.

In another embodiment of the invention, a risk assessment attribute is used as an indicator of significance of price change. In this embodiment, the risk assessment attribute is an indicator of the price change of an item. Such an indicator of price change may use actual price change, percent price change, equivalent price change, percent equivalent price change, or some other similar price change measure.

FIG. 18 is a flow chart of a process that may be used to provide a risk assessment attribute. Attribute ranges are set (step 1804). In one example, five ranges may be provided and ranked from 1 to 5. If a percent price change is used, a user may place price changes of greater than 50% in range 5, percent price changes from 20% to 50% in range 4, percent price changes from 0% to 20% in range 3, percent price changes from -20% to 0% in range 2, and percent price changes for -50% to -20% in range 1. After the optimization (step 1704), in this embodiment the indicator of the significance of the price change (step 1708) is provided by calculating the percentage price changes of each item and placing the percent price changes in the set ranges (step 1808). A graphical indicator is then used to indicate the range that an item is placed. Such a graphical indicator may be a color coding. An example of such a use of color may be by providing a table of optimized prices according to item. The prices, item, or background may be colored according to the range that the percentage price change for the item is placed. The use of color allows a user scanning a table of optimized prices to quickly see which items had a percent price change greater than 50% (range 5) or between 25% to 50% (range 4). In another embodiment, a bar graph or an icon may be used to graphically indicate ranges.

In another embodiment of the invention, the risk assessment attribute may use a volume weighted price change. If the image metric were applied to a group of products, such as a product that comes in different sizes, a volume weighted average may be used to generate an image metric for the product using sales of all the different sizes.

In another embodiment of the invention, the indicator, such as an image metric, may be used as a constraint in the optimization using the indicator of significance of price change (step 1716). A rule used in the optimization may specify a range for the indicator. The optimization using the indicator of significance of price change may then be performed keeping the indicator within the specified range. If the

Uber Exhibit 1002 - p. 167
Uber Technologies, Inc. v. SurgeTech, LLC

optimization is iterated over several cycles, the indicator of significance of price change may be changed over each cycle as new values for price change and elasticities are calculated, causing the constraint to change every iteration.

FIG. 20 is a flow chart of another a process of obtaining an image metric. A price optimization is performed (step 2004). Such price optimization may be a price optimization as described above. The optimization and demand model are used to generate price differences and demand elasticities (step 2008). Other values such as revenues, margins, and sales volumes may also be generated. The price differences and elasticities are used to generate an image metric (step 2012). The generation of the image metric may use the above equations for the image metric or the competitive image metric. Such equations may use revenues to generate the image metric.

FIG'S. 9A and 9B illustrate a computer system 900, which is suitable for implementing embodiments of the present invention. FIG. 9A shows one possible physical form of the computer system. Of course, the computer system may have many physical forms ranging from an integrated circuit, a printed circuit board, and a small handheld device up to a huge super computer. Computer system 900 includes a monitor 902, a display 904, a housing 906, a disk drive 908, a keyboard 910, and a mouse 912. Disk 914 is a computer-readable medium used to transfer data to and from computer system 900.

FIG. 9B is an example of a block diagram for computer system 900. Attached to system bus 920 are a wide variety of subsystems. Processor(s) 922 (also referred to as central processing units, or CPUs) are coupled to storage devices, including memory 924. Memory 924 includes random access memory (RAM) and read-only memory (ROM). As is well known in the art, ROM acts to transfer data and instructions uni-directionally to the CPU and RAM is used typically to transfer data and instructions in a bi-directional manner. Both of these types of memories may include any suitable of the computer-readable media described below. A fixed disk 926 is also coupled bi-directionally to CPU 922; it provides additional data storage capacity and may also include any of the computer-readable media described below. Fixed disk 926 may be used to store programs, data, and the like and is typically a secondary storage medium (such as a hard disk) that is slower than primary storage. It will be appreciated that the information retained within fixed disk 926 may, in

Uber Exhibit 1002 - p. 168
Uber Technologies, Inc. v. SurgeTech, LLC

appropriate cases, be incorporated in standard fashion as virtual memory in memory 924. Removable disk 914 may take the form of any of the computer-readable media described below.

CPU 922 is also coupled to a variety of input/output devices, such as display 904, keyboard 910, mouse 912 and speakers 930. In general, an input/output device may be any of: video displays, track balls, mice, keyboards, microphones, touch-sensitive displays, transducer card readers, magnetic or paper tape readers, tablets, styluses, voice or handwriting recognizers, biometrics readers, or other computers. CPU 922 optionally may be coupled to another computer or telecommunications network using network interface 940. With such a network interface, it is contemplated that the CPU might receive information from the network, or might output information to the network in the course of performing the above-described method steps. Furthermore, method embodiments of the present invention may execute solely upon CPU 922 or may execute over a network such as the Internet in conjunction with a remote CPU that shares a portion of the processing.

In addition, embodiments of the present invention further relate to computer storage products with a computer-readable medium that have computer code thereon for performing various computer-implemented operations. The media and computer code may be those specially designed and constructed for the purposes of the present invention, or they may be of the kind well known and available to those having skill in the computer software arts. Examples of computer-readable media include, but are not limited to: magnetic media such as hard disks, floppy disks, and magnetic tape; optical media such as CD-ROMs and holographic devices; magneto-optical media such as floptical disks; and hardware devices that are specially configured to store and execute program code, such as application-specific integrated circuits (ASICs), programmable logic devices (PLDs) and ROM and RAM devices. Examples of computer code include machine code, such as produced by a compiler, and files containing higher level code that are executed by a computer using an interpreter. Computer readable media may also be computer code transmitted by a computer data signal embodied in a carrier wave and representing a sequence of instructions that are executable by a processor.

Uber Exhibit 1002 - p. 169
Uber Technologies, Inc. v. SurgeTech, LLC

FIG. 10 is a schematic illustration of an embodiment of the invention that functions over a computer network 800. The network 800 may be a local area network (LAN) or a wide area network (WAN). An example of a LAN is a private network used by a mid-sized company with a building complex. Publicly accessible WANs include the Internet, cellular telephone network, satellite systems and plain-old-telephone systems (POTS). Examples of private WANs include those used by multi-national corporations for their internal information system needs. The network 800 may also be a combination of private and/or public LANs and/or WANs. In such an embodiment the price optimizing system 100 is connected to the network 800. Computer systems used by the stores 124 are also connected to the network 800. The computer systems for the stores 124 are able to bi-directionally communicate with the price optimizing system 100 over the network 800.

While this invention has been described in terms of several preferred embodiments, there are alterations, modifications, permutations, and substitute equivalents, which fall within the scope of this invention. It should also be noted that there are many alternative ways of implementing the methods and apparatuses of the present invention. It is therefore intended that the following appended claims be interpreted as including all such alterations, modifications, permutations, and substitute equivalents as fall within the true spirit and scope of the present invention.

Uber Exhibit 1002 - p. 170
Uber Technologies, Inc. v. SurgeTech, LLC

CLAIMS

What is claimed is:

1. An apparatus for computing a preferred set of prices for a subset of a plurality of products, comprising computer readable media, comprising:

computer readable code for storing initial prices for a plurality of products;

computer readable code for designating a subset of products of the plurality of products, wherein the number of products in the subset of products is less than the number of products in the plurality of products; and

computer readable code for optimizing prices for products in the subset of products, while maintaining the initial prices of products of the plurality of products that are not in the subset of products.

2. The apparatus, as recited in claim 1, wherein the computer readable code for designating a subset, comprises:

computer readable code for allowing a number N to be designated; and

computer readable code for selecting no more than N products of the plurality of products to form the subset of products.

3. The apparatus, as recited in claim 2, wherein the computer readable code for selecting no more than N products selects products that provide the greatest optimization for any set of N products of the plurality of products.

4. The apparatus, as recited in any of claims 1-3, further comprising computer readable code for providing initial prices by optimizing prices for all of the plurality of products.

5. The apparatus, as recited in claim 4, further comprising computer readable code for providing new data subsequent to providing initial prices by optimizing prices.

Uber Exhibit 1002 - p. 171
Uber Technologies, Inc. v. SurgeTech, LLC

6. The apparatus, as recited in claim 5, wherein the computer readable code for providing new data comprises computer readable code for providing new price data and computer readable code for providing new bound data.

7. The apparatus, as recited in any of claims 1-6, further comprising computer readable code for providing rule relaxation.

8. The apparatus, as recited in claim 7, wherein the computer readable code for providing rule relaxation comprises:

computer readable code for allowing the prioritization of a plurality of rules; and

computer readable code for relaxing at least one lower priority rule to allow a higher priority rule to become feasible.

9. A method for computing a preferred set of prices for a subset of products of a plurality of products, comprising:

storing initial prices for a plurality of products;

designating a subset of products of the plurality of products, wherein the number of products in the subset of products is less than the number of products in the plurality of products; and

optimizing prices for products in the subset of products, while maintaining the initial prices of products of the plurality of products that are not in the subset of products.

10. The method, as recited in claim 9, wherein the designating a subset comprises:

allowing a number N to be designated; and

selecting no more than N products of the plurality of products to form the subset of products.

11. The method, as recited in claim 10, wherein the selecting no more than N products selects products that provide the greatest optimization for any set of N products of the plurality of products.

Uber Exhibit 1002 - p. 172
Uber Technologies, Inc. v. SurgeTech, LLC

12. The method, as recited in any of claims 9-11, further comprising providing initial prices by optimizing prices for all of the plurality of products.

13. The method, as recited in claim 12, further comprising providing new data subsequent to providing initial prices by optimizing prices.

14. The method, as recited in claim 13, wherein the new data comprises new price data and bound data.

15. The method, as recited in any of claims 9-14, further comprising providing rule relaxation.

16. A method for setting prices for a subset of products of a plurality of products, comprising:

receiving optimized prices for a product category;

pricing every item in the product category according to the received optimized prices;

providing new data

receiving new prices for the subset of products of the product category, wherein the subset is smaller than the product category, wherein the received new prices are generated by storing initial prices for a plurality of products, designating a subset of products of the plurality of products, wherein the number of products in the subset of products is less than the number of products in the plurality of products, and optimizing prices for products in the subset of products, while freezing the initial prices of products of the plurality of products in the product category that are not in the subset of products; and

setting prices for the subset of products according to the received new prices.

17. A computer data signal embodied in a carrier wave and representing sequences of instructions which when executed by a processor, causes the processor to compute a preferred set of prices for a subset of a plurality of products, by performing the steps comprising:

Uber Exhibit 1002 - p. 173
Uber Technologies, Inc. v. SurgeTech, LLC

storing initial prices for a plurality of products;

designating a subset of products of the plurality of products, wherein the number of products in the subset of products is less than the number of products in the plurality of products; and

optimizing prices for products in the subset of products, while maintaining the initial prices of products of the plurality of products that are not in the subset of products.

18. A price database generated by the method comprising:

storing initial prices for a plurality of products;

designating a subset of products of the plurality of products, wherein the number of products in the subset of products is less than the number of products in the plurality of products; and

optimizing prices for products in the subset of products, while maintaining the initial prices of products of the plurality of products that are not in the subset of products.

19. A method for obtaining optimized price data on a client system, comprising the steps of:

sending sales data to a server system for a plurality of products;

selecting optimization preferences;

transmitting said optimization preferences to said server system;

receiving from said server system optimization prices for all of the plurality of products;

sending additional sales data to the server system;

selecting a subset constraint;

sending the subset constraint to the server system; and

Uber Exhibit 1002 - p. 174
Uber Technologies, Inc. v. SurgeTech, LLC

receiving from the server system a new set of optimization prices for a subset of the plurality of products which is less than the plurality of products.

20. A method for forming a plurality of stores into a plurality of clusters, comprising:

collecting store specific information;

providing optimized combinations for each individual store based on the store specific information; and

creating a plurality of clusters based on the closeness of the optimal combinations.

21. The method, as recited in claim 20, further comprising providing cluster based combinations.

22. The method, as recited in any of claims 20-21, wherein the store specific information is selected from a group comprising point-of-sales data, customer survey data, and cost data.

23. The method, as recited in any of claims 20-22, wherein the combinations is selected from a group comprising item and price, assortment, and promotion combinations.

24. The method, as recited in any of claims 20-23, wherein the creating the plurality of clusters, comprises:

providing at least one constraint; and

placing stores that meet the constraints and with the closest optimal combinations in the same cluster of the plurality of clusters.

25. The method, as recited in any of claims 24, wherein the at least one constraint places two stores in the same cluster, by making each store of the two stores have the same optimal combination.

26. The method, as recited in any of claims 24-25, wherein the at least one constraint specifies a maximum number of clusters.

Uber Exhibit 1002 - p. 175
Uber Technologies, Inc. v. SurgeTech, LLC

27. An apparatus for forming a plurality of stores into a plurality of clusters, comprising computer readable media, comprising:

computer code for collecting store specific information;

computer code for providing optimized combinations for each individual store based on the store specific information; and

computer code for creating a plurality of clusters based on the closeness of the optimal combinations.

28. The apparatus, as recited in claim 27, further comprising computer code for providing cluster based combinations.

29. A method for providing prices for items, comprising:

performing at least one iteration in a price optimization and generating a plurality of values;

using the generated plurality of values to generate an indicator of significance of price change; and

performing at least one iteration in an indicator of significance of price change using price optimization to obtain optimized prices for the items.

30. The method, as recited in claim 29, wherein a first set of the plurality of values comprises price differences, wherein the price differences are used to generate the indicator of significance of price change.

31. The method, as recited in claim 30, wherein a second set of the plurality of values comprises elasticities, wherein the elasticities are used to generate the indicator of significance of price change.

32. The method, as recited in claim 31, wherein a third set of the plurality of values comprises revenues for each item, wherein the revenues are used to generate the indicator of significance of price change.

Uber Exhibit 1002 - p. 176
Uber Technologies, Inc. v. SurgeTech, LLC

33. The method, as recited in any of claims 29-32, wherein the performing the at least one iteration in an indicator of significance of price change using price optimization uses the indicator of significance of price change as a constraint.

34. The method, as recited in any of claims 30-33, wherein the price differences are the differences between optimized prices and initial prices.

35. The method, as recited in any of claims 30-33, wherein the price differences are the differences between the optimized prices and competitor prices.

36. The method, as recited in any of claims 29-35, wherein the using the determined plurality of values to generate an indicator of significance of price change comprises providing a graphical indicator to indicate a range in which a price indicator is placed.

37. The method, as recited in any of claims 29-36, further comprising the step of allowing a user to set a plurality of price indicator ranges.

38. The method, as recited in any of claim 36, wherein the graphical indicator is provided by using a different color for each range.

39. The method, as recited in any of claims 29-38, wherein the performing the at least one iteration in the price optimization comprises,

collecting point-of-sales data;

modeling the point-of-sales data;

modeling cost data; and

providing an optimization based on the modeled point of sales data and cost data.

Uber Exhibit 1002 - p. 177
Uber Technologies, Inc. v. SurgeTech, LLC

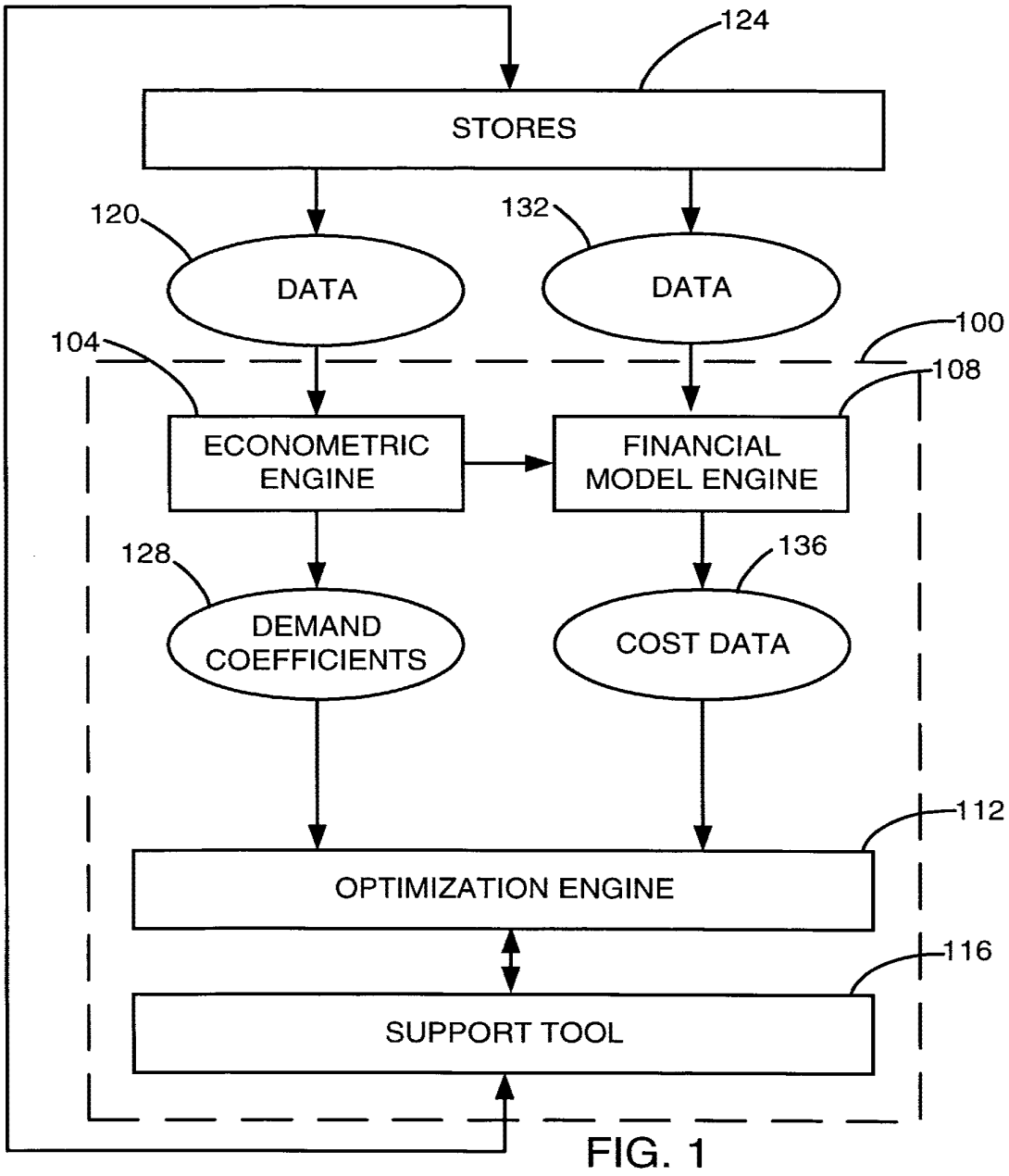

124
STORES
120
DATA
132
DATA
100
104
108
ECONOMETRIC ENGINE
FINANCIAL MODEL ENGINE
128
136
DEMAND COEFFICIENTS
COST DATA
112
OPTIMIZATION ENGINE
116
SUPPORT TOOL

FIG. 1

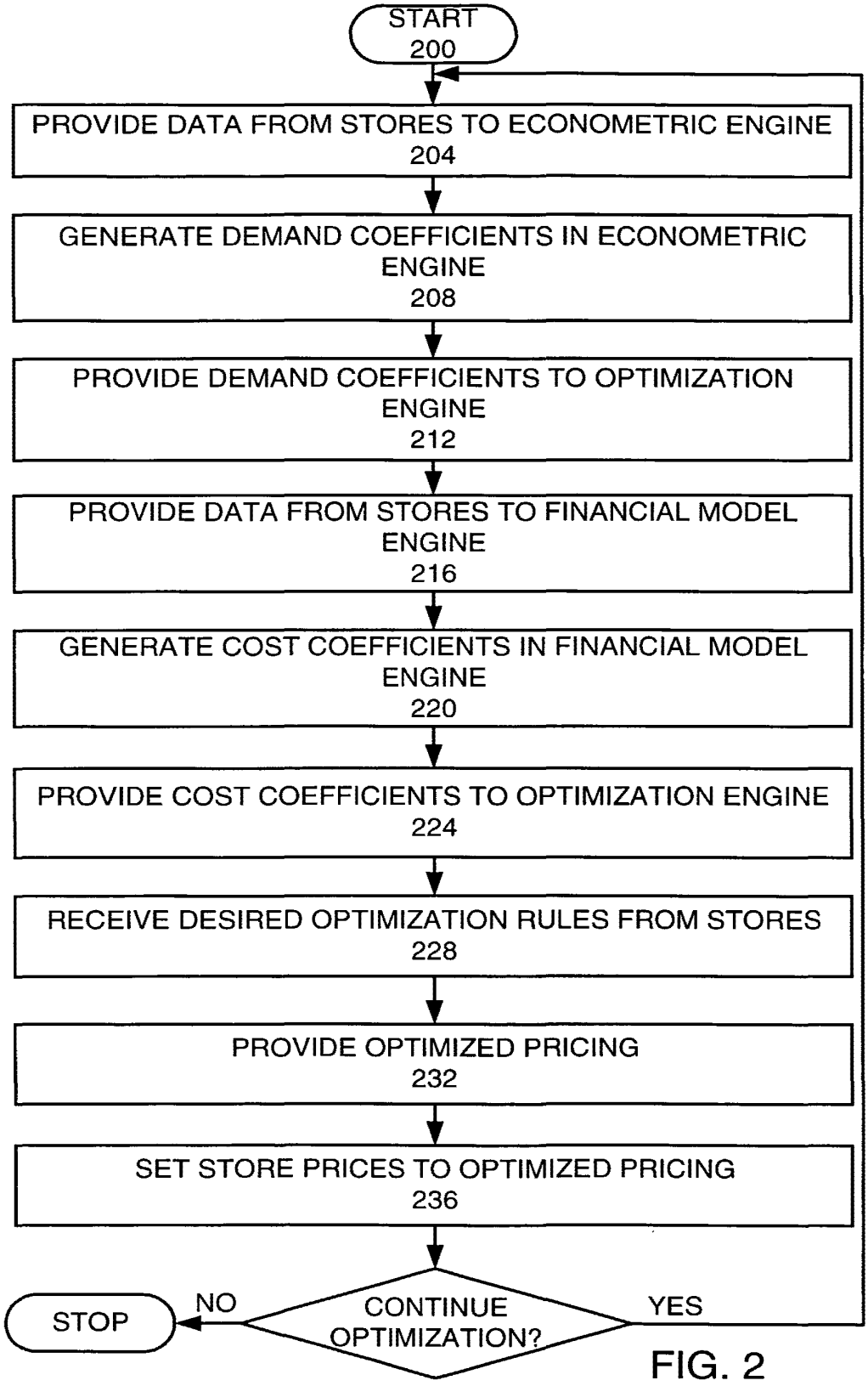

START
200
PROVIDE DATA FROM STORES TO ECONOMETRIC ENGINE
204
GENERATE DEMAND COEFFICIENTS IN ECONOMETRIC ENGINE
208
PROVIDE DEMAND COEFFICIENTS TO OPTIMIZATION ENGINE
212
PROVIDE DATA FROM STORES TO FINANCIAL MODEL ENGINE
216
GENERATE COST COEFFICIENTS IN FINANCIAL MODEL ENGINE
220
PROVIDE COST COEFFICIENTS TO OPTIMIZATION ENGINE
224
RECEIVE DESIRED OPTIMIZATION RULES FROM STORES
228
PROVIDE OPTIMIZED PRICING
232
SET STORE PRICES TO OPTIMIZED PRICING
236
CONTINUE OPTIMIZATION?
NO
YES
STOP

FIG. 2

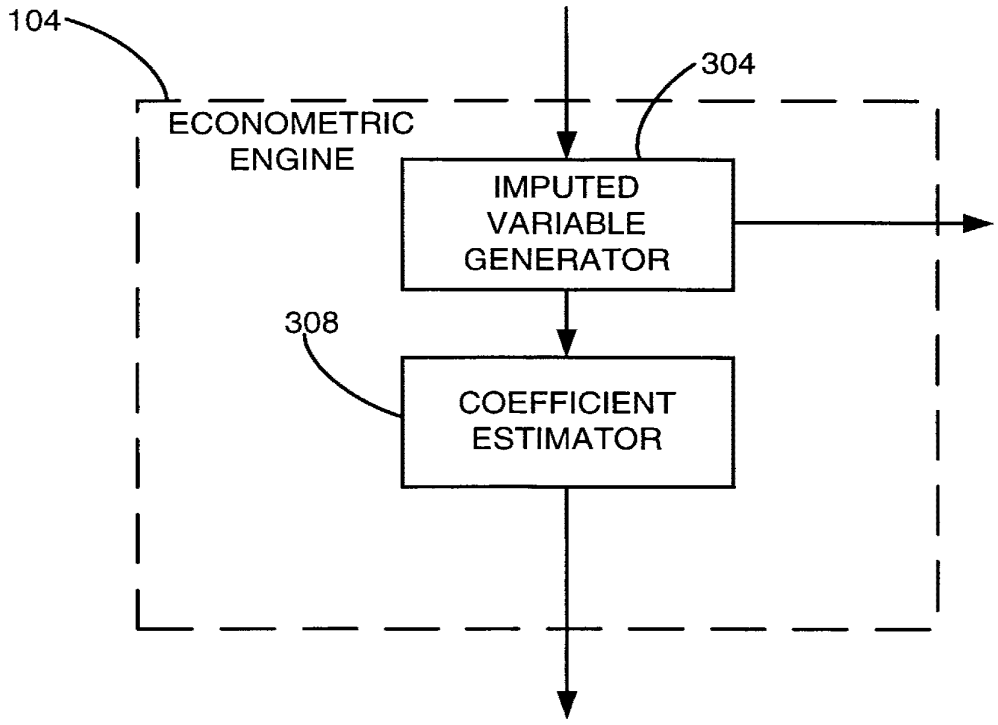

104
ECONOMETRIC ENGINE
304
IMPUTED VARIABLE GENERATOR
308
COEFFICIENT ESTIMATOR

FIG. 3

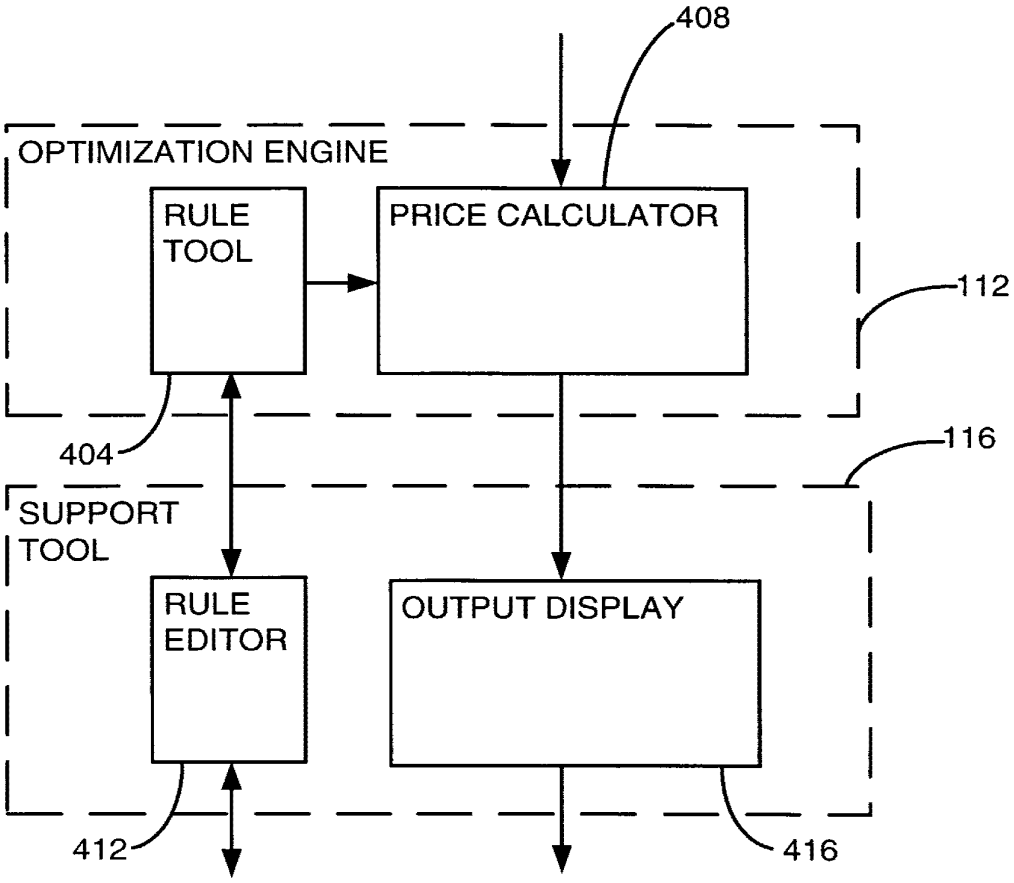

408
OPTIMIZATION ENGINE
RULE TOOL
PRICE CALCULATOR
112
404
116
SUPPORT TOOL
RULE EDITOR
OUTPUT DISPLAY
412
416

FIG. 4

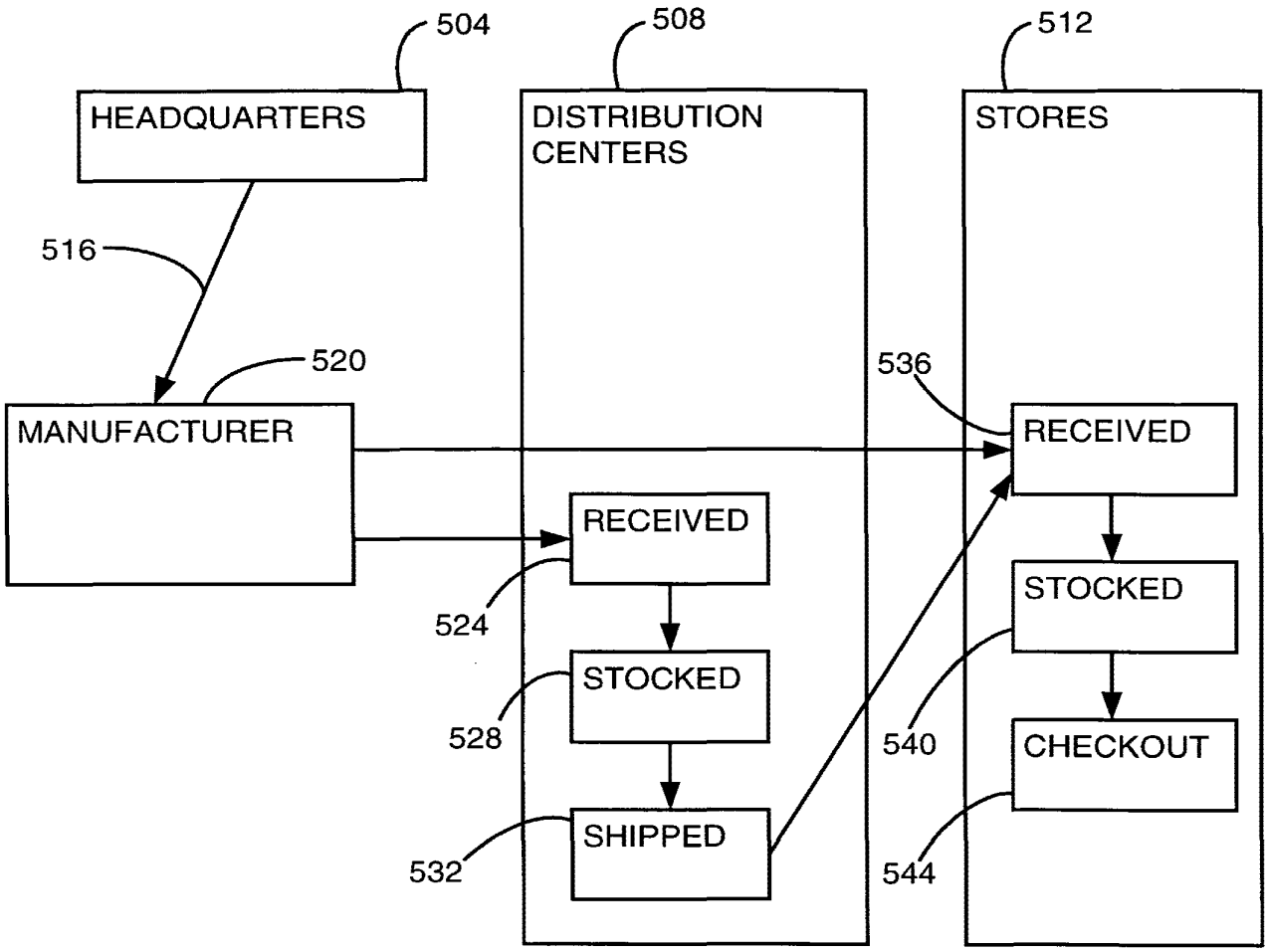

504
508
512
HEADQUARTERS
DISTRIBUTION CENTERS
STORES
516
520
536
MANUFACTURER
RECEIVED
RECEIVED
524
STOCKED
STOCKED
528
540
CHECKOUT
SHIPPED
532
544

FIG. 5

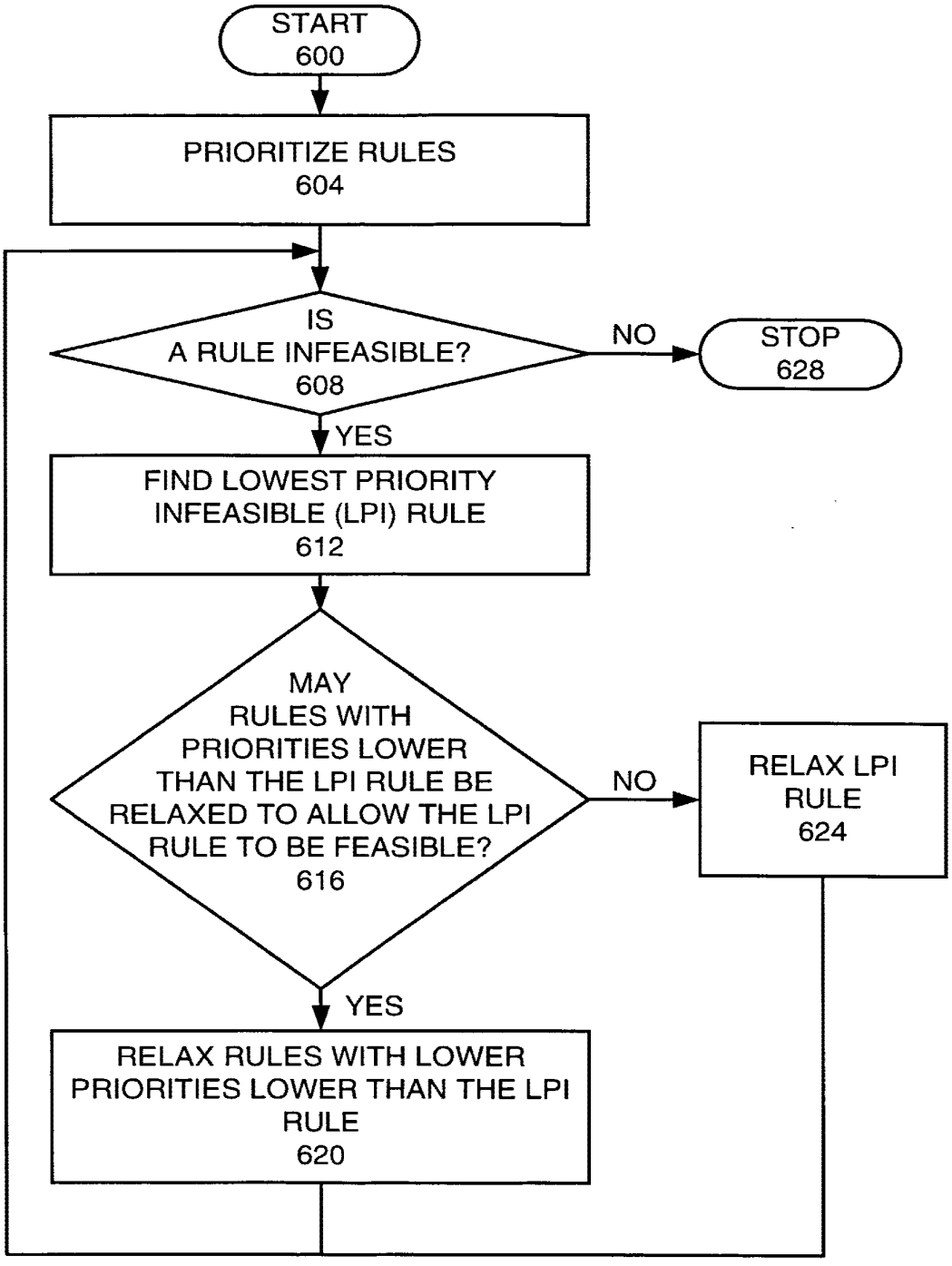

START
600
PRIORITIZE RULES
604
IS
A RULE INFEASIBLE?
608
NO
STOP
628
YES
FIND LOWEST PRIORITY
INFEASIBLE (LPI) RULE
612
MAY
RULES WITH
PRIORITIES LOWER
THAN THE LPI RULE BE
RELAXED TO ALLOW THE LPI
RULE TO BE FEASIBLE?
616
NO
RELAX LPI
RULE
624
YES
RELAX RULES WITH LOWER
PRIORITIES LOWER THAN THE LPI
RULE
620

FIG. 6

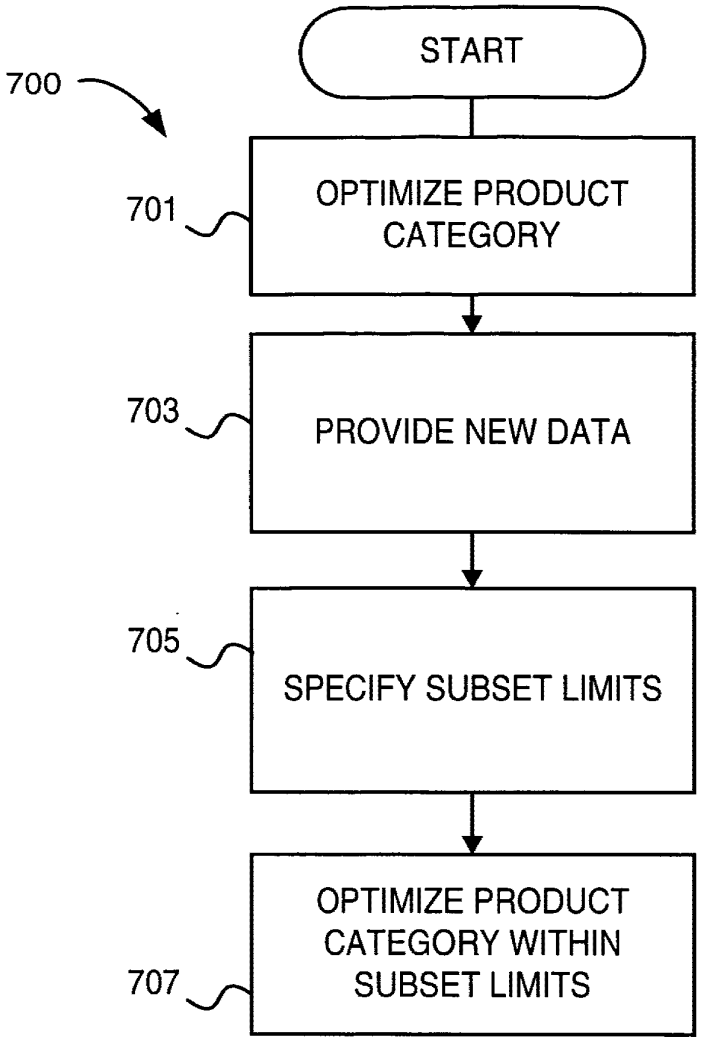

START
700
701
OPTIMIZE PRODUCT CATEGORY
703
PROVIDE NEW DATA
705
SPECIFY SUBSET LIMITS
707
OPTIMIZE PRODUCT CATEGORY WITHIN SUBSET LIMITS

FIG. 7

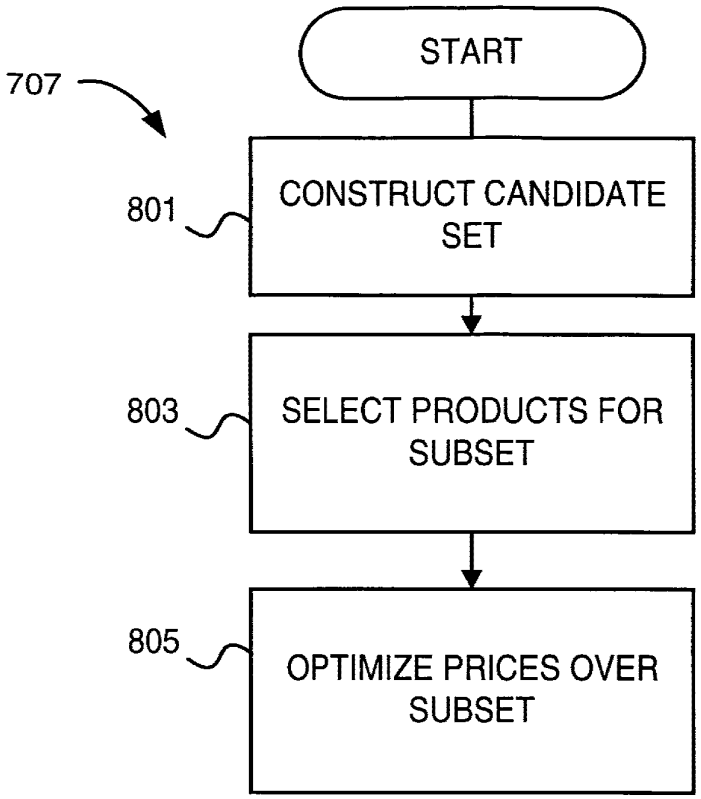

START
707
801
CONSTRUCT CANDIDATE SET
803
SELECT PRODUCTS FOR SUBSET
805
OPTIMIZE PRICES OVER SUBSET

FIG. 8

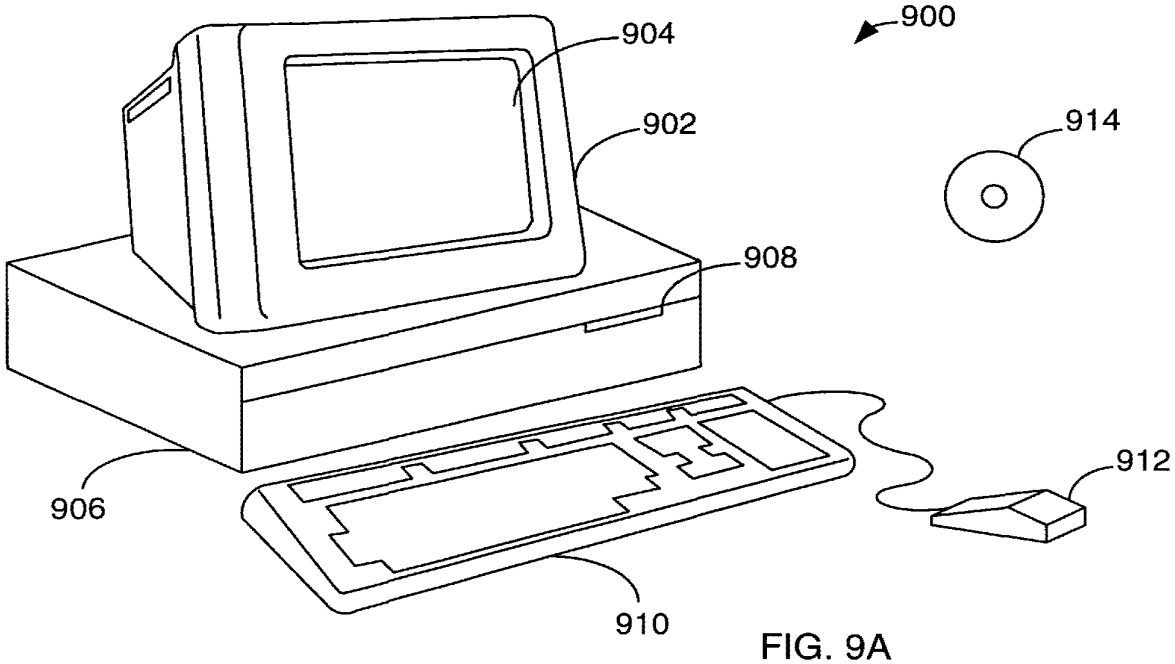

900
904
902
914
908
912
906
910

FIG. 9A

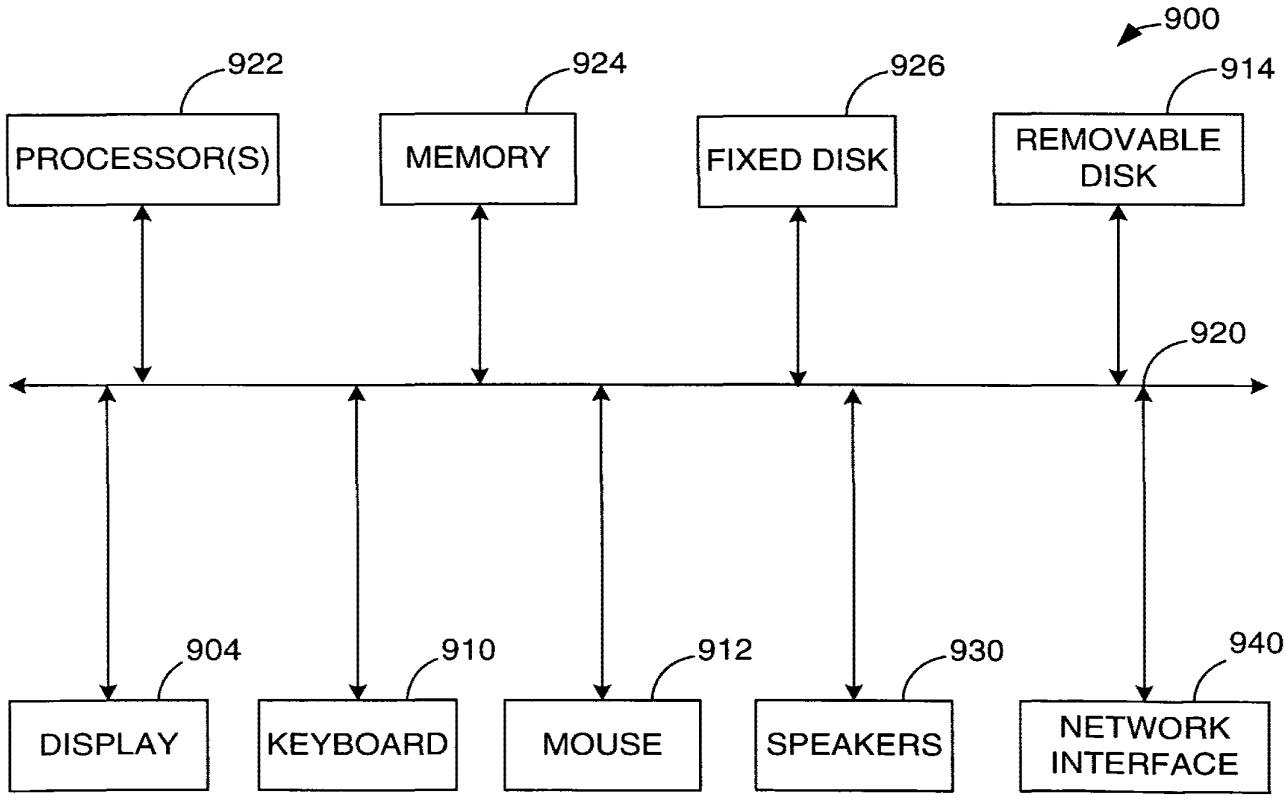

900
922
924
926
914
PROCESSOR(S)
MEMORY
FIXED DISK
REMOVABLE DISK
920
904
910
912
930
940
DISPLAY
KEYBOARD
MOUSE
SPEAKERS
NETWORK INTERFACE

FIG. 9B

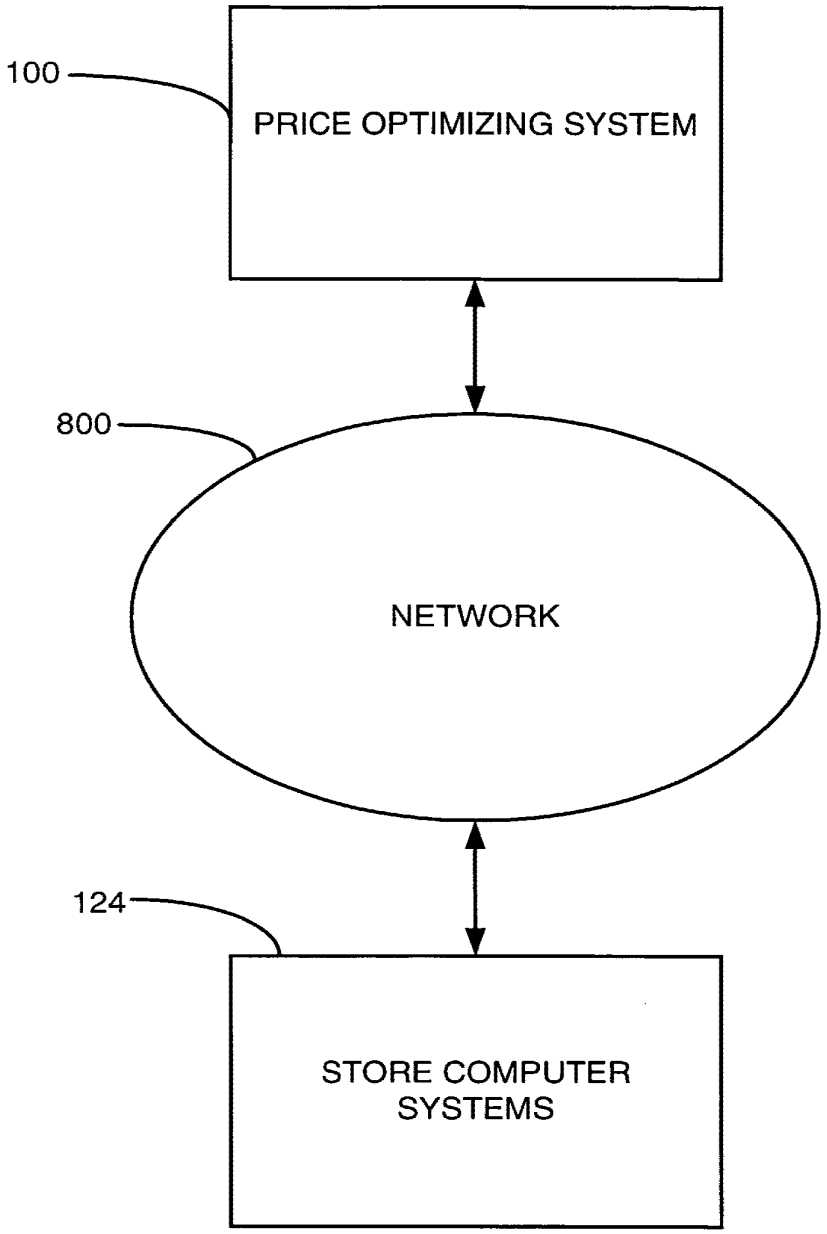

100
PRICE OPTIMIZING SYSTEM
800
NETWORK
124
STORE COMPUTER SYSTEMS

FIG. 10

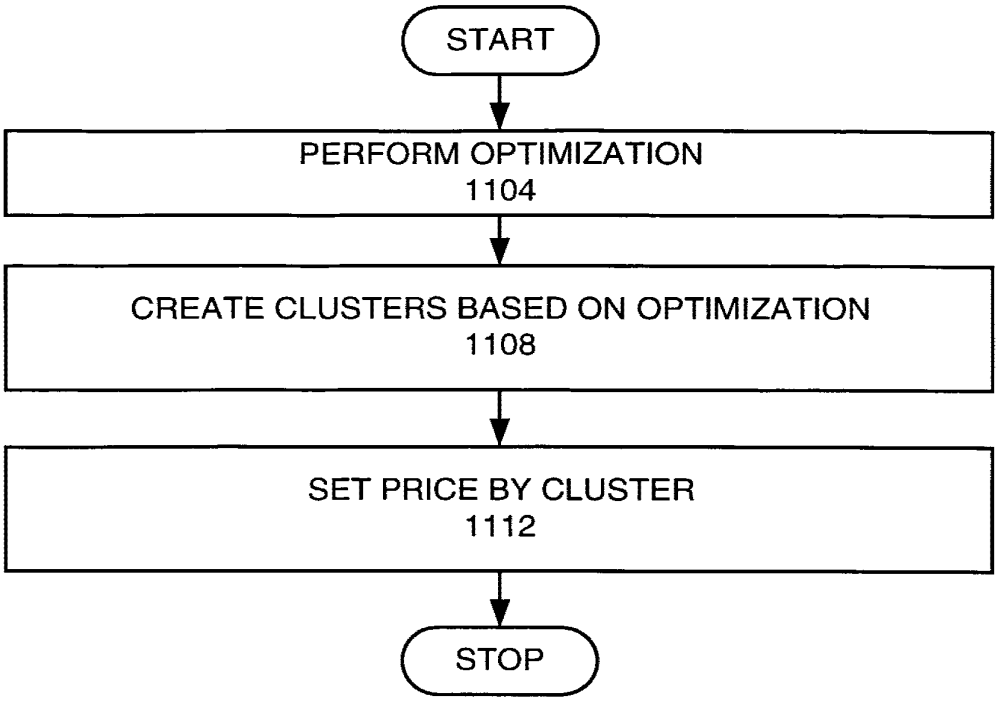

START
PERFORM OPTIMIZATION
1104
CREATE CLUSTERS BASED ON OPTIMIZATION
1108
SET PRICE BY CLUSTER
1112
STOP

FIG. 11

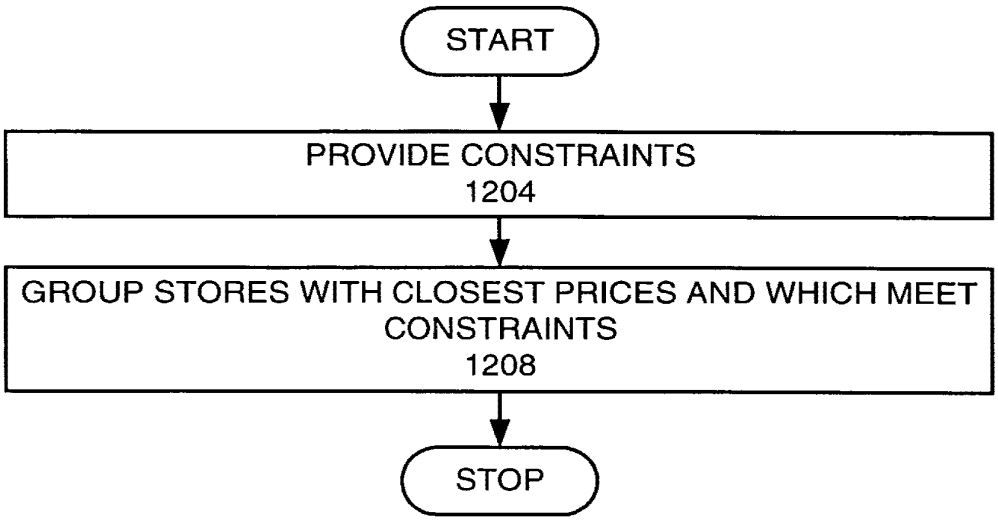

START
PROVIDE CONSTRAINTS
1204
GROUP STORES WITH CLOSEST PRICES AND WHICH MEET CONSTRAINTS
1208
STOP

FIG. 12

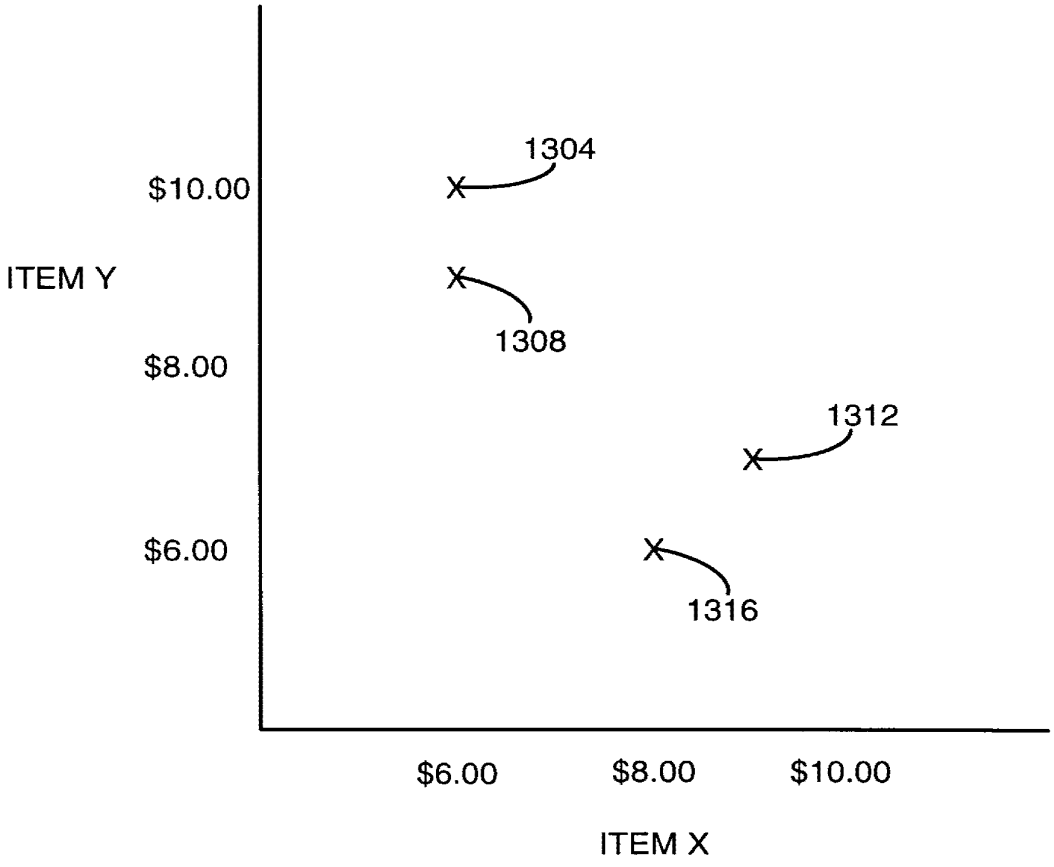


FIG. 13

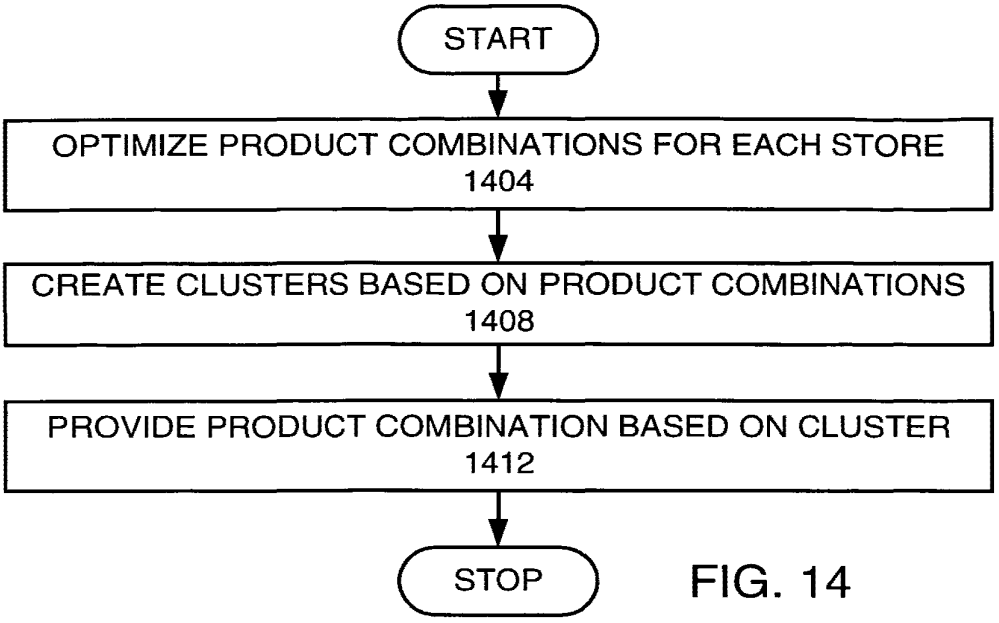

START
OPTIMIZE PRODUCT COMBINATIONS FOR EACH STORE
1404
CREATE CLUSTERS BASED ON PRODUCT COMBINATIONS
1408
PROVIDE PRODUCT COMBINATION BASED ON CLUSTER
1412
STOP

FIG. 14

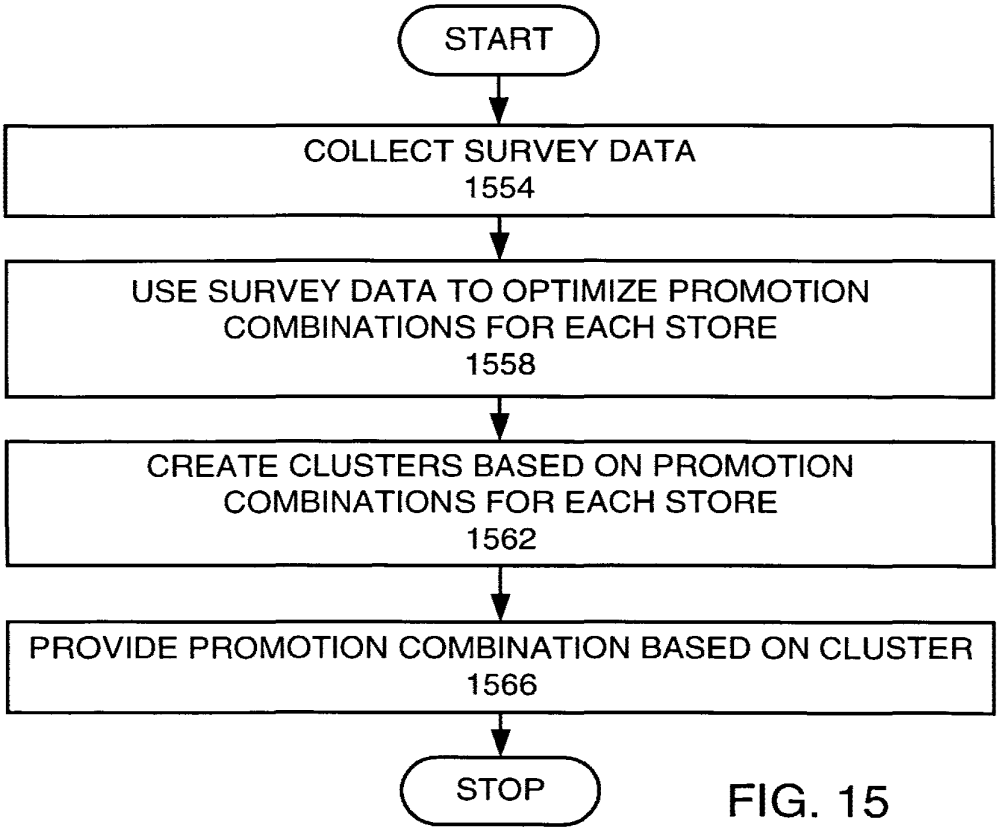

START
COLLECT SURVEY DATA
1554
USE SURVEY DATA TO OPTIMIZE PROMOTION COMBINATIONS FOR EACH STORE
1558
CREATE CLUSTERS BASED ON PROMOTION COMBINATIONS FOR EACH STORE
1562
PROVIDE PROMOTION COMBINATION BASED ON CLUSTER
1566
STOP

FIG. 15

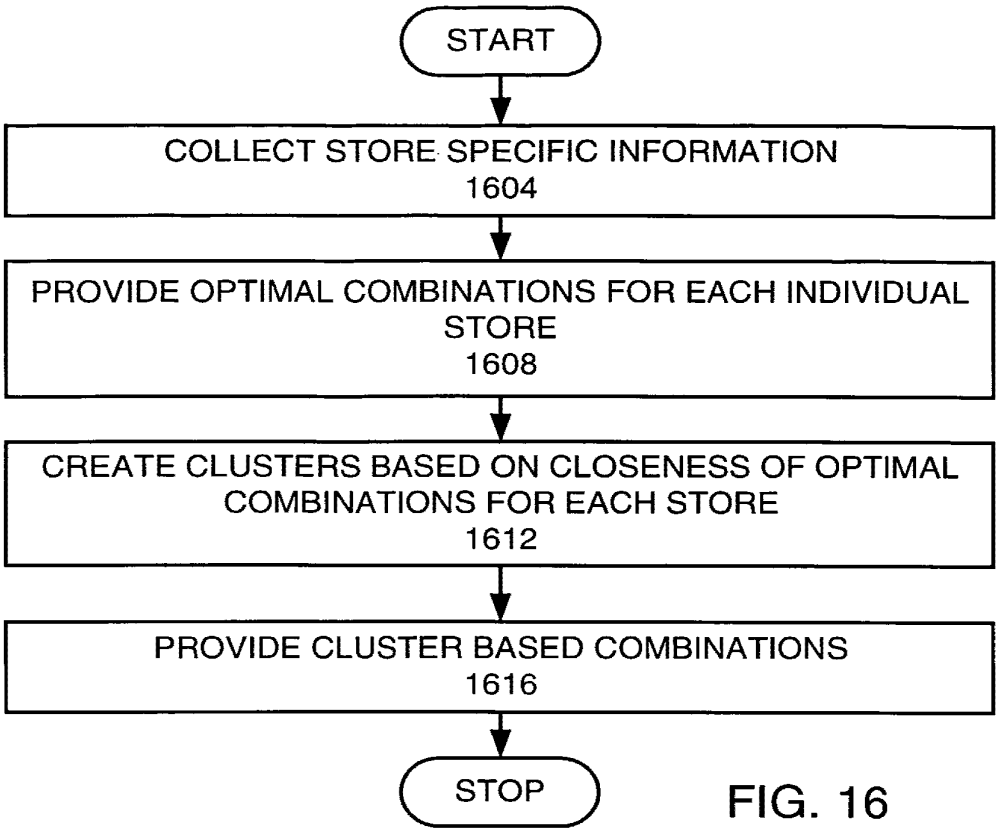

START
COLLECT STORE SPECIFIC INFORMATION
1604
PROVIDE OPTIMAL COMBINATIONS FOR EACH INDIVIDUAL STORE
1608
CREATE CLUSTERS BASED ON CLOSENESS OF OPTIMAL COMBINATIONS FOR EACH STORE
1612
PROVIDE CLUSTER BASED COMBINATIONS
1616
STOP

FIG. 16

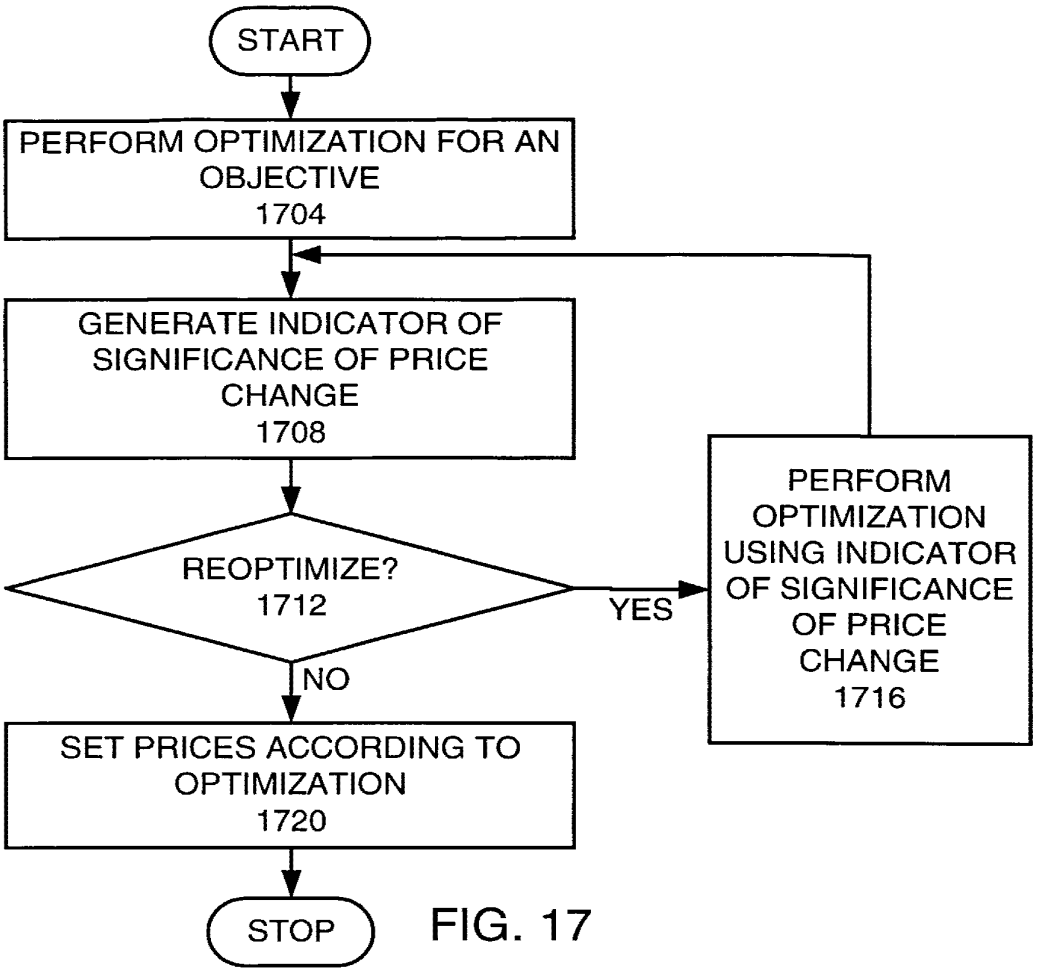

START
PERFORM OPTIMIZATION FOR AN OBJECTIVE
1704
GENERATE INDICATOR OF SIGNIFICANCE OF PRICE CHANGE
1708
REOPTIMIZE?
1712
YES
NO
PERFORM OPTIMIZATION USING INDICATOR OF SIGNIFICANCE OF PRICE CHANGE
1716
SET PRICES ACCORDING TO OPTIMIZATION
1720
STOP

FIG. 17

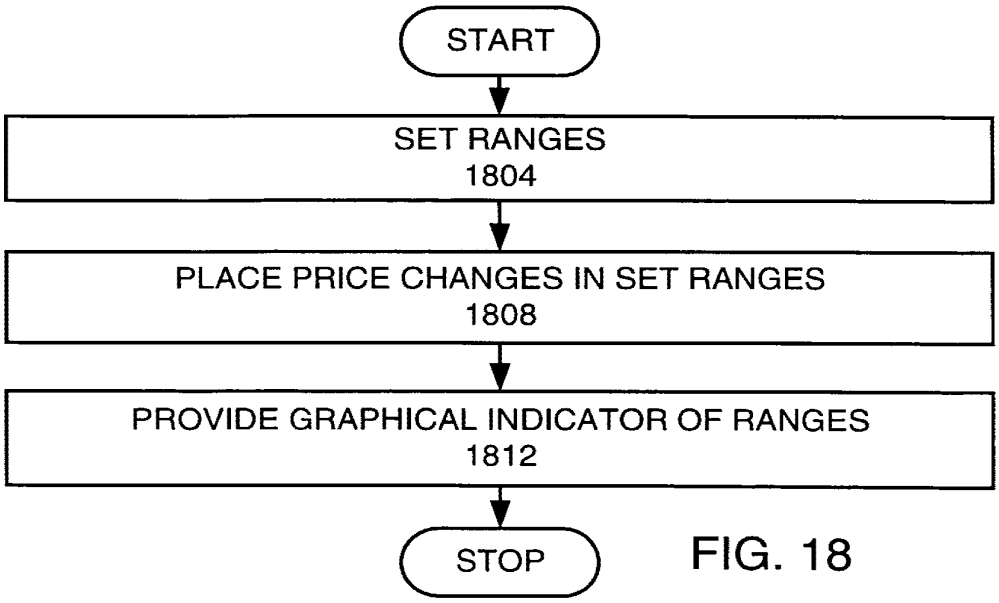

START
SET RANGES
1804
PLACE PRICE CHANGES IN SET RANGES
1808
PROVIDE GRAPHICAL INDICATOR OF RANGES
1812
STOP

FIG. 18

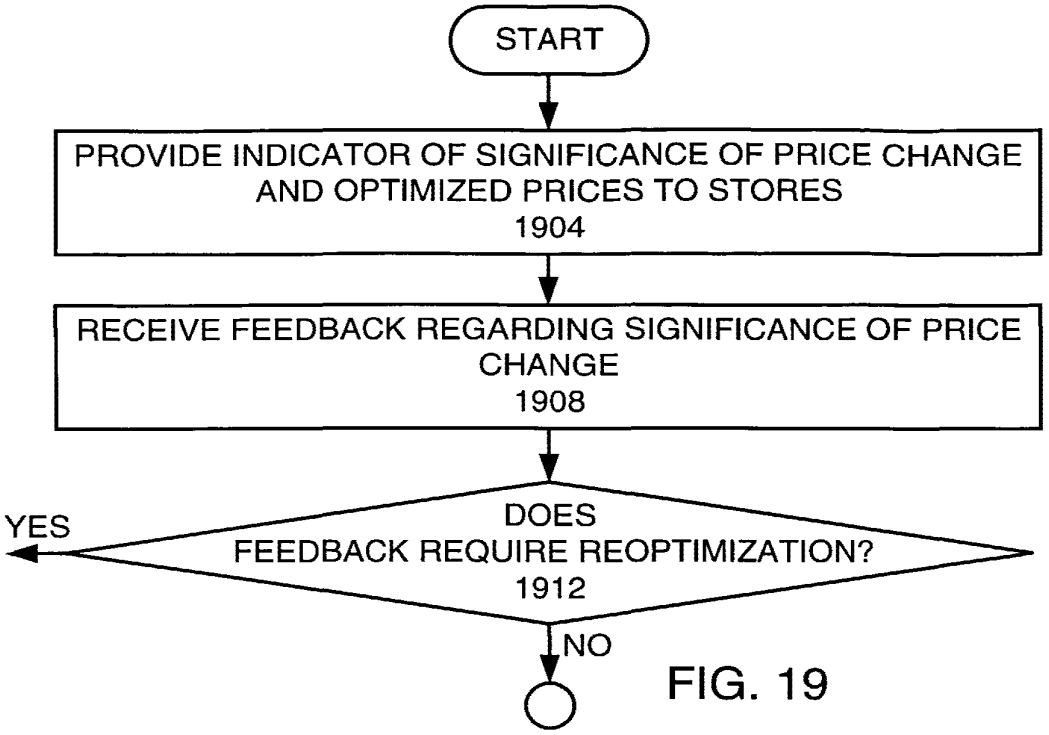

START
PROVIDE INDICATOR OF SIGNIFICANCE OF PRICE CHANGE AND OPTIMIZED PRICES TO STORES
1904
RECEIVE FEEDBACK REGARDING SIGNIFICANCE OF PRICE CHANGE
1908
DOES FEEDBACK REQUIRE REOPTIMIZATION?
1912
YES
NO

FIG. 19

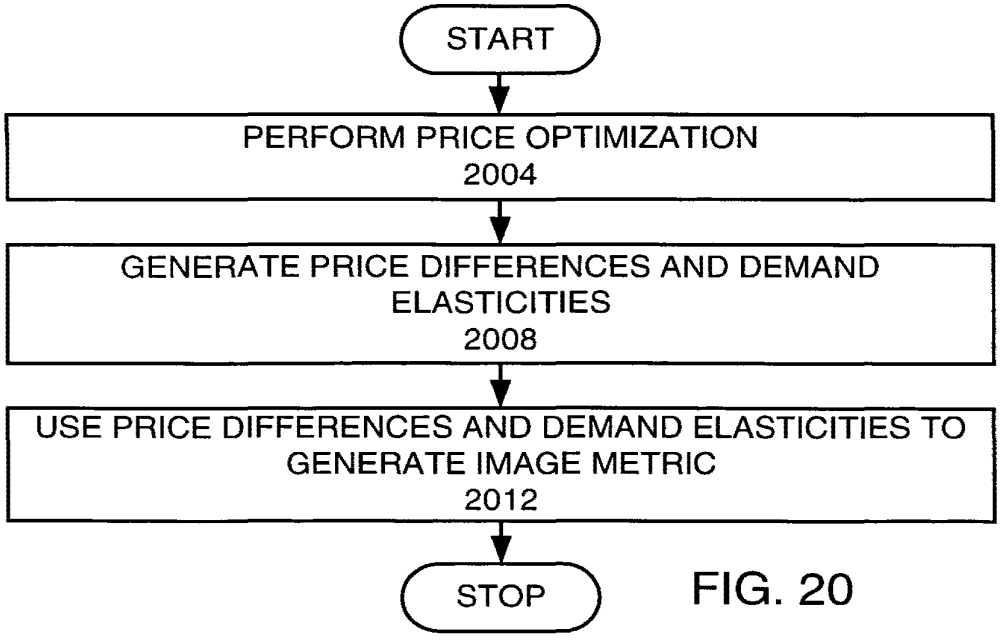

START
PERFORM PRICE OPTIMIZATION
2004
GENERATE PRICE DIFFERENCES AND DEMAND ELASTICITIES
2008
USE PRICE DIFFERENCES AND DEMAND ELASTICITIES TO GENERATE IMAGE METRIC
2012
STOP

FIG. 20

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(19) 世界知的所有権機関
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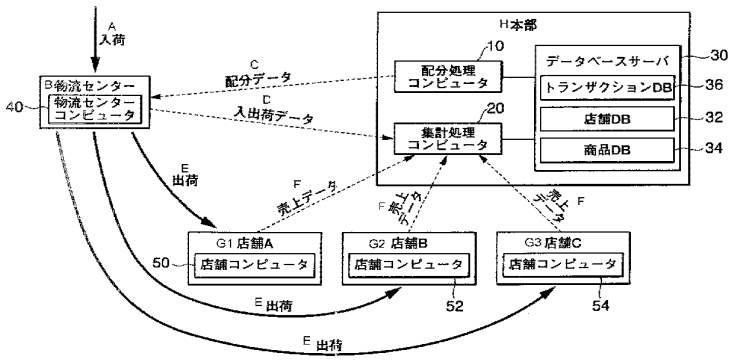
(81) 指定国 (国内): CN, KR, SG.

添付公開書類:
— 国際調査報告書

[続葉有]

(54) Title: DISTRIBUTION SYSTEM, DISTRIBUTION DEVICE, AND DISTRIBUTION METHOD

(54) 発明の名称: 配分処理システム、配分処理装置および配分処理方法



A.. ARRIVAL OF COMMODITY
B.. DISTRIBUTION CENTER
40.. DISTRIBUTION CENTER COMPUTER
C.. DISTRIBUTION DATA
D.. COMMODITY ARRIVAL/SHIPMENT DATA
E.. SHIPMENT
F.. SALES DATA
G1.. STORE A
G2.. STORE B
G3.. STORE C
50...STORE COMPUTER
52...STORE COMPUTER
54...STORE COMPUTER
H...HEADQUARTER
10.. DISTRIBUTION COMPUTER
20.. CALCULATION COMPUTER
30.. DATABASE SERVER
36...TRANSACTION DB
32...STORE DB
34....COMMODITY DB

(57) Abstract: A distribution computer (10) uses a transaction DB (36) to rank stores related to the commodity to be distributed. This ranking is performed by using sales result of the group (commodity attribute group) to which the commodity belongs in each store. Stores are ranked to S, A, B, and C. For the commodity to be distributed, to which store the commodity is to be distributed and how much of the commodity is to be distributed are decided according to the rank of each store. According to this distribution simulation, commodity is distributed to stores. Moreover, in the case of additional distribution, it is decided according to the processing performed according to the sales result of the commodity in each store.

(57) 要約: 配分処理コンピュータ10は、トランザクションDB36を用いて、配分しようとする商品に関する各店舗のランク付を行う。このランク付けは、各店舗におけるその商品が属するグループ（商品属性グループ）についての売上実績を用いて行われ、各店舗はランクS、A、B、Cに分けられる。配分対象である商品を、いずれの店舗に配分するか、どれだけ配分するかは、各店舗のランクに基づいて実行する処理により決定される。この配分シミュレーションの結

[続葉有]

WO 03/094068 A1

２文字コード及び他の略語については、定期発行される各*PCT*ガゼットの巻頭に掲載されている「コードと略語のガイダンスノート」を参照。

果に基づいて、各店舗に対して商品が配分される。また、追加配分の場合には、各店舗における当該商品の売上実績に基づいて実行する処理により決定する。

明　細　書

配分処理システム、配分処理装置および配分処理方法

技術分野

この発明は、複数の配分先に対して、どのように配分対象物を配分するかを決定するためのシステム、装置および方法に関するものである。特に、複数の店舗において同一商品が販売されるような場合に、複数の店舗に対して、どのように商品を配分するかを決定するためのものである。

背景技術

従来、複数の店舗に対してどのように商品を配分するかは、配分者側の経験や各店舗の責任者の経験に基づいた試行錯誤によってなされていた。これに対して、特開平 2-23464 号公報に、店舗における商品の品揃えシステムが開示されている。これは、各店舗においてより最適な品揃えを実現するために、「店舗の特徴（立地条件、業務形態等）、各店舗にて品揃えすべき商品の特徴」と「店舗の特徴、各店舗の個々の商品の販売実績」を考慮して、各店舗にて陳列すべき商品を自動決定するものである。

しかしながら、このようなシステムでは、以下のような問題が生じている。第一に、配分しようとする商品が、店舗にて初めて販売される場合（新商品等の場合）、各店舗における当該商品の販売実績は存在しない。ゆえに、上記方法を使用することはできない。

第二に、配分しようとする商品が、店舗全体であまり販売されていない場合や希少商品等の場合に、当該商品についての販売実績は少ない。ゆえに、上記方法を使用しても、各店舗の販売実績はほとんど意味をなさず、各店舗における販売効率を高めることができない。

第三に、複数の各店舗における販売実績そのもののデータは、操作者にとって把握しにくいため、操作者自身が当該販売実績を考慮して、配分方法を決定することは困難である。つまり、操作者の意思を、容易に配分方法に反映することができない。

この発明は、このような問題を解決して、配分先における取扱効率を高めることを可能とするとともに、操作者の意思を容易に配分方法に反映することが可能な配分処理システム、装置および方法を提供することを目的とする。例えば、複数の店舗に対して商品を配分しようとする場合に、販売実績がない商品や販売実績の少ない商品については、より売れそうな店舗へ、販売実績の豊富な商品については、より売れている店舗へ配分することにより、各店舗における販売効率を高めることができる。

発明の開示

(1) この発明の配分処理システムは、複数の配分先端末装置と配分処理装置と配分実行装置とを備えており、配分先端末装置は、対象物の取扱実績情報を記録し、配分処理装置は、各配分先端末装置から、各配分先における対象物の取扱実績情報を受けて記録し、新たに配分を行う配分対象物に対応する取扱実績情報に基づいて、各配分予定先を分類し、新たに配分を行う配分対象物の総量を受けて、各配分予定先に対して決定された分類を用いて、前記各配分予定先に対し、当該配分対象物をどのように配分するかを示す配分データを生成して、配分実行装置に送信し、配分実行装置は、前記配分データを受けて、当該配分対象物を、当該配分データに基づいて、配分先に配分するための処理を実行することを特徴としている。

(2)～(4) この発明の配分処理装置は、配分対象物を各配分先にどのように配分するかを決定するための配分データを生成する装置であって、各配分先における対象物の取扱実績情報を受け、新たに配分を行う配分対象物に対応する取扱実績情報に基づいて、各配分予

Uber Exhibit 1002 - p. 197
Uber Technologies, Inc. v. SurgeTech, LLC

定先を分類し、新たに配分を行う配分対象物の総量を受けて、各配分予定先に対して決定された分類を用いて、前記各配分予定先に対し、当該配分対象物をどのように配分するかを示す配分データを生成することを特徴としている。

したがって、各配分先における取扱実績情報に基づいた分類を用いて配分方法を決定しているため、今後の配分対象物の取扱効率を高めることができる。例えば、複数の店舗に対して商品を配分しようとする場合に、各店舗の当該商品の売上実績に基づいた分類を用いることにより、店舗全体の当該商品の販売効率を高め、その結果として売上を伸ばすことができる。

また、操作者等が配分先を選択するために分類を特定したり、配分量を決定するために各分類に対して重み付け等を設定することにより、操作者等の意思を容易に配分方法に反映させることができる。さらに、分類を利用することにより、諸事情に応じて、配分方法を容易に変更することができる。

(5) この発明の配分処理装置は、いずれの配分予定先に配分対象物を配分するか、またはいずれの配分予定先に対してどれだけ配分対象物を配分するか、を示す前記配分データを生成することを特徴としている。これにより、分類に基づいて、各店舗に対する配分対象物の配分量等を決定することができる。

(6) この発明の配分処理装置では、前記配分対象物に対応する取扱実績情報は、当該配分対象物の過去における取扱実績情報であることを特徴としている。これにより、配分対象物の取扱実績情報が適度に存在する場合に、その取扱実績情報を用いることにより、各配分先においてより最適に配分対象物が供給されうる。

(7) この発明の配分処理装置では、前記配分対象物に対応する取扱実績情報は、当該配分対象物の属するグループ全体についての過去における取扱実績情報であることを特徴としている。

Uber Exhibit 1002 - p. 198
Uber Technologies, Inc. v. SurgeTech, LLC

これにより、配分対象物の取扱実績情報が存在しない場合や少ない場合でも、当該配分対象物が属するグループの取扱実績情報を用いることにより、各配分先においてより最適に配分対象物が供給されうる。例えば、複数の店舗に対して新商品や希少商品を配分しようとする場合に、当該商品の属するグループの売上実績を用いることにより、各店舗においてより最適な品揃えを実現することができる。

(8) この発明の配分処理装置は、配分予定先に対して決定された分類を用いて選択された選択配分先に対して、どれだけ配分対象物を配分するかを示す前記配分データを生成することを特徴としている。これにより、分類を選択することにより、いずれの配分先に配分するかを決定することができる。

(9) この発明の配分処理装置は、前記選択配分先全体の前記配分対象物に対応する取扱実績情報に対する、前記各選択配分先の前記配分対象物に対応する取扱実績情報の割合に応じて、各選択配分先に対してどれだけ配分対象物を配分するかを示す前記配分データを生成することを特徴としている。これにより、選択配分先だけを対象とした取扱実績情報の割合に基づいて、配分対象物の配分量を決定することができる。

(10) この発明の配分処理装置は、前記各選択配分先に対して、前記配分対象物を所定量配分するとともに、当該配分後の残存配分対象物について、前記選択配分先全体の前記配分対象物に対応する取扱実績情報に対する、前記各選択配分先の前記配分対象物に対応する取扱実績情報の割合に応じて、各選択配分先に対してどれだけ配分するかを示す前記配分データを生成することを特徴としている。

これにより、配分対象物が少ない場合等でも、各選択配分先は少なくとも所定量は配分されるため、選択配分先のいずれかが全く配分されないという事態が生じない。

(11) この発明の配分処理装置は、前記分類に対して設定された配分量または配分比率に基づいて、配分対象物をどのように配分するかを示す前記配分データを生成することを特徴としている。

これにより、同一分類の各配分先に対して、均等に配分することができる。また、操作者が各分類に対する配分量等を任意に設定することにより、操作者の意思を反映することができる。

(12) この発明の配分処理装置は、配分対象物が属するグループの前記配分対象物に対応する取扱実績情報、および当該グループに属するグループ構成物の種類数から算出されるグループ構成物あたりの取扱能力に基づいて、どれだけ配分対象物を配分するかを示す前記配分データを生成することを特徴としている。したがって、グループ構成物あたりの取扱能力を考慮することにより、各配分先においてより最適に配分対象物が供給されうる。

(13) この発明の配分処理装置は、前記配分対象物に対応する取扱実績情報から算出される売上予測値に基づいて、どれだけ配分対象物を配分するかを示す前記配分データを生成することを特徴としている。これにより、例えば、各配分先において販売効率を高め、その結果として売上を伸ばすことができるよう配分することができる。

(14) この発明の配分処理装置は、週末指数を考慮した前記売上予測値に基づいて、どれだけ配分対象物を配分するかを示す前記配分データを生成することを特徴としている。これにより、週末の売上比率が高い店舗に対して、優先的に集中配分することができる。

(15) この発明の配分処理装置では、前記取扱実績情報は、少なくとも売上情報を含むことを特徴としている。

(16) この発明の配分処理装置では、前記取扱実績情報は、少なくとも売上情報および在庫情報から算出される稼働率を含むことを特徴としている。これにより、例えば、複数の店舗に対して、各店舗にて販売しようとする商品を配分しようとする場合に、各店舗にお

ける当該商品の売上実績、在庫実績に基づいて決定された分類に基づいて、どのように当該商品を配分するかを決定することができる。

(17) この発明の配分処理方法は、コンピュータを用いて、各配分先における対象物の取扱実績情報を受け、新たに配分を行う配分対象物に対応する取扱実績情報に基づいて、各配分予定先を評価し、新たに配分を行う配分対象物の総量を受けて、各配分予定先に対して決定された評価を用いて、前記各配分予定先に対し、当該配分対象物をどのように配分するかを示す配分データを生成することを特徴としている。したがって、各配分先における取扱実績情報に基づいた評価を用いて配分方法を決定しているため、今後の配分対象物の取扱効率を高めることができる。例えば、複数の店舗に対して商品を配分しようとする場合に、各店舗の当該商品の売上実績に基づいた評価を用いることにより、店舗全体の当該商品の販売効率を高め、その結果として売上を伸ばすことができる。

なお、この発明において、「配分処理装置」は、下記の実施形態では、配分処理コンピュータ 10 に該当する。「配分実行装置」は、下記の実施形態では、物流センターコンピュータ 40 に該当する。「配分先端末装置」は、下記の実施形態では、店舗コンピュータ 50、52、54 に該当する。

「配分対象物」は、配分先に対して配分しようとする物品であり、下記の実施形態では、本部が各店舗に配分しようとする SKU が該当する。なお、配分先に対して電気通信回線等により配信しようとするデータ等も含む概念である。「配分対象物が属するグループ」は、配分対象物の特性等に基づいてグループ化されたものであり、下記の実施形態では、本部が各店舗に配分しようとする SKU が属する商品属性グループが該当する。この「商品属性グループ」とは、商品の特性に基づいてグループ化されたものである。下記の実施形態では、アイテム（例えば、ジャケット、プルオーバーなど）とサイズでグループ化したものが該当する。また、アイテムおよびサイズととも

に、アイテム・サブ（例えば、ニット、ファブリック、ジャージなど）を用いてグループ化したものなども該当する。

「取扱実績情報」は、配分先において取り扱われた実績情報であり、下記の実施形態では、売上金額や売上枚数、SKU稼働率が該当する。例えば、配分先が工場である場合（生産のための部品等を配分する場合など）には、生産量等も該当する。なお、過去のものに限らず、将来のもの（例えば、売上予測、生産予定量等）も含む概念である。

「配分先」、「配分予定先」は、配分対象物が配分されるところであり、下記の実施形態では、各店舗が該当する。なお、工場や営業所等も含み、配分対象物がデータである場合には、コンピュータやショッピングモール内の店舗も含まれる概念である。「選択配分先」とは、配分可能な配分先のうちから、配分先として選択されたものをいう。下記の実施形態では、配分予定先に対して決定された分類を用いて選択された配分先であり、操作者により選択されたランクS、Aの店舗が該当する。なお、すべてのランク(S～C)が選択された場合には、すべての店舗が該当する。

「残存配分対象物」は、各選択配分先に所定量配分した後の残りの配分対象物であり、下記の実施形態では、1:100配分方法において、ランクS、Aの各店舗に1枚ずつ配分した後の配分対象物（SKU）が該当する。

「グループ構成物」は、商品属性グループに属するSKU、または所定量以上販売されたSKU（稼働SKU）に該当する。

「グループ構成物あたりの取扱能力」は、グループの取扱実績情報とグループ構成物の種類数から算出されるものであり、下記の実施形態では、売上枚数／SKU数や売上枚数／稼働SKU数に該当する。

「売上予測値」とは、商品等の売り上げ予測だけでなく、電気使用量などの需要予測を含む概念である。

「配分対象物が属するグループ全体についての過去における取扱実績情報」は、下記の実施形態では、配分しようとするSKUが属する商品属性グループの売上金額等に該当する。

「新たに配分を行う配分対象物の総量を受けて」とは、当該総量を操作者や他のコンピュータ等から取得する場合に限らず、当該総量を算出するための情報を取得する場合も含む概念である。

「各配分予定先に対して決定された評価」は、各配分予定先における取扱実績情報に基づいて決定されるものであり、下記の実施形態では、店舗に設定されたランクS～Cや店舗ごとに算出された参考値（数式(7)）、店舗ごとに算出された「売上枚数／SKU数」、「売上枚数／稼働SKU数」等が該当する。

「プログラムを記録した記録媒体」とは、フレキシブルディスク、CD-ROM、ハードディスク、メモリカード、ROM、パンチカード、テープ等を含む概念である。また、コンピュータによって直接実行可能なプログラムを記録した記録媒体だけでなく、一旦他の記録媒体（ハードディスク等）にインストールすることによって実行可能となるようなプログラムを記録した記録媒体や、暗号化されたり、圧縮されたりしたプログラムを記録した記録媒体を含む概念である。「プログラム」とは、CPUにより直接実行可能なプログラムだけでなく、ソース形式のプログラム、圧縮処理がされたプログラム、暗号化されたプログラム等を含む概念である。

図面の簡単な説明

図1は、配分処理システムの構成を示す図である。

図2は、配分処理システムの処理の概要を示すフローチャートである。

図3は、SKUと商品属性グループの関係を示す図である。

図4は、配分処理コンピュータ10、データベースサーバ30のハードウエア構成を示す図である。

Uber Exhibit 1002 - p. 203
Uber Technologies, Inc. v. SurgeTech, LLC

図５は、商品 DB34、トランザクション DB36 のデータを示す図である。

図６は、店舗ランク付処理を示すフローチャートである。

図７は、店舗ランク設定画面を示す図である。

図８は、初回配分時の配分シミュレーションを示すフローチャートである。

図９は、配分シミュレーション画面を示す図である。

図１０は、通常配分処理を示すフローチャートである。

図１１は、1:100 配分処理を示すフローチャートである。

図１２は、商品ランク配分処理を示すフローチャートである。

図１３は、ランク別配分数設定画面を示す図である。

図１４は、追加配分時の配分シミュレーションを示すフローチャートである。

図１５は、配分シミュレーション画面を示す図である。

図１６は、売上枚数の構成比による配分処理を示すフローチャートである。

図１７は、各店舗における売上枚数と SKU 稼働率、売上枚数と売上金額の関係を示すグラフである。

図１８は、ランク別配分数設定画面を示す図である。

図１９は、配分対象物、それに対応する取扱実績情報の例を示す表である。

図２０は、データ集計処理を示すフローチャートである。

発明を実施するための最良の形態

1. システムの構成、処理の概要

図１に、一実施形態として、ブランドが同一のアパレル商品を、複数の店舗に対して配分する場合の配分処理システムの構成を示す。配分処理コンピュータ 10 と集計処理コンピュータ 20 は、商品の配分を担う本部に設置されており、データベースサーバ 30 は、店舗マ

Uber Exhibit 1002 - p. 204
Uber Technologies, Inc. v. SurgeTech, LLC

スタ、商品マスタを蓄積するデータベース（店舗 DB32、商品 DB34）と各店舗別の売上データ、在庫データ等を蓄積するトランザクション DB36 を備えている。物流センターコンピュータ 40 は、商品の入出荷、保管を担う物流センターに設置されている。店舗コンピュータ 50、52、54 は、本部により配分された商品の販売を担う複数の各店舗に設置されている。各コンピュータは、インターネット等を介して通信可能である。以下に、このシステムの処理の概要を説明する。

まず、配分処理コンピュータ 10 は、トランザクション DB36 を用いて、配分しようとする商品に関する各店舗のランク付を行う（「店舗ランク付処理」）（図 2 ステップ S10）。このランク付けは、各店舗におけるその商品が属する商品属性グループについての売上実績を用いて行われ、各店舗はランク S、A、B、C に分けられる。例えば、商品が「ジャケット（品番 A、サイズ A、カラーA）」ならば、商品属性グループは「ジャケット、サイズ A」になる。

なお、以下の説明において、品番、サイズ、カラーで特定された商品を SKU とよび、この SKU と商品属性グループの関係を図 3 に示す。この商品属性グループは、商品の種類であるアイテムとサイズでグループ化されたものである。このアイテムとは、例えば、ジャケット、プルオーバー、カーディガンなどのことである。

そして、配分対象である SKU を、いずれの店舗に配分するか、どれだけ配分するかは、配分処理コンピュータ 10 が各店舗のランクに基づいて実行する処理により、決定される（初回配分時の配分シミュレーション）（図 2 ステップ S12）。

この配分シミュレーションの結果に基づいて、各店舗に対して SKU が配分され（図 2 ステップ S14）、各店舗において配分された SKU が販売される（図 2 ステップ S16）。これに伴い、店舗コンピュータ 50 等は売上データを記録する。また、集計処理コンピュータ 20 は、店舗コンピュータ 50 等から売上データ等、物流センターコ

Uber Exhibit 1002 - p. 205
Uber Technologies, Inc. v. SurgeTech, LLC

ンピュータ 40 から入出荷データ等を受け取り、データベースサーバ 30 のトランザクション DB36 に蓄積する（データ集計処理）（図 2 ステップ S18）。

さらに、物流センターに SKU が所定量入荷されると、本部は、その SKU をいずれの店舗に追加配分するか、どれだけ追加配分するかを、配分処理コンピュータ 10 が当該 SKU の属する商品属性グループの売上実績に基づいて実行する処理により、決定する（追加配分時の配分シミュレーション）（図 2 ステップ S20）。この配分シミュレーションの結果に基づいて、各店舗に対して SKU が追加配分され、各店舗において追加配分された SKU が販売される（図 2 ステップ S22、S24、S26）。

なお、初回配分時の配分シミュレーションによる配分処理方法には、(1)通常配分、(2)1:100 配分、(3)商品ランク配分がある。また、追加配分時の配分シミュレーションによる配分処理方法には、(4)売上予測配分、(5)売上枚数の構成比による配分がある。

2. 各コンピュータのハードウエア構成

図 4A に、配分処理コンピュータ 10 のハードウエア構成を示す。この配分処理コンピュータ 10 は、CPU102、ハードディスク 104、ディスプレイ 106、通信部 108、メモリ 110、キーボード／マウス 112、CD-ROM ドライブ 114、フレキシブルディスク・ドライブ 116 等を備えている。

通信部 108 は、データベースサーバ 30、物流センターコンピュータ 40 等と通信するためのものである。ハードディスク 104 には、店舗ランク付処理および配分シミュレーションを実行するための配分処理プログラム、オペレーティングシステム（OS）などが記録されている。配分処理プログラムは、CD-ROM ドライブ 114 を介して CD-ROM118 等からインストールされたもの、または通信回線を介してダウンロードされたものである。

Uber Exhibit 1002 - p. 206
Uber Technologies, Inc. v. SurgeTech, LLC

図4Bに、データベースサーバ30のハードウエア構成を示す。このデータベースサーバ30は、CPU302、ハードディスク304、通信部306、メモリ308、CD-ROMドライブ310、フレキシブルディスク・ドライブ312等を備えている。ハードディスク304には、上述の店舗DB32、商品DB34、トランザクションDB36などが記録されている。図5Aに示す商品DB34には、各SKUごとに、ブランド、品番、店頭標準販売価格である上代、販売年度、シーズン等が記録されている。図5Bに示すトランザクションDB36には、各店舗におけるSKUごとに、当該週の売上金額の累計（月曜日からの売上金額の累計）、当該週の売上枚数の累計、仕入枚数、在庫枚数などが記録されている。

集計処理コンピュータ20のハードウエア構成は、図4Aに示す配分処理コンピュータ10のものと基本的に同様である。ただし、ハードディスクには、店舗コンピュータ50等から売上データを受け取って、データベースサーバ30のトランザクションDB36に記録するための集計処理プログラムが記録されている。

3. 配分処理コンピュータ10の処理

以下に、初回配分時（3.1）と追加配分時（3.2）に分けて、配分処理コンピュータ10による処理について説明する。

3.1 初回配分時

初回配分時の配分処理コンピュータ10による(1)店舗ランク付処理、(2)配分シミュレーションを説明する。

(1) 店舗ランク付処理

図6に、店舗ランク付処理のフローチャートを示す。CPU102は、設定期間入力画面（図示せず）をディスプレイ106に表示して、操作者に対して、「設定期間、ブランド、販売年度、シーズン」の設定を促す（図6ステップS50）。この設定期間とは、トランザクションDB36から取り出す売上金額の期間のことである。

CPU102は、操作者によって、設定期間「2000年第37週～第40週」等が入力されると、データベースサーバ30から、各店舗における商

品属性グループ別の売上データ等、店舗マスタ、商品マスタを取り出し、ハードディスク 104 に記憶する（図 6 ステップ S51、S52）。そして、商品属性グループ設定画面（図示せず）をディスプレイ 106 に表示して、操作者に対して「アイテム、サイズ」の設定を促す（図 6 ステップ S53）。ここでは、操作者により「アイテム（ジャケット）、サイズ（A）」が設定されたものとする（図 6 ステップ S54）。

CPU102 は、設定された商品属性グループ（ジャケット、サイズ A）についての各店舗における当該設定期間の売上金額等を、図 6 ステップ S52 で取得したデータから抽出する（図 6 ステップ S55）。そして、各店舗における設定期間の売上金額の合計（以下、期間売上金額とする）、数式(1)に示す SKU 稼働率、数式(2)に示す売上稼働倍率を算出し、これらを図 7 に示す店舗ランク設定画面の実績データ欄にて表示する（図 6 ステップ S55、S56）。

SKU 稼働率＝定価販売の SKU 数／店舗在庫の SKU 数・・・・(1)

売上稼働倍率＝期間売上金額（または期間売上枚数）×SKU 稼働率・・・・(2)

なお、上式において、定価販売の SKU 数（稼働ＳＫＵ数）とは、当該店舗において定価販売された SKU の種類数のことであり、店舗在庫の SKU 数とは、当該店舗における在庫である SKU の種類数のことである。つまり、ＳＫＵ稼働率は、その店舗における販売力を示す一指標である。

操作者は、属性設定欄 510 において、期間属性、売上稼働倍率の選択を行う。期間属性のプルダウンメニューは、「期間売上金額」または「期間売上枚数」であり、店舗のランク付けにおいていずれを考慮するかを決定する。売上稼働倍率のプルダウンメニューは、「有効」または「無効」であり、店舗のランク付けにおいて SKU 稼働率を考慮するか否かを決定する。

ここでは、操作者は、期間属性「期間売上金額」、売上稼働倍率「無効」を選択して、分析ボタン 520 をクリックしたものとする（図 6

Uber Exhibit 1002 - p. 208
Uber Technologies, Inc. v. SurgeTech, LLC

ステップ S58）。CPU102は、期間売上金額により店舗のランク付けを行う（図6ステップ S60、S62）。つまり、各店舗の期間売上金額により各店舗の順位を定め、上位40%以上をランクS、上位40～70%をランクA、上位70～90%をランクB、下位10%未満をランクCとして、各店舗についてランク付けを行う。各店舗のランクを、図7に示す店舗ランク設定画面のランク欄に表示する（図6ステップ S66）。

なお、店舗ランク付けが、「期間売上枚数」、「期間売上金額とSKU稼働率」、「期間売上枚数とSKU稼働率」によって行われる場合については、後述する。

(2) 配分シミュレーション

図8に、初回配分時の配分処理コンピュータ10による配分シミュレーションについて、配分処理方法(a)通常配分、(b)1:100配分、(c)商品ランク配分に分けて説明する。なお、後述の追加配分時の配分方法を、初回配分時の配分方法として用いてもよい。

(a) 通常配分

CPU102は、図9に示す配分シミュレーション画面をディスプレイ106に表示して、操作者に対して配分対象となるSKUの入力を促す（図8ステップ S100）。操作者は、SKU入力欄600に、配分しようとするSKUを入力する。なお、このSKUの属する商品属性グループは、上記で設定した「ジャケット、サイズA」である。

CPU102は、トランザクション DB36、商品 DB34から当該SKUの属する商品属性グループ（ジャケット、サイズA）の売上データ（設定期間の売上枚数等）、店舗ランク、当該SKUの配分可能な総量（総配分枚数）、SKU詳細情報、当該SKU対応のアイテム「JK（ジャケット）」を取り出して、表示する（図8ステップ S102、S104）。SKU詳細情報とは、豆絵表示、「素材」、店頭標準販売価格である「上代」、物流センターによる保管数（PK）、発注数のうち物流センターへの

入荷数を控除した数(発注残)等のことである(SKU豆絵表示欄610、SKU詳細情報欄620参照)。

総配分枚数は、「PK(30)＋発注残(60)＝90」となる。当該SKU対応のアイテム「JK(ジャケット)」は、アイテム欄630に表示される。

操作者は、総配分枚数、配分対象店舗または配分処理方法を設定する(図8ステップS106)。総配分枚数は、配分枚数変更ボタン640をクリックして、総配分枚数設定欄650に数値を入力することにより操作者が設定することができる。配分対象店舗は、店舗選択欄660のプルダウンメニューにより「S店舗のみ、S・A店舗、S・A・B店舗、全店舗配分」から選択することができる。配分処理方法は、1:100配分指令ボタン670または商品ランクボタン680をクリックすることにより、1:100配分、商品ランク配分に変更することができる。ここでは、操作者は、総配分枚数「90枚」は変更せずに、配分対象店舗「S・A店舗」のみを設定するものとする。

CPU102は、配分対象店舗「S・A店舗」が選択されると、図10に示す通常配分処理に移行する(図8ステップS108、S110)。なお、1:100配分指令ボタン670、商品ランクボタン680がクリックされなければ、通常配分と判断する。

CPU102は、ランクS、Aの店舗全体の商品属性グループ「ジャケット、サイズA」についての期間売上金額に対する、ランクS、Aの各店舗の当該商品属性グループについての期間売上金額の割合(期間売上金額の構成比)を算出する(図10ステップS200)。この期間売上金額の構成比に応じて、総配分枚数「90枚」の配分を行うことによって、各店舗に対する配分枚数を決定し、図9に示す各店舗の配分数欄に表示する(図10ステップS202、S204)。つまり、ある店舗に対する配分枚数は、数式(3)の算出値aを整数に切り上げた数値となる。

総配分枚数×当該店舗の期間売上金額の構成比＝算出値a ・・・・(3)

なお、各店舗の期間売上金額の構成比は、全店舗（ランクS～C）全体ではなく、配分対象店舗（ランクS、A）のみの期間売上金額から算出されている。また、総配分枚数設定欄650の下欄の数値は、各店舗に対する配分枚数の合計値である。

上記のようにして、各店舗に対する配分枚数が決定される。なお、上記では、与えられた総配分枚数と配分枚数の合計が異なる場合には、配分枚数の合計を用いるようにしている。しかし、CPU102の計算処理によって、配分枚数の合計が総配分枚数と合致するように、各店舗への配分枚数を調整するようにしてもよい（以下の例においても同様である）。

(b) 1:100配分

図11に、図8ステップS112の1:100配分処理のフローチャートを示す。CPU102は、総配分枚数「90枚」、配分対象店舗「S・A店舗」の状態で、1:100配分指令ボタン670がクリックされると、図11に示す1:100配分処理に移行する（図8ステップS106、S108、S111、S112）。

CPU102は、ランクS、Aの各店舗に対して、上位ランクから1枚ずつ配分する（図11ステップS300）。残り配分枚数（総配分枚数－ランクS、Aの店舗数）が0か否かを判断する（図11ステップS302）。この実施形態では、残り配分枚数は0でないとすると、ランクS、Aの店舗全体の商品属性グループ「ジャケット、サイズA」についての期間売上金額に対する、ランクS、Aの各店舗の当該商品属性グループについての期間売上金額の割合（期間売上金額の構成比）を算出する（図11ステップS304）。この期間売上金額の構成比に応じて、残り配分枚数の配分を行うことによって、各店舗に対する配分枚数を決定し、図9に示す各店舗の配分数欄に表示する（図11ステップS306、S308）つまり、ある店舗に対する配分枚数は、数式(4)の算出値bを整数に切り上げた数値となる。

Uber Exhibit 1002 - p. 211
Uber Technologies, Inc. v. SurgeTech, LLC

1＋残り配分枚数×当該店舗の期間売上金額の構成比＝算出値b ・・・・(4)

(c) 商品ランク配分

図12に、図8ステップS114の商品ランク配分処理のフローチャートを示す。CPU102は、総配分枚数「90枚」、配分対象店舗「S・A店舗」の状態で、商品ランク指令ボタン680がクリックされると、図12に示す商品ランク配分処理に移行する(図8ステップS106、S108、S114)。

CPU102は、図13Aに示すランク別配分数設定画面を表示し、操作者に対して各ランクの配分数の設定を促す(図12ステップS400)。ここでは、操作者は、ランクSに配分数「5」、ランクAに配分数「4」、ランクBに配分数「0」、ランクCに配分数「0」を設定したものとする。

CPU102は、操作者により合計値計算ボタンがクリックされると(図12ステップS402)、設定されたランク別配分数により、各店舗に配分したときの合計配分数を数式(5)に基づいて算出し、図13Bに示すウインドウを表示する(図12ステップS404)。

合計配分枚数＝Sの店舗数×5＋Aの店舗数×4
＋Bの店舗数×0＋Cの店舗数×0・・・・(5)

CPU102は、操作者により配分実行指令「OK」がクリックされると(図12ステップS406)、設定されたランク別配分数にしたがって、各店舗に対する配分枚数を図9に示す各店舗の配分数欄に表示する(図12ステップS408)。これにより、同一ランクの店舗に対して、均等に配分することができる。

この配分方法の場合、操作者は、配分枚数の合計が総配分枚数に合致(もしくは近似するよう)に、配分数の調整を行う。なお、各ランクにおける配分枚数の組み合わせを予め用意しておき、CPU102が、総配分枚数に最も合致する配分枚数を選択して提示するようにしてもよい。

Uber Exhibit 1002 - p. 212
Uber Technologies, Inc. v. SurgeTech, LLC

3.2 追加配分時

上記の初回配分時の配分シミュレーションの結果（配分データ）は、物流センターコンピュータ40に転送される。物流センターは、物流センターコンピュータ40を用いて配分データを出力し、当該出力データに基づいて各店舗に対してSKUを配分するための出荷業務を行う。各店舗は、物流センターから配分されたSKUを販売する。

これに伴い、集計処理コンピュータ20は、店舗コンピュータ50等から売上データ等を受け取り、データベースサーバ30のトランザクションDB36に蓄積する（データ集計処理）。以下に、追加配分時の配分処理コンピュータ10による配分シミュレーションについて、(a)売上予測配分、(b)売上枚数の構成比による配分に分けて説明する。なお、前述の初回配分時の配分方法を、追加配分時の配分方法として用いてもよい。

(a) 売上予測配分

図14に、追加配分時の配分シミュレーションのフローチャートを示す。CPU102は、操作者により配分対象となるSKUが入力されると（図14ステップS500、S502）、トランザクションDB36から当該SKUについての所定の期間の売上枚数を取り出して、数式(6)に示す当週売上予測値から数式(7)に示す参考値を算出し、これを売上データ等ともに表示する（図15の配分シミュレーション画面の参考値表示欄参照）（図14ステップS504、S506）。さらに、各店舗の配分数欄に、参考値を整数に切り上げた配分枚数を表示する。この配分枚数欄に表示された数値が、各店舗に対する配分枚数となる。

この配分方法では、各店舗の配分枚数を合計した枚数が、全体としての配分枚数になる。なお、総配分枚数が与えられる場合には、上記にて算出した各店舗の配分枚数の比率に応じて、総配分枚数を各店舗に配分するようにしてもよい。

数式(6)

当週売上予測値

＝｛Pre1×a＋Pre2×b＋Pre3×c＋Pre4×d｝／（a＋b＋c＋d）

Pre1：1週前の週間の売上枚数　　a：Pre1の重み

Pre2：2週前の週間の売上枚数　　b：Pre2の重み

Pre3：3週前の週間の売上枚数　　c：Pre3の重み

Pre4：4週前の週間の売上枚数　　d：Pre4の重み

数式(7)

参考値＝当週売上予測値／消化率－（在庫数＋積送数＋当週売上枚数）ここで、消化率とは、各店舗における当該ＳＫＵの販売枚数推累計を、仕入数累計で除した率である。また、積送数とは、各店舗における当該ＳＫＵについての、発注済であって未入荷の枚数である。

なお、設定期間中の土曜、日曜の売上比率である週末指数（1週間の売上枚数のうち、土曜・日曜の売上枚数が占める割合）を考慮して当週売上予測値を算出してから、参考値を算出してもよい（数式(8)参照）。これにより、週末の売上比率が高い店舗のプライオリティを高め、当該店舗に対して優先的に集中配分することができる。

数式(8)

当週売上予測値

＝｛Pre1×a＋Pre2×b＋Pre3×c＋Pre4×d｝／（a＋b＋c＋d）

×週末指数

Pre1：1週前の週間の売上枚数　　a：Pre1の重み

Pre2：2週前の週間の売上枚数　　b：Pre2の重み

Pre3：3週前の週間の売上枚数　　c：Pre3の重み

Pre4：4週前の週間の売上枚数　　d：Pre4の重み

なお、Pre1等の重み a～d、消化率は、操作者が任意に設定できるようにしてもよい。

(b)売上枚数の構成比による配分

図16に、図14ステップS508の売上枚数の構成比による配分処理のフローチャートを示す。CPU102は、初回配分時にSKUが配分され

た店舗全体における当該SKUについて、各店舗の当該SKUについての当週を含めた5週間の売上枚数の合計の割合（各店舗毎の期間売上枚数の構成比）を算出する（図16ステップS600）。この期間売上枚数の構成比に応じて、追加配分枚数の配分を行うことによって、各店舗に対する配分枚数を決定し、図15に示す配分シミュレーション画面の各店舗の配分数欄に表示する（図16ステップS602、S604）。つまり、ある店舗に対する配分枚数は、数式(9)の算出値cを整数に切り上げた数値となる。

追加配分枚数×当該店舗の期間売上枚数の構成比＝算出値c・・・・(9)

この追加配分時の配分シミュレーションの結果（配分データ）は、物流センターコンピュータ40に転送される。物流センターは、物流センターコンピュータ40を用いて配分データを出力し、当該出力データに基づいて各店舗に対してSKUを追加配分するための出荷業務を行う。各店舗は、物流センターから追加配分されたSKUを販売する。

4. 他の実施例等

4.1 店舗ランク付処理についての他の実施例

(1) 上記の実施形態では、ＳＫＵの属する商品属性グループの「期間売上金額」に基づいて店舗のランク付けを行っているが、当該商品属性グループの「期間売上枚数」、「期間売上金額とSKU稼働率」、「期間売上枚数とSKU稼働率」に基づいて行ってもよい。「期間売上枚数とSKU稼働率」に基づいて店舗のランク付けを行う場合について、図17Aを用いて説明する。横軸に各店舗の当該商品属性グループの期間売上枚数、縦軸に各店舗の当該商品属性グループにおけるSKU稼働率をとり、各店舗をプロットで表す。売上稼働倍率（期間売上枚数×SKU稼働率）により各店舗の順位を定め、上位40%以上をランクS、上位40～70%をランクA、上位70～90%をランクB、下位10%

未満をランクCとして、各店舗についてランク付けを行う。なお、曲線800、802、804、806は、各ランク間の売上稼働倍率を示す。また、これと比較するために、図17Bに「期間売上枚数」に基づいて店舗のランク付けを行った場合を示す。

このようにSKU稼働率を考慮した場合、売上枚数は多いがSKU稼働率は低い店舗は、順位が下がり、逆に売上枚数は少ないがSKU稼働率は高い店舗は、順位が上がる。つまり、後者の販売効率の高い店舗はランクが上がるため、当該店舗に対して配分量を増やすことにより、売上を伸ばすことができる。

なお、図17Bの縦軸「売上SKU数」とは、設定期間において売上が発生したSKUの種類数のことである。また、SKU稼働率の代わりに、在庫回転率等を用いて店舗のランク付けを行ってもよい。

(2) 上記の実施形態では、配分しようとするSKUが属する商品属性グループの売上金額等に基づいて、店舗のランク付けを行っている。しかしながら、これに限られるものではない。例えば、当該SKUの売上金額等に基づいて、店舗のランク付けを行ってもよい。また、当該SKUに類似するSKUの売上金額等に基づいて、店舗のランク付けを行ってもよい。また、当該SKUが属する商品属性グループに類似する商品属性グループの売上金額等に基づいて、店舗のランク付けを行ってもよい。

(3) 上記の実施形態では、図9に示す配分シミュレーション画面の店舗選択欄660のプルダウンメニューにより「S店舗のみ、S・A店舗、S・A・B店舗、全店舗配分」から配分対象店舗を選択することができる。しかしながら、これに限られるものではなく、例えば、ランクBの店舗のみを選択できるようにしてもよい。

4.2 配分シミュレーション（初回配分時、追加配分時）についての他の実施例

(1) 上記の実施形態では、通常配分処理、1:100配分処理において、配分しようとするSKUが属する商品属性グループの売上金額（期間

売上金額の構成比）に基づいて、各店舗に対する配分枚数を算出している（図10ステップS202、図11ステップS306）。しかしながら、配分しようとするSKUが属する商品属性グループの売上枚数（期間売上枚数の構成比）に基づいて、各店舗に対する配分枚数を算出してもよい。

また、配分しようとするSKUの売上金額または売上枚数に基づいて、各店舗に対する配分枚数を算出してもよい。また、当該SKUに類似するSKUの売上金額または売上枚数に基づいて、各店舗に対する配分枚数を算出してもよい。また、配分しようとするSKUが属する商品属性グループに類似または関連する商品属性グループの売上金額または売上枚数に基づいて、各店舗に対する配分枚数を算出してもよい。

(2) 上記の実施形態では、売上予測配分処理、売上枚数の構成比による配分処理において、配分しようとするSKUの売上枚数に基づいた参考値または期間売上枚数の構成比を用いて、各店舗に対する配分枚数を算出している（図14ステップS506、図16ステップS602）。しかしながら、配分しようとするSKUの売上金額に基づいて、各店舗に対する配分枚数を算出してもよい。

また、配分しようとするSKUの属する商品属性グループの売上枚数または売上金額に基づいて、各店舗に対する配分枚数を算出してもよい。また、配分しようとするSKUが属する商品属性グループに類似または関連する商品属性グループの売上枚数または売上金額に基づいて、各店舗に対する配分枚数を算出してもよい。

(3) 上記の実施形態では、1:100配分処理において、操作者により選択されたランクS、Aの各店舗に対して、上位ランクから1枚ずつ配分している（図11ステップS300）が、所定量ずつ配分してもよい。また、上位ランクから配分するのではなく、売上金額または売上枚数の大きい順に配分してもよい。

Uber Exhibit 1002 - p. 217
Uber Technologies, Inc. v. SurgeTech, LLC

(4) 上記の実施形態では、商品ランク配分処理において、操作者に対して、図13Aに示すランク別配分数設定画面にランク別配分数を入力させている（図12ステップS400）。しかしながら、図18に示すランク別配分数設定画面であってもよい。これは、あらかじめランク別配分数が設定されており、操作者に対して、所望の項目を選択させるものである。また、ランク別配分数ではなく、ランク別配分比率であってもよい。

(5) 上記の実施形態では、初回時および追加時の配分処理方法として、「通常配分、1:100配分、商品ランク配分、売上予測配分、売上枚数の構成比による配分」を一例として説明している。しかしながら、これらに限られるものではない。例えば、配分しようとするSKUの属する商品属性グループの期間売上枚数と、その商品属性グループに属するSKUの種類数（SKU数）（図3参照）を用いて、SKU1種類あたりの売上枚数（売上枚数／SKU数）を店舗ごとに算出し、この算出値に基づいて配分してもよい。

また、その商品属性グループに属し、かつ所定量以上販売された（たとえば、1枚以上販売された）SKUの種類数（稼働SKU数）を用いて、SKU1種類あたりの売上枚数（売上枚数／稼働SKU数）を店舗ごとに算出し、この算出値に基づいて配分してもよい。これにより、SKU1種類あたりの販売パワーを考慮した配分処理が実現できる。なお、店舗のランク付けを行わないで、「売上枚数／SKU数」、「売上枚数／稼働SKU数」を利用した配分シミュレーションを実行してもよい。

(6) 上記の実施形態では、操作者自身が、総配分枚数を設定していない場合について説明している。しかしながら、図9に示す配分シミュレーション画面において、配分枚数変更ボタン640をクリックし、総配分枚数設定欄650に数値を入力することにより設定してもよい。

Uber Exhibit 1002 - p. 218
Uber Technologies, Inc. v. SurgeTech, LLC

(7) 上記の実施形態では、追加配分時の売上予測配分、売上枚数の構成比による配分において、当週を含めた5週間の売上枚数を利用する場合を一例として説明している。しかしながら、この期間のものに限られるものではなく、操作者が任意に当該期間を設定できるようにしてもよい。また、期間を設定せずに、これまでの売上枚数の累計であってもよい。

(8) 上記の実施形態では、数式(7)により算出した参考値を用いて、各店舗に対する配分枚数を算出しているが、その参考値の代わりに、当週配分予測値（＝当週売上予測値／消化率）を用いて、各店舗に対する配分枚数を算出してもよい。

(9) 上記の実施形態では、追加配分時において、店舗のランク付けを行わないで、参考値を利用した配分シミュレーションを実行している。しかしながら、ランク付けされた店舗に対して、参考値を用いることにより配分シミュレーションを実行してもよい。

(10) 上記の実施形態では、数式(3)、(4)の算出値を整数に切り上げた数値を、各店舗に対する配分枚数としている。しかしながら、その算出値を整数に切り下げた数値や、その算出値に最も近い整数値を各店舗に対する配分枚数としてもよい。同様に、数式(7)で算出される参考値を整数に切り上げた数値ではなく、整数に切り下げた数値等を各店舗に対する配分枚数としてもよい。

4.3 他の実施例

(1) 上記の実施形態では、商品属性グループは、アイテム(例えば、ジャケット、プルオーバー、カーディガンなど）とサイズでグループ化されたものである。しかしながら、これに限られるものではなく、その他の要素（例えば、カラー等）を用いてグループ化してもよい。また、アイテム、サイズとともに、アイテム・サブ（例えば、ニット、ファブリック、ジャージなど）を用いてグループ化してもよい。このアイテム・サブを用いることにより、配分対象となるSKUにより近い特性を有する商品属性グループを形成することができる。

Uber Exhibit 1002 - p. 219
Uber Technologies, Inc. v. SurgeTech, LLC

また、商品属性グループをアイテムのみ、アイテム・サブのみ、またはサイズのみで形成してもよい。例えば、「ジャージ」型のSKUを配分しようとする場合に、アイテムを設定しないでアイテム・サブ「ジャージ」により形成される商品属性グループを利用する。

また、商品属性グループを複数設定できるようにしてもよい。例えば、アイテムやアイテム・サブを複数設定することにより、商品属性グループの売上データが多くなり有用な場合もあり得る。

(2) 上記の実施形態では、配分対象物として、品番、サイズ、カラーで特定された商品であるSKUを対応づけ、配分対象物に対応する取扱実績情報として、商品属性グループ（ジャケット、サイズA）の売上金額を対応づけて説明している。しかしながら、配分対象物に対応する取扱実績情報として、配分対象物の種類、性質、機能等その他の特性と関連または類似する特性を有する物の取扱実績情報でもよい。配分対象物と配分対象物に対応する取扱実績情報の例を図19に示す。

(3) 上記の実施形態では、配分シミュレーションにおいて、いずれの店舗に対してどれだけ商品を配分するかを決定する場合について説明している。しかしながら、いずれの店舗に配分するか（配分先）だけを決定する場合や、どれだけ商品を配分するか（配分量）だけを決定する場合にも、この発明を適用することができる。

(4) 上記の実施形態では、複数の各店舗に対して、物理的に商品を配分する場合を一例として説明しているが、電気通信回線を用いて、配分対象物としてデータやプログラムを配送する場合にもこの発明を適用することができる。また、同一店舗等内において、複数の商品配置領域に商品を配分する場合にも、この発明を適用することができる。例えば、同一店舗において、1階～5階に同一商品を配分する場合である。

(5) 上記の実施形態では、配分処理コンピュータ10と別個のコンピュータ（集計処理コンピュータ20）を用いて、データ集計処理を

Uber Exhibit 1002 - p. 220
Uber Technologies, Inc. v. SurgeTech, LLC

行っているが、配分処理コンピュータ10が、データ集計処理を行ってもよい。

(6) 上記の実施形態では、アパレル商品を各店舗に対して配分する場合を一例として説明しているが、商品一般（食品、電気製品等）について、この発明を適用することができる。また、配分の対象となるものは、各店舗において販売対象となる物品に限られるものでない。また、企業間において取り引きされるような商品についても適用することができる。

(7) 上記の実施形態では、配分先として店舗を一例として説明しているが、これに限られるものではない。例えば、工場や営業所、物流センター等であってもよい。

(8) 上記の実施形態では、配分シミュレーションの結果（配分データ）を物流センターコンピュータ40に転送している。しかしながら、店舗コンピュータ50、52、54に転送してもよい。この場合、各店舗が、配分データに基づいて物流センター等に対して商品の出荷指令を行ってもよい。また、配分データに示される各店舗に対する配分枚数の範囲内で、各店舗が商品の出荷指令を行ってもよい。

(9) 上記の実施形態では、物流センターコンピュータ40は、本部の集計処理コンピュータ20に対して入出荷データを送信しているが、入出荷データを出力した書類を本部に送付してもよい。同様に、店舗コンピュータ50、52、54は、本部の集計処理コンピュータ20に対して売上データを送信しているが、売上データを出力した書類を本部に送付してもよい。

(10) 上記の実施形態では、配分処理コンピュータ10は、集計処理コンピュータ20、物流センターコンピュータ40、店舗コンピュータ50等とともに用いることによって、上記の配分シミュレーション、店舗ランク付処理を実行している場合を一例として説明している。しかしながら、配分処理コンピュータ10単独で、配分シミュレーション、店舗ランク付処理を実行してもよい。

(11) 上記の実施形態では、ブランドが同一のアパレル商品を、配分する場合を一例として説明している。しかしながら、ブランドが同一の場合に限られるものでない。

4.4 集計処理コンピュータ20の処理について

図20に、図1に示す集計処理コンピュータ20によるデータ集計処理のフローチャートを示す。集計処理コンピュータ20のCPUは、各店舗の店舗コンピュータ50、52、54からの売上データ（いずれのSKUが何枚売れたか）や、物流センターコンピュータ40からの入出庫データ（いずれのSKUを何枚入荷し、何枚集荷したか）を受信し、また、操作者から発注データ（いずれのSKUを何枚注文したか）を取得して、データベースサーバ30のトランザクションDB36に蓄積する（図20ステップS800）。この処理は、所定時刻になるまで繰り返し行われる（図20ステップS802）。

所定時刻になると、各店舗の売上データをSKUごとに集計し、当日の売上数として、データベースサーバ30のトランザクションDB36に記録する（図20ステップS804）。同様に、入庫データ、出庫データをSKUごとに集計し、トランザクションDB36に記録する。これにより、毎日の売上データ等が蓄積される。

さらに、各店舗におけるSKUごとに、当該週の売上金額の累計（月曜日からの売上金額の累計）、当該週の売上枚数の累計、仕入枚数、在庫枚数なども算出し（図20ステップS806）、データベースサーバ30のトランザクションDB36（図5B参照）に記録される（図20ステップS808）。

Uber Exhibit 1002 - p. 222
Uber Technologies, Inc. v. SurgeTech, LLC

請　求　の　範　囲

1．複数の配分先端末装置と配分処理装置と配分実行装置とを備えた配分処理システムにおいて、

配分先端末装置は、対象物の取扱実績情報を記録し、

配分処理装置は、

各配分先端末装置から、各配分先における対象物の取扱実績情報を受けて記録し、

新たに配分を行う配分対象物に対応する取扱実績情報に基づいて、各配分予定先を分類し、

新たに配分を行う配分対象物の総量を受けて、各配分予定先に対して決定された分類を用いて、前記各配分予定先に対し、当該配分対象物をどのように配分するかを示す配分データを生成して、配分実行装置に送信し、

配分実行装置は、前記配分データを受けて、当該配分対象物を、当該配分データに基づいて、配分先に配分するための処理を実行すること、を特徴とする配分処理システム。

2．請求項1のシステムにおいて、

いずれの配分予定先に配分対象物を配分するか、またはいずれの配分予定先に対してどれだけ配分対象物を配分するか、を示す前記配分データを生成することを特徴とするもの。

3．請求項1または請求項2のシステムにおいて、

前記配分対象物に対応する取扱実績情報は、当該配分対象物の過去における取扱実績情報であることを特徴とするもの。

4．請求項1または請求項2のシステムにおいて、

Uber Exhibit 1002 - p. 223
Uber Technologies, Inc. v. SurgeTech, LLC

前記配分対象物に対応する取扱実績情報は、当該配分対象物の属するグループ全体についての過去における取扱実績情報であることを特徴とするもの。

5．請求項1または請求項2のシステムにおいて、

配分予定先に対して決定された分類を用いて選択された選択配分先に対して、どれだけ配分対象物を配分するかを示す前記配分データを生成することを特徴とするもの。

6．請求項5のシステムにおいて、

前記選択配分先全体の前記配分対象物に対応する取扱実績情報に対する、前記各選択配分先の前記配分対象物に対応する取扱実績情報の割合に応じて、各選択配分先に対してどれだけ配分対象物を配分するかを示す前記配分データを生成することを特徴とするもの。

7．請求項5のシステムにおいて、

前記各選択配分先に対して、前記配分対象物を所定量配分するとともに、当該配分後の残存配分対象物について、前記選択配分先全体の前記配分対象物に対応する取扱実績情報に対する、前記各選択配分先の前記配分対象物に対応する取扱実績情報の割合に応じて、各選択配分先に対してどれだけ配分するかを示す前記配分データを生成することを特徴とするもの。

8．請求項1または請求項2のシステムにおいて、

前記分類に対して設定された配分量または配分比率に基づいて、配分対象物をどのように配分するかを示す前記配分データを生成することを特徴とするもの。

9．請求項1または請求項2のシステムにおいて、

配分対象物が属するグループの前記配分対象物に対応する取扱実績情報、および当該グループに属するグループ構成物の種類数から算出されるグループ構成物あたりの取扱能力に基づいて、どれだけ配分対象物を配分するかを示す前記配分データを生成することを特徴とするもの。

１０．請求項１または請求項２のシステムにおいて、

前記配分対象物に対応する取扱実績情報から算出される売上予測値に基づいて、どれだけ配分対象物を配分するかを示す前記配分データを生成することを特徴とするもの。

１１．請求項１０のシステムにおいて、

週末指数を考慮した前記売上予測値に基づいて、どれだけ配分対象物を配分するかを示す前記配分データを生成することを特徴とするもの。

１２．請求項１または請求項２のシステムにおいて、

前記取扱実績情報は、少なくとも売上情報を含むことを特徴とするもの。

１３．請求項１または請求項２のシステムにおいて、

前記取扱実績情報は、少なくとも売上情報および在庫情報から算出される稼働率を含むことを特徴とするもの。

１４．配分対象物を各配分先にどのように配分するかを決定するための配分データを生成する配分処理装置であって、

各配分先における対象物の取扱実績情報を受け、新たに配分を行う配分対象物に対応する取扱実績情報に基づいて、各配分予定先を分類し、

Uber Exhibit 1002 - p. 225
Uber Technologies, Inc. v. SurgeTech, LLC

新たに配分を行う配分対象物の総量を受けて、各配分予定先に対して決定された分類を用いて、前記各配分予定先に対し、当該配分対象物をどのように配分するかを示す配分データを生成すること、を特徴とする配分処理装置。

１５．請求項１４の装置において、

いずれの配分予定先に配分対象物を配分するか、またはいずれの配分予定先に対してどれだけ配分対象物を配分するか、を示す前記配分データを生成することを特徴とするもの。

１６．請求項１４または請求項１５の装置において、

前記配分対象物に対応する取扱実績情報は、当該配分対象物の過去における取扱実績情報であることを特徴とするもの。

１７．請求項１４または請求項１５の装置において、

前記配分対象物に対応する取扱実績情報は、当該配分対象物の属するグループ全体についての過去における取扱実績情報であることを特徴とするもの。

１８．請求項１４または請求項１５の装置において、

配分予定先に対して決定された分類を用いて選択された選択配分先に対して、どれだけ配分対象物を配分するかを示す前記配分データを生成することを特徴とするもの。

１９．請求項１８の装置において、

前記選択配分先全体の前記配分対象物に対応する取扱実績情報に対する、前記各選択配分先の前記配分対象物に対応する取扱実績情報の割合に応じて、各選択配分先に対してどれだけ配分対象物を配分するかを示す前記配分データを生成することを特徴とするもの。

Uber Exhibit 1002 - p. 226
Uber Technologies, Inc. v. SurgeTech, LLC

２０．請求項１８の装置において、

前記各選択配分先に対して、前記配分対象物を所定量配分するとともに、当該配分後の残存配分対象物について、前記選択配分先全体の前記配分対象物に対応する取扱実績情報に対する、前記各選択配分先の前記配分対象物に対応する取扱実績情報の割合に応じて、各選択配分先に対してどれだけ配分するかを示す前記配分データを生成することを特徴とするもの。

２１．請求項１４または請求項１５の装置において、

前記分類に対して設定された配分量または配分比率に基づいて、配分対象物をどのように配分するかを示す前記配分データを生成することを特徴とするもの。

２２．請求項１４または請求項１５の装置において、

配分対象物が属するグループの前記配分対象物に対応する取扱実績情報、および当該グループに属するグループ構成物の種類数から算出されるグループ構成物あたりの取扱能力に基づいて、どれだけ配分対象物を配分するかを示す前記配分データを生成することを特徴とするもの。

２３．請求項１４または請求項１５の装置において、

前記配分対象物に対応する取扱実績情報から算出される売上予測値に基づいて、どれだけ配分対象物を配分するかを示す前記配分データを生成することを特徴とするもの。

２４．請求項２３の装置において、

Uber Exhibit 1002 - p. 227
Uber Technologies, Inc. v. SurgeTech, LLC

週末指数を考慮した前記売上予測値に基づいて、どれだけ配分対象物を配分するかを示す前記配分データを生成することを特徴とするもの。

２５．請求項１４または請求項１５の装置において、
前記取扱実績情報は、少なくとも売上情報を含むことを特徴とするもの。

２６．請求項１４または請求項１５の装置において、
前記取扱実績情報は、少なくとも売上情報および在庫情報から算出される稼働率を含むことを特徴とするもの。

２７．各配分先における対象物の取扱実績情報を受け、新たに配分を行う配分対象物に対応する取扱実績情報に基づいて、各配分予定先を分類し、
新たに配分を行う配分対象物の総量を受けて、各配分予定先に対して決定された分類を用いて、前記各配分予定先に対し、当該配分対象物をどのように配分するかを示す配分データを生成する処理を、コンピュータに実行させるためのプログラム。

２８．請求項２７のプログラムにおいて、
いずれの配分予定先に配分対象物を配分するか、またはいずれの配分予定先に対してどれだけ配分対象物を配分するか、を示す前記配分データを生成することを特徴とするもの。

２９．請求項２７または請求項２８のプログラムにおいて、
前記配分対象物に対応する取扱実績情報は、当該配分対象物の過去における取扱実績情報であることを特徴とするもの。

３０．請求項２７または請求項２８のプログラムにおいて、

前記配分対象物に対応する取扱実績情報は、当該配分対象物の属するグループ全体についての過去における取扱実績情報であることを特徴とするもの。

３１．請求項２７または請求項２８のプログラムにおいて、

配分予定先に対して決定された分類を用いて選択された選択配分先に対して、どれだけ配分対象物を配分するかを示す前記配分データを生成する処理を、コンピュータに実行させることを特徴とするもの。

３２．請求項３１のプログラムにおいて、

前記選択配分先全体の前記配分対象物に対応する取扱実績情報に対する、前記各選択配分先の前記配分対象物に対応する取扱実績情報の割合に応じて、各選択配分先に対してどれだけ配分対象物を配分するかを示す前記配分データを生成する処理を、コンピュータに実行させることを特徴とするもの。

３３．請求項３１のプログラムにおいて、

前記各選択配分先に対して、前記配分対象物を所定量配分するとともに、当該配分後の残存配分対象物について、前記選択配分先全体の前記配分対象物に対応する取扱実績情報に対する、前記各選択配分先の前記配分対象物に対応する取扱実績情報の割合に応じて、各選択配分先に対してどれだけ配分するかを示す前記配分データを生成する処理を、コンピュータに実行させることを特徴とするもの。

３４．請求項２７または請求項２８のプログラムにおいて、

前記分類に対して設定された配分量または配分比率に基づいて、配分対象物をどのように配分するかを示す前記配分データを生成する処理を、コンピュータに実行させることを特徴とするもの。

３５．請求項２７または請求項２８のプログラムにおいて、

配分対象物が属するグループの前記配分対象物に対応する取扱実績情報、および当該グループに属するグループ構成物の種類数から算出されるグループ構成物あたりの取扱能力に基づいて、どれだけ配分対象物を配分するかを示す前記配分データを生成する処理を、コンピュータに実行させることを特徴とするもの。

３６．請求項２７または請求項２８のプログラムにおいて、

前記配分対象物に対応する取扱実績情報から算出される売上予測値に基づいて、どれだけ配分対象物を配分するかを示す前記配分データを生成する処理を、コンピュータに実行させることを特徴とするもの。

３７．請求項３６のプログラムにおいて、

週末指数を考慮した前記売上予測値に基づいて、どれだけ配分対象物を配分するかを示す前記配分データを生成する処理を、コンピュータに実行させることを特徴とするもの。

３８．請求項２７または請求項２８のプログラムにおいて、

前記取扱実績情報は、少なくとも売上情報を含むことを特徴とするもの。

３９．請求項２７または請求項２８のプログラムにおいて、

前記取扱実績情報は、少なくとも売上情報および在庫情報から算出される稼働率を含むことを特徴とするもの。

Uber Exhibit 1002 - p. 230
Uber Technologies, Inc. v. SurgeTech, LLC

４０．各配分先における対象物の取扱実績情報を受け、新たに配分を行う配分対象物に対応する取扱実績情報に基づいて、各配分予定先を分類し、

新たに配分を行う配分対象物の総量を受けて、各配分予定先に対して決定された分類を用いて、前記各配分予定先に対し、当該配分対象物をどのように配分するかを示す配分データを生成する処理を、コンピュータに実行させるためのプログラムを記録した記録媒体。

４１．請求項４０の記録媒体において、

いずれの配分予定先に配分対象物を配分するか、またはいずれの配分予定先に対してどれだけ配分対象物を配分するか、を示す前記配分データを生成する処理を、コンピュータに実行させるためのプログラムを記録したことを特徴とするもの。

４２．請求項４０または請求項４１の記録媒体において、

前記配分対象物に対応する取扱実績情報は、当該配分対象物の過去における取扱実績情報であることを特徴とするもの。

４３．請求項４０または請求項４１の記録媒体において、

前記配分対象物に対応する取扱実績情報は、当該配分対象物の属するグループ全体についての過去における取扱実績情報であることを特徴とするもの。

４４．請求項４０または請求項４１の記録媒体において、

配分予定先に対して決定された分類を用いて選択された選択配分先に対して、どれだけ配分対象物を配分するかを示す前記配分データを生成することを特徴とするもの。

Uber Exhibit 1002 - p. 231
Uber Technologies, Inc. v. SurgeTech, LLC

４５．請求項４４の記録媒体において、

前記選択配分先全体の前記配分対象物に対応する取扱実績情報に対する、前記各選択配分先の前記配分対象物に対応する取扱実績情報の割合に応じて、各選択配分先に対してどれだけ配分対象物を配分するかを示す前記配分データを生成する処理を、コンピュータに実行させるためのプログラムを記録したことを特徴とするもの。

４６．請求項４４の記録媒体において、

前記各選択配分先に対して、前記配分対象物を所定量配分するとともに、当該配分後の残存配分対象物について、前記選択配分先全体の前記配分対象物に対応する取扱実績情報に対する、前記各選択配分先の前記配分対象物に対応する取扱実績情報の割合に応じて、各選択配分先に対してどれだけ配分するかを示す前記配分データを生成する処理を、コンピュータに実行させるためのプログラムを記録したことを特徴とするもの。

４７．請求項４０または請求項４１の記録媒体において、

前記分類に対して設定された配分量または配分比率に基づいて、配分対象物をどのように配分するかを示す前記配分データを生成する処理を、コンピュータに実行させるためのプログラムを記録したことを特徴とするもの。

４８．請求項４０または請求項４１の記録媒体において、

配分対象物が属するグループの前記配分対象物に対応する取扱実績情報、および当該グループに属するグループ構成物の種類数から算出されるグループ構成物あたりの取扱能力に基づいて、どれだけ配分対象物を配分するかを示す前記配分データを生成する処理を、コンピュータに実行させるためのプログラムを記録したことを特徴とするもの。

Uber Exhibit 1002 - p. 232
Uber Technologies, Inc. v. SurgeTech, LLC

４９．請求項４０または請求項４１の記録媒体において、

前記配分対象物に対応する取扱実績情報から算出される売上予測値に基づいて、どれだけ配分対象物を配分するかを示す前記配分データを生成する処理を、コンピュータに実行させるためのプログラムを記録したことを特徴とするもの。

５０．請求項４９の記録媒体において、

週末指数を考慮した前記売上予測値に基づいて、どれだけ配分対象物を配分するかを示す前記配分データを生成する処理を、コンピュータに実行させるためのプログラムを記録したことを特徴とするもの。

５１．請求項４０または請求項４１の記録媒体において、

前記取扱実績情報は、少なくとも売上情報を含むことを特徴とするもの。

５２．請求項４０または請求項４１の記録媒体において、

前記取扱実績情報は、少なくとも売上情報および在庫情報から算出される稼働率を含むことを特徴とするもの。

５３．コンピュータを用いて、

各配分先における対象物の取扱実績情報を受け、新たに配分を行う配分対象物に対応する取扱実績情報に基づいて、各配分予定先を評価し、

新たに配分を行う配分対象物の総量を受けて、各配分予定先に対して決定された評価を用いて、前記各配分予定先に対し、当該配分対象物をどのように配分するかを示す配分データを生成すること、を特徴とする配分処理方法。

Uber Exhibit 1002 - p. 233
Uber Technologies, Inc. v. SurgeTech, LLC

５４．複数の配分先端末装置と配分処理装置と配分実行装置とを備えた配分処理システムであって、

各配分先端末装置は、

対象物の取扱実績情報を記録する第１の記憶手段を備え、

前記配分処理装置は、

各配分先端末装置から、各配分先における対象物の取扱実績情報を受けて記録する第２の記憶手段と、

前記第２の記憶手段により記憶された、新たに配分を行う配分対象物に対応する取扱実績情報に基づいて、各配分予定先を分類する分類手段と、

新たに配分を行う配分対象物の総量を受けて、前記分類手段により各配分予定先に対して決定された分類を用いて、前記各配分予定先に対し、当該配分対象物をどのように配分するかを示す配分データを生成する生成手段と、

前記生成手段により生成された配分データを配分実行装置に送信する送信手段と、を備え、

前記配分実行装置は、

前記送信手段により送信された配分データを受けて、当該配分対象物を、当該配分データに基づいて、配分先に配分するための処理を実行する実行手段と、

を備えることを特徴とする配分処理システム。

５５．配分対象物を各配分先にどのように配分するかを決定するための配分処理装置であって、

各配分先における対象物の取扱実績情報を受け付ける受付手段と、

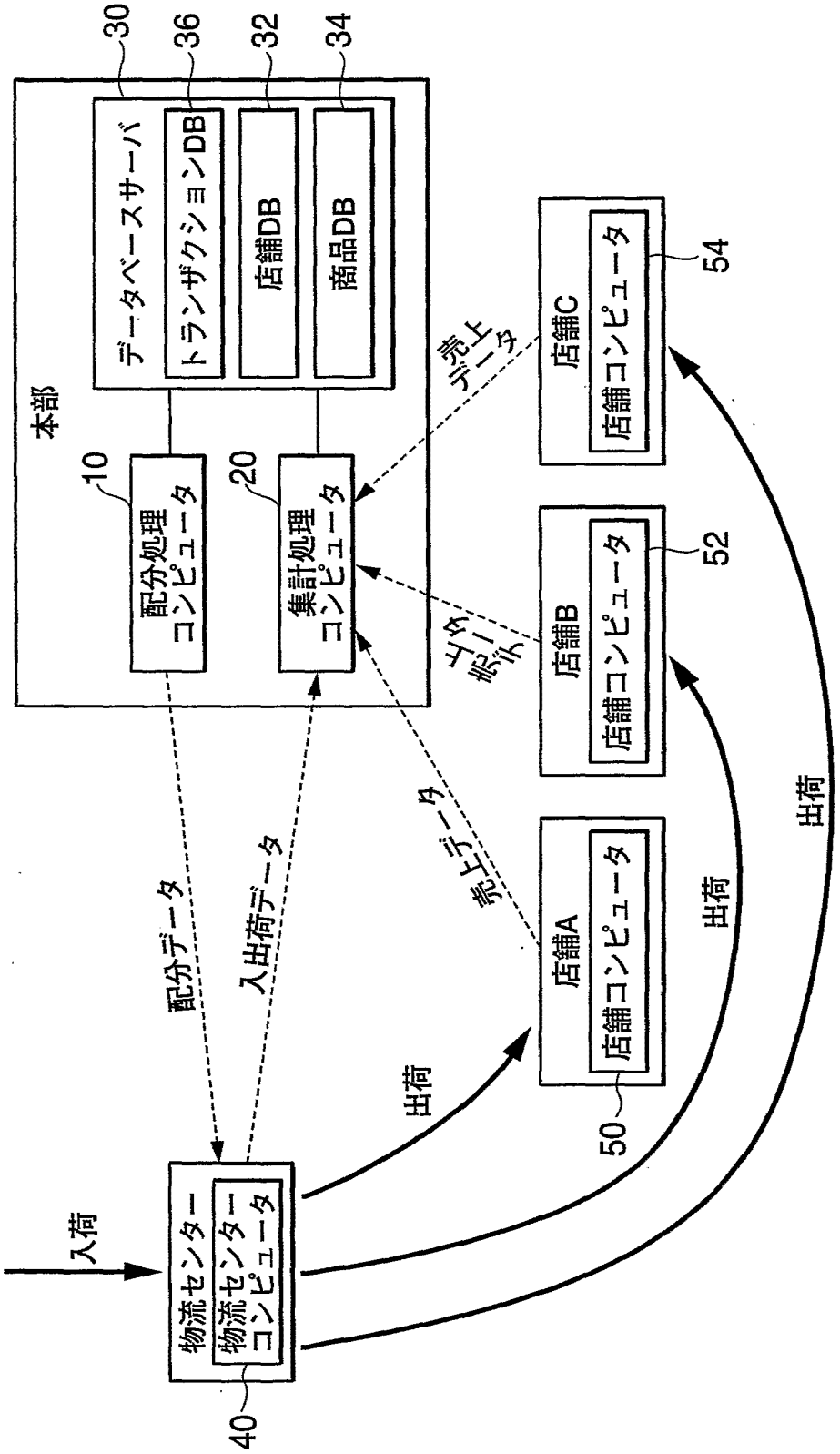
前記受付手段により受け付けた、新たに配分を行う配分対象物に対応する取扱実績情報に基づいて、各配分予定先を分類する分類手段と、

Uber Exhibit 1002 - p. 234
Uber Technologies, Inc. v. SurgeTech, LLC

新たに配分を行う配分対象物の総量を受けて、前記分類手段により各配分予定先に対して決定された分類を用いて、前記各配分予定先に対し、当該配分対象物をどのように配分するかを示す配分データを生成する生成手段と、

を備えることを特徴とする配分処理装置。

図 1

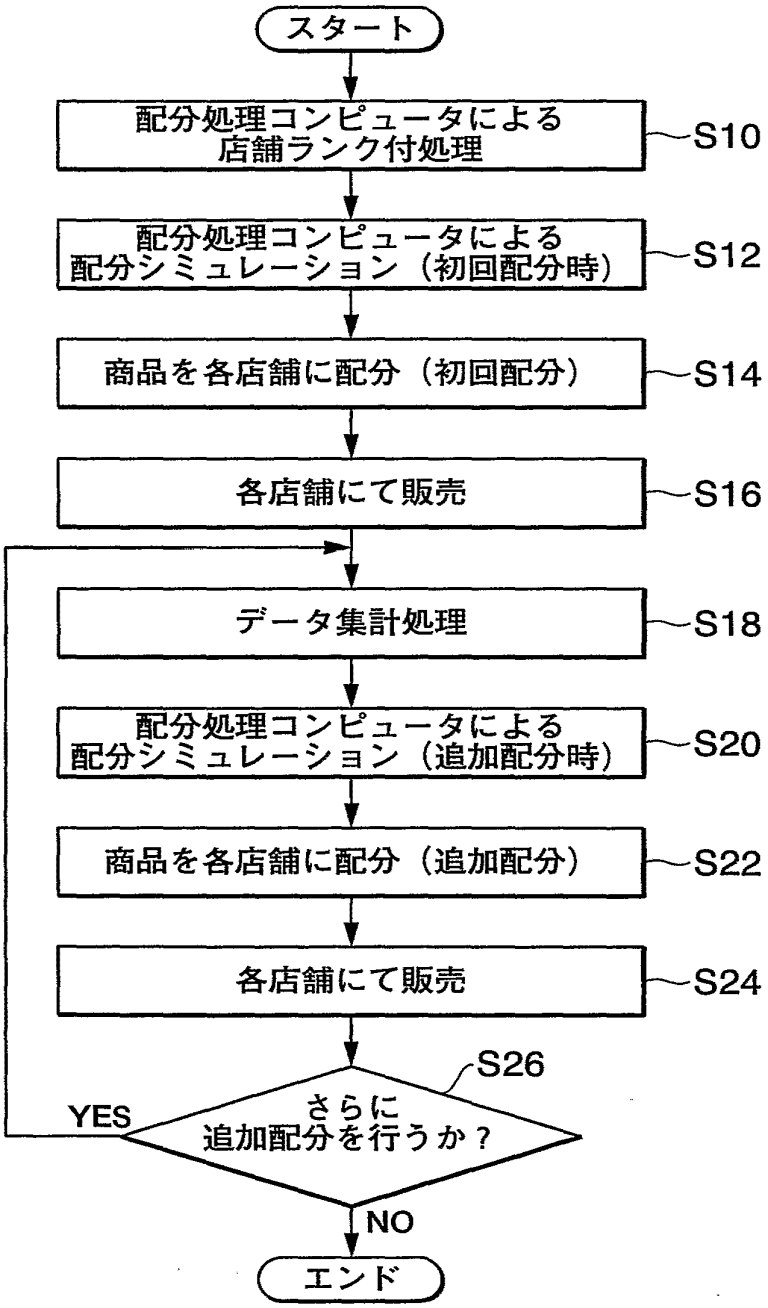


差替え用紙 (規則26)

Uber Exhibit 1002 - p. 236
Uber Technologies, Inc. v. SurgeTech, LLC

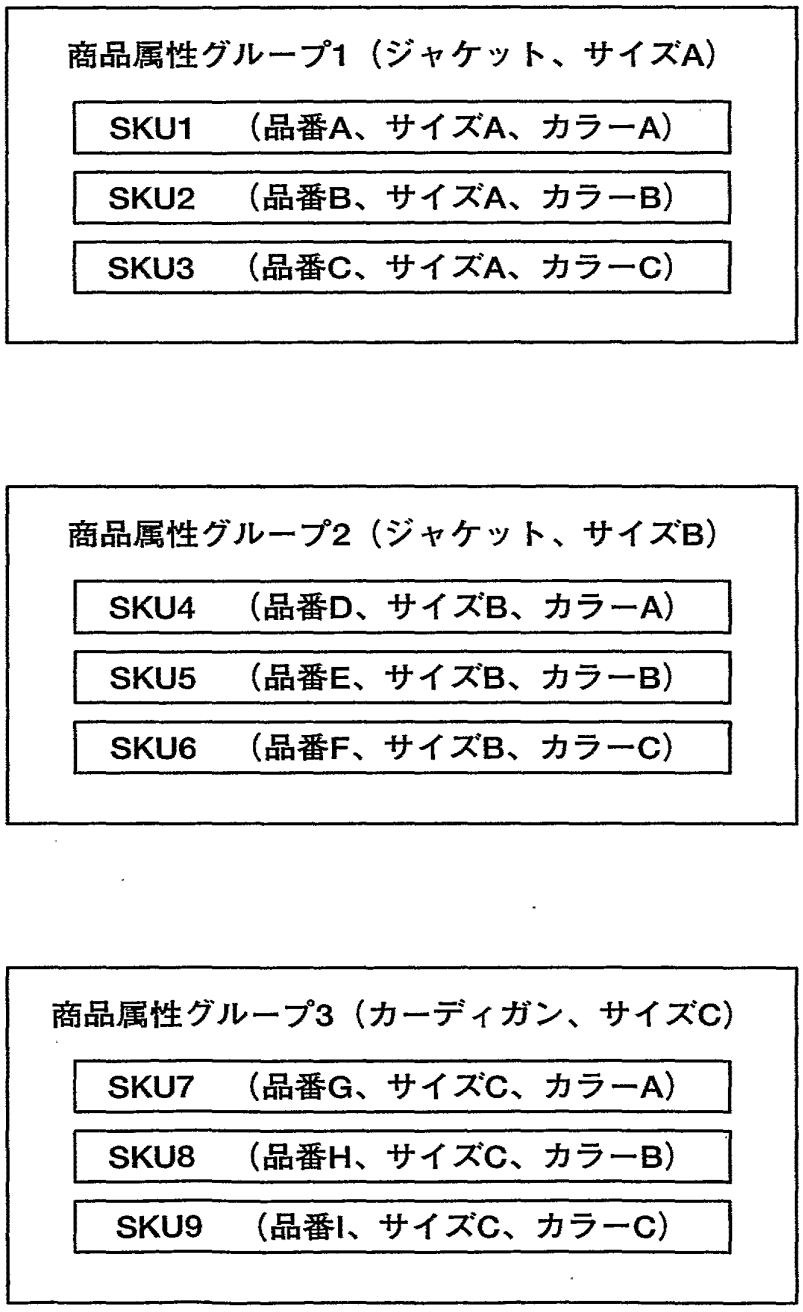
図 2

処理の概要



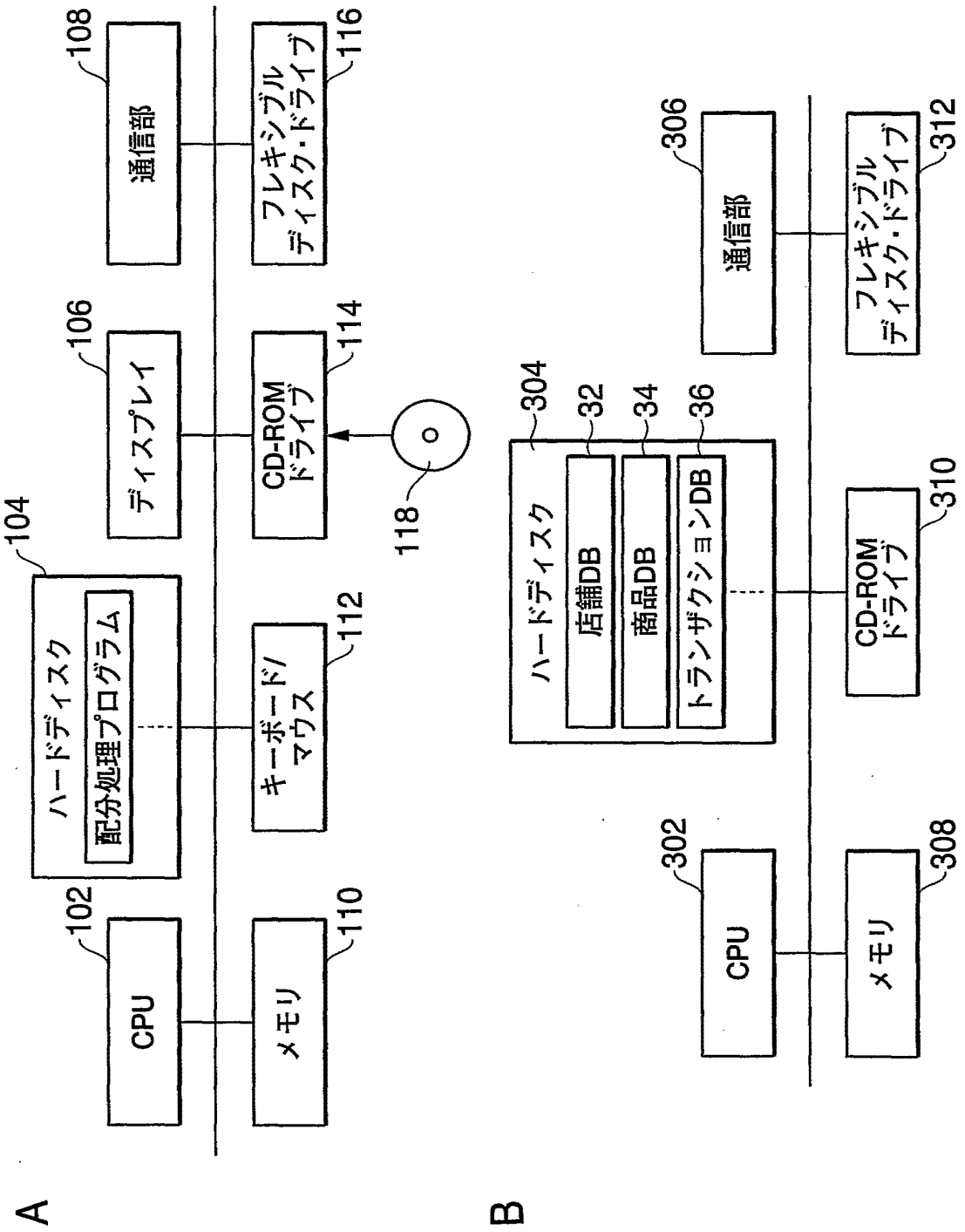
Uber Exhibit 1002 - p. 237
Uber Technologies, Inc. v. SurgeTech, LLC

図 3



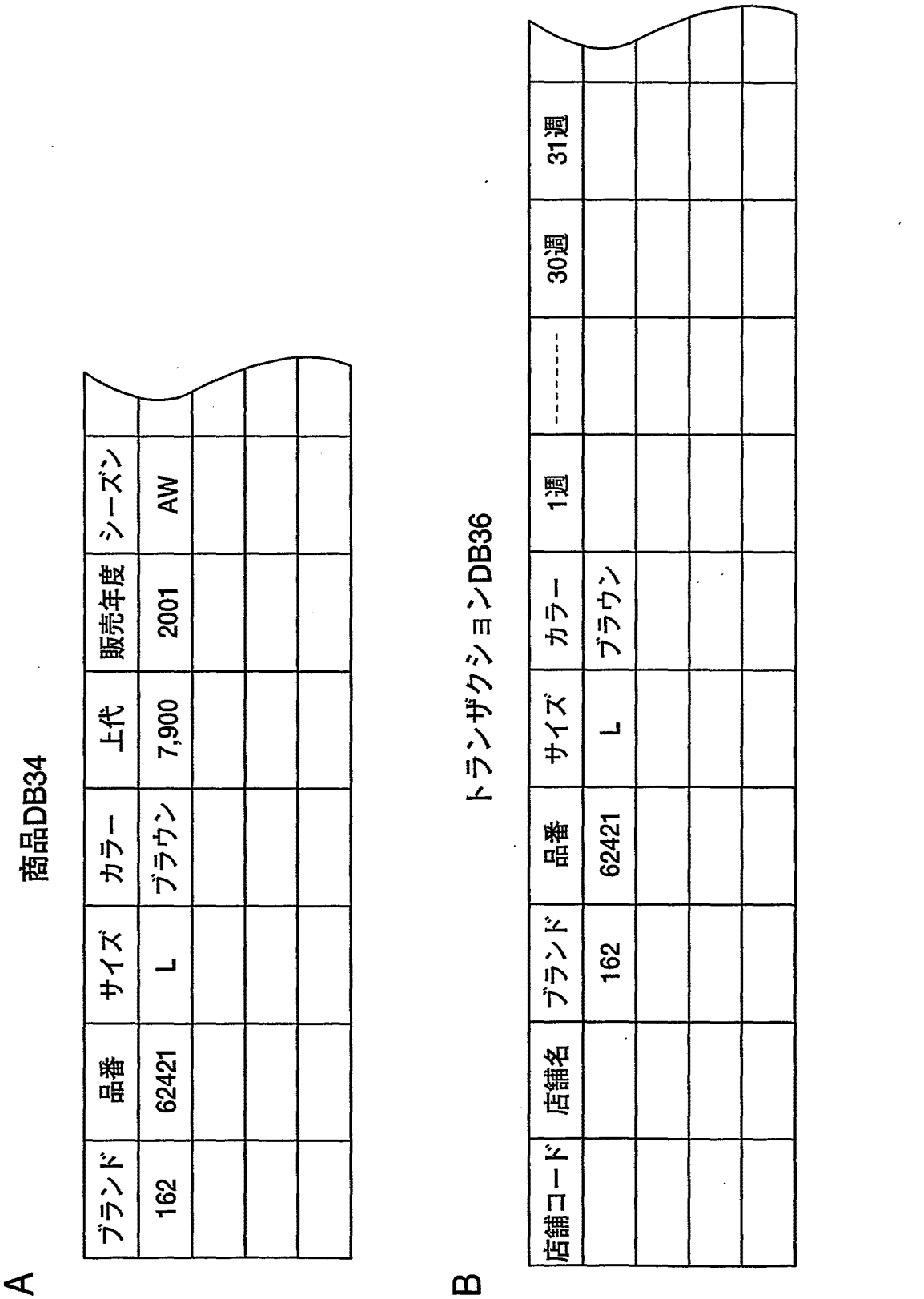
Uber Exhibit 1002 - p. 238
Uber Technologies, Inc. v. SurgeTech, LLC

図 4



Uber Exhibit 1002 - p. 239
Uber Technologies, Inc. v. SurgeTech, LLC

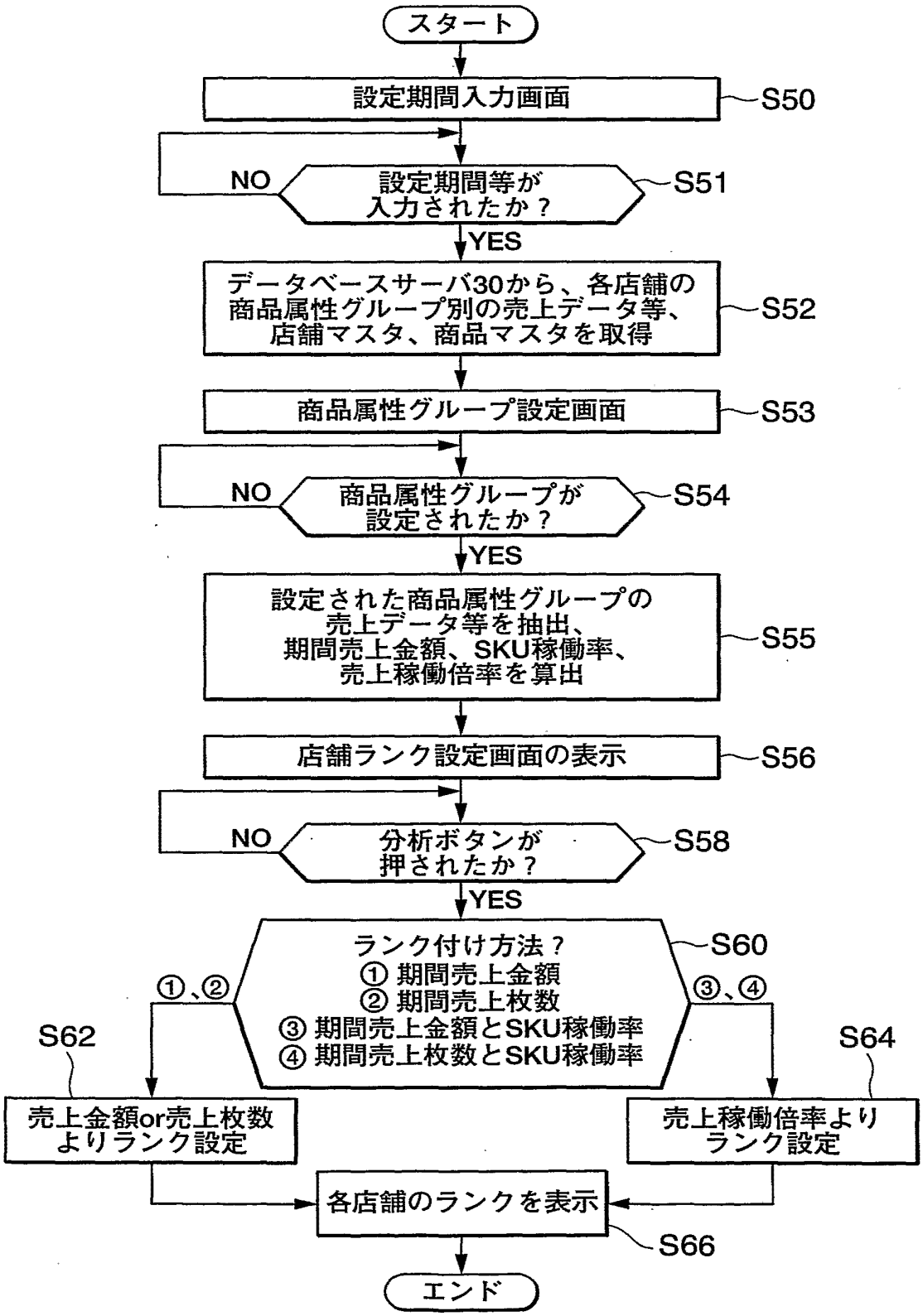
図 5



Uber Exhibit 1002 - p. 240
Uber Technologies, Inc. v. SurgeTech, LLC

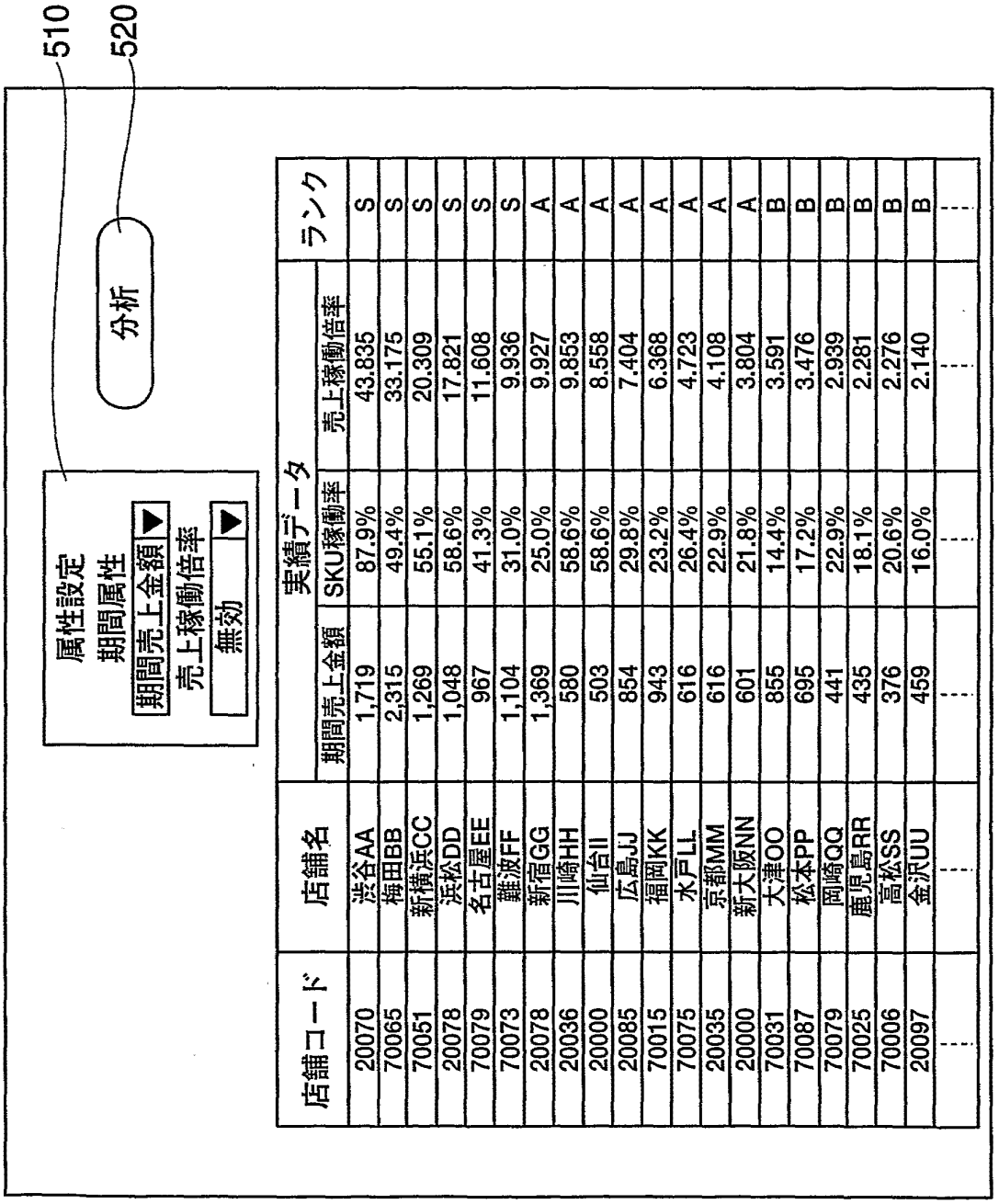
図 6

店舗ランク付処理



Uber Exhibit 1002 - p. 241
Uber Technologies, Inc. v. SurgeTech, LLC

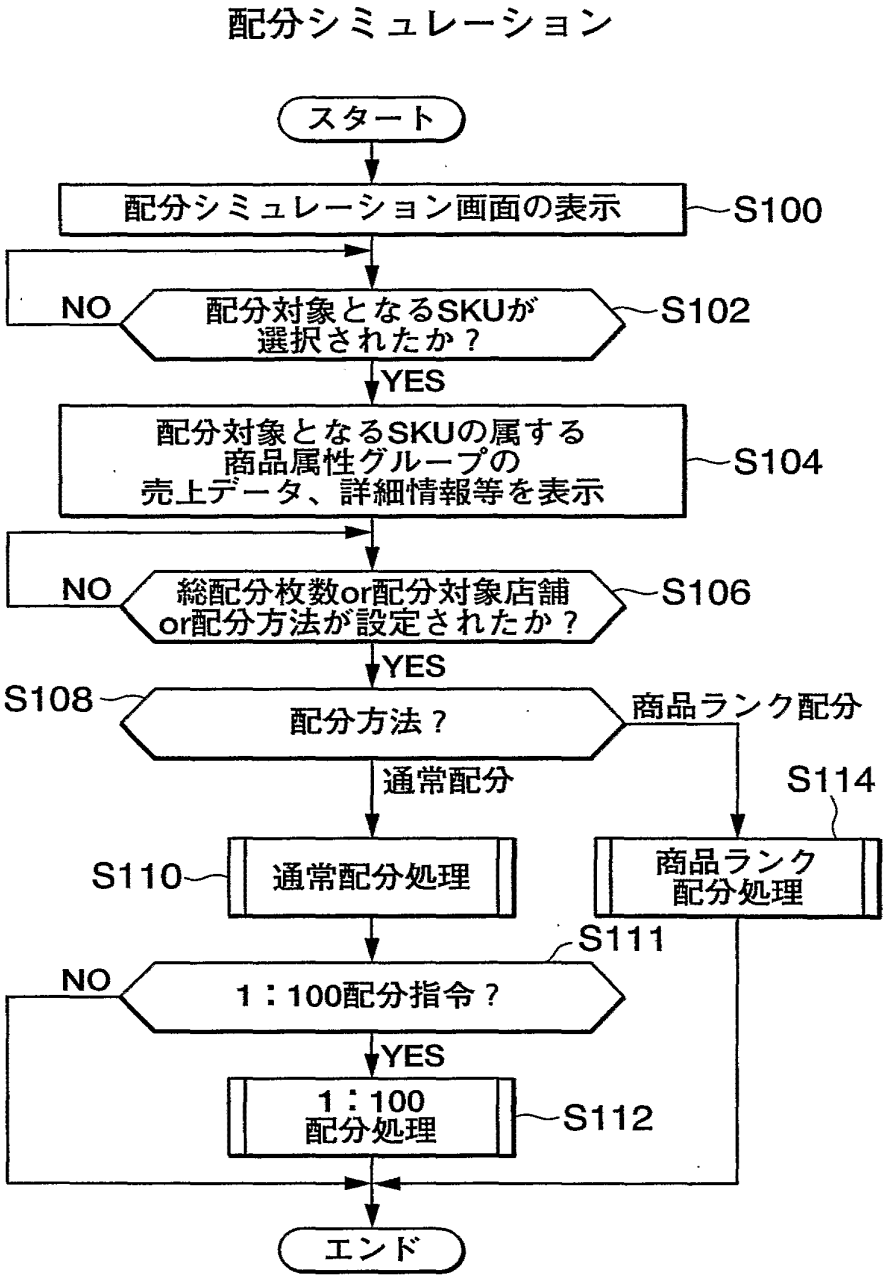
図 7



店舗コード	店舗名	実績データ			ランク
		期間売上金額	SKU稼働率	売上稼働倍率	
20070	渋谷AA	1,719	87.9%	43.835	S
70065	梅田BB	2,315	49.4%	33.175	S
70051	新横浜CC	1,269	55.1%	20.309	S
20078	浜松DD	1,048	58.6%	17.821	S
70079	名古屋EE	967	41.3%	11.608	S
70073	難波FF	1,104	31.0%	9.936	S
20078	新宿GG	1,369	25.0%	9.927	A
20036	川崎HH	580	58.6%	9.853	A
20000	仙台II	503	58.6%	8.558	A
20085	広島JJ	854	29.8%	7.404	A
70015	福岡KK	943	23.2%	6.368	A
70075	水戸LL	616	26.4%	4.723	A
20035	京都MM	616	22.9%	4.108	A
20000	新大阪NN	601	21.8%	3.804	A
70031	大津OO	855	14.4%	3.591	B
70087	松本PP	695	17.2%	3.476	B
70079	岡崎QQ	441	22.9%	2.939	B
70025	鹿児島RR	435	18.1%	2.281	B
70006	高松SS	376	20.6%	2.276	B
20097	金沢UU	459	16.0%	2.140	B
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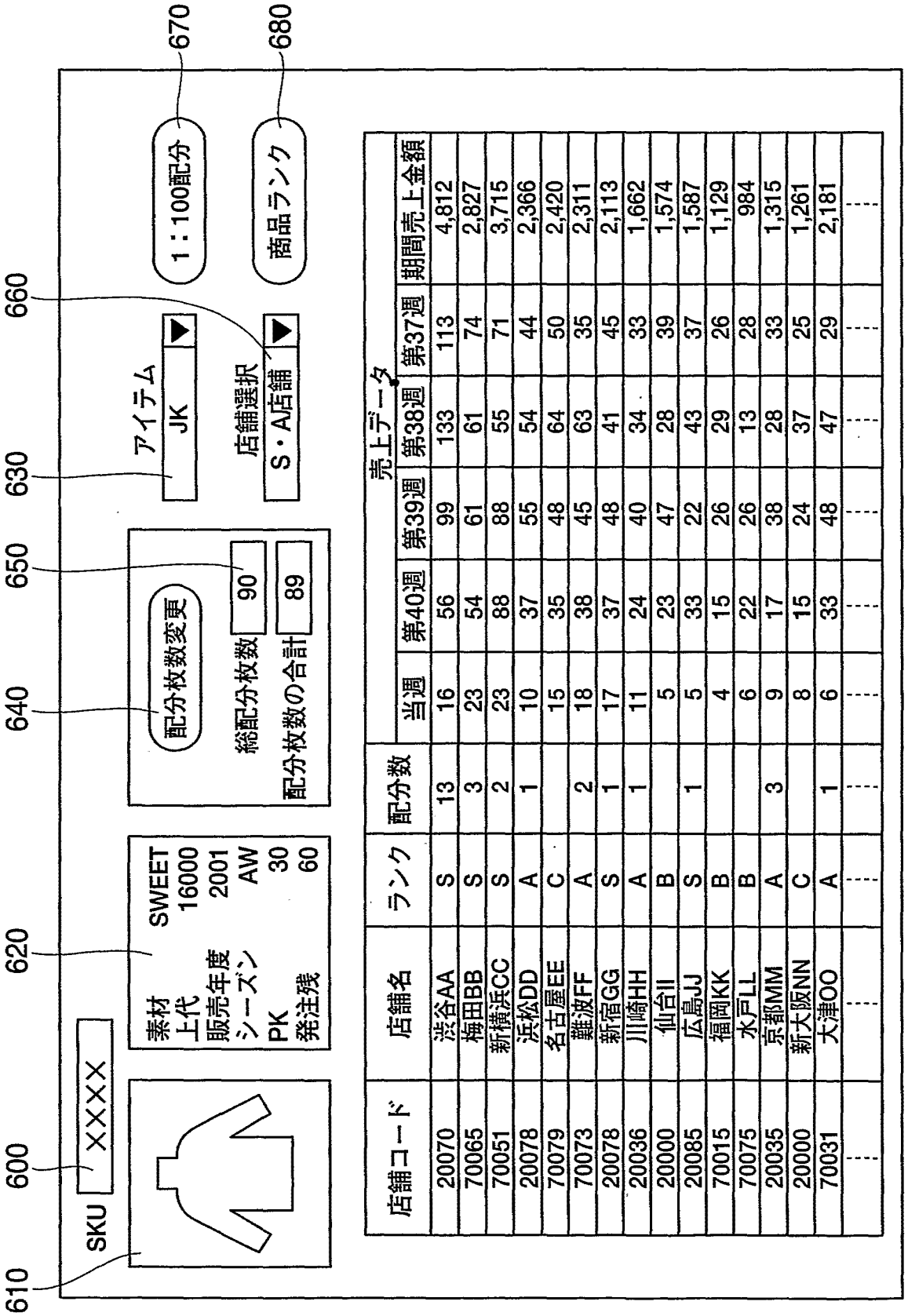
Uber Exhibit 1002 - p. 242
Uber Technologies, Inc. v. SurgeTech, LLC

図 8 8/20



Uber Exhibit 1002 - p. 243
Uber Technologies, Inc. v. SurgeTech, LLC

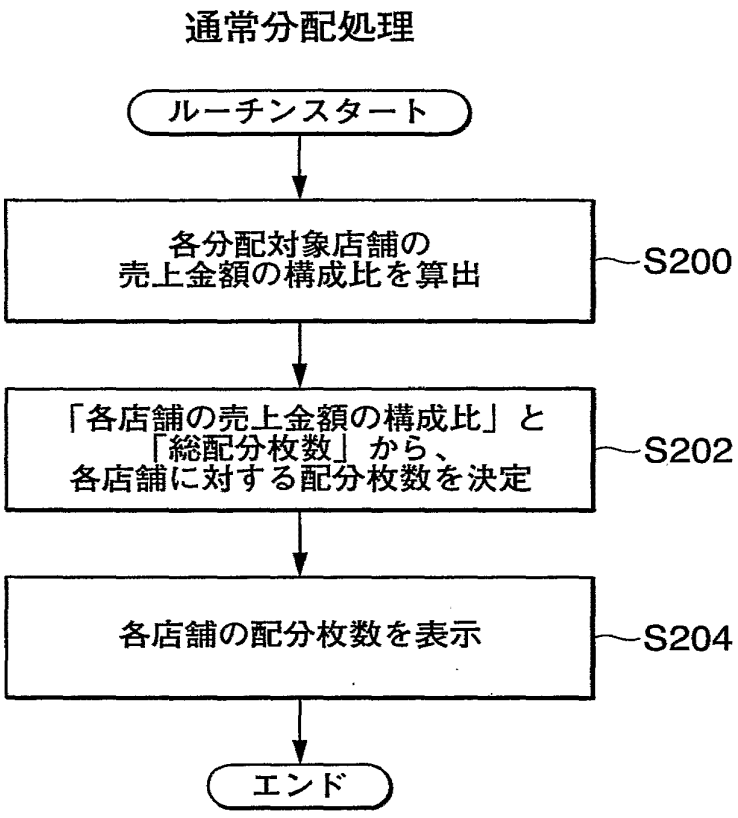
図 9



差替え用紙 (規則26)

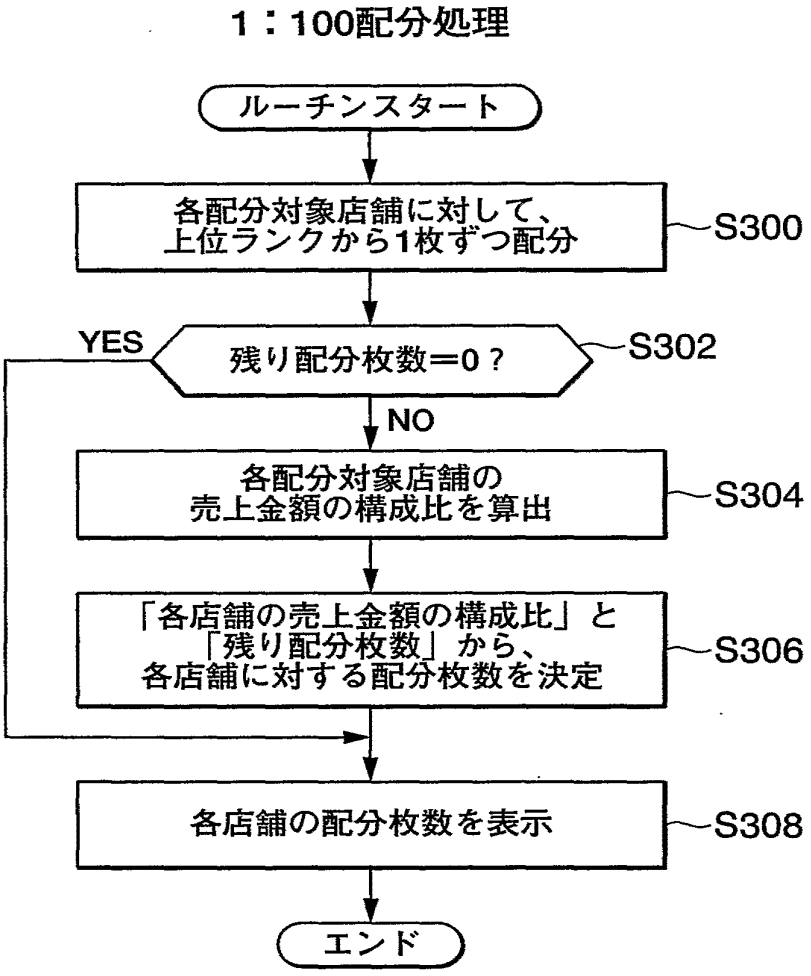
Uber Exhibit 1002 - p. 244
Uber Technologies, Inc. v. SurgeTech, LLC

図１０ 10/20



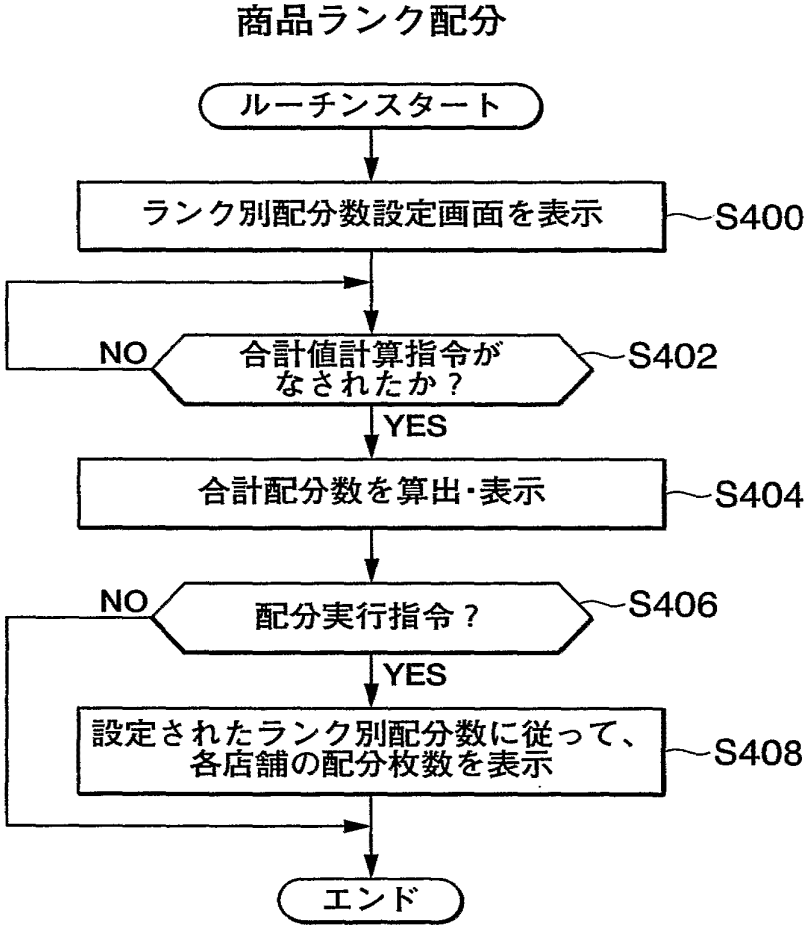
Uber Exhibit 1002 - p. 245
Uber Technologies, Inc. v. SurgeTech, LLC

図１１ 11/20



Uber Exhibit 1002 - p. 246
Uber Technologies, Inc. v. SurgeTech, LLC

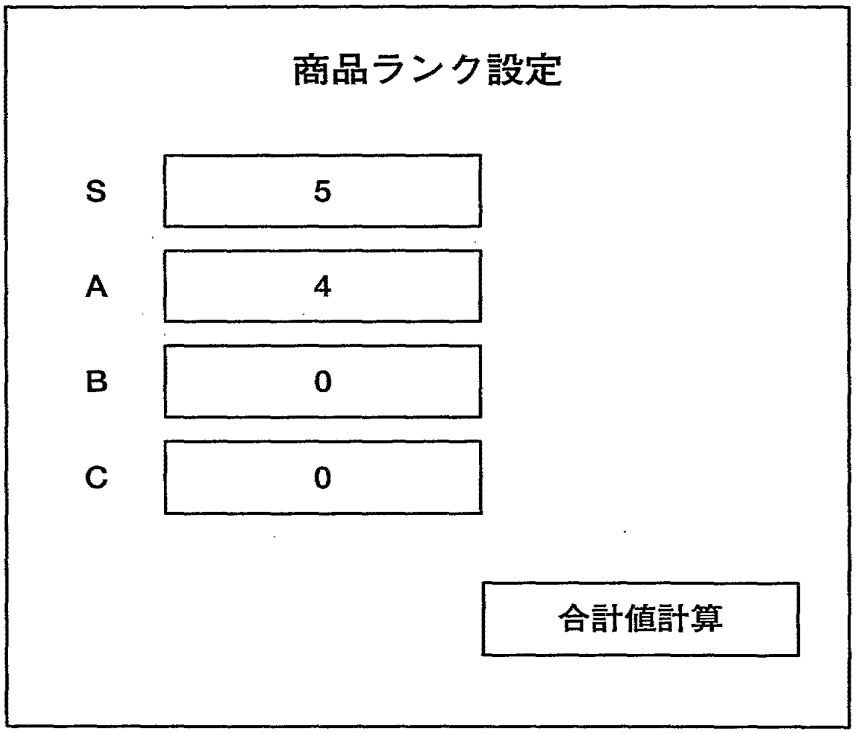
図１２ 12/20



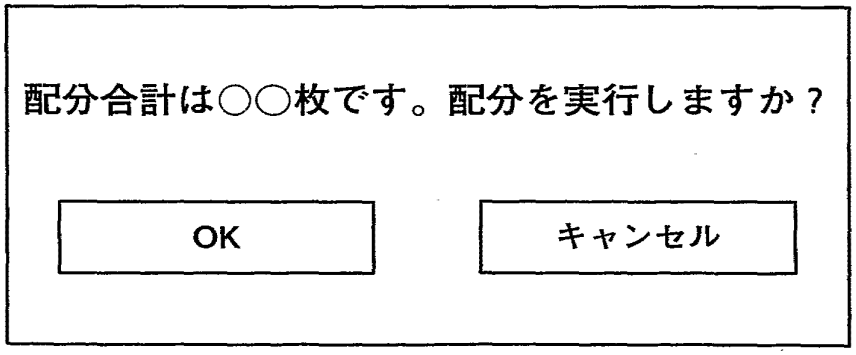
Uber Exhibit 1002 - p. 247
Uber Technologies, Inc. v. SurgeTech, LLC

図１３ 13/20

A



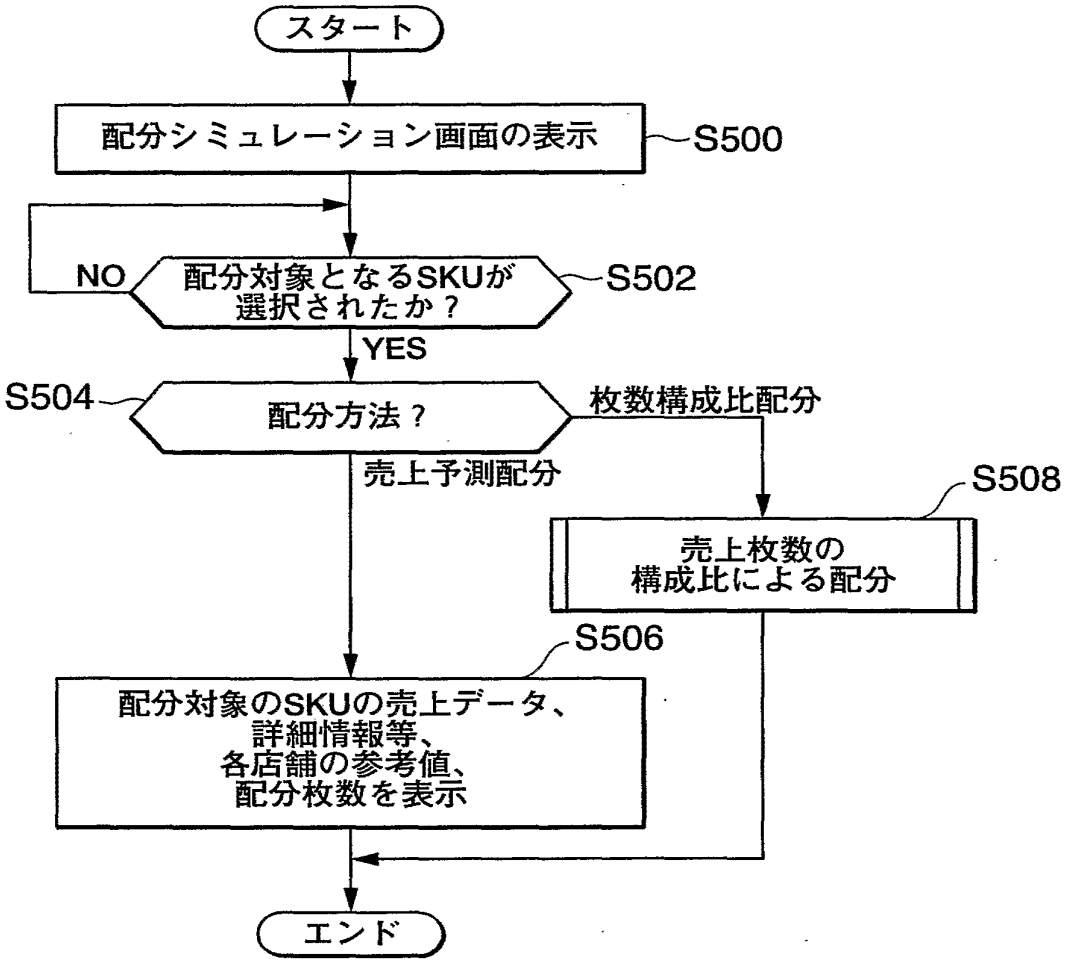
B



Uber Exhibit 1002 - p. 248
Uber Technologies, Inc. v. SurgeTech, LLC

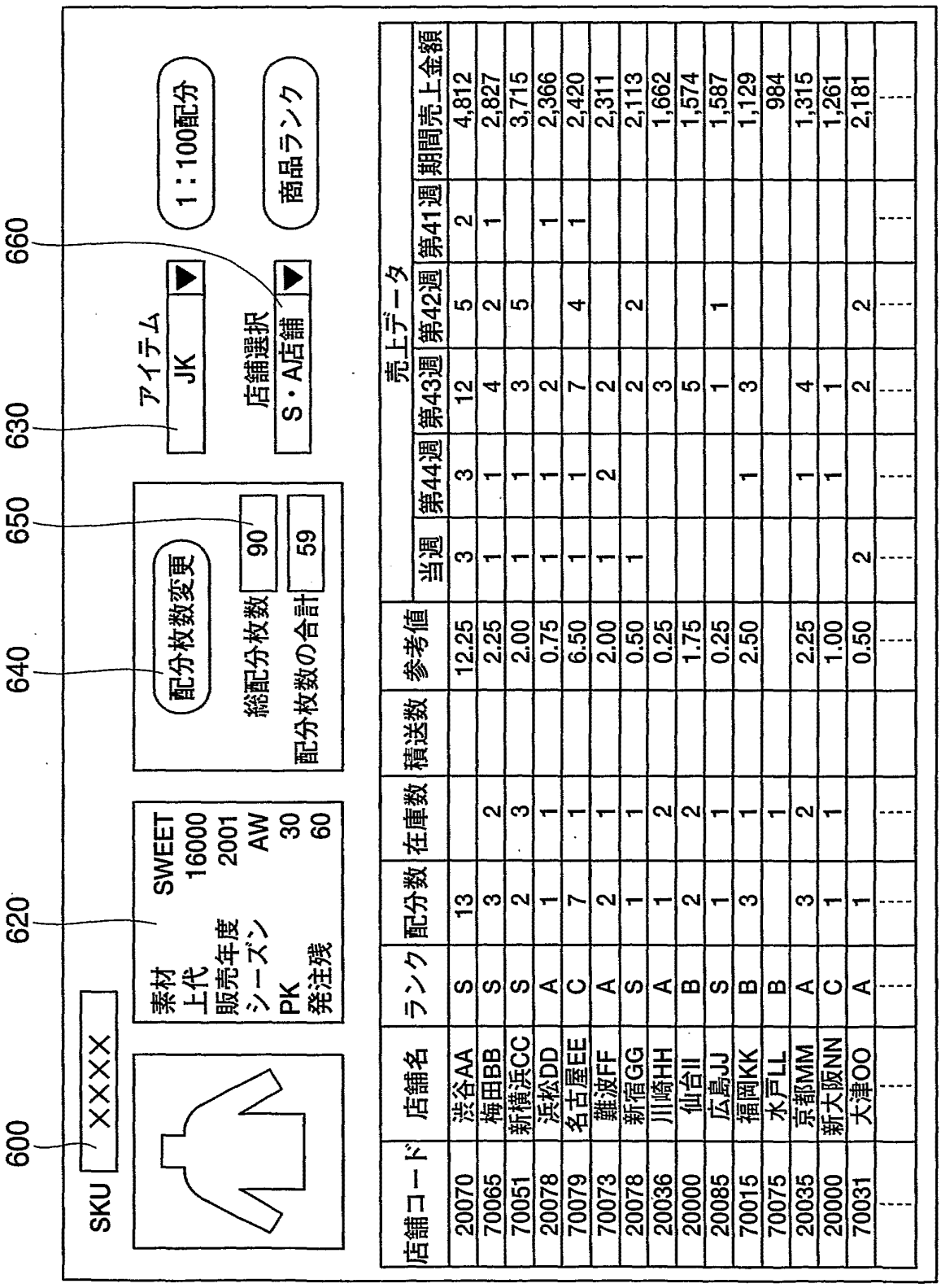
図１４ 14/20

配分シミュレーション（追加配分時）



Uber Exhibit 1002 - p. 249
Uber Technologies, Inc. v. SurgeTech, LLC

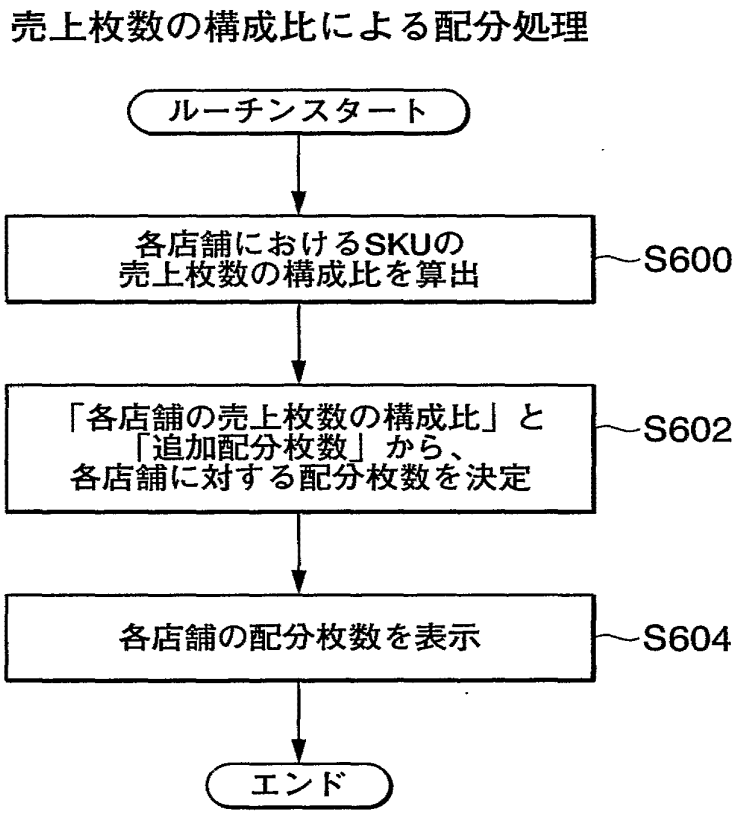
図１５



店舗コード	店舗名	ランク	配分数	在庫数	積送数	参考値	売上データ 当週	第44週	第43週	第42週	第41週	期間売上金額
20070	渋谷AA	S	13			12.25	3	3	12	5	2	4,812
70065	梅田BB	S	3	2		2.25	1	1	4	2	1	2,827
70051	新横浜CC	S	2	3		2.00	1	1	3	5		3,715
20078	浜松DD	A	1	1		0.75	1	1	2		1	2,366
70079	名古屋EE	C	7	1		6.50	1	1	7	4	1	2,420
70073	難波FF	A	2	1		2.00	1	2	2			2,311
20078	新宿GG	S	1	1		0.50	1		2	2		2,113
20036	川崎HH	A	1	2		0.25			3			1,662
20000	仙台II	B	2	2		1.75			5			1,574
20085	広島JJ	S	1	1		0.25			1	1		1,587
70015	福岡KK	B	3	1		2.50		1	3			1,129
70075	水戸LL	B		1								984
20035	京都MM	A	3	2		2.25		1	4			1,315
20000	新大阪NN	C	1	1		1.00		1	1			1,261
70031	大津OO	A	1			0.50	2		2	2		2,181
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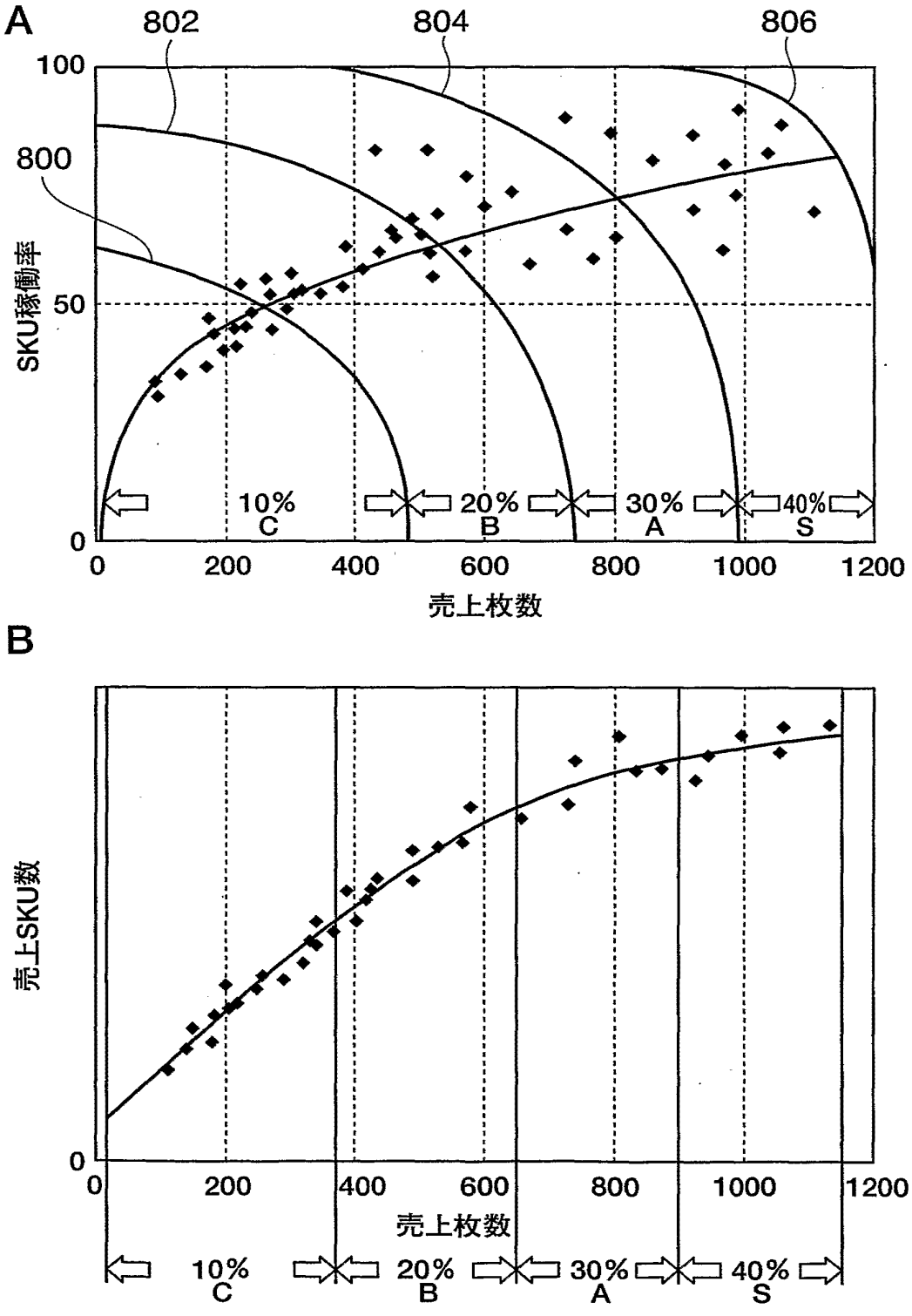
Uber Exhibit 1002 - p. 250
Uber Technologies, Inc. v. SurgeTech, LLC

図１６ 16/20



Uber Exhibit 1002 - p. 251
Uber Technologies, Inc. v. SurgeTech, LLC

図１７ 17/20



Uber Exhibit 1002 - p. 252
Uber Technologies, Inc. v. SurgeTech, LLC

図１８ 18/20

ランク別配分数設定画面

	配分数	S	A	B	C
	110	店舗数8	店舗数20	店舗数32	店舗数50
□	+5	376	10	5	3	2
☑	+4	352	7	5	3	2
□	+3	274	6	4	3	1
□	+2	266	5	4	3	1
□	+1	234	5	4	2	1
□	●	214	5	3	2	1
□	−1	186	4	2	2	1
□	−2	146	3	2	1	1
□	−3	68	2	1	1	0
□	−4	36	2	1	0	0
□	−5	8	1	0	0	0

Uber Exhibit 1002 - p. 253
Uber Technologies, Inc. v. SurgeTech, LLC

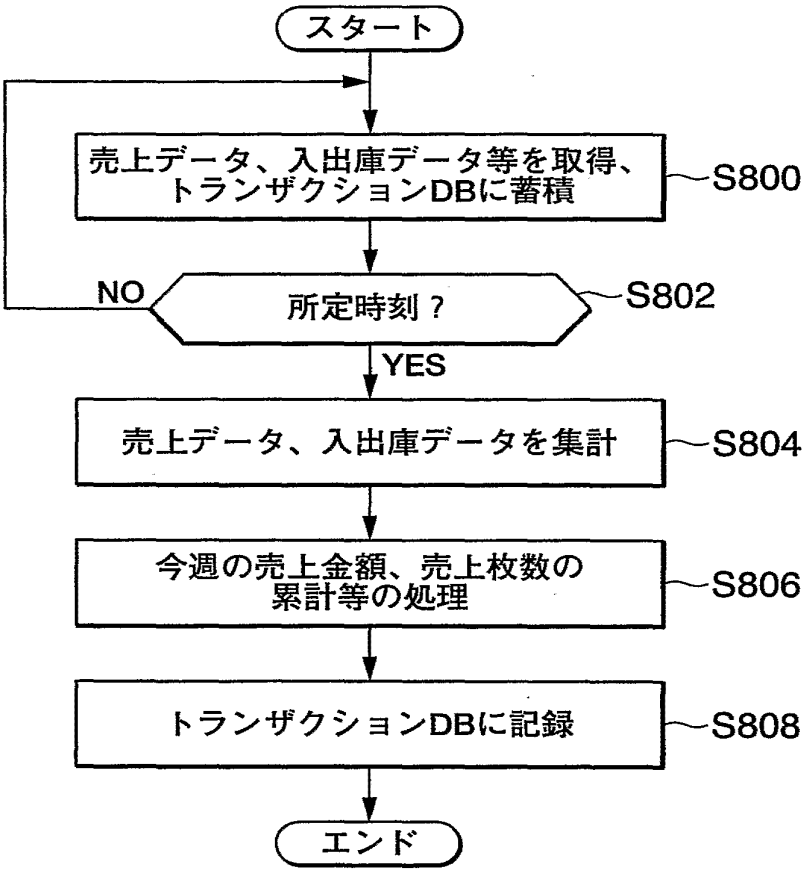
図１９ 19/20

配分対象物	配分対象物に対応する取扱実績情報
メーカで特定されたノート型パソコン	ノート型パソコンの売上金額
メーカで特定されたノート型パソコン	パソコンの売上金額
メーカ、サイズで特定されたワイドテレビ	当該サイズで特定されたワイドテレビの売上金額
メーカ、サイズで特定されたワイドテレビ	当該メーカの商品の売上金額
作家で特定された推理小説	当該作家の小説の売上数
作家で特定された推理小説	推理小説の売上数

Uber Exhibit 1002 - p. 254
Uber Technologies, Inc. v. SurgeTech, LLC

図２０ 20/20

データ集計処理



Uber Exhibit 1002 - p. 255
Uber Technologies, Inc. v. SurgeTech, LLC

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP03/05532

A. CLASSIFICATION OF SUBJECT MATTER
Int.Cl[7] G06F17/60

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
Int.Cl[7] G06F17/60

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Jitsuyo Shinan Koho	1922-1996	Toroku Jitsuyo Shinan Koho	1994-2003
Kokai Jitsuyo Shinan Koho	1971-2003	Jitsuyo Shinan Toroku Koho	1996-2003

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
JICST FILE(JOIS), WPI, INSPEC(DIALOG)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP 2-23464 A (Hitachi, Ltd.), 25 January, 1990 (25.01.90), Full text; all drawings (Family: none)	1-55
Y	JP 2001-265866 A (Nomura Research Institute, Ltd.), 28 September, 2001 (28.09.01), Page 3 (Family: none)	1-55
Y	JP 2002-109190 A (Toyota Motor Corp.), 12 April, 2002 (12.04.02), Full text; all drawings (Family: none)	8-11,21-24, 34-37,47-50

[X] Further documents are listed in the continuation of Box C. [ ] See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier document but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search 09 July, 2003 (09.07.03)	Date of mailing of the international search report 22 July, 2003 (22.07.03)
Name and mailing address of the ISA/ Japanese Patent Office Facsimile No.	Authorized officer Telephone No.

Form PCT/ISA/210 (second sheet) (July 1998)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP03/05532

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP 2001-338354 A (Olympus Optical Co., Ltd.), 07 December, 2001 (07.12.01), Pages 4 to 5; Figs. 1 to 10 (Family: none)	8-11,21-24, 34-37,47-50
Y	JP 11-250132 A (Toshiba Tec Corp.), 17 September, 1999 (17.09.99), Full text; all drawings (Family: none)	1-7,14-20, 27-33,40-46, 53-55
A	JP 2002-83091 A (SN Solutions Corp.), 22 March, 2002 (22.03.02), Full text; all drawings (Family: none)	1-55
A	JP 2002-83111 A (Nichimen Corp.), 22 March, 2002 (22.03.02), Full text; all drawings (Family: none)	1-55

Uber Exhibit 1002 - p. 257
Uber Technologies, Inc. v. SurgeTech, LLC

国際調査報告

国際出願番号　ＰＣＴ／ＪＰ０３／０５５３２

A.　発明の属する分野の分類（国際特許分類（ＩＰＣ））

Ｉｎｔ．Ｃｌ⁷　　Ｇ０６Ｆ１７／６０

B.　調査を行った分野

調査を行った最小限資料（国際特許分類（ＩＰＣ））

Ｉｎｔ．Ｃｌ⁷　　Ｇ０６Ｆ１７／６０

最小限資料以外の資料で調査を行った分野に含まれるもの

日本国実用新案公報	１９２２－１９９６年
日本国公開実用新案公報	１９７１－２００３年
日本国登録実用新案公報	１９９４－２００３年
日本国実用新案登録公報	１９９６－２００３年

国際調査で使用した電子データベース（データベースの名称、調査に使用した用語）

ＪＩＣＳＴファイル（ＪＯＩＳ），ＷＰＩ，ＩＮＳＰＥＣ（ＤＩＡＬＯＧ）

C.　関連すると認められる文献

引用文献のカテゴリー＊	引用文献名　及び一部の箇所が関連するときは、その関連する箇所の表示	関連する請求の範囲の番号
Ｙ	ＪＰ　２－２３４６４　Ａ（株式会社日立製作所） １９９０．０１．２５、全文、全図（ファミリーなし）	１－５５
Ｙ	ＪＰ　２００１－２６５８６６　Ａ（株式会社野村総合研究所） ２００１．０９．２８、第３頁（ファミリーなし）	１－５５
Ｙ	ＪＰ　２００２－１０９１９０　Ａ（トヨタ自動車株式会社） ２００２．０４．１２、全文、全図（ファミリーなし）	8-11, 21-24, 34-37, 47-50
Ｙ	ＪＰ　２００１－３３８３５４　Ａ（オリンパス光学工業株式会	8-11, 21-24, 3

☒ Ｃ欄の続きにも文献が列挙されている。　　☐ パテントファミリーに関する別紙を参照。

＊　引用文献のカテゴリー

「Ａ」特に関連のある文献ではなく、一般的技術水準を示すもの

「Ｅ」国際出願日前の出願または特許であるが、国際出願日以後に公表されたもの

「Ｌ」優先権主張に疑義を提起する文献又は他の文献の発行日若しくは他の特別な理由を確立するために引用する文献（理由を付す）

「Ｏ」口頭による開示、使用、展示等に言及する文献

「Ｐ」国際出願日前で、かつ優先権の主張の基礎となる出願の日の後に公表された文献

「Ｔ」国際出願日又は優先日後に公表された文献であって出願と矛盾するものではなく、発明の原理又は理論の理解のために引用するもの

「Ｘ」特に関連のある文献であって、当該文献のみで発明の新規性又は進歩性がないと考えられるもの

「Ｙ」特に関連のある文献であって、当該文献と他の１以上の文献との、当業者にとって自明である組合せによって進歩性がないと考えられるもの

「＆」同一パテントファミリー文献

国際調査を完了した日	国際調査報告の発送日
０９．０７．０３	22.07.03

国際調査機関の名称及びあて先	特許庁審査官（権限のある職員）
日本国特許庁（ＩＳＡ／ＪＰ） 郵便番号１００－８９１５ 東京都千代田区霞が関三丁目４番３号	竹中　辰利　５Ｌ　９１９７ 電話番号　０３－３５８１－１１０１　内線　３５６０

様式ＰＣＴ／ＩＳＡ／２１０（第２ページ）（１９９８年７月）

Uber Exhibit 1002 - p. 258
Uber Technologies, Inc. v. SurgeTech, LLC

Ｃ（続き）．　関連すると認められる文献

引用文献のカテゴリー＊	引用文献名　及び一部の箇所が関連するときは、その関連する箇所の表示	関連する請求の範囲の番号
	社）、２００１．１２．０７、第４－５頁、図１－１０（ファミリーなし）	4-37, 47-50
Ｙ	ＪＰ　１１－２５０１３２　Ａ（東芝テック株式会社）１９９９．０９．１７、全文、全図（ファミリーなし）	1-7, 14-20, 27-33, 40-46, 53-55
Ａ	ＪＰ　２００２－８３０９１　Ａ（新日鉄ソリューションズ株式会社）、２００２．０３．２２、全文、全図（ファミリーなし）	１－５５
Ａ	ＪＰ　２００２－８３１１１　Ａ（ニチメン株式会社）２００２．０３．２２、全文、全図（ファミリーなし）	１－５５

Uber Exhibit 1002 - p. 259
Uber Technologies, Inc. v. SurgeTech, LLC

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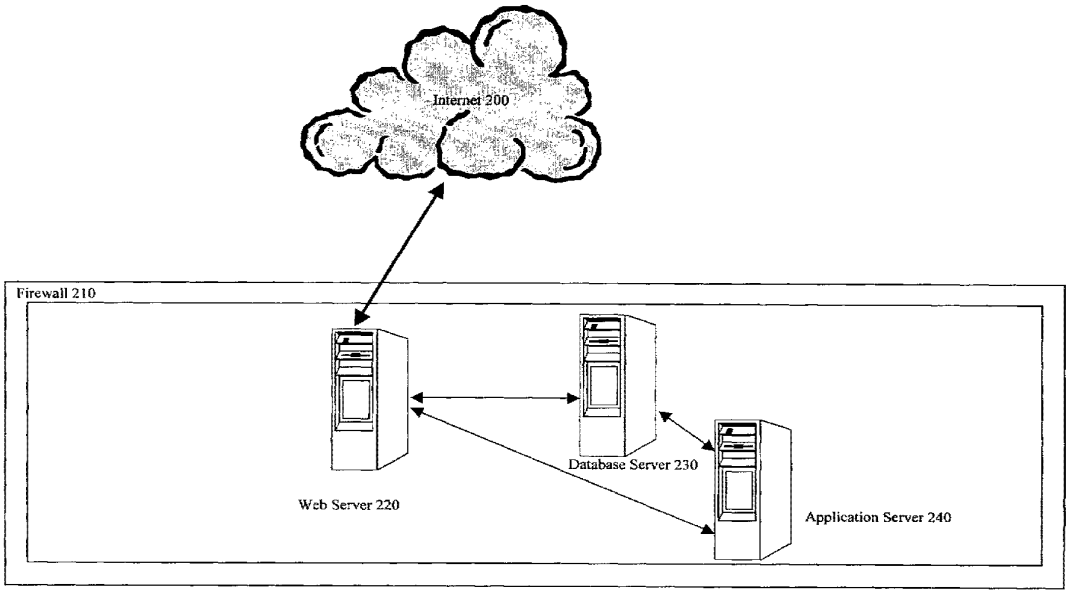
(81) Designated States *(national)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW.

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(54) Title: INVENTORY CONTROL SYSTEM AND METHODS



(57) Abstract: A system and method which allows third-parties to monitor company inventory via the Internet and Worl Wide Web ("web") and automatically order needed items. The present invention also provides a forum through which resellers and customers may directly interact to resell surplus and used equipment. The present invention may also allow a third party to act as a broker, thereby assuring that both equipment purchased is actually delivered, and that the seller is properly compensated.

WO 01/67356 A1

INVENTORY CONTROL SYSTEM AND METHODS

PRIORITY AND COPYRIGHT CLAIMS

This application claims the benefit of U.S. Provisional Patent Application Serial No. 60/187,389 filed March 7, 2000, the entire disclosure of which is incorporated herein by reference.

This application includes material which is subject to copyright protection. The copyright owner has no objection to the facsimile reproduction by anyone of the patent disclosure, as it appears in the Patent and Trademark Office files or records, but otherwise reserves all copyright rights whatsoever.

FIELD OF THE INVENTION

The present invention relates to the field of electronic inventory control. In particular, the present invention relates to controlling healthcare supply inventories.

BACKGROUND OF THE INVENTION

Traditionally, inventory control has been done by the company or organization using the items in the inventory. In smaller offices, inventory control is typically not a high priority, and orders may be placed whenever items are out of stock.

As an office increases in size, inventory management becomes more of a challenge, and monitoring of frequently used or crucial items becomes very important. Typically a person is given the responsibility of monitoring inventory and ordering replacements as supply diminishes. As a company further increases in size, more advanced inventory management techniques may be used. For example, supply and usage trends may be analyzed to determine minimum quantities on hand, and seasonal or other peak usage may be determined.

Some larger offices have switched to automated or semi-automated inventory tracking systems. These automated systems utilize barcode scanners or other electronic identifiers to track outgoing and incoming inventory, and can prepare purchase requests as supplies diminish.

SUMMARY OF THE INVENTION

The present invention improves upon the prior art by shifting the burden of inventory tracking onto a third party; this concept is referred to as vendor managed inventory, or VMI. When a third party provides VMI services for multiple companies, it gains significant buying power which it can use to negotiate better deals, improve supplier responsiveness, and streamline the buying process.

The present invention allows third-parties to monitor company inventory via the Internet and World Wide Web ("web"). In addition, the present invention allows small to medium sized companies to take advantage of VMI by providing a cost-effective solution to their inventory tracking needs.

The present invention utilizes web-enabled technologies to revolutionize inventory management by tracking inventory and automatically contacting suppliers, manufacturers, or distributors when additional supplies are needed. This may result in a labor reduction as compared to the labor-intensive inventory maintenance systems currently deployed.

In addition to reducing labor costs, the present invention may help a company cut other costs. The present invention may help reduce delivery costs by regularly ordering supplies in anticipation of need, thus obviating the need for express shipments. The present invention may also allow third parties to take advantage of manufacturer or distributor specials when offered for the products its customers require, thus further reducing customer cost.

While purchasing is a large part of inventory maintenance, the present invention may also facilitate other transactions as well. For example, the present invention may allow customers to resell products or equipment to other businesses, thereby maximizing utility. Although some in the prior art, such as Neoforma.com and Medibuy.com, have attempted to provide business-to-business equipment resale through web-based auctions, auctions do not provide equipment availability assurances. The present invention provides a forum through which resellers and customers may interact, where the present invention acts as a broker, thereby assuring both that purchased equipment is delivered, and that a seller receives proper compensation.

Uber Exhibit 1002 - p. 262
Uber Technologies, Inc. v. SurgeTech, LLC

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a block diagram illustrating the major hardware components of the present invention.

Figure 2 is a block diagram illustrating an overview of the software components of the present invention.

Figure 3 is a process flow diagram illustrating sample logic implemented when client software attempts to update data stored in a server.

Figure 4 is a process flow diagram illustrating sample logic implemented when client software polls a data connection.

Figure 5 illustrates a sample RFID portal and related computer equipment.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

The present invention implements an Internet-based, vendor managed inventory ("VMI") system. A VMI system allows a customer to reduce costs by pushing inventory management responsibilities onto a third party, or manager. Managers may service multiple companies, thus allowing them to negotiate better deals, improve supplier responsiveness, and serve as an effective customer advocate.

The present invention allows managers to inexpensively monitor customer inventory via the Internet and World Wide Web ("web"). The present invention utilizes web-enabled technologies to revolutionize inventory management by tracking inventory and automatically contacting suppliers, manufacturers, or distributors when products are needed. This may result in a labor reduction as compared to the labor-intensive inventory maintenance systems currently deployed.

Figure 1 is a block diagram illustrating the major hardware components of the present invention. As illustrated in Figure 1, the present invention utilizes a client/server architecture to facilitate communication between customer inventory systems and managers. A client running on a Customer Inventory System 130 may be used to track inventory, place special orders, and interact with other customers.

A client may include custom software, such as an application written in Visual Basic, JAVA, or C; commercial software, such as a web page accessible through a web browser; or a combination of custom and commercial software, such as a "plug-in" which operates in a web browser. Examples of common web browsers include

Uber Exhibit 1002 - p. 263
Uber Technologies, Inc. v. SurgeTech, LLC

Internet Explorer, developed by Microsoft Corporation of Redmond, Washington, and Navigator, developed by Netscape Corporation of Mountain View, California.

Customer Inventory Systems 130 may allow manual inventory tracking, semi-automated inventory tracking, or inventory may be dispensed using automated systems. By way of example, without intending to limit the present invention, a preferred embodiment of the present invention includes a handheld device, such as a Palm VII device by Palm Computing, Inc., to be outfitted with a barcode scanner. Such a device can allow barcodes or other identifiers associated with each inventory item to be scanned or otherwise entered into the system prior to or at the time of item distribution. As each item is scanned, a count maintained by the present invention may be adjusted to properly track inventory levels. Recipient-specific labels, including product warnings and other information, can then be printed for each scanned item.

Other inventory distribution methods contemplated include, but are not limited to, interfacing the present invention with vending machines. Vending machines may allow accurate inventory tracking without requiring human interaction, except to periodically restock a particular supply or group of supplies. In a preferred embodiment, vending machines may include security measures to prevent unauthorized supply distribution. Such security measures may include, but are not limited to, the use of an identification card and personal identification number ("PIN"), and biometric systems. Vending machines equipped with security systems may restrict access to specific supplies on an individual-by-individual level, or group-by-group basis. Vending machines may also be equipped with label printers that allow warnings and other information to be attached to a dispensed item's packaging.

Alternatively, supply closets or other storage areas can be outfitted with a Radio Frequency Identification (RFID) portal, as illustrated in Figure 5. An RFID portal (Block 500) is similar in structure to airport security metal detectors, except that RFID portals can detect or scan RFID tags as such tags pass through a portal. The present invention can monitor RFID tag identifiers, including identifiers assigned to individuals, such that access to a storage area can be monitored, and items removed by an individual can be tracked without any direct user interaction.

A preferred embodiment of the present invention can also track individual product dispensation, and may require additional information as products are dispensed. By way of example, without intending to limit the present invention, if a

Uber Exhibit 1002 - p. 264
Uber Technologies, Inc. v. SurgeTech, LLC

doctor dispenses sample medication to a patient, the present invention may also request a patient identifier, whereas if a package of gauze bandages was removed from inventory to restock an examination room, the present invention may not request a patient identifier. Patient identifiers can be used by the present invention to generate dispensation history reports for various products which may help suppliers and manufacturers to better understand income, race, ethnicity, or other demographic characteristics of typical recipients. The present invention may restrict such reports to only demographic information, and may not include individual-specific information in such reports.

An alternative embodiment of the present invention allows physicians or others to carry a handheld device through which prescriptions can be written while talking with a patient. Such a handheld device can connect to a local inventory management system through a wireless or wired means, and, when appropriate, a prescribed item sample may be automatically dispensed by a vending machine. Alternatively, a message may be displayed at a nurse's station indicating the items to be pulled from inventory. When items are dispensed by a vending machine or pulled from inventory, inventory counts can be decremented as appropriate, and new orders can be placed as necessary.

As inventory is distributed, Customer Inventory System 130 may track supply usage habits to determine minimum acceptable quantities on-hand. Usage information may be studied for various periods of time, and the present invention may create an inventory usage model based on collected data. As models are created and refined, the present invention may modify minimum in-stock thresholds to reflect anticipated usage. As quantity in-stock approaches a calculated or specified threshold, Customer Inventory System 130 may automatically request new supplies from Server 100. Supply requests may include various information, including, but not limited to, urgency of request, customer willingness to accept alternative brands or sizes, billing information, and shipping information.

As Server 100 receives supply requests, Server 100 may request price quotes from several Manufacturer, Supplier, or Distributor 120's ("Distributor 120"). Distributor 120 may respond with quantity available, price, estimated delivery time, and other such information. Server 100 may then automatically evaluate each Distributor 120 response to find the best value given various factors associated with each customer request. When an appropriate Distributor 120 response is chosen,

Uber Exhibit 1002 - p. 265
Uber Technologies, Inc. v. SurgeTech, LLC

Server 100 may automatically arrange payment and shipping of requested supplies for Customer Inventory System 130.

Communication between Customer Inventory System 130, Server 100, and Distributor 120 may be achieved through various methods, including, but not limited to, hypertext transfer protocol ("HTTP"), file transfer protocol ("FTP"), simple mail transfer protocol ("SMTP"), or other such related methods.

Although purchasing is a large part of inventory maintenance, a preferred embodiment of the present invention may also facilitate communication between customers, provide a source of information dissemination, and encourage customer interaction. The present invention may facilitate customer communication by allowing customers to resell products, equipment, or excess inventory to other businesses. The present invention may allow information dissemination by providing an up to date catalog of available equipment and other inventory from which a customer may order. The present invention may facilitate customer communication by allowing managers and customers to author and distribute articles describing new rules, regulations, procedures, revenue generation prospects, or other information of interest to other customers.

Customer Inventory System 130 may serve as the primary source of customer interaction with the present invention. Articles, catalogs, inventory information, and other such information may be stored on Server 100, and Customer Inventory System 130 may communicate with Server 100 to obtain requested information.

Figure 2 illustrates a preferred embodiment of Server 100, in which relationships between data storage, web server, and application services provided by Server 100 are illustrated. All client communications may first pass through Firewall 210. Firewall 210 represents a combination of software and hardware which is used to protect the data stored in Web Server 220, Database Server 230, and Application Server 240 from unauthorized access.

As previously described, clients may communicate with the present invention through various protocols, including HTTP. Web Server 220 represents software capable of transmitting and receiving information via HTTP or other protocols. Examples of such software include Internet Information Server, developed by Microsoft Corporation of Redmond, Washington; Enterprise Server, developed by Netscape Corporation of Mountain View, California; and Apache Server, developed by the Apache Software Foundation of Forest Hill, Maryland.

Uber Exhibit 1002 - p. 266
Uber Technologies, Inc. v. SurgeTech, LLC

When a client requests information, Web Server 220 may determine whether a client request requires pre-processing, in which case a request is transferred to Application Server 240, or if a request simply requires data to fulfill the request, in which case Web Server 220 may communicate directly with Database Server 230.

Database Server 230 represents commercially available database software, such as Microsoft SQL Server, developed by Microsoft Corporation of Redmond, Washington, Oracle 8i, developed by Oracle Corporation, of Redwood Shores, California, or other, similar software. Database Server 230 may store raw data, such as customer inventory information, customer addresses, vendor names, vendor product classes, and other such similar information. Such information may be transmitted to a client by Web Server 220, or Application Server 240 may interpret information stored in Database Server 230 prior to transmission.

Application Server 240 may contain business rules associated with the present invention, which can be used to interpret Database Server 230 data prior to transmission of that data to a client. In addition to interpreting information stored in Database Server 230 for client use, Application Server 240 may also monitor inventory levels reflected in Database Server 230, contact vendors based on information from Database Server 230, adjust inventory information as new inventory is received, and provide the services necessary to facilitate business-to-business resale of equipment or products stored in Database Server 230.

Web Server 220, Database Server 230, and Application Server 240 each represent software which may run on the same computer, or on multiple computers. In addition, Application Server 240 may be implemented within Database Server 230 as a set of business rules.

An alternative description of the present invention follows, in which the present invention is described through a series of functional specifications. This information is included for enablement purposes, and describes the best mode contemplated at the time the present specification was filed. While the following functional specification describes a preferred embodiment of the present invention, descriptions within the functional specification should not be construed as limiting the present invention.

To avoid confusion, the following terms are used in this functional specification:

Customer – Refers to a buyer of products via the present invention.

Uber Exhibit 1002 - p. 267
Uber Technologies, Inc. v. SurgeTech, LLC

Customers can have "open account" relationships to avoid credit card and COD shipment problems.

Linked Supplier – A distinction is made to avoid confusion with other vendors doing business with the present invention, given that payables may be in a common accounts payable system. Distributors, manufacturers, or other vendors (collectively "suppliers"), are distinguished by whether they are using the present invention's inventory tracking and accounting software, and therefore have live Internet linkages into their databases for queries, order processing, and billing.

Manual Supplier - If a supplier provides goods or services through the present invention, but tracks inventory through a manual interface, such a supplier may be termed a "Manual Supplier". Open account relationships may be maintained between Linked or Manual Suppliers avoid payment complexities.

Non-linked Supplier - Suppliers not linked to the present invention.

Products – Items for sale via the present invention.

Customer Inventory – A list of products to be maintained at a given customer site.

In addition to the general definitions set forth above, this functions specification also defines a set of system functions. System functions may fall into one of the following general sub-system categories:

Interactive – human interface and related functions for tracking inventory counts, inventory consumption rates, ordering critical products, and the like. Interactive processes may be web-based or PC-based (client-server).

Nightly Processes – periodic processes through which orders can be generated and invoicing and related processes can be performed, including interaction with Distribution system at distributor warehouses.

Corporate – processes performed within corporate offices, but which update a database. Includes accounting, client data management, and other such processes.

Distribution – Linked Suppliers integrated with the present invention. Industry standard Enterprise Resource Planning (ERP) software may be bundled with commercial financial software to provide a complete business system to Linked Suppliers.

Database Design – A database schema which may be utilized in a preferred embodiment of the present invention.

Uber Exhibit 1002 - p. 268
Uber Technologies, Inc. v. SurgeTech, LLC

The present invention in general, and this functional specification specifically, defines styles and functions included in detailed web pages and other user interface elements that are intended to be available system wide. Web pages, application windows, program screens, and transactions within the present invention should observe common rules. These rules include, but are not limited to:

- No customer can view, inquiry into, update or in any way alter another customers data. Transactions can use an IP address or other unique identifier as a cross-check against a customer ID coming in with transmitted pages to insure rule enforcement. For such security procedures, customer IP addresses or other unique identifiers may only be changed through a function accessible only to Corporate staff.
- No Linked Supplier can see data belonging to another linked supplier.
- System parameters controlling customer options can be set through an account setup and editing process. Such a process may be accessed by only someone with an authorized identifier. Initially, such identifiers may only be given to Corporate Staff.
- Data changes will generally be reflected by a transaction log or transaction history, which may be accessible to customers or distributors, and to which Corporate Staff with appropriate security levels may have access.

Functions involving data changes may be performed as server-side scripts, rather than through client-side logic. In general, such server-side scripts can utilize a logical flow similar to Figure 3. As Figure 3 illustrates, client software running on a customer machine may generate a page containing data to be updated by a web server and transmit said page to said web server (Block 300).

When a web server receives a page from a customer machine, the present invention may attempt to process any changes requested by said page. If such changes are successful (Block 320), the present invention may return a confirmation page or cause a confirmation message to be displayed to a customer machine, and appropriate transaction logging may occur.

If changes are not successful, the present invention may increment a retry count by one (Block 340). If the retry count is less than or equal to three, the present invention may retransmit customer changes (Block 370) to Block 310 in an effort to make any appropriate changes. If the retry count exceeds three (Block 350), the

Uber Exhibit 1002 - p. 269
Uber Technologies, Inc. v. SurgeTech, LLC

present invention may cause a page containing any error codes or other feedback information to be displayed on a client machine. Such a page may also contain original client data changes as well as a means for resubmitting said changes (Block 360).

Client software may also periodically verify that a data connection exists between said client software and a server acting as part of the present invention. Such software may follow the logic illustrated in Figure 4 to achieve accurate data connection monitoring. As Block 400 illustrates, client software may send one or more TCP/IP Ping commands or other network test commands to verify that a high-speed connection is still available to a server acting as part of the present invention.

If a high-speed network connection is detected, the present invention can continue normal operations (Block 410). If a high-speed network connection is not detected, the present invention may attempt to reestablish such a connection (Block 420). If a high-speed network connection can be reestablished (Block 430), the present invention may continue normal operations (Block 410). If a high-speed network connection cannot be established, a lower speed network connection, such as a dial-up network connection, may be established by the present invention (Block 440). If a lower speed network connection can be established, the present invention may continue normal operations, including periodically attempting to reestablish a high-speed network connection (Block 410).

If a lower speed network connection cannot be established, client software may display an application or page with alternative user interface and alternative functionality (Block 460). Such alternative functionality can include local storage of product usage information, local inventory tracking, and limited reordering via a dial-up or other temporary connection with a known supplier (Block 470). A client functioning without a data connection may periodically attempt to reestablish high or low speed network connections (Block 480). When a connection is reestablished (Block 490), a client may transmit product usage scan information to a server acting as part of the present invention.

In addition to an inventory tracking application, the present invention may also utilize a high speed network connection to transmit new product offerings or special promotions to a client for display to a customer. As new products are entered into a Products table or similar data structure, the present invention may cause such a product to appear on a client. In a preferred embodiment, the present invention may

Uber Exhibit 1002 - p. 270
Uber Technologies, Inc. v. SurgeTech, LLC

allow customers to select products in which a customer is interested, and the present invention may only display new products or special deals meeting a customer's prior specifications. Such specifications can include, but are not limited to, categories by manufacturer, product trade name, specific product type, general product classification, and quantity available or quantity per shipping unit.

A client displaying such information may allow a customer to indicate an interest in a product by typing a command, clicking a button or other graphical interface element, or otherwise interacting with said client. If a customer expresses an interest in a featured product, a client may allow a customer to create a one-time order, or to configure recurring orders.

In addition to allowing customers to record product usage and order new inventory or new products, client software may also display advertisements on a rotating basis, and may be used for other purposes. A typical client software screen may also contain additional information and fields, including, but not limited to, a Product SKU field, a User-ID field, a Doctor-ID field, and a Sales Consultant Contact field.

When customers are not directly interacting with client software, client software may place a cursor in a Product SKU field by default. Placing a cursor in a Product SKU field can allow client software to ready accept an automatically or manually entered product identifier, such as a barcode label scanned via a wedge-style bar-code scanner.

As product identifiers are entered, client software may request a User-ID for each product identifier or set of product identifiers. A User-ID is a unique identifier created for each employee or set of employees within an organization. Such identifiers may be entered manually through an active user interface, such as, but not limited to, a keyboard, touch screen, or number pad, or through a passive user interface, such as, but not limited to, biometric recognition equipment, barcode identifiers worn by or associated with an employee, or through RFID tags worn by or associated with an employee. User-ID's may be combined with passwords to create a more secure inventory tracking system.

User-ID's may be used to track persons removing items from an inventory, but additional tracking or other controls may also be desirable. For example additional authorization may be required when employees remove expensive items or controlled substances from an inventory. The present invention may recognize when such an

Uber Exhibit 1002 - p. 271
Uber Technologies, Inc. v. SurgeTech, LLC

inventory item is removed, and client software may request an additional identifier, called a Doctor-ID, as authorization. Client software may even allow any user to enter a Doctor-ID for some inventory items, while for other inventory items a Doctor-ID and related password may be required. A biometric or other positive identifier may be used in place of a Doctor-ID or Doctor-ID and password in some applications.

When appropriate inventory tracking data has been entered into client software, the present invention may transmit such data to a server. A server may send a confirmation message to a client upon receipt of such data. If a confirmation message is not received within a predetermined period of time, the present invention may resend inventory tracking data. If successive resend attempts are unsuccessful, the present invention may follow a process similar to that illustrated by Figure 3. Client software may allow additional inventory scans to occur while waiting for confirmation from a server.

In addition to recording inventory tracking information, client software may also allow a customer to access various options. Such options may include, but are not limited to, an administrative page, an inventory status inquiry page, and an inventory receipt page. An administrative page can allow authorized customers to create, edit, or remove User-ID's, Doctor-ID's, groups of such accounts, and account-specific information. An inventory status inquiry page can retrieve and display a page containing customer inventory records, order status, and other such information.

An inventory status inquiry may be initiated through client software, which can send a page containing customer-specific information, as well as site-specific identification information stored on a client machine. In a preferred embodiment, a server receiving such a request may select records with appropriate site- and user-specific information from a table of customer inventory records. A server may generate a page or screen containing customer inventory information, including information from several tables. Table 1 below provides an example of columns displayed on a typical inventory request screen, as well as sample table and field names from which such data can be drawn.

Column Heading	**Source Table**	**Source Field**
Description	PRODUCTS	DESCRIPTION
Product	CUSTOMER_INVENTORY	PRODUCT
Quantity In Stock	CUSTOMER_INVENTORY	ON_HAND_QTY
Order Point	CUSTOMER_INVENTORY	ROP
ReOrder Quantity	CUSTOMER_INVENTORY	ROQ

Uber Exhibit 1002 - p. 272
Uber Technologies, Inc. v. SurgeTech, LLC

Activity Status	CUSTOMER_INVENTORY	STATUS

Table 1

An advantage of the present invention over the prior art is the ability to simplify adding new items or restocking items into an inventory. Linked Suppliers shipping goods to a customer can provide a specially coded packing list, and a customer can automatically or manually enter such a code into client software. Client software can validate a packing list number as belonging to a customer and ensure a packing list is not credited to a customer system more than once. Entry of an invalid or previously validated packing slip can cause client software to display an error message.

If a valid packing slip is entered, client software may retrieve shipment contents from a centralized database or from a supplier database, and automatically update customer inventory information to reflect inventory received. Client software may then display a message confirming successful inventory changes, and return a customer to a main page.

A product search page may also be accessible through client software. A product search page can allow a user to select a search type and, if appropriate, search parameters and search parameter values (collectively "search criteria"). By way of example, without intending to limit the present invention, a product search page may allow a customer to search by specific manufacturer and products of a certain classification.

When a customer has selected appropriate search criteria, client software may pass such search criteria to a server. A server may query a database of products and product descriptions and return products matching or approximating customer search criteria.

If a user has selected a descriptive search, a server may select records from a Products table, or other similar table, whose data matches or approximates descriptive text entered by a user. If a user has selected a parameter search, a server may select Product table records whose fields match or approximate user search requests. To expedite such selections, a server may index descriptions, manufacturers, product classes, product names, and other frequently searched fields.

Uber Exhibit 1002 - p. 273
Uber Technologies, Inc. v. SurgeTech, LLC

When appropriate records are selected, a server may transmit such records to client software for display. Client software may present such records in a variety of formats, including, but not limited to, a columnar or tabular format. Table 2 lists sample column names, sample source table names, source field names, and additional functionality client software may present when displaying such records.

Column Heading	Source Table	Source Field
Description	PRODUCTS	SHORT_DESCRIPTION
Product ID	PRODUCTS	PRODUCT_ID
Manufacturer	PRODUCTS	MANUFACTURER
Mfg Item No.	PRODUCTS	MANUFACTURER_ITEM_NUMBER
Prod. Type	PRODUCTS	PRODUCT_TYPE
Prod. Class	PRODUCTIONS	PRODUCT_CLASS
Check Availability	None	Window action field
Add to Stock Plan	None	Window action field

Table 2

As Table 2 indicates, client software can allow a customer to check product availability and add products to a stock plan. In a preferred embodiment, client software may make such functionality available for each record displayed. In an alternative embodiment, records may have check boxes or other selection controls, thereby allowing customers to check the availability of multiple items, and add multiple items to a stock plan.

When a customer checks availability of a product or products, the present invention may search Linked Supplier inventories to determine quantities available, physical location, anticipated delivery times, and the like. When inventory is available, client software may allow a customer to order a product.

When a customer chooses to add a product to an inventory or stocking plan, client software may request restocking and other parameters from a customer, then send appropriate information to a server. A server may add an appropriate entry to a Customer_Inventory or other similar table, thereby enabling inventory tracking through the present invention.

Client software can also allow a customer to request a telephone call, an E-mail, or other contact from a sales consultant. In a preferred embodiment, a customer may select a product or supplier, and client software can query a server to determine an appropriate sales consultant for the selected product or supplier. A user can then

Uber Exhibit 1002 - p. 274
Uber Technologies, Inc. v. SurgeTech, LLC

be presented with a dialog box or other interactive interface which asks a customer to confirm a contact request. Once a contact request has been confirmed, client software may cause a server to store a request message in a Contact_Log table or other similar table.

In a preferred embodiment, a server may periodically scan Contact_Log table entries. When new or unanswered requests are found, a server may send a notification to a supplier alerting said supplier of such a request, where such a notification can include a customer E-mail address, telephone number, fax number, or other contact information, as well as other relevant customer and product information.

While the present invention can monitor inventory use and automatically order new inventory when necessary, a customer may anticipate a need for additional inventory based on parameters outside the scope of the present invention. By way of example, without intending to limit the present invention, if the present invention is used in a hospital, and the Olympics was held in or near the city in which the hospital is located, a hospital administrator may foresee the need to order additional quantities of frequently used supplies. Client software can provide a customer with the ability to quickly place such orders.

Customers can initiate such an order by clicking a button or otherwise interacting with a graphical or physical interface. In a preferred embodiment, a customer may select from products or groups of products already included in an inventory or stocking plan, or a customer may search for products through an interface similar to that described earlier. As previously described, customers can designate standard restocking quantities, and client software may use such quantities as defaults when clients are requesting additional inventory. Client software may also present quantities on hand to help customers make smarter purchasing decisions. Based on such information, customers can modify order quantities before submitting an order.

Client software can transmit customer orders to a server. Upon receipt of a customer order, a server can initiate an order fulfillment process.

A server may also automatically place an order based on customer demand. A server may periodically scan a customer inventory table and monitor inventory usage. As inventory is depleted, a server can predict frequently used items, and order appropriate quantities. Initially, a server may order limited quantities, to limit customer costs. A server may increase order quantities for frequently ordered

Uber Exhibit 1002 - p. 275
Uber Technologies, Inc. v. SurgeTech, LLC

products as customer usage habits dictate. A server may also construct an historical usage characterization, so that seasonal or other periodic usage patterns can be automatically taken into account.

As orders are placed, a server can query Linked Supplier inventories to determine each supplier's ability to fulfill an order. A server can calculate shipping costs as each order is processed, and a server can select one or more suppliers who can most cost effectively meet customer needs. As qualified suppliers are identified, orders are placed which can include expedited delivery and other options as specified by a customer or as determined by a server.

A server can also post supplier invoices to an accounts payable system, generate customer invoices based on supplier invoices, post customer invoices to an accounts receivable system. A server may further integrate with an automated payment system, thereby limiting invoicing and other such expenses.

In addition to customer and order related functions, a server can also provide administrative functions. By way of example, without intending to limit the present invention, a user who is not a customer can register to be a customer through a server-provided interface. Such an interface may allow a user to specify a business name, business type, executive director or general manager, physical address, mailing address, shipping address, one or more telephone numbers, employee names, employee licensing and accreditation information, and the like.

As users submit such information, a server may validate that an address, telephone number, and zip code are all valid with respect to each other, and that all necessary fields have been filled. If any validations fail, a server may present a data entry page along with any invalid data, thus simplifying data correction.

A server and client software may also allow customers and suppliers to change various information. By way of example, without intending to limit the present invention, suppliers can change pricing; add or remove vendors and products; add, edit, or remove contacts; view account status and open invoices; and perform other such functions. Customers can adjust inventory counts to reflect audit results; add, edit, or remove employees and employee information; update payment and contact information; view account balances and make payments; and perform other such functions.

Uber Exhibit 1002 - p. 276
Uber Technologies, Inc. v. SurgeTech, LLC

Linked Suppliers can also take advantage of many of these same features. Linked Suppliers implementing the present invention can track inventory; provide real-time inventory information to prospective customers; accept electronic orders; generate pick/pack lists; track order fulfillment process, including tracking into which containers each item in an order has been placed; generate bar-coded packing lists and shipping labels for each container; and generate invoices.

The present invention also provides Linked Suppliers with other advantages over the prior art. By way of example, without intending to limit the present invention, Linked Supplier inventory needs can be forecast based on prior order history, prior lead times, safety stock quantities, and the like, thereby reducing overall inventory investment. The present invention can also allow enable a Linked Supplier to track processing and shipping status for various products within an order, thereby providing a higher level of customer service. The present invention may also allow managers or other authorized individuals to electronically sign a purchase order, invoice, or other billing or order document and electronically transmit such a document to an appropriate recipient.

To achieve the functionality set forth above, a preferred embodiment of the present invention includes the following table structure. The table structure described below is included for enablement and best mode purposes, and should not be construed as limiting the present invention.

Table Name –

CLIENT_CONTROL

Table Description and function – This table can reside locally on a customer computer. It can store one or more records containing control data needed to manage on and off-line functions remotely. These records can be updated via an update applet transferring data from the Web Server's SQL database to this control. Its purpose is to provide control over the processes running on the local machine even if it is off-line, and to enable it to reconnect automatically.

Column (field) Name	Description
CUSTOMER_ID	Customer ID – matches Customer ID in CUSTOMERS data in the Web Server SQL Database

Uber Exhibit 1002 - p. 277
Uber Technologies, Inc. v. SurgeTech, LLC

IP_ADDRESS	This is the IP address for this machine
DSL_PORT	Connection path or port (e.g., COM2) where DSL connection exists; null if there is no DSL line for this machine
DIAL_PORT	Connection path ro port (e.g., COM3) where dial-up connection exists; null if there is no dial-up connection for this machine
DIAL_CONNECTION_PHONE	Phone number the software dials to establish a dial-up connection to the Web server system. Null if there is no dial-up connection
DIAL_CALL_BACK	Phone number of the dial-up line; to allow call-back from the web server.

Table Name –

CLIENT_ERROR_LOG

Table Description and function – This table contains an error generation history for processes originating on a customer machine. It can provide an audit trail and view of how well processes are functioning, and a place to record both fatal-error conditions and those that may not need to be displayed to customers. Its data may not be processed, but can be stored for review by system administrators and managers.

Column (field) Name	Description	Field Characteristics & Indexing
ERROR_DATE	Date of error log entry	Index – concatenated with ERROR_TIME
ERROR_TIME	Time of error log entry	Index – with ERROR_DATE
CALLER	Program name generating the error log entry	
ERROR_MESSAGE	Error message generated by the caller program	
USER_VIEWABLE	Yes – if message also displayed on user seen page; No if internal only message	
DATA_DUMP	Data (if any) causing the error	

Table Name –

SYSTEM_ERROR_LOG

Table Description and function – This table can contain a history of errors generated by processes originating from outside a customer machine. The table can provide an audit trail and view of how well processes are functioning, and provide a

Uber Exhibit 1002 - p. 278
Uber Technologies, Inc. v. SurgeTech, LLC

place to record both fatal and non-fatal errors. Such data can allow system administrators, programmers, and managers to monitor automated, unattended processes. SYSTEM_ERROR_LOG can use a data dictionary/field structure similar to a Client_Error_Log table.

Column (field) Name	Description	Field Characteristics & Indexing
ERROR_DATE	Date of error log entry	Index – concatenated with ERROR_TIME
ERROR_TIME	Time of error log entry	Index – with ERROR_DATE
CALLER	Program name generating the error log entry	
ERROR_MESSAGE	Error message generated by the caller program	
USER_VIEWABLE	Yes – if message also displayed on user seen page; No if internal only message	
DATA_DUMP	Data (if any) causing the error	

Table Name –

SYS_PARAMETERS

Table Description and function – Stores system-wide parameters in a common table.

Column (field) Name	Description	Field Characteristics & Indexing
PARAM_ID	Identifies parameter	Primary Index
VAR1	First variable	
VAR2	Second variable	
VAR3	Third variable	

Table Name –

CUSTOMER_APPLICATION

Table Description and function – this table can have a data dictionary similar to the CUSTOMERS table, and can be used to temporarily store unapproved, unprocessed customer application data submitted by a Customer/Client Application page. When an application is processed, appropriate records can be deleted from this table.

Column (field) Name	Description	Field Characteristics & Indexing

Uber Exhibit 1002 - p. 279
Uber Technologies, Inc. v. SurgeTech, LLC

See CUSTOMERS		

Table Name –

MEMBERS_APPLICATION

Table Description and function – this table has may use a data dictionary similar to PRACTICE_MEMBERS, and can temporarily store unapproved, unprocessed customer application data submitted by a Customer/Client Application page. When an application is processed, appropriate records can be deleted from this table.

Column (field) Name	Description	Field Characteristics & Indexing
See PRACTICE_MEMBERS		

Table Name –

CUSTOMERS

Table Description and function – Can store a unique identifier for each customer in a permanent table. Activity logged in CUSTOMER_MAINT_HISTORY table. Can be linked to third-party applications for credit terms, bill to, ship to addresses, phones and other financial data.

Column (field) Name	Description	Comment	Field Characteristics & Indexing
CUSTOMER	Identifies customer	Unique identifier (account number); matches CUSTOMER in A/R system	Primary Index
NAME	Practice Business Name	See Practice Members for doctor data.	Index
SALES_CONSULTANT	Identifies sales consultant assigned to account		Index
IPADDRESS1	Internet address used to link, identify computers in customers office	Can have multiple computers in larger offices.	
IPADDRESS2	Internet address used to link,	Can have multiple computers in larger	

Uber Exhibit 1002 - p. 280
Uber Technologies, Inc. v. SurgeTech, LLC

	identify computers in customers office	offices.	
IPADDRESS3	Internet address used to link, identify computers in customers office	Can have multiple computers in larger offices.	
IPADDRESS4	Internet address used to link, identify computers in customers office	Can have multiple computers in larger offices.	
DISCOUNT_CODE	Identifies which discount code is used to calculate prices charged for this customer	Code must be in DISCOUNT_CODES table.	Index
PHYSICAL_ADDRESS	Street address of practice		
PHYSICAL_STATE	State in which the practice is located		
PHYSICAL_ZIP	Zip code of physical location of practice		
SHIP_TO_ADDRESS	Address to which shipments go		
SHIP_TO_STATE	State for ship to address		
SHIP_TO_ZIP	Zip code for ship to address		
MAIL_ADDRESS	Mailing address (for other than shipments)	Literature, documents only (may be a PO Box to which UPS & FedEx cannot ship)	
MAIL_STATE	Mail address state		
MAIL_ZIP	Zip code for mail address		
ADMINISTRATOR	Administrator, manager, etc. of Customer		

Table Name –

PRACTICE_MEMBERS

Table Description and function – This table can be linked to records in a CUSTOMERS table, and can store data pertaining to individual physicians or other health-care professionals working at or with a practice.

Uber Exhibit 1002 - p. 281
Uber Technologies, Inc. v. SurgeTech, LLC

Column (field) Name	Description	Comment	Field Characteristics & Indexing
CUSTOMER	Customer to whom the Practice Member is associated	Must be in CUSTOMERS table already	Index – concatenated with MEMBER_NAME
MEMBER_NAME	Name of health-care professional or physician linked to CUSTOMER	Together with CUSTOMER, forms unique record key	With CUSTOMER
MEMBER_TITLE	Title (e.g., Exec. Director) of member		
MEMBER_MAIL_ADDRESS	Separate mailing address for member		
MEMBER_MAIL_STATE	Member mail address state		
MEMBER_MAIL_ZIP	Member mail address zip		
MEMBER_LICENSE_NO	Professional license for member		
MEMBER_LICENSE_EXPIRE	Expiration Date of member's professional license		
MEMBER_DEGREE1	First degree of member		
MEMBER_DEGREE2	Second degree of member		
MEMBER_DEGREE3	Third degree of member		
MEMBER_DEGREE4	Fourth degree of member		
MEMBER_NOTES	Text/comment field		
DATE_NEW	Date this member was added to table		
DATE_LAST	Last activity date		

Table Name –

Uber Exhibit 1002 - p. 282
Uber Technologies, Inc. v. SurgeTech, LLC

DISCOUNT_CODES

Table Description and function – can contain decimal values representing a unique price to be charged or discount to be granted to each customer. Any number of customers may use a discount code. When a decimal value associated with a given code is changed, the result is that all prices for all customers using that code are changed. If a customer's discount code specifies a discount value greater than allowed for a given product, the present invention may limit a price to the maximum discount .

Column (field) Name	Description	Comment	Field Characteristics & Indexing
DISC_CODE	Discount code	Identifies specific discount; numbering should be 10,20,30, etc. to allow for insertions in future, e.g, 14	Primary Index
DISC_VALUE	Decimal value for the discount to be given.		
NOTES	Notes; text field for commentary about a particular discount code		

Table Name –

CUSTOMER_INVENTORY

Table Description and function – stores inventory at customer office. One record for each customer/SKU combination, including all that have been used in past, or which are to be used for next ordering cycle. Permanent table. Activity logged in CUSTOMER_INVENTORY_TX table.

Column (field) Name	Description	Comment	Field Characteristics & Indexing
CUSTOMER	Identifies customer		Index – concatenated with PRODUCT
PRODUCT	Identifies product at customer's site		Indexed with CUSTOMER
ON_HAND_QTY	Quantity of an item on hand at this customer		
ROP	Reorder point	When on_hand_qty	

Uber Exhibit 1002 - p. 283
Uber Technologies, Inc. v. SurgeTech, LLC

	quantity	falls to or below this quantity, a new order is triggered for the product.	
ROQ	Quantity to be ordered	Ordering process uses this quantity when a product is "triggered"	
STATUS	Activity status of item	Values: Active (default, normal setting) NoOrder (continue to use up inventory, but no more orders) NoUse (do not accept scanned usage of product)	Index

Table Name –

PRODUCTS

Table Description and function – identifies products available for sale at any point in time. Includes products no longer active. One record for each product/SKU/Item Number.

Column (field) Name	Description	Comment	Field Characteristics & Indexing
PRODUCT_ID	Identifies product; SKU; also is"item number"		Primary Index
SHORT_DESCRIPTION	Short description appearing on most printed outputs & screens		Index
LONG_DESCRIPION	Long description for additional description		Index, built so each word is indexed separately.
MANUFACTURER	Company making product; Must be in MANUFACTURERS table		Index
MANUFACTURER_ITEM_NUMBER	Manufacturer's product identifier		Index
STATUS	Item status	Values: Active (default,	

Uber Exhibit 1002 - p. 284
Uber Technologies, Inc. v. SurgeTech, LLC

		normal usage) NoOrder (accept usage scans, no orders) NoUse (do not accept usage scans; no activity; obsolete or discontinued)	
PRODUCT_CLASS	Marketing/sales classification of product		Index
PRODUCT_GROUP	Commodity classification of product		Index
PRODUCT_LINE	Financial reporting classification of product		Index
SELL_START_DATE	Date that new orders for this product can be processed	Prior to this date orders will not be processed (new product so not available yet)	
SELL_END_DATE	Date after which new orders for this product cannot be processed	After or on this date, orders will not be processed (discontinued product)	
PRODUCT_PICTURE	Product Picture bit map image	JPEG or GIF	

Table Name –

MANUFACTURERS

Table Description and function – This table stores all manufacturers whose products may be carried in the PRODUCTS table. It serves as a reference and validation table for products.

Column (field) Name	Description	Comment	Field Characteristics & Indexing
MANUFACTURER_ID	Short abbreviation for manufacturer		Primary Index
MANUFACTURER_NAME	Normal business name for manufacturer		Indexed
DATE_ADDED	Date this Manufacturer was		

Uber Exhibit 1002 - p. 285
Uber Technologies, Inc. v. SurgeTech, LLC

	added to the table		

Table Name –

ORDERS

Table Description and function – stores orders generated by nightly process and/or by critical ordering process, which are then downloaded to distributor. Serves as order "header" record. Linked to ORDER_DETAIL table where line items are stored. No maintenance history log table. One record for each order generated and downloaded.

Column (field) Name	Description	Comment	Field Characteristics & Indexing
ORDER_NO	Order Number; unique identifier for the order	Generated by ordering processes; increments SYSTEM_PARAMTER for order number	Primary Index
ORDER_DATE	Date order generated		Index
ORDER_TIME	Time order generated		
ORDER_SOURCE	How order was generated	Sources are: AUTO – nightly process MANUAL – manual order entered on terminal in customer's office.	
CUSTOMER	Customer on the order		Index
LINKED_SUPPLIER	Linked Supplier to whom the order was downloaded		Index
ORDER_STATUS	Status of the order; shows latest status only, sequence is presumed	Values: GEN – generated PLACED – downloaded to supplier S_BILLED – supplier has invoiced Med-e-Track C_BILLED – system has	Index

Uber Exhibit 1002 - p. 286
Uber Technologies, Inc. v. SurgeTech, LLC

		converted supplier invoice to customer invoices	
STATUS_DATE	Date which status changed		
SHIP_TO_ADDRESS	Address to which orders is to be shipped; appears on downloaded order data		
ORDER_PRODUCT_TOTAL	Total value of order for product only; not including tax, shipping, other charges		

Table Name –

ORDER_DETAIL

Table Description and function – stores line item detail on ORDERS. One record for each line item on an order.

Column (field) Name	Description	Comment	Field Characteristics & Indexing
ORDER_DTL_ORDER_NO	Order number to which this detail record belongs		Index – concatenated with ORDER_LINE_NUMBER
ORDER_LINE_NUMBER	Line number for order.	With Order_Dtl_Order_no, forms a unique identifier	
PRODUCT	Product identifier for item ordered		Index
ORDER_QUANTITY	Quantity of the product that is being ordered.		
SHIP_QUANTITY	Quantity of the item shipped; as reflected on an uploaded, processed supplier invoice/packlist		
CUSTOMER_UNIT_PRICE	Price to be charged to		

Uber Exhibit 1002 - p. 287
Uber Technologies, Inc. v. SurgeTech, LLC

	customer		
CUSTOMER_UNI_SALES_TAX	Sales tax, if any to be charged customer		
PRODUCT_ORDERED_SUBTOTAL	Value = Order_Quantity * Customer_Unit_price		
PRODUCT_SHIP_SUBTOTAL	Value = Ship_Quantity * Customer Unit_Price		
LINKED_SUPPLIER_UNIT_COST	Price to be paid Linked Supplier for this item		
LINKED_SUPPLIER_PRODUCT_SHIP_SUBTOTAL	Value = Ship_Quantity * Linked_Supplier_Unit_cost		

Table Name –

LINKED_SUPPLIER

Table Description and function – Stores and sets up each linked supplier, i.e., distributor that is linked into the web site. One record for each supplier that will be, is now, or has been linked at one time into Med-e-Track. Activity logged in LINKED_SUPPLIER MAINT_HISTORY. Account is linked to Supplier table in the SOLOMAN Accounts Payable subsystem.

Column (field) Name	Description	Comment
SUPPLIER	Supplier's ID	Unique identifier
SUPPLIER_IP_ADDRESS	IP Address where linking process occurs	
OPEN_DATE	Date the relationship was setup/started	

Table Name –

SUPPLIER_INVOICE

Table Description and function – stores uploaded invoice/pack lists from linked suppliers. Serves as "header" record for invoices. A given Order can have multiple invoices. Linked to SUPPLIER_INVOICE_DETAIL records which carry line item detail. Invoices uploaded from distributor reflect orders they have shipped and are then used to generate Customer invoices. The uploaded invoice data is also

Uber Exhibit 1002 - p. 288
Uber Technologies, Inc. v. SurgeTech, LLC

transferred to the Accounts Payable module of the Solomon IV software for corporate accounting/tracking. Customer invoices generated and recorded in this table are also transferred to the Accounts Receivable module.

Column (field) Name	Description	Comment	Field Characteristics & Indexing
INTERNAL_INVOICE_ID	Internal, system generated invoice identifier	Insures unique invoice identification in case of similar supplier invoicing schemes/numbers	
ORDER	Order number which the invoice is a shipment/bill for.		
SUPPLIER_INVOICE	Invoice identifier from supplier	Uploaded invoice data	
SUPPLIER_INVOICE_DATE	Date of/on supplier invoice that was uploaded		
SUPPLIER_INVOICE_TIME	Time that supplier invoice was uploaded	Invoice time may not appear in supplier database.	
AP_DATE	Date supplier invoice data posted to AP tables		
AP_TIME	Time supplier invoice data was posted to AP tables		
CUSTOMER_INVOICE	Invoice ID generated by nightly process to bill customer for shipment	Presence indicates that nightly process has run, generating this separate invoice number.	
CUSTOMER_INVOICE_DATE	Date customer invoice generated by nightly process		
CUSTOMER_INVOICE_TIME	Time of customer invoice generation process.		
AR_DATE	Time		
SHIPMENT	Shipment document number	May be separate ID from invoice no.	Index on this field for packing slip data retrieval.
SHIP_VIA	Shipping method; e.g., UPS Ground		

Table Name –

Uber Exhibit 1002 - p. 289
Uber Technologies, Inc. v. SurgeTech, LLC

INTERNAL_INVOICE_SHIP_DETAIL

Table Description and function – This table contains shipment information for the shipment covered by the Internal Invoice. There is one record for each carton comprising the shipment covered by the Invoice. It is linked to the Internal_Invoice table.

Column (field) Name	Comment
INTERNAL_INVOICE_ID	
SHIP_CARTON_ID	Together with invoice id, comprises unique record ID
TRACKER_NO	

Table Name –

SUPPLIER_INVOICE_DETAIL

Table Description and function – this table carries the line item level detail for invoices uploaded from the linked supplier/distributor. Some line item level detail is used to update Order data to support quick order status inquiries and track back-ordered items.

Column (field) Name	Description	Comment
INTERNAL_INVOICE_ID	Identifier for internal invoice no	
INTERNAL_INVOICE_LINE_ NUMBER	Line number for internal invoice	Together with Internal Invoice identifier, forms unique key
SHIPPED_PRODUCT	Product shipped	
SHIP_QUANTITY	Quantity shipped	
UNIT_PRICE	Supplier's Unit price	
UNIT_TAX	Sales Tax (if any)	
EXTENDED_PRICE	Value = Ship_qty * Unit_Price	Product only subtotal
LINE_TAX_TOTAL	Value = Ship_Qty * Unit_Tax	
LINE_TOTAL_AMOUNT	EXTENDED_PRICE + Line_Tax_total	

Table Name –

SUPPLIER_COST

Table Description and function – Stores prices to be paid to each Linked Supplier in the system. One record for each linked supplier and SKU. Permanent table. Activity logged in SUPPLIER_COST_MAINT_HISTORY table.

Uber Exhibit 1002 - p. 290
Uber Technologies, Inc. v. SurgeTech, LLC

Column (field) Name	Description	Comment	Field Characteristics & Indexing

Table Name –

SUPPLIER_COST_MAINT_HISTORY

Table Description and function – records changes made to SUPPLIER_COST records. One record for each field changed during an update of a given record.

Column (field) Name	Description	Comment	Field Characteristics & Indexing

Table Name –

PRODUCT_MAINT_HISTORY

Table Description and function – records changes made to PRODUCTS table. One record for each field changed during an update of a given record.

Column (field) Name	Description	Comment	Field Characteristics & Indexing

Table Name –

PRODUCT_CLASS

Table Description and function – Identifies valid product classes; serves as a reference table.

Column (field) Name	Description
PROD_CLASS_CODE	Code for product class description
DESCRIPTION	Text/descriptive name for product_class code

Table Name –

PRODUCT_GROUP

Table Description and function – Identifies valid product groups; serves as a reference table.

Column (field) Name	Description
PRODUCT_GROUP_CODE	Code for product group description
DESCRIPTION	Text/descriptive name for Product Group Code.

Table Name –

Uber Exhibit 1002 - p. 291
Uber Technologies, Inc. v. SurgeTech, LLC

PRODUCT_LINE

Table Description and function – Identifies valid product lines; serves as a reference table.

Column (field) Name	Description
PRODUCT_LINE_CODE	Code for product line description
DESCRIPION	Text/descriptive name for product line code

Table Name –

CUSTOMER_INVENTORY_TRANSACTIONS

Table Description and function – transaction history table for activity altering data in Customer_Inventory table; one record for each change recorded; main use will be recording inventory activity, although transactions will be generated for changes to status, ROP, ROQ and Notes values, i.e., non-on-hand quantity values. Each transaction affects only one data field. Transaction code indicates what update/change activity was performed, and therefore which data field was updated.

Column (field) Name	Description	Comment
TRAN_NO	Unique identifier for each transaction; non significant	Functions like a check number.
TRAN_DATE	Date transaction processed	
TRAN_TIME	Time transaction processed	
TRAN_ID	Code identifying transaction	Values: TBD
PRODUCT	Product identifier of item affected	
QTY		
CUSTOMER	Customer whose inventory data was updated/changed	
USER_ID	User performing transaction	
BEFORE_VALUE	Value of data field prior to update action	
AFTER_VALUE	Value of data field after update action	

Table Name –

Uber Exhibit 1002 - p. 292
Uber Technologies, Inc. v. SurgeTech, LLC

CONTACT_LOG

Table Description and function – this table accepts transactions from the consultant request function, enters and tracks them for followup and management purposes.

Column (field) Name	Description
SALES_CONSULTANT_ID	ID in Sales_Consultants table.
REQUEST_DATE	Date customer initiated request
REQUEST_TIME	Time customer initiated request

Table Name –

CUSTOMER_USERS

Table Description and function – This table stores information about each user at a customer's site. There are two classes of users, supervisor and staff. Only a user with supervisor rights can add new users. The web page "hard-wires" who the customer is so customer users are kept associated with the correct customer.

Column (field) Name	Description	Comment	Field Characteristics & Indexing

Table Name – SALES_CONSULTANTS

Table Description and function – This table stores data about each Sales Consultant. It is essentialy a reference table.

Column (field) Name	Description
SALES_CONSULTANT_ID	Unique identifier * record key
CONSULANT_SHORT_NAME	Short name, nicknemame, initials to be used on screens, reports
CONSULTANT_FULL_FIRST_NAME	First name of consultant
CONSULTANT_LAST_NAME	Last name of consultant

It should be obvious to one skilled in the art that the present invention allows inventory tracking and management through a combination of manual, semi-automated, and automated means. The present invention also allows a manager to purchase in bulk and take advantage of promotions and other special offerings, thus reducing inventory costs. In addition, the present invention reduces the amount of inventory which must be kept on-hand by accurately modeling and predicting inventory needs. The present invention further provides customers with the ability to review new equipment, communicate with each other, and buy and sell excess inventory, refurbished equipment, and the like.

While the preferred embodiment and various alternative embodiments of the

Uber Exhibit 1002 - p. 293
Uber Technologies, Inc. v. SurgeTech, LLC

present invention have been disclosed and described in detail herein, it may be apparent to those skilled in the art that various changes in form and detail may be made therein without departing from the spirit and scope thereof, including applying the present invention to fields other than healthcare.

Uber Exhibit 1002 - p. 294
Uber Technologies, Inc. v. SurgeTech, LLC

CLAIMS

I claim as my invention:

1) An inventory management system comprising:
   one or more computers;
   one or more databases residing on said computers, in which inventory and customer information is stored;
   client software providing an interface to said database and performing administrative functions;
   a user identification subsystem;
   a subsystem through which new products can be added to said inventory database, and which enables proper accounting of restocked products within said inventory database; and
   a subsystem which accounts for a product or products within said database as such products are removed from inventory.
2) The inventory management system of Claim 1, in which one or more of said subsystems are comprised of an optical reader which can read specially coded information on an object or person.
3) The inventory management system of Claim 1, in which one or more of said subsystems are comprised of an electronic device for scanning wirelessly accessible identifiers associated with objects or persons.
4) The inventory management system of Claim 1, in which said user identification subsystem is comprised of a biometric identification device.
5) The inventory management system of Claim 1, in which said client software permits registration and removal of individual users, and modification of user information.
6) The inventory management system of Claim 1, in which said client software allows users to be classified into groups, and where permissions or roles are assigned to such groups.

Uber Exhibit 1002 - p. 295
Uber Technologies, Inc. v. SurgeTech, LLC

7) The inventory management system of Claim 1, in which said client software allows products to be grouped into classifications, allows restrictions to be placed on distribution of such products, permits recording of patient information when individual products or products belonging to a particular group or set of groups are dispensed, and allows printing of product specific or group specific labels or information to be included with each product removed from inventory.

8) The inventory management system of Claim 1, in which said client software monitors inventory levels and reports anticipated shortages.

9) The inventory management system of Claim 1, in which said client software monitors inventory levels and generates orders to cover anticipated shortages.

10) The inventory management system of Claim 1, in which said client software allows users to order new products or to supplement inventory when desired.

11) The inventory management system of Claim 1, in which said client software allows users to specify a price for goods for sale within an inventory.

12) A vendor managed inventory system, comprising:

one or more suppliers maintaining inventory utilizing an inventory management system;

one or more customers maintaining inventory utilizing an inventory management system;

a central server, which facilitates communications and inventory management between said customers and said suppliers; and,

a redundant data connection between said suppliers, said customers, and said central server.

13) The vendor managed inventory management system of Claim 12, in which said central server receives inventory information from customers and suppliers, anticipates inventory shortages, generates orders to cover such shortages, selects suppliers and products for such orders, places orders with selected suppliers, and monitors order status.

14) An inventory distribution system comprising:

a vending machine;

Uber Exhibit 1002 - p. 296
Uber Technologies, Inc. v. SurgeTech, LLC

a computer connected to said vending machine;

software running on said computer;

a printer;

a user identification subsystem; and

a data entry subsystem.

15) The inventory distribution system of Claim 14, in which said user identification subsystem is comprised of a biometric scanner, RFID reader, barcode scanner, keyboard, touch sensitive display, or combinations thereof, and through which users can positively identify themselves to said computer via said software.

16) The inventory distribution system of Claim 14, in which said data entry subsystem is comprised of an active or passive user interface, and through which users can request dispensation of certain products.

17) The inventory distribution system of Claim 14, in which said printer prints product information when requested and as necessary to satisfy applicable regulations.

18) The inventory distribution system of Claim 14, further comprising a central server and a redundant data connection between said vending machine and said server.

19) The inventory distribution system of Claim 18, in which said computer monitors distribution of products contained within said vending machine, transmits such distributions to said server via said redundant data connection, and through which said server can notify a vending machine service provider of any inventory shortages.

20) A automated method of inventory management involving the steps of:

accounting for received products in an inventory;

monitoring products as such products are removed from an inventory;

calculating trends based on the frequency with which products are used;

determining optimal product quantities for each order, such that shipping costs are reduced and price points for different quantities are taken into account while also reducing expenditures.

ordering additional stock as needed;

tracking said orders;

Uber Exhibit 1002 - p. 297
Uber Technologies, Inc. v. SurgeTech, LLC

calculating order fulfillment trends based on delivery times from each supplier and for each product; and,

determining preferred suppliers based on such order fulfillment trends.

21) The automated inventory management method of Claim 20, in which the step of accounting for received products in an inventory involves electronically reading documentation supplied with each package and automatically updating inventory information to reflect package contents.

22) The automated inventory management method of Claim 20, in which the step of monitoring products as such products are removed from an inventory involves electronically reading a product identifier associated with a product or group of products.

23) The automated inventory management method of Claim 20, further including the step of identifying a user removing products from an inventory by electronically retrieving an identifier from said user.

24) An automated order fulfillment method, comprising the steps of:

receiving an availability and pricing request from a customer for one or more products;

determining acceptable alternatives for said products based on customer preferences;

determining quantities available, pricing, quantities necessary for a price break, and anticipated delivery times from one or more suppliers to meet said request, including any acceptable alternatives;

selecting products, product quantities, and suppliers that provide the most value while still meeting customer inventory needs;

generating product pick and pack slips for each supplier;

recording products as they are "picked" from a supplier inventory;

recording products as they are packed into shipping packages;

generating package packing slips and shipping labels;

correlating shipping and packing information;

shipping said packages; and

tracking said shipments.

25) The automated order fulfillment method of Claim 24, in which picked products are recorded by electronically scanning identifiers associated with such products.

Uber Exhibit 1002 - p. 298
Uber Technologies, Inc. v. SurgeTech, LLC

26) The automated order fulfillment method of Claim 25, in which picked products are recorded by electronically scanning identifiers associated with such products using a handheld computing device, to which a barcode scanner is attached.

27) The automated order fulfillment method of Claim 24, in which the step of recording products as they are packed further includes the step of scanning an identifier associated with a shipping package prior to scanning individual items packed into a shipping package.

28) The automated order fulfillment method of Claim 24, in which the packing and shipping labels include a machine readable identifier.

29) A vendor managed inventory and group purchasing system, comprising:

one or more servers;
one or more databases running on said servers;
client software running on one or more computers at a customer site, which is capable of monitoring customer inventories and reporting such information to said server via a redundant data communications connection;
client software running on one or more computers at a supplier site, which is capable of monitoring product quantities on hand and supports multiple product prices depending on order quantities, and which is capable of transmitting such information to said server via a redundant data communications connection; and
software running on said server that consolidates customer orders such that customer costs may be decreased by leveraging the consolidated order quantities.

Uber Exhibit 1002 - p. 299
Uber Technologies, Inc. v. SurgeTech, LLC

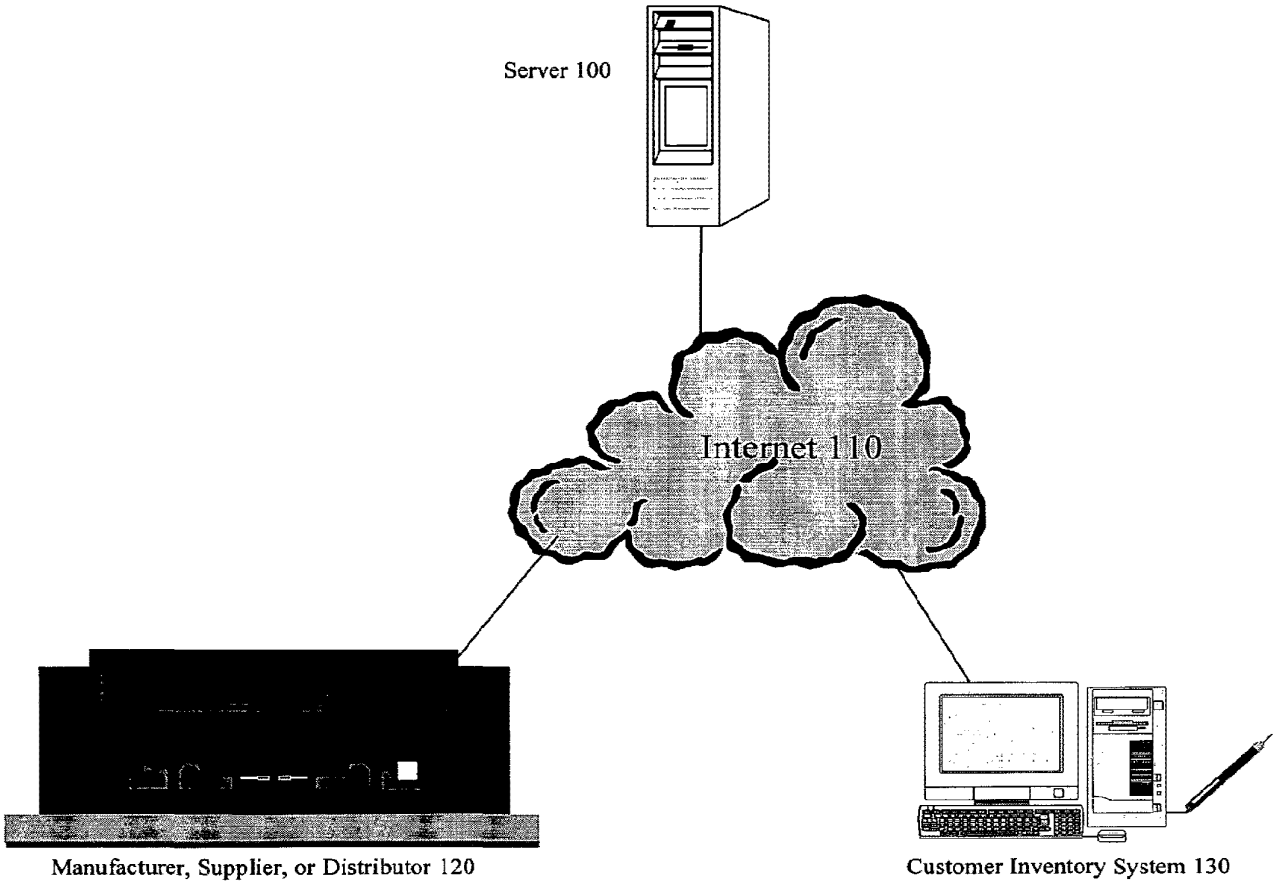


Figure 1

Uber Exhibit 1002 - p. 300
Uber Technologies, Inc. v. SurgeTech, LLC

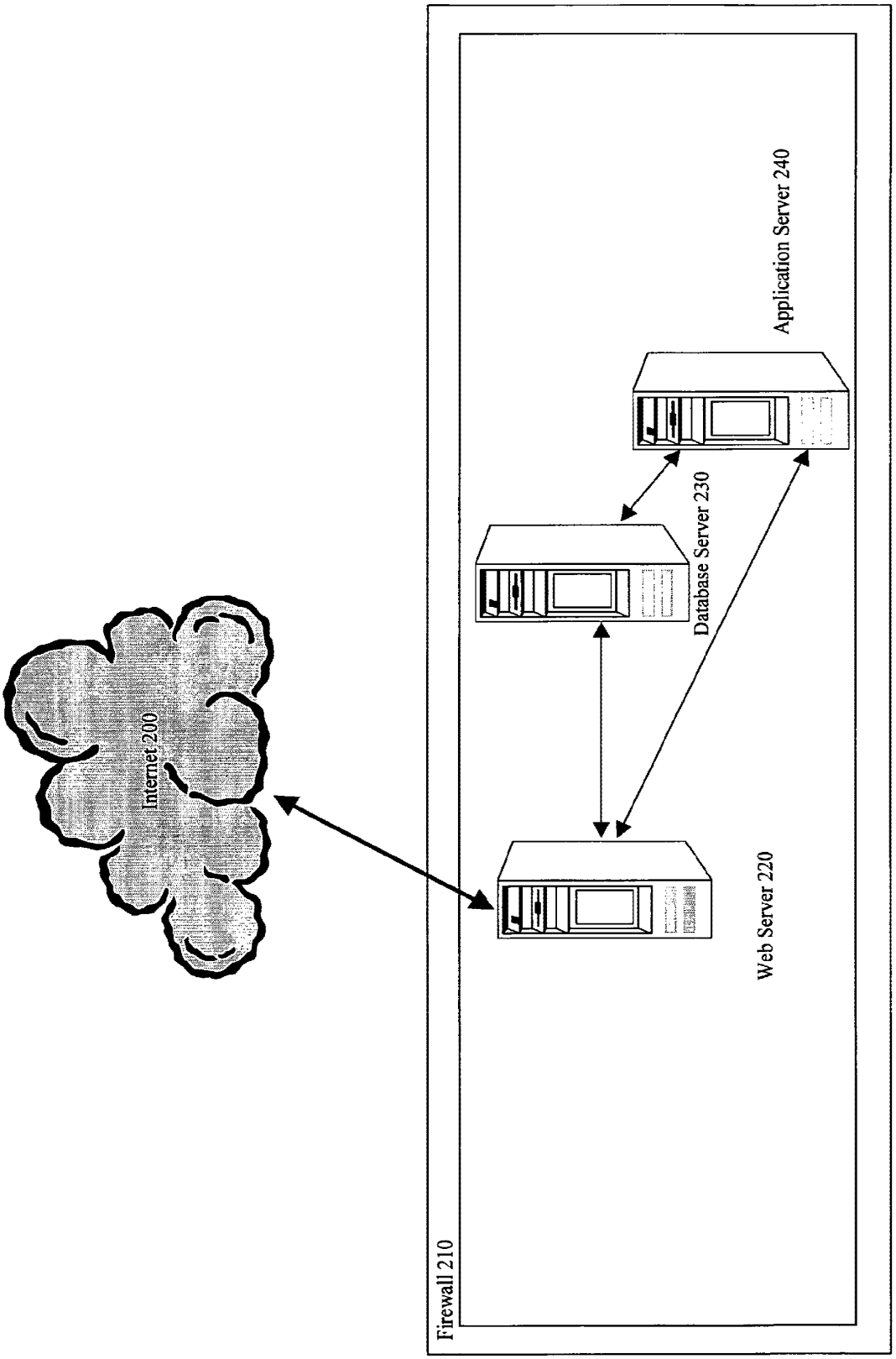


Figure 2

Uber Exhibit 1002 - p. 301
Uber Technologies, Inc. v. SurgeTech, LLC

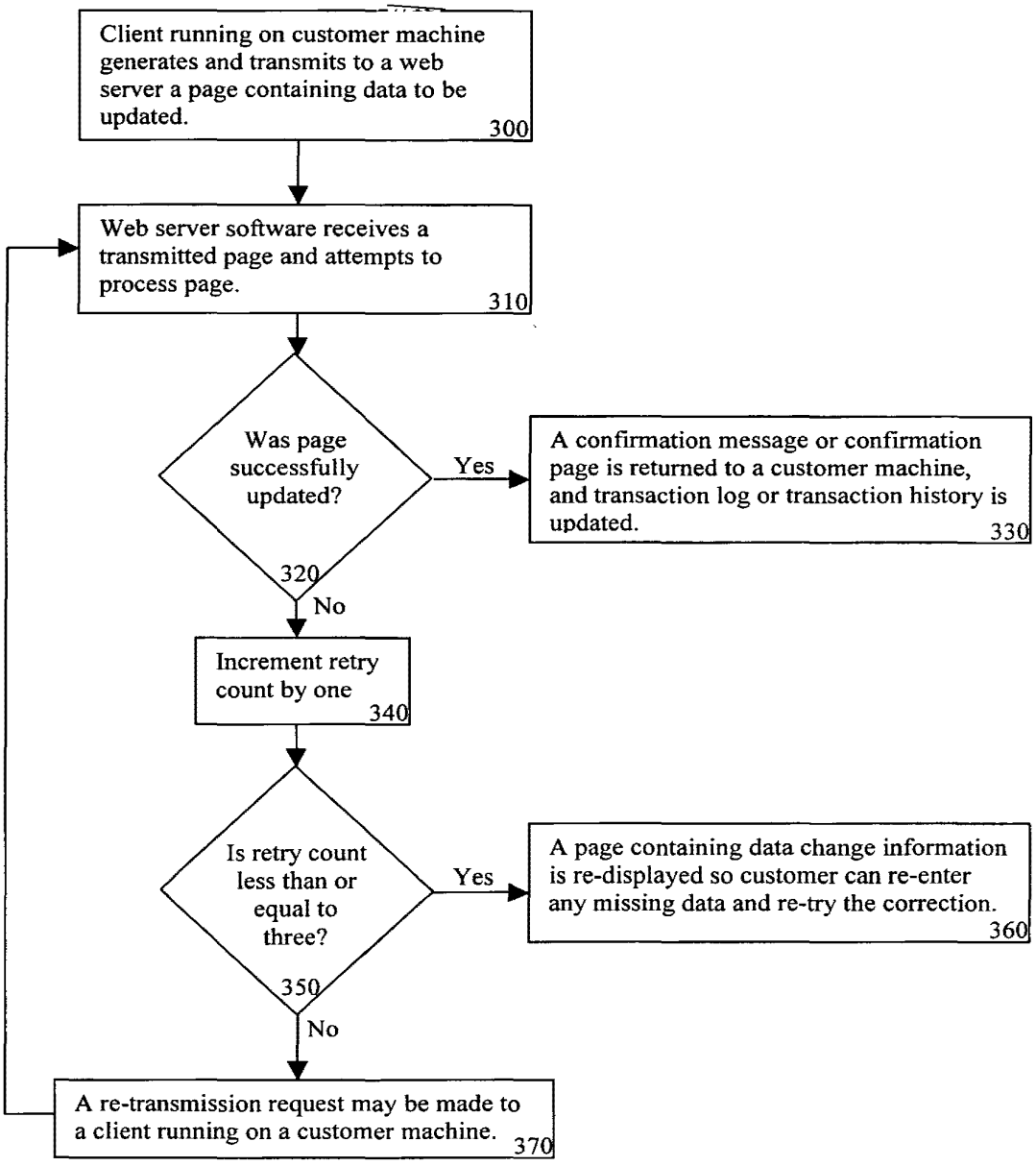


Figure 3

3/5

Uber Exhibit 1002 - p. 302
Uber Technologies, Inc. v. SurgeTech, LLC

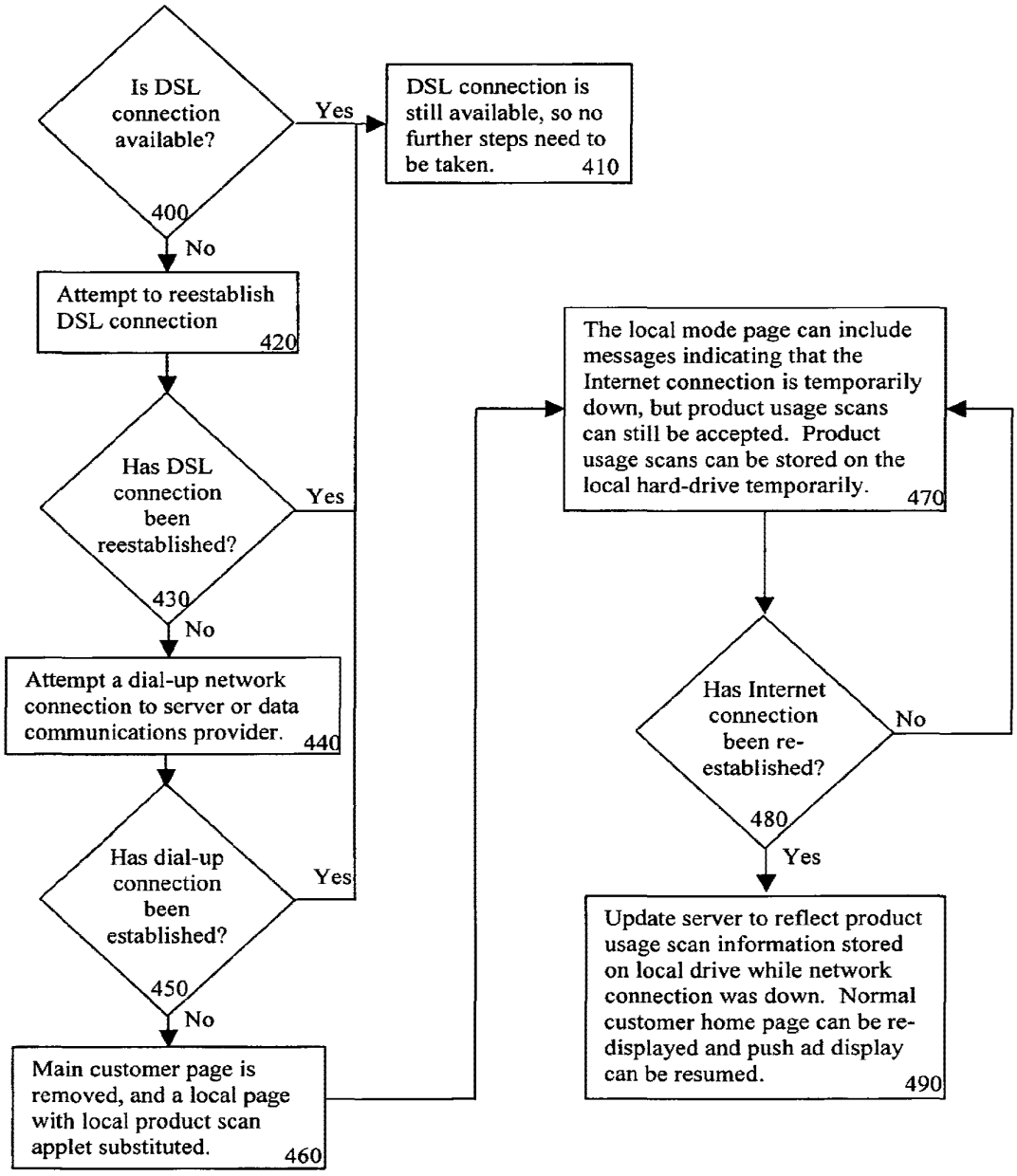


Figure 4

Uber Exhibit 1002 - p. 303
Uber Technologies, Inc. v. SurgeTech, LLC

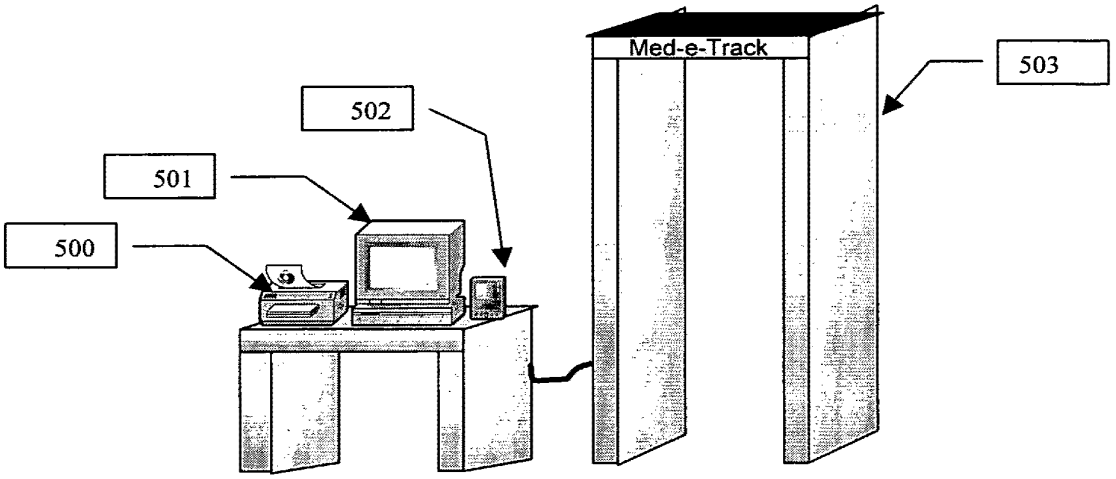


Figure 5

Uber Exhibit 1002 - p. 304
Uber Technologies, Inc. v. SurgeTech, LLC

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US01/07253

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : G06F 17/60; G06G 1/14
US CL : 705/22,28

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
U.S. : 705/22,28

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A,E	US 6,247,774 B1 (RODEN et al) 19 June 2001, see entire document.	1-29
A	US 5,983,198 A (MOWERY et al) 09 November 1999, see entire document.	1-29
A	US 5,920,317 A (McDONALD) 06 July 1999, see entire document.	1-29
A	US 5,893,076 A (HAFNER et al) 06 April 1999, see entire document.	1-29
A	US 5,638,519 A (HALUSKA) 10 June 1997, see entire document.	1-29
A	US 5,608,621 A (CAVENEY et al) 04 March 1997, see entire document.	1-29
A	US 5,638,516 A (DUZETT et al) 10 June 1997, see entire document.	1-29

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
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Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703)305-3230	Authorized officer Olszewski Robert Telephone No. (703) 306-5484

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WO 01/82135 A1

(54) Title: SYSTEM AND METHOD OF SUPPLY CHAIN MANAGEMENT

(57) Abstract: A supply chain management system and method for managing a supply chain that enables a user to analyze and control numerous aspects of the supply chain including up-stream supplier capabilities and constraints, and down-stream customer needs and constraints. The system applies data warehouse design concepts to the Supply Chain Operations Reference (SCOR) model processes developed by the Supply Chain Council (SCC). The supply chain management system permits vertical integration of order management, vendor managed inventory, transportation management, and legacy transaction systems. The system consolidates transaction history across multiple, disparate systems to allow query and analysis of business key indicators and metrics, and can help to closely track supply verses demand.

SYSTEM AND METHOD OF SUPPLY CHAIN MANAGEMENT

1. BACKGROUND OF THE INVENTION

1.1 FIELD OF THE INVENTION

The present invention relates to a supply chain management system and method therefor. More particularly, the present invention relates to system and method for managing a supply chain that enables a user to analyze and control numerous aspects of the supply chain including up-stream supplier capabilities and constraints, and down-stream customer needs and constraints. The system applies data warehouse design concepts to the Supply Chain Operations Reference (SCOR) model processes developed by the Supply Chain Council (SCC).

1.2. DESCRIPTION OF THE PRIOR ART

At present, there is no convenient way for a business to analyze and/or quickly and easily manage its supply chain, be it in an upstream or downstream direction. The number of factors affecting the supply chain makes such management an arduous task, at best. For example, the cost of raw materials, the cost of transportation, labor costs, market considerations, customer demands, product changes, inventory stocks, and accounts receivable and payable are just some of the factors that need to be accounted for.

In addition entities making up the supply chain operate with different management and accounting systems, and are not necessarily inclined to making their internal data public. As a result, there is no simple method for providing management of the supply chain that works across multiple platforms.

The Supply Chain Council (SCC) was formed in the late 1990's as a grass roots initiative to model the entire supply chain and all of its processes. The SCC produced the Supply Chain Operations Reference (SCOR) model processes as a result of this initiative. However, the various methods of accessing data, from and about the supply chain components, do not make use of the SCOR model, and are often manual or stovepipe, requiring complex extraction from various enterprise legacy systems. Such methods often are without meaningful decision support capabilities.

2. SUMMARY OF THE INVENTION

These and other deficiencies of the prior art are addressed by the present invention that is directed to a supply chain management system and method therefor.

The present invention applies data warehouse design concepts to supply chain operation model processes, thus permitting vertical integration of order management, vendor managed inventory, transportation management, and legacy transaction systems. The system consolidates transaction history across multiple, disparate systems to allow query and analysis of business key indicators and metrics.

The present invention can help to closely track supply verses demand when, for instance, a business has an excessive amount of inventory in its warehouse. The system of the present invention can be used to analyze current business practices and needs, and determine how an organization compares to the Supply-Chain Council's list of best practices. The system can further be used to recommend modifications to improve the business, and to help implement these changes.

The present supply chain management system provides a supportive process that will assist the client team in documenting a supply chain vision that supports the strategic business strategy. The system can assist in the definition of the supply chain processes required to execute the strategy, and establish the organizational issues and requirements to execute the processes to meet the strategy. In addition, the system facilitates collaborative process and organizational interaction required to support the vision and strategy.

Other benefits include the ability to determine the information requirements for the process and organizational elements, and to determine the technology requirements to deliver the information and environment for collaborative participation. The system will then be able to document the final "To Be" system required to support the vision and strategy in terms of process, organization and technology. In summary, the supply chain management system can provide: a supply chain vision, mission, and process definition; a supply chain metrics and targets, organizational specifications for successful execution; and information and technology specifications for successful execution.

The supply chain management system of the present invention provides the following capabilities:

Uber Exhibit 1002 - p. 308
Uber Technologies, Inc. v. SurgeTech, LLC

Evaluate a company's current business model;

Determine a company's requirements, and evaluate the commercial-off-the-shelf (COTS) tools needed to achieve these requirements;

Use the Supply-Chain Council's list of best practices, analyze the current business metrics and a determine what metrics should be tracked in the future;

Perform Business Process Reengineering (BPR) functions, if required;

Analyze industry trends as they relate the company's business;

Develop processes and work flows; and

Determine the gap between the company's current business practice and the desired result.

The supply chain management system of the present invention can document the organizational net assessment, including the associated deliverables, namely organizational net assessment, documented business performance requirements, team cast portrayal of the supply chain, and documented gaps from supply chain model.

From the foregoing, it is an object of the present invention to provide a supply chain management system that establishes available industry benchmarks, and establishes the meaning of success for a business.

Another object of the supply chain management system according to the present invention is to establish the degree of supply chain maturity of an organization.

Yet another object of the supply chain management system according to the present invention is to establish the scope of supply chain performance required of an organization, and establish the baseline for current performance within the supply chain; identify extremes.

Still another object of the supply chain management system according to the present invention is to analyze organization and structure, quality and measurement, operations management, information and technology, customer and external relationships, and knowledge and its use.

Uber Exhibit 1002 - p. 309
Uber Technologies, Inc. v. SurgeTech, LLC

Another object of the supply chain management system according to the present invention is to team cast for roles within the organization, supply side participants and demand side participants; identify decision authorities and decision methods.

3. BRIEF DESCRIPTION OF THE DRAWINGS

These and other attributes of the present invention will be described with respect to the following drawings in which:

FIG. 1 is a block diagram of Business Integration and Decision Support Architecture;

FIG. 2 is a diagram of a methodology for ensuring that the business needs are understood, and that the strategy is expressed in business processes, the business organization, and then the supporting technology for those two elements;

FIG. 3 is a chart illustrating the flow of information according to the supply chain management system of the present invention;

FIG. 4 is a flow diagram of order management process functions of the present invention;

FIG. 5 is a flow diagram of the warehouse management process of the present invention;

FIG. 6 is a flow diagram of the product monitoring process of the present invention;

FIG. 7 is a diagram of the transportation management process of the present invention;

FIG. 8 is a graphical representation of the data warehouse/marts infrastructure according to the present invention;

FIG. 9 is a graphical representation of an N-Tier network/server architecture according to the present invention;

FIG. 10 is a graphical representation of the a base view of the supply chain according to the present invention;

FIG. 11 is a graphical representation of a meta view of the supply chain management according to the present invention;

FIG. 12 is a graphical representation of a meta view of the supply chain measurement according to the present invention; and

Uber Exhibit 1002 - p. 310
Uber Technologies, Inc. v. SurgeTech, LLC

FIG. 13 is a flow chart of integrated logistics for the supply chain management system according to the present invention;

FIG. 14 illustrates a user interface login screen according to the present invention;

FIG. 15 illustrates a system main menu screen according to the present invention;

FIG. 16 illustrates an SCM operation management system menu according to the present invention; and

FIGS. 17 and 18 illustrate an accounts payable screen and an accounts receivable screen, respectively, according to the present invention.

4. DETAILED DESCRIPTION OF THE INVENTION

The present invention can help to closely track supply verses demand when, for instance, a business has an excessive amount of inventory in its warehouse. The system of the present invention can be used to analyze current business practices and needs, and determine how an organization compares to the Supply-Chain Council's list of best practices. The system can further be used to recommend modifications to improve the business, and to help implement these changes.

The primary functions of the supply chain management system of the present invention include the ability to extract data from legacy systems using automated programming interfaces, message queuing, and processware, the ability to populate an operational data store with enterprise views of existing legacy data, the ability to map the enterprise operational data store and business processes to the SCOR model, and the ability to apply OracleTM data warehouse techniques and tools to an analysis and management of key performance indicators and metrics.

The supply chain management system solution set allows application of the SCOR model to any business requiring advanced supply chain management analysis capability. The data warehouse is structured generally to allow mapping of virtually any legacy transaction system or set of systems, through an operational data store and enterprise view of legacy data and business processes, directly to the processes contained within the SCOR model.

Uber Exhibit 1002 - p. 311
Uber Technologies, Inc. v. SurgeTech, LLC

As a result, the system provides for the development of a multi-tier, decision support infrastructure capability integrated with back office functions. The system allows for the application of supply chain information mining and knowledge management. Automated messaging and alerts may be initiated when supply chain performance or events deviate from expectations and preset metrics. Further, the system facilitates vertical integration of legacy applications or ERP transaction systems without modifying the underlying systems.

Using the SCOR model as the basis for mapping processes and measuring performance against established benchmarks allows for decision support against best-of-class criteria. Further, the application of the SCOR model within a solid data warehouse framework allows rapid and dynamic implementation in almost any environment or business model. The extract, transform and transport (ETT) methodology used in the solution set allows mapping of legacy data from any source to the generic data warehouse. The business scenario templates modeled in the design repository, supporting the solution set, provide for rapid mapping and modeling of business problems and requirements to the underlying models and architecture. The enterprise visibility components of the solution set provide flexible and scalable decision support capability across multiple, disparate legacy applications and transaction systems without requiring extensive and costly modifications to the underlying systems. All of the foregoing aspects are leveraged in one solution set that is generic enough to apply across large spectrums of supply chain disciplines.

The management system can: provide a supportive process that will assist the client team in documenting a supply chain vision that supports the strategic business strategy; assist in the definition of the supply chain processes required to execute the strategy; establish the organizational issues and requirements to execute the processes to meet the strategy; facilitate collaborative process and organizational interaction required to support the vision and strategy; determine the information requirements for the process and organizational elements; determine the technology requirements to deliver the information and environment for collaborative participation; and document the final "To Be" system required to support the vision and strategy in terms of process, organization and technology

The supply chain management system of the present invention provides:

The ability to evaluate a company's current business model;

Uber Exhibit 1002 - p. 312
Uber Technologies, Inc. v. SurgeTech, LLC

The ability to determine a company's requirements, and evaluate the commercial-off-the-shelf (COTS) tools needed to achieve these requirements;

The ability to use the Supply-Chain Council's list of best practices, analyze the current business metrics and a determine what metrics should be tracked in the future;

The capability to perform Business Process Reengineering (BPR) functions, if required;

The ability to analyze industry trends as they relate the company's business;

The ability to develop processes and work flows; and

The ability to determine the gap between the company's current business practice and the desired result.

The supply chain management system of present invention provides the dynamic capability of integrating information across multiple applications and enterprises into a system for inter-enterprise decision support.

The system supports multiple applications that provide executive information from a logistics business domain. Through supply chain management, the logistics business domain encompasses most business critical systems and extensions beyond a single enterprise to all participants in business so that they can achieve success through their supply chain performance.

Vertical integration is the modeling of the business processes and decisions as well as other key factors in a dynamic repository so they can be used to provide access to real data, and to adjust rapidly when the business changes, without impacting the transaction systems in use. The actual transaction systems are not physically integrated (horizontal integration) at the transaction level. A business transaction can be analyzed within the business rules, which leads to the generation of applicable Electronic Data Interchange "EDI" transaction messages that update the appropriate transaction systems of record.

A Business Integration and Decision Support (BIDS) environment has many components, as shown in Figure 1.

Query analysis and data mining OLAP tools, shown in block 50 are normally strap-on tools that allow one to design specific queries, as a user, to build views into information. The richer the information, the better comparisons can be made with the tools 50. The user must have

Uber Exhibit 1002 - p. 313
Uber Technologies, Inc. v. SurgeTech, LLC

access to the information and have some training if pre-defined queries are not provided to support the business needs. The unique queries and the graphics are configured to display meaningful information. Data Mining (looking through large volumes of information across multiple domains) is an ultimate use of this capability. OLAP capability normally requires modeling the business decisions and key performance indicators as a means to understand what queries are needed to support the business. The result is generally easy to read graphics about competitiveness, profitability, marketing comparisons, etc.

Without already defined key performance indicators and business processes, this activity could be lengthy and often is described as Business Process Reengineering if done from scratch.

In order to present the routine business process requirements, most applications build screens or windows to allow individuals to obtain the information tailored to their job and required workflow. These screens are constructed from standard coding practices, or from assembling pieces from repositories or libraries (more current practice). It is uncommon to develop web capability for these systems since most development environments have the tools necessary to make any screen you develop into a web accessible page. To develop these screens, it is necessary to understand the business processes that one's screens will support.

When libraries are used to build the screens, the savings in time and dollars can be up to five times what it would take without the libraries available. Without the business processes described, this initial activity could also be lengthy.

The information directory 52 is the navigation mechanism for the data warehouse 54. It includes levels of relationships that tie data dictionary information to the business processes and data-flows. The directory 52 is used to navigate through legacy or other transaction systems 56 to obtain the right piece of data to bring to the data warehouse database 54 for use in the decision support systems that are presented to the user. The capability allows you to define what your business will call certain data elements and to give you the capability to use your definitions to navigate to and select data from multiple other systems. Without the defined business processes, the relationships between the data and the processes, and the internal navigation to work-flow screens, the development of a means 58 to tie the data to the business processes would require at least 36% of one's total development effort. Changes can be expected for each new similar

Uber Exhibit 1002 - p. 314
Uber Technologies, Inc. v. SurgeTech, LLC

business domain (stay within the supply chain area) with great savings (average of 80% already done).

There are levels of databases in a data warehouse. The lowest level is called an operational data store 60. It is a physical database that is constructed to represent a business at a given point in time. There are also logical databases that are multi-dimensional to capture the nuances of particular business segments such as marketing, purchasing, accounting, transportation, etc. (with the third dimension often being time). Each of these multi-dimensional "cubes" must have relationships described to manage the way that populating the databases would occur. Marts 62 and Enterprise Data Warehouses 64 fall into this category.

Without the business processes being fully developed, there is no certainty that all of the data required to support the business would be represented in the databases. Once the databases are developed and applications are built to use them it becomes much harder to retrofit changes to the databases. Therefore, the business processes need to be well developed to minimize retrofitting time.

This component of data warehouses/marts 62 and 64 is the actual capability to go and get data elements from multiple systems, clean the data to user standards, transform the data to the format required within the warehouse/mart, and commit it to the warehouse or mart in a usable form.

There are significant tools available to perform this function. The use of the tools is empowered significantly from having the information directory in a dynamic form; otherwise the descriptions and configurations of the tools would be lengthy to ensure that the data is coming across correctly.

There are many forms of electronic commerce (EC) and security has similarly many types of application. Many tools come with the capability to handle EC and to configure security environments. In custom coded applications there are protocols and standards to meet to build features that can provide the EC and security capabilities. Also, it is not uncommon lately to see these features built into production environments through an integrated suite of tools. EC is more commonly applied to transaction systems, but information may also be pertinent to the decision support systems. Security is required for both domains and multiple layers are common to ensure

Uber Exhibit 1002 - p. 315
Uber Technologies, Inc. v. SurgeTech, LLC

not only access to what the user needs, but also protection from access by those who should not have access.

The environment readiness for these features is critical to not having to develop these applications since such development could be lengthy and less tested.

The supply chain management system of the present invention provides for secure web access to information with controlled access to participants that need total assurance that their competitive data is not accessible by other participants in the system. A preferred embodiment in the environment deals with supply chain processes; similar capabilities exist for business specific needs. The environment is a technical solution to a particular domain. Achieving the technical solution requires a methodology to ensure that the business needs are understood, and that the strategy is expressed in business processes, the business organization, and then the supporting technology for those two elements. Figure 1 identifies the methodology used to define the parameters for the technical solution.

Referring to Fig. 1, data from the existing ERP and operational systems 56 is acquired through the ETT 58. The data manager 66 and the information directory 52 receive data from the ETT 58. The information directory 52 is accessed through design tools and data warehouse/marts builder 68. The query analysis and mining tools 50 utilize the information from the data manger 66. Information creation and delivery 70 utilizes information from both the data manager 66 and the information directory 52. The information produced in the information directory 52 is stored in the repository database 72. The results of the information creation are displayed through a user interface 74.

The methodology of supply chain management system according to the present invention allows a business to be modeled incrementally with the enterprise, and with an inter-enterprise view in mind while constructing rapid business operational capability. A business enterprise system will most generally provide services at three levels:

1. The strategic level will provide the highest level of information for strategic decision-making.

2. The tactical level will provide information across business functions to assist the horizontal process management of all participating organizations.

Uber Exhibit 1002 - p. 316
Uber Technologies, Inc. v. SurgeTech, LLC

3. The operational level allows sharing of pertinent information that execution personnel need to make things happen in the immediate context of providing services to all participants.

The management system of the present invention provides a very versatile business/supply chain assessment feature. The system can establish available industry benchmarks, and thereby define the meaning of success for each organization. The system can also establish the degree of supply chain maturity of an organization, and establish the scope of supply chain performance required of an organization. The baseline for current performance within the supply chain can be established, and extremes can be identified.

The system is further able to analyze organization and structure, quality and measurement, operations management, information and technology, customer and external relationships, and knowledge and its use. The system determines roles within the organization, supply side participants and demand side participants, as well as identifying decision authorities and decision methods. Gaps in performance and characteristics with the model can be established. The system can further focus on the catalyst for change, the most compelling reasons for change, and the willingness of individuals and organizations to change.

Another feature of the present system is providing valuation positioning. Value positioning provides diverse data, such as value proposition curves for potential process changes, organization value priorities, and investment guidelines. The valuation positioning can determine the key metrics that the enterprise has determined as key to their business, establish the sensitivity of metrics at multiple levels to specific changes in performance within supply chain processes, and establish the priorities for the organization with regard to most desired value propositions. The valuation-positioning feature can further determine the likely payback for given initiatives within the organization as an initial means to adjust the focus of effort based on perceived likely value. Value positioning can determine what the potential payback is so that the investment can be gauged for appropriateness, and can obtain client buy-in on value propositions and possible methods for performing projects based on the potential value proposition.

As stated previously, the supply chain management system uses data warehouse design concepts to vertically integrate order management (OM), inventory management (IM), vendor managed inventory (VMI), and transportation management (TM) systems. The system provides a big picture of the operation of a business.

Uber Exhibit 1002 - p. 317
Uber Technologies, Inc. v. SurgeTech, LLC

The data warehouse will provide an enterprise-wide performance view of the business operation of the supply chain management system. By consolidating the history of transactions across disparate supply chain management transactional systems, the data warehouse can be queried for a number of business key performance indicators and metrics. These include:

Asset measurement	Revenue
Cost	Customer profitability
Consumer service	Speed
Productivity	Integrated metrics
Quality	Miscellaneous
Timeliness of shipments	

In ordinary operation, it is expected that the customer's supplier information will provide inventory data by product and warehouse, while the customer information furnishes purchase order and inventory data. Purchase order data will be organized by order date, product, supplier, and delivery terms. The customer's customers (customer2) information will provide purchase order, inventory and sales data. The sales data will be transmitted to the vendor managed inventory system. The partner providers, which includes carriers and warehouse facility providers, will transmit shipment data for orders shipped from supplier to the SCM customer, and for orders shipped from SCM customer to customer2. The data will be consolidated in the enterprise Web-Enabled Data Warehouse/Mart. The warehouse can then be queried to develop a host of measures for supplier shipment, supplier inventory, customer purchase orders, customer inventory, customer shipment, customer2 purchase orders, customer2 inventory, and customer2 sales.

Referring to figure 3, a chart illustrating the flow of information according to the supply chain management system of the present invention is shown. In the ETT 58, when an ERP transaction 76 occurs it is logged as an incoming transaction 78 and placed in the receiving queue 80, which in turn launches an electronic messaging process 82. The electronic messaging process 82 interacts with an electronic message database 84, which may send messages to

Uber Exhibit 1002 - p. 318
Uber Technologies, Inc. v. SurgeTech, LLC

customer relations management 86, message definitions 88, and/or message definitions 90. An OS Demon/Watchdog 92 monitors the electronic messaging process 82 and the receiving queue 80.

In ODS acquisition, information from the electronic messaging process 82 is sent to a process queue 94. The process queue 94 launches an operational data store process 96, which is monitored by an ODS scheduler Demon/Watchdog 98. The operational data store process 96 updates an operation data store 100 and an SCM repository 102. The SCM repository 102 contains customer and product relations management, and performance measurement metrics.

Information from the operation data store process 96 is sent in a data warehouse transaction to an archive queue 104, which in turn launches a data warehouse marts process 106. A data warehouse demon/watchdog 108 monitors the data warehouse marts process 106. The data warehouse marts process 106 updates the data warehouse 110 and the data marts 112.

The primary points of contact among the software package suites are the individual input data requirements for each system, the data transactions among systems, and vertical integration logic.

The next aspect of the supply chain management system is the order management process functions. For inbound items, inbound processing controls a purchase order (PO) from requisition through payment authorization, which includes sourcing, purchase release, receiving, and payment authorization.

The first step is the monitoring and maintenance of open requisitions, consolidation of stock-keeping unit (SKU) purchase quantities by vendor, and creation of a planned PO, by sourcing. Next, the purchase release creates the P.O., either from a purchase requisition or by direct entry, and establishes purchase price, considering any special discount schedules or volume purchase agreements. It also creates the authorization to receive product in the Warehouse Management system, and follows the progress of the order from time of requisition through receipt.

In the receiving step, the incoming products are identified, and verification that they were ordered is made. The product is then controlled through counting and quality control. The

Uber Exhibit 1002 - p. 319
Uber Technologies, Inc. v. SurgeTech, LLC

receiving step supports put-away tasks, and posts the record of receipt, including date and quantity shipped, based on an authorization to pay from warehouse management.

The final step is payment authorization. Here, invoices from vendors are authorized for payment by determining that the quantities invoiced were received at the purchase price invoiced. Exceptions are noted and the appropriate manager is notified.

In outbound processing, the customer order from time of product creation through billing is controlled, which includes sourcing, order release, shipping, and invoicing.

In the sourcing step, any customer, product, and any special pricing requirements are identified. Credit checks are performed, and inventory availability is determined. Inventory required for immediate shipments are then reserved.

In the order release step the requirements for future delivery of non-standard product, back-ordered items, or scheduled shipments are captured. Next the authorization to ship for items that can be shipped immediately are created.

In the shipping step outbound products are identified, quantities picked are confirmed, products are controlled through packing, quality control, and shipping, and the record of shipment, including date and quantity shipped, based on an authorization to bill from warehouse management is posted.

The next step is the invoicing step. Here, all orders shipped to a customer are invoiced. Exceptions are noted and the appropriate manager is notified.

The final step is physical distribution. Physical Distribution controls the warehousing and transportation of all orders as follows:

Distribution Center Planning

1. Plans and manages efficient and economical strategic center's (SC) operations based on order backlog, supply, storage capacity, and available manpower.

2. Schedules inbound receipts based on authorizations to receive (ATR).

3. Directs put-away operations either cross-dock to fill order backlog, such as back-orders or scheduled releases, or to storage.

4. Releases outbound orders for shipment based on authorizations to ship (ATS).

Uber Exhibit 1002 - p. 320
Uber Technologies, Inc. v. SurgeTech, LLC

5. Directs inventory replenishment to support established picking procedures, and

6. Controls work queues in support of these operations.

Picking

1. Identifies outbound products; confirms quantities picked.

2. Controls product through packing, quality control, and staging, and

3. Updates inventory balances.

Put-Away

1. Identifies inbound receipts.

2. Controls product through counting and quality control.

3. Supports put-away tasks; and updates inventory balances.

Storage Management

1. Establishes and maintains the warehouse location map.

2. Maintains perpetual inventory balances.

3. Controls internal movement of product, including put-away and replenishment requirements.

Billing is the link between Inventory Management and Financial Management in the receivable area. All orders shipped to a customer are invoiced. Exceptions are noted and the appropriate manager is notified. The order management process functions are identified in Figure 4.

In order management (OM), new customer information is created in step 120. Items, customers and suppliers are maintained in steps 122, 124, and 126, respectively. In step 128, a confirmation of a valid order is produced in response to the customer. The order is sent to distribution center planning 132 through Assian lines 130. A put away is created in step 134.

The data from steps 122, 124, and 126 are also employed in data validation step 140, which is part of the transportation management system (TMS) as well as the business. When the data is validated in step 140, confirmation is sent back to process the valid order received step

Uber Exhibit 1002 - p. 321
Uber Technologies, Inc. v. SurgeTech, LLC

128. In addition, as part of the vendor managed inventory (VMI), a deployment plan 142 is created after the data validation.

Information from the step of creating the put away 134 is sent to a shipment received step 144, which in turn is sent to a shipment received step 146 at the customer end. Both shipment received steps 144 and 146 send confirmations to transaction receipt step 148, which produces an invoice payable 150.

The data validation steps 140 are part of a larger data capture step 150. Customer history 152 is used in a forecasting step 154 so that the data validation step 140 can utilize this information in the creation of the deployment plan in step 142. The data capture step 150 also produces a new customer contract in response to a valid order from a new customer in step 156.

As part of the order validation process, supplier sourcing is determined in step 160. The selected supplier information is sent to supplier order entry step 162 and to tendering step 164. The supplier order entry step 162 initiates an order received step 166, and is further used in the data validation step 140. Finally, the transaction receipt step 148 initiates a customer invoice payable 170.

The functions of the inventory management process are forecasting, deployment, leveling, and replenishment. Inventory Forecasting determines what to stock. Provides statistical and/or empirical techniques to forecast product demand, based on historical sales performance.

Inventory deployment manages planned availability for each SKU, including:

1. How much to stock, based on projected demand.

2. Where to stock to satisfy established service levels.

3. When to replenish to maintain established levels.

4. How much to buy, based on the following economic order quantities:

a.) Availability Management

Manages planned availability for each SKU, including quantities on hand, on order, committed, and quarantined.

b) Inventory Leveling

Uber Exhibit 1002 - p. 322
Uber Technologies, Inc. v. SurgeTech, LLC

Allocates planned availability to fill customer orders or to maintain stocking levels in the distribution network.

Determines net requirements based on planned allocations.

Identifies excess inventory.

Recommends adjustments to minimum stocking levels.

Recommends whether inventory will be bought or transferred to maintain recommended stocking levels.

c) Inventory Replenishment

Generates requisitions to either buy or transfer inventory to meet net requirements in the distribution network.

The functions of vendor managed inventory are demand planning, inventory planning, inventory deployment, sourcing, order release, and shipping.

Demand planning determines what to stock. Provides statistical and/or empirical techniques to forecast product demand, based on historical sales performance.

Inventory planning manages planned availability for each SKU, including:

1. How much to stock based on projected demand.

2. Where to stock in order to satisfy established service levels.

3. When to replenish to maintain established levels.

4. How much to buy based on economic order quantities.

Inventory deployment performs a number of functions, namely, it allocates planned availability to fill customer orders or to maintain stocking levels in the distribution network. Inventory deployment determines net requirements based on planned allocations, identifies excess inventory; recommends adjustments to minimum stocking levels, recommends whether inventory will be bought or transferred to maintain recommended stocking levels, and generates requisitions to either buy or transfer inventory to meet net requirements in the distribution network.

Uber Exhibit 1002 - p. 323
Uber Technologies, Inc. v. SurgeTech, LLC

Sourcing (common with order management) assists in identifying customer, product, and any special pricing requirements, performs credit checks determines inventory availability, and reserves inventory required for immediate shipments.

Order Release (common with order management) captures requirements for future delivery of non-standard product, back-ordered items, or scheduled shipments, and creates the authorization to ship for items that can be shipped immediately.

Shipping (common with order management) identifies outbound products, confirms quantities picked, controls products through packing, quality control, and shipping, and posts the record of shipment, including date and quantity shipped, based on an authorization to bill from warehouse management.

The functions of warehouse management are distribution center planning, picking, put-away, storage management, and inventory accounting.

Distribution center planning plans and manages efficient and economical SLC operations based on order backlog, supply, storage capacity, and available manpower, schedules inbound receipts based on Authorizations To Receive (ATR) from Purchase Management, directs put-away operations either cross-dock to fill order backlog, such as back-orders or scheduled releases, or to storage, releases outbound orders for shipment based on authorizations to ship from Order Management, directs inventory replenishment to support established picking procedures, and controls work queues in support of these operations.

The picking function identifies outbound products, confirms quantities picked, controls product through packing, quality control, and staging, and updates inventory balances. Shipping functions related to order processing controls, bills of lading, truck manifests, and billing procedures are included in the Order Management checklists.

The put-away function identifies inbound receipts, controls product through counting and quality control, supports put-away tasks, and updates inventory balances. Receiving functions related to purchase order controls and payment procedures are included in the Purchase Management checklists.

Uber Exhibit 1002 - p. 324
Uber Technologies, Inc. v. SurgeTech, LLC

The storage management establishes and maintains the warehouse location map, maintains perpetual inventory balances, and controls internal movement of product, including put-away, multiple customers per location/bin and replenishment requirements.

The inventory accounting controls real-time inventory updates, provides on-line inquiry to perpetual balances; and supports cyclical/physical inventory procedures, (an effective Warehouse Management functionally isolates warehouse business operations from other business operations.) Work requirements are received as either authorizations to ship (ATS) from order management or authorizations to receive (ATR) from purchase management.

The warehouse management controls planning, inbound, outbound, and storage management operations. The warehouse automation controls the actions of any automated devices, such as carousels, fixed scanners, and palletizers. When a required business operation, such as shipment or receipt, is completed, authorizations to bill (ATB) or authorizations to pay (ATP) are returned as appropriate. Periodically, reports are generated of on-hand inventory to the inventory management and financial management. The Warehouse Management process flow is shown in Figure 5.

An availability manager 200 monitors the movement of goods, and receives goods receipts 202, and produces goods issues 204. Authorizations to ship goods (ATS) are sent by the availability manager 200 to a pick planner 206, and includes prioritized customer information, ship date/time information, and transit time information. The information from the pick planner is sent to a shipment planner step 208 that produces load planning and tendering information. A pick order step 210 is performed based on the information from the shipment planning step 208. The pick order step 210 produces directed picking information, updated location status information, first-in-first-out information, labeling and scanning information, customized pallet information, and building, case pick, and order assembly information.

The information from the pick order step 210 is used to perform a ship orders step 212, which is sent to both the availability manager 200 and an ATMS step 214. In the ATMS step the carrier system is selected, the load is tendered to the carrier, and a carrier assignment is made.

Periodically a count of the physical inventory is cycled in step 216. Storage management step 220 is performed parallel to the availability manager 200. The storage management step monitors the available storage space, storage locations including storage configurations,

Uber Exhibit 1002 - p. 325
Uber Technologies, Inc. v. SurgeTech, LLC

replenishment, and re-warehousing. Furthermore, the storage management 220 performs productivity analysis and management reporting, produces performance measures, and monitors equipment utilization and maintenance.

Product monitoring is the ability to inquire and report the current location, quantity, and status of products throughout the supply chain at any time. Two categories of information are supported: inventory visibility and in-transit visibility. Through automated and manual procedures, Product Monitoring provides a consolidated view of all products across warehouses, vendors, customers, and in-transit modes.

As a result, customers can track and manage in-transit progress. By proactively tracking in-transit progress the customer can identify potentially late deliveries in time to redirect the shipment and plan loads for possible deliveries enroute. Customers can consider alternate sourcing. By viewing total inventory status, customers can determine the most appropriate location from which to fill an order. Furthermore, customers can combine individual visibility solutions to Enterprise visibility. By consolidating information across multiple departments and organizations, the customer can see a total view of their supply chain, including internal organizations and external partners. Finally, customers can automate tracking to lower costs. Product Monitoring Automation will reduce the staff required to track the product and resolve both internal and external inquiries. The product monitoring process flow is shown in Figure 6.

A query 250 initiates a determination 252 whether in-stock status is required. If the answer is yes the inventory is viewed in step 254. The view inventory step 254 sends and receives information with the order management status in step 256. Next, a decision 258 is made whether in-transit status is required. If no in-transit status is required a query response step 260 is performed.

If in-stock status is not required in step 252, or if in-transit status is required in step 258, then view transit step 262 is performed. In the course of step 262 shipment information 264 is shared. A carrier and an expected delivery date are determined in step 266. A carrier bill of lading file is maintained in step 268. The delivery is validated in step 270 and the data is confirmed in step 272. If the data is correct the query response is generated in step 260, and if incorrect the carrier bill of lading file is updated in step 274.

Uber Exhibit 1002 - p. 326
Uber Technologies, Inc. v. SurgeTech, LLC

A bill of lading (BOL) is created from shipment information. The transportation management auto-rating program, diagramed in Figure 7, validates the shipment information, creates bill of lading records, and calculates the freight cost for the bills of lading. If the freight cost is successfully calculated, shipment history and charge history records are created. The network 300 receives information from the shipper 302, the carrier 304, the consignee 306, and the freight/ vehicle 308.

In the case of consolidated shipment, the shipment is contained within a master bill of lading. Each individual shipment of the consolidation retains a separate bill of lading. Transportation management refers to the master bill of lading as a bill of lading group.

When the shipment is populated with shipments transported under a master bill, a shipment interface record with the bill of lading group ID must be populated as well as all individual bills of lading referencing the master bill of lading number. If a shipment interface record is entered without a detail record (individual bill of lading), the auto-rating program will create a master bill of lading instead of a single bill of lading.

A BOL is created either from shipment information received through the shipment interface or when shipment information moves from shipment planning to shipment execution. Transportation management rates the line haul portion and the distribution leg separately for shipments going through a pool point. The shipment interface will need two types of records, the line haul shipment with the master bill of lading information and each distribution leg for individual sub-bill of lading information. The through point on the shipment interface record has to be populated with the pool point location.

Track a shipment by the contents (i.e., cookies, candies, chocolate, etc.) in a package. Transportation management generates non-cartonized bills of lading when a shipment tracked by package content is rated. Non-cartonized bills of lading list itemized products (ship items), and provide specific instructions to a carrier on a BOL (i.e., Inside Delivery, Hot Delivery or Delivery to Room 210).

The status notification receives a delivery status notification through the EDI 214 Delivery Status Transaction set. A carrier can transmit the shipment tracking status via EDI to an organization (either the shipper or customer), eventually to be populated in transportation management.

Uber Exhibit 1002 - p. 327
Uber Technologies, Inc. v. SurgeTech, LLC

Shipment tracking is accomplished through the use of delivery status messages. These messages are added to the shipment history record.

Referring to Figure 8, a graphical representation of the data warehouse/marts infrastructure according to the present invention is shown. The ETT 58 draws information from the existing ERP and operating system 56, external feed data 350, and text, image and video data 352. Information from the ETT 58 is sent to the information directory 52, which in turn send s information to the operational data store 60, the data warehouse time series 54 and the information creation 70. The information creation 70 sends information to the data marts 62, exceptions and alerts 354, and DSS tools 356. Furthermore, knowledge base distribution 360 is fed to the data marts 62, exceptions and alerts 354, and DSS tools 356.

A graphical representation of an N-Tier network/server architecture according to the present invention is shown in Fig. 9. In a presentation tier, the system is viewed through a web browser 400. A web server Intra/Internet 402 forms a distribution tier 404. A publication tier is made up of at least one web application server. A ROLAP/ application tier includes a web agent/broker 406 and stored process cartridges 408. The data marts tier includes enterprise servers 410 and 412. The data Warehouse tier is connected tot he enterprise servers 410 and 412 and includes an ORDBMS server 416. Finally a source tier includes source data legacy systems 416 and source data (COTS) 418.

Referring to Fig 10, a graphical representation of a base view of the supply chain according to the present invention is shown. A customer 440 receives inventory from a supplier 442 and ships to customer2 444. A partner provider 446 carries the goods from the supplier 442 to the customer2 444.

Fig. 11 is a graphical representation of meta views of the supply chain management according to the present invention. A customer to customer shipment 450 is graphed to show the shipment mode over time. Aggregate customer shipment is represented by a graph 452 of customer verses partner provider over time. Customer inventory is represented by a graph 454 of warehouse inventory verses product over time.

Referring to Fig. 12, a graphical representation of a meta view of the supply chain measurement according to the present invention is shown. The factual data 460 is disseminated

Uber Exhibit 1002 - p. 328
Uber Technologies, Inc. v. SurgeTech, LLC

into product dimension data 462, channel dimension data 464, time dimension data 466, and customer dimension data 468.

A flow chart of integrated logistics for the supply chain management system according to the present invention is illustrated in Fig. 13. A sales plan 600 is developed and process, volumes, and planned promotions are sent to promotional management 602, and category management and customer contact team 604, and a sales forecast is sent to distribution planning 606. The distribution planning sends adjustments to supply planning 608 and demand planning 610, which in turn send supply and demand information back to the distribution planning 606. The distribution planning 606 net requirements to deployment planning 610 that returns availability information back to the distribution planning 606.

Supply planning 608 sends promotion requests and planned orders to vendors and suppliers 612, planned orders to inbound order management 614, and a supply plan to the deployment planning 610. Order management returns an on order inventory to the supply planning 608. Inbound order management 614 further sends on order inventory to the deployment planning 610, purchase information to the vendors and suppliers 612, matched receipts to accounts payable 616, and authorization to receive orders and to ship returns to warehouse management 618. The vendors and suppliers 612 send return authorization and invoices to the inbound order management 614. Deployment planning 610 sends planned transfer information to inbound order management 614. Warehouse management 618 sends authorization to pay to inbound order management 614.

Accounts payable 616 receives invoices from the vendors and suppliers 612 and sends payments and deductions to the vendors and suppliers 612.

Demand planning 610 sends planned orders to outbound order management 620, which in turn sends ship point demand data to demand planning 610. Outbound order management 620 sends committed inventory information to the deployment planning 610 and receives planned transfers in return. Outbound order management further sends return authorization and invoices to category management and customer contact team 604, which returns orders. The invoices are also sent to accounts receivable 622. The category management and customer contact team 604 further sends promotional requests and planned orders to demand planning 610, payments and deductions to accounts receivable 622, and returns to warehouse management 618.

Uber Exhibit 1002 - p. 329
Uber Technologies, Inc. v. SurgeTech, LLC

Credit status is sent by accounts receivable to warehouse management 618, which also receives authorization to ship orders and to receive returns from the outbound order management 620. Warehouse management sends authorization to bill to outbound order management 620, and cyclical inventories to the general ledger 624. Warehouse management 618 further receives shipments data from the vendors and suppliers 612, and sends returns in return. Similarly, category management and customer contact team 604 sends shipments to the warehouse management 618 and receives returns therefrom. Warehouse management 618 sends receipts, on hand inventory, and shipment data to deployment planning 610 and receives anticipated workload data in return.

The following is a description of the user interface screens utilized in the present invention. Fig. 14 is a user interface login screen 650, which requires user ID and password. Figure 15 is a system main menu screen 652 that appears upon successful login. Figure 16 shows an SCM operation management system menu 654 that may be accessed through the SCM operation management system menu 654. Figs. 17 and 18 illustrate an accounts payable screen 656 and an accounts receivable screen 658, respectively.

The foregoing screens are the interface through which a user accesses the system set forth previously. Additional user interface screens may be provided to utilize the other features of the present invention set forth in detail previously.

Having described several embodiments of the system and method of supply chain management in accordance with the present invention, it is believed that other modifications, variations and changes will be suggested to those skilled in the art in view of the description set forth above. It is therefor to be understood that all such variations, modifications and changes are believed to fall within the scope of the invention as defined in the appended claims.

Uber Exhibit 1002 - p. 330
Uber Technologies, Inc. v. SurgeTech, LLC

What is claimed is:

1. A method of managing a supply chain comprising the steps of:

extracting supply chain data from one of existing systems, new systems, and both existing and new systems for entities in said supply chain;

populating an operational data store with enterprise views of said supply chain data;

mapping process models from Supply Chain Operations Reference (SCOR) model processes to said enterprise views of said supply chain data; and

applying data warehouse techniques to provide analysis of indicators and metrics for said entities in said supply chain.

Uber Exhibit 1002 - p. 331
Uber Technologies, Inc. v. SurgeTech, LLC

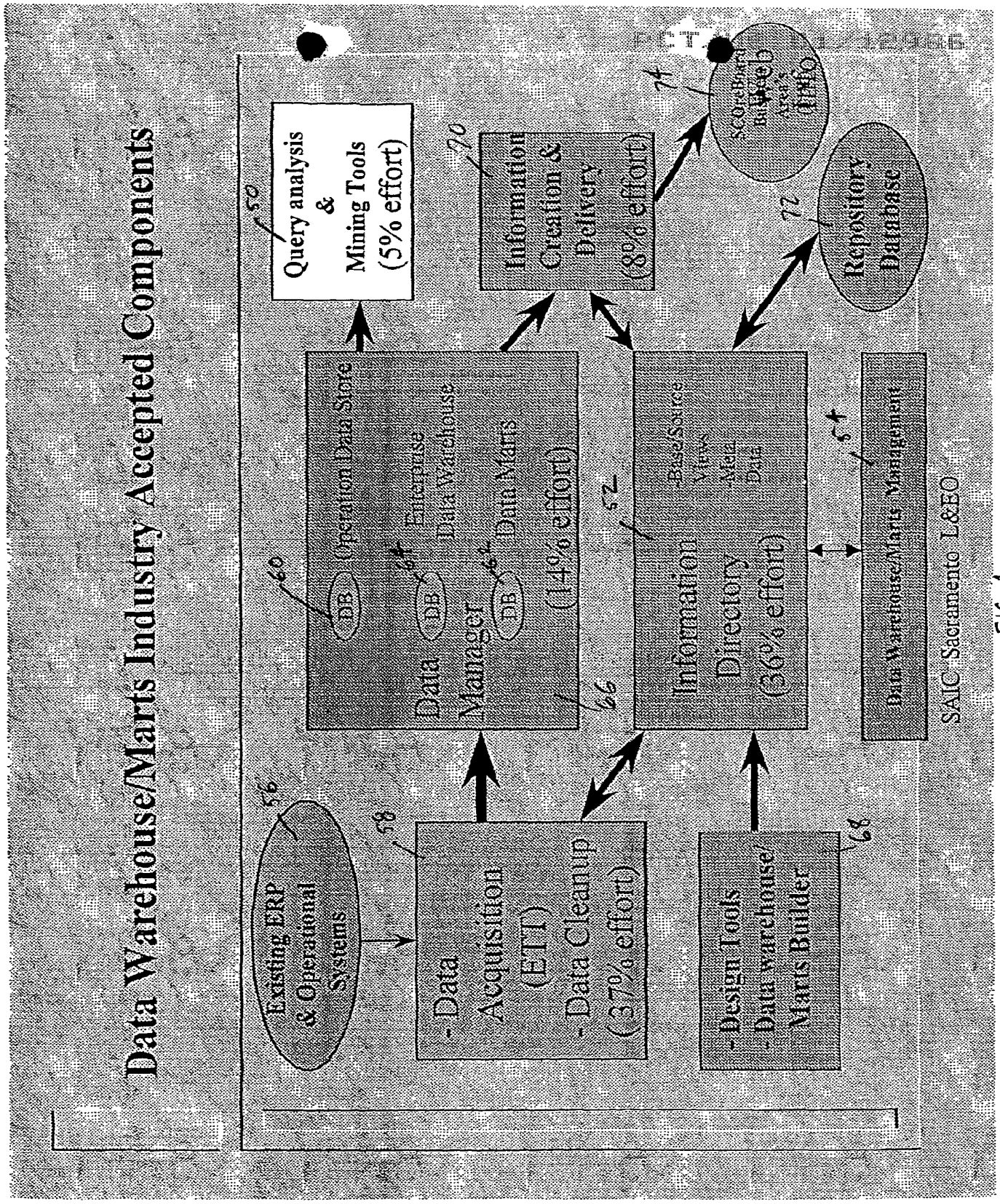


FIG. 1

Uber Exhibit 1002 - p. 332
Uber Technologies, Inc. v. SurgeTech, LLC

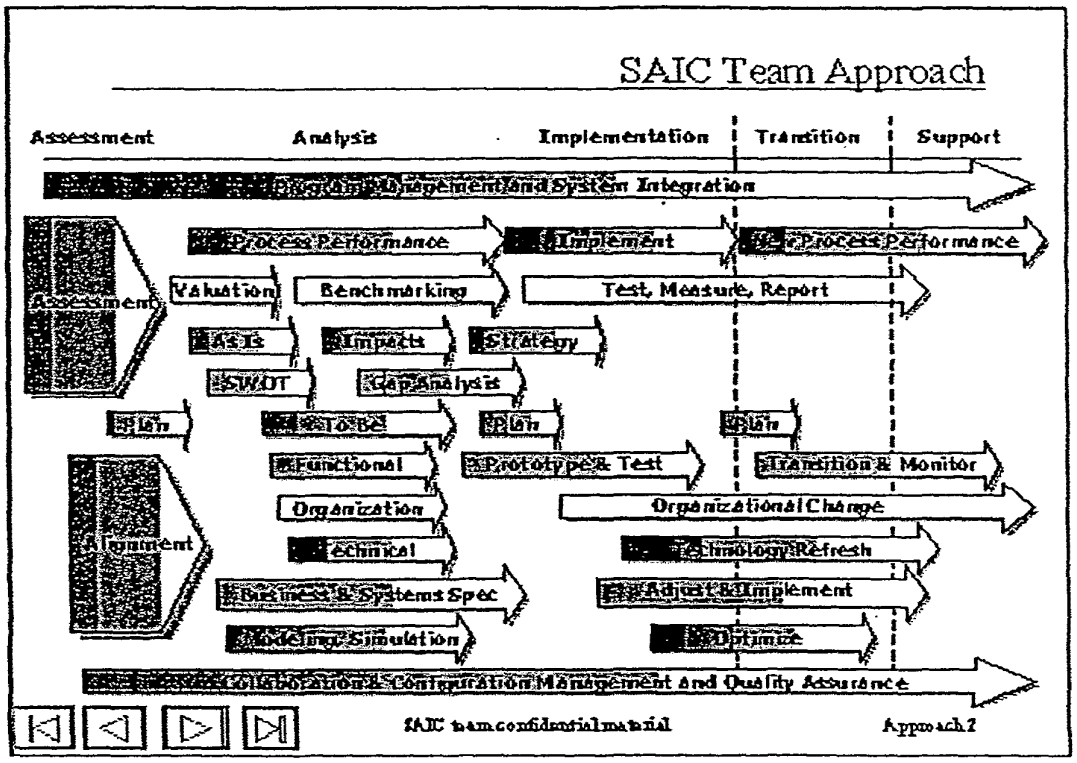


Figure 2. Technical Solution Methodology.

Uber Exhibit 1002 - p. 333
Uber Technologies, Inc. v. SurgeTech, LLC

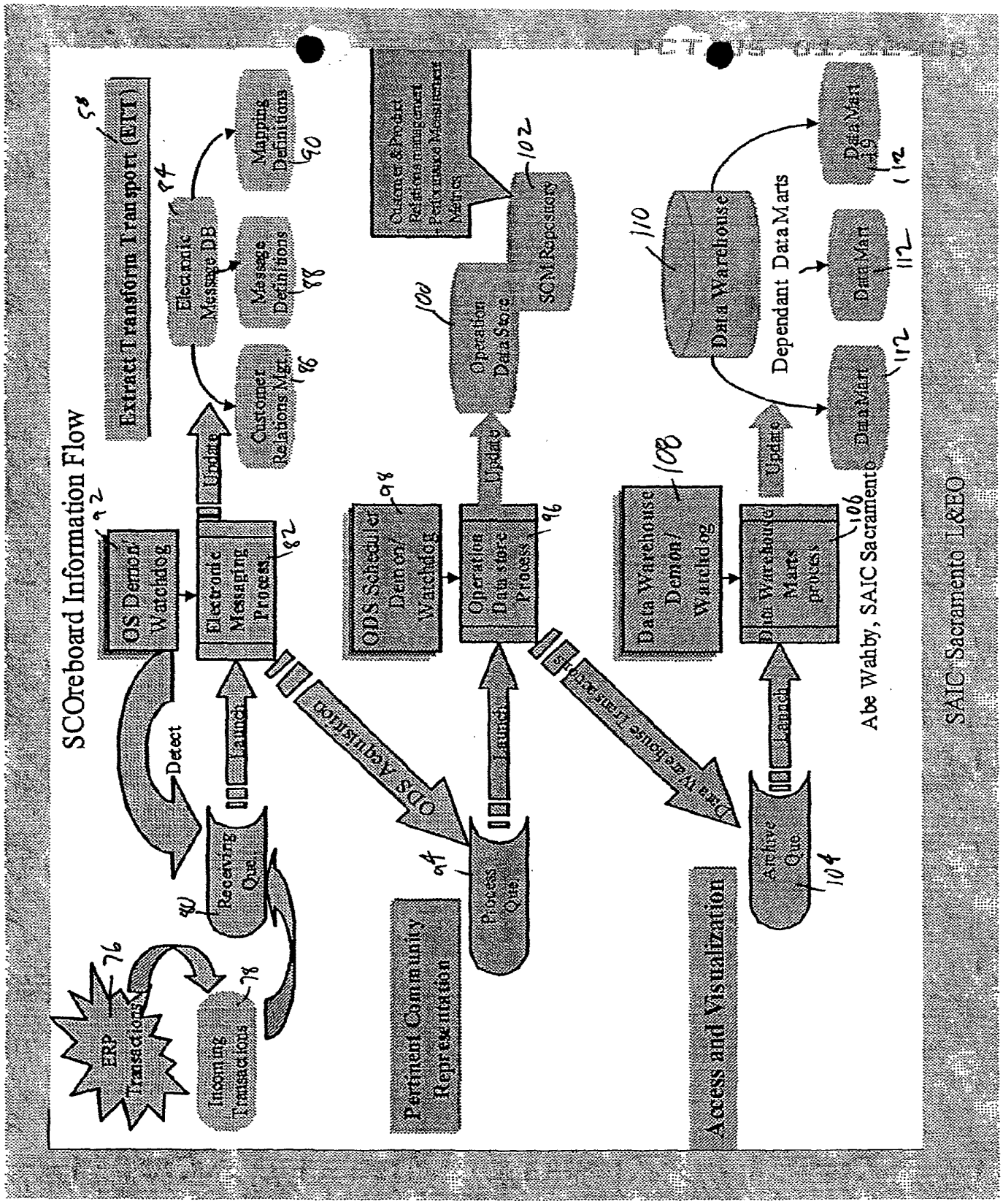


FIG 3

Uber Exhibit 1002 - p. 334
Uber Technologies, Inc. v. SurgeTech, LLC

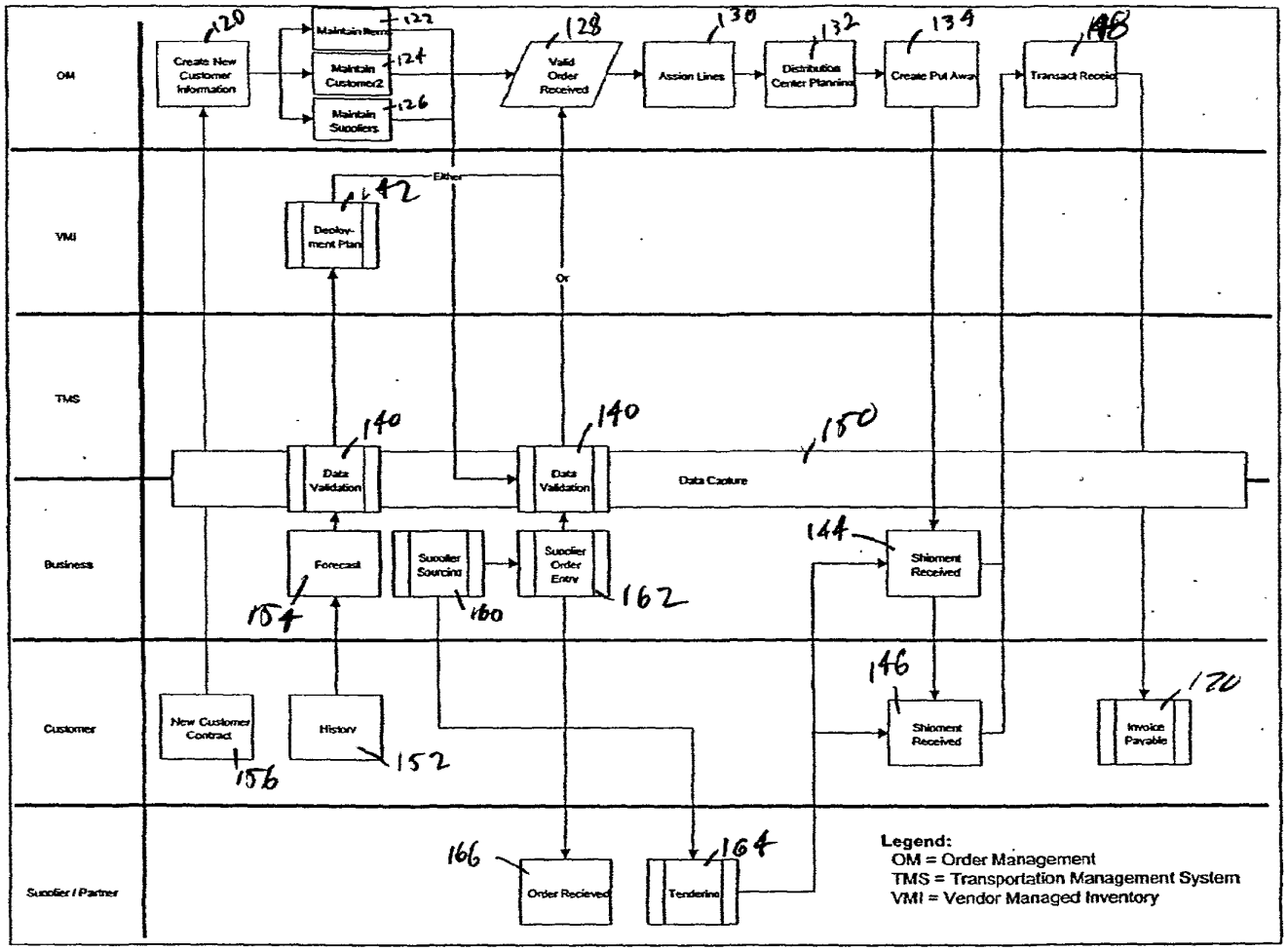


Figure 4. Order Management Process Functions.

Uber Exhibit 1002 - p. 335
Uber Technologies, Inc. v. SurgeTech, LLC

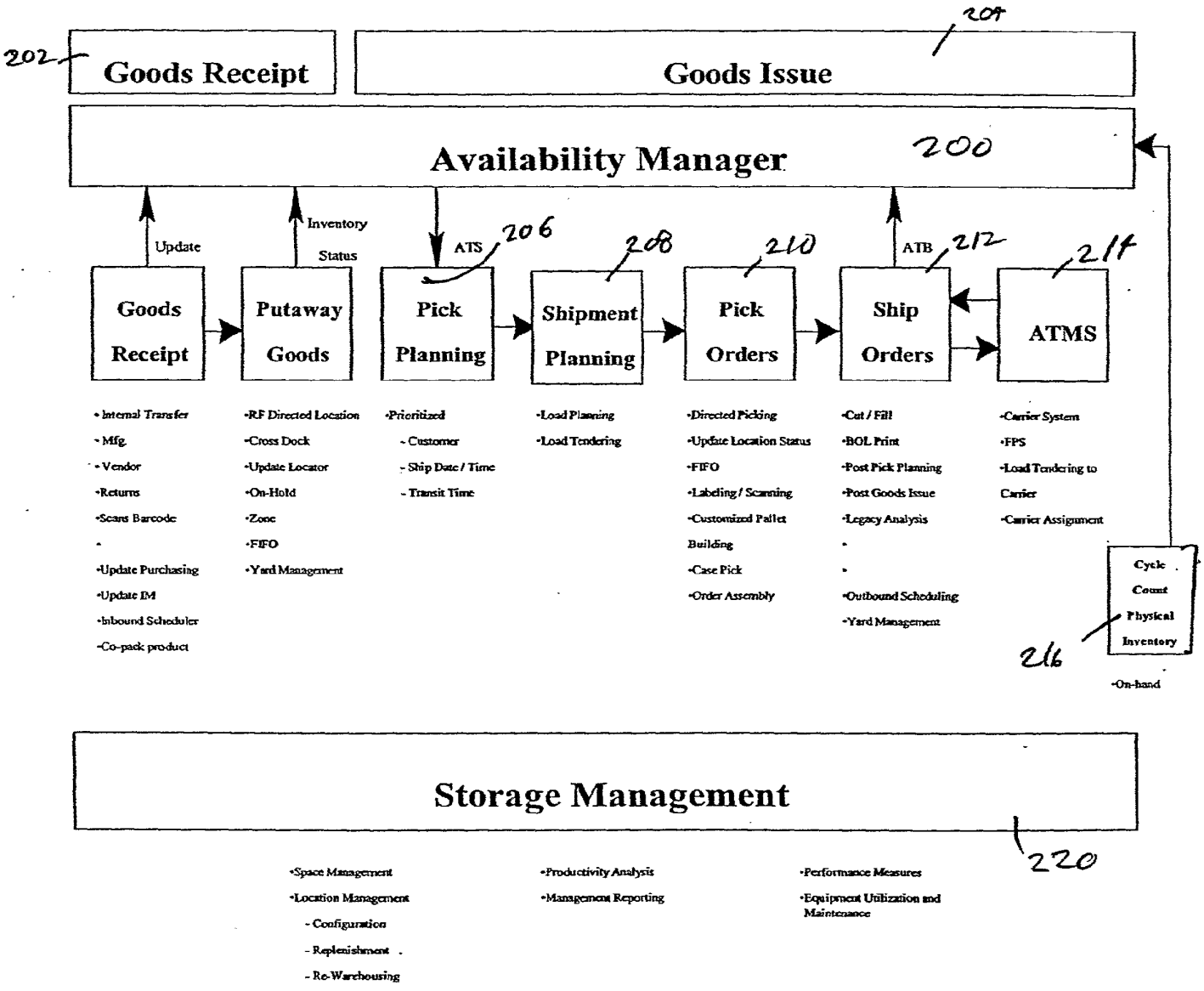


Figure 5. Warehouse Management Process Flow Diagram.

Uber Exhibit 1002 - p. 336
Uber Technologies, Inc. v. SurgeTech, LLC

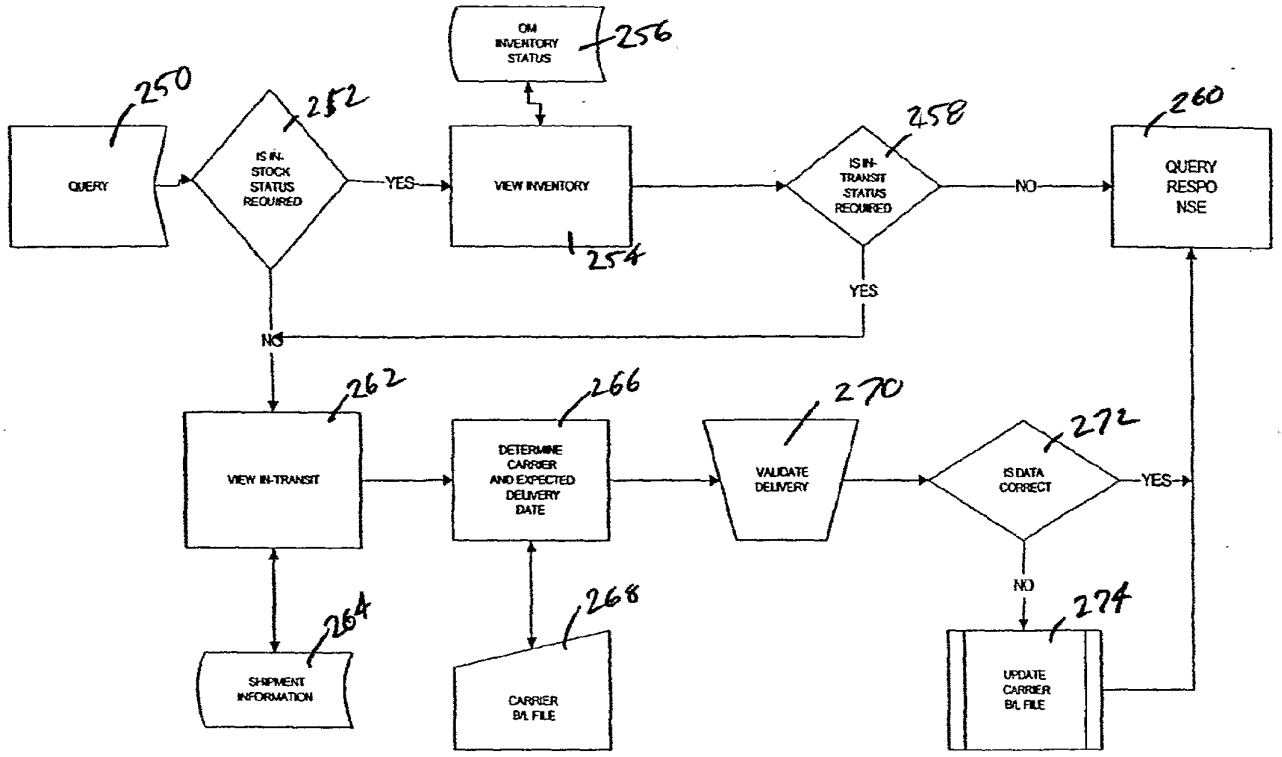
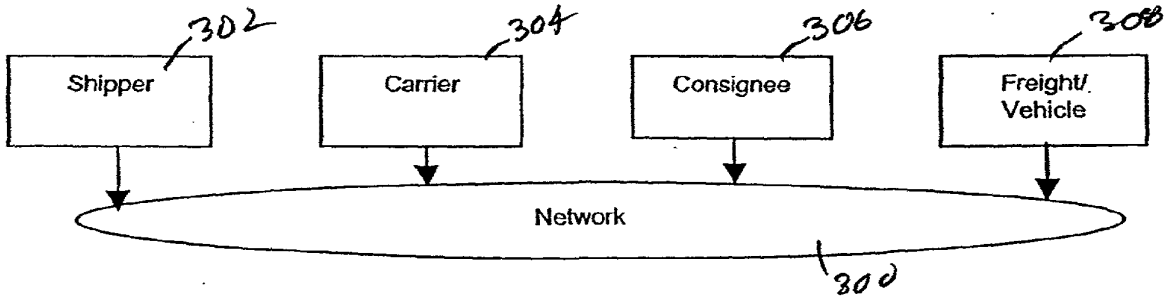


Figure 6. Product Monitoring Process Flow Diagram.



Ship Management	Carrier Operation	Mobile System	Decision Support
* Ship Plan	* Customer service	* Applications	* Carrier select
* Scheduling	* Load plan	* Middleware	* Load select
* Rate/Route	* Fleet management	* Integration	* Load console
* Tracking	* Personnel	* Network	* Clustering

Figure 7.

Uber Exhibit 1002 - p. 337
Uber Technologies, Inc. v. SurgeTech, LLC

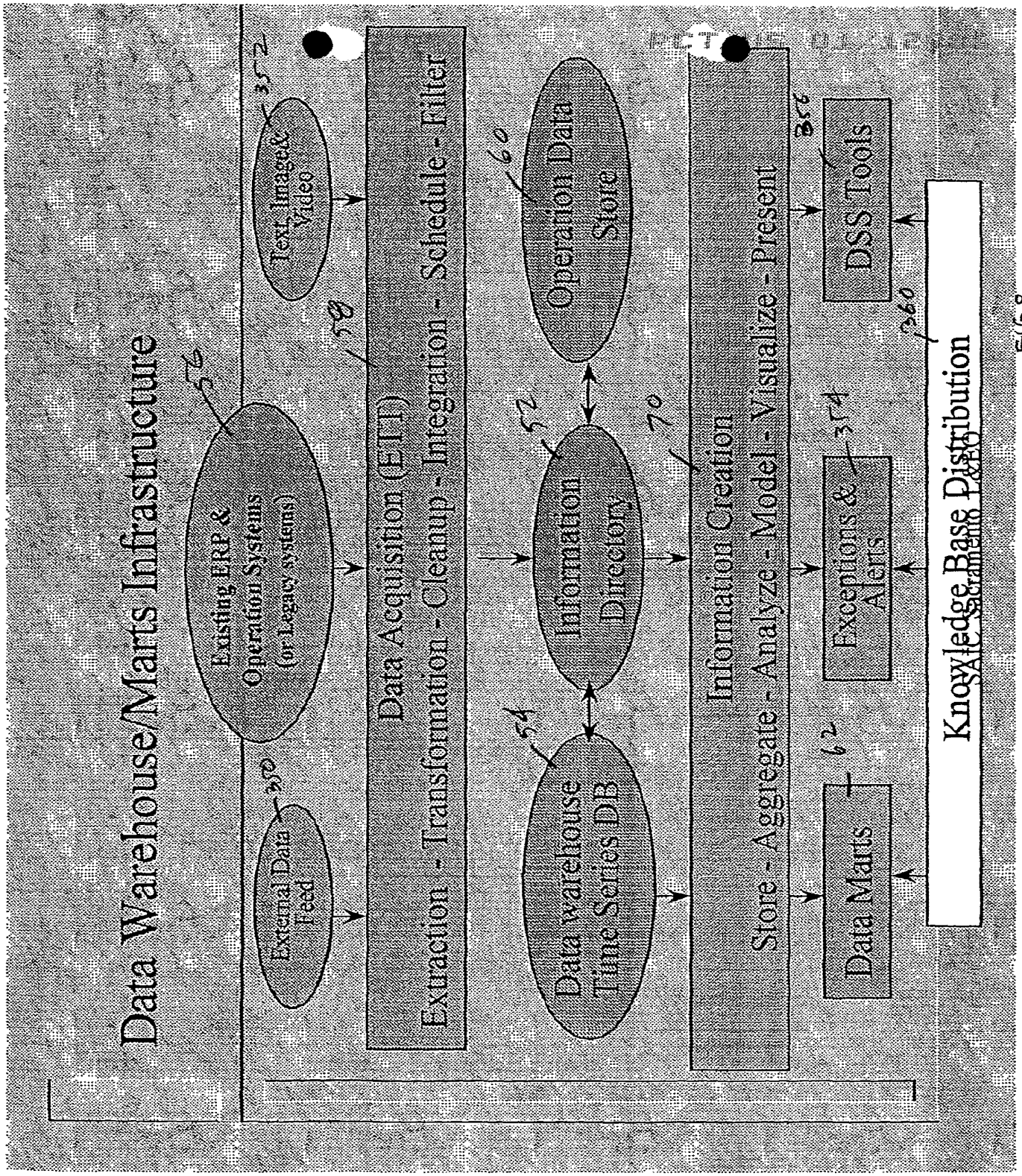


FIG. 3

Uber Exhibit 1002 - p. 338
Uber Technologies, Inc. v. SurgeTech, LLC

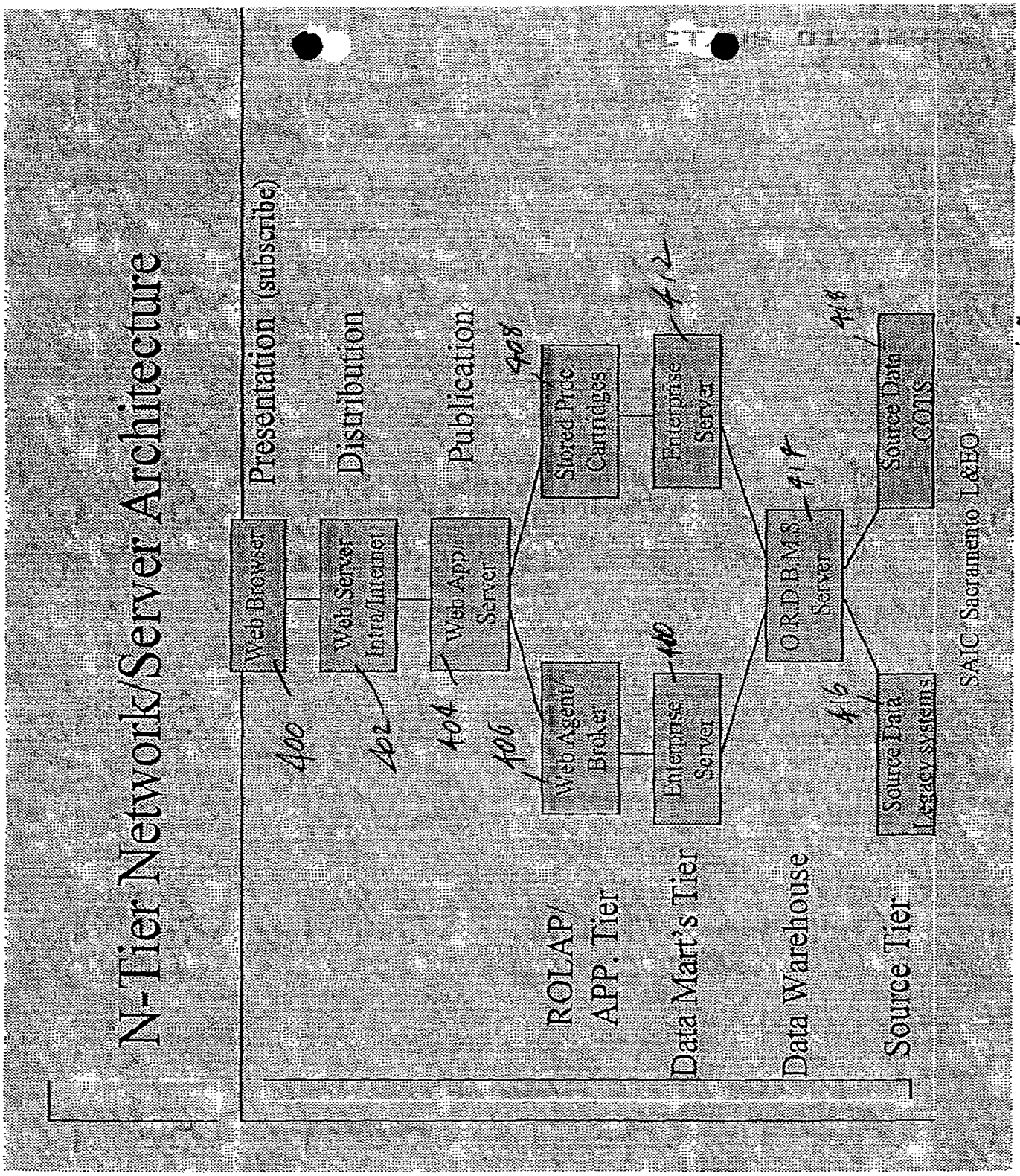


Fig. 4

Uber Exhibit 1002 - p. 339
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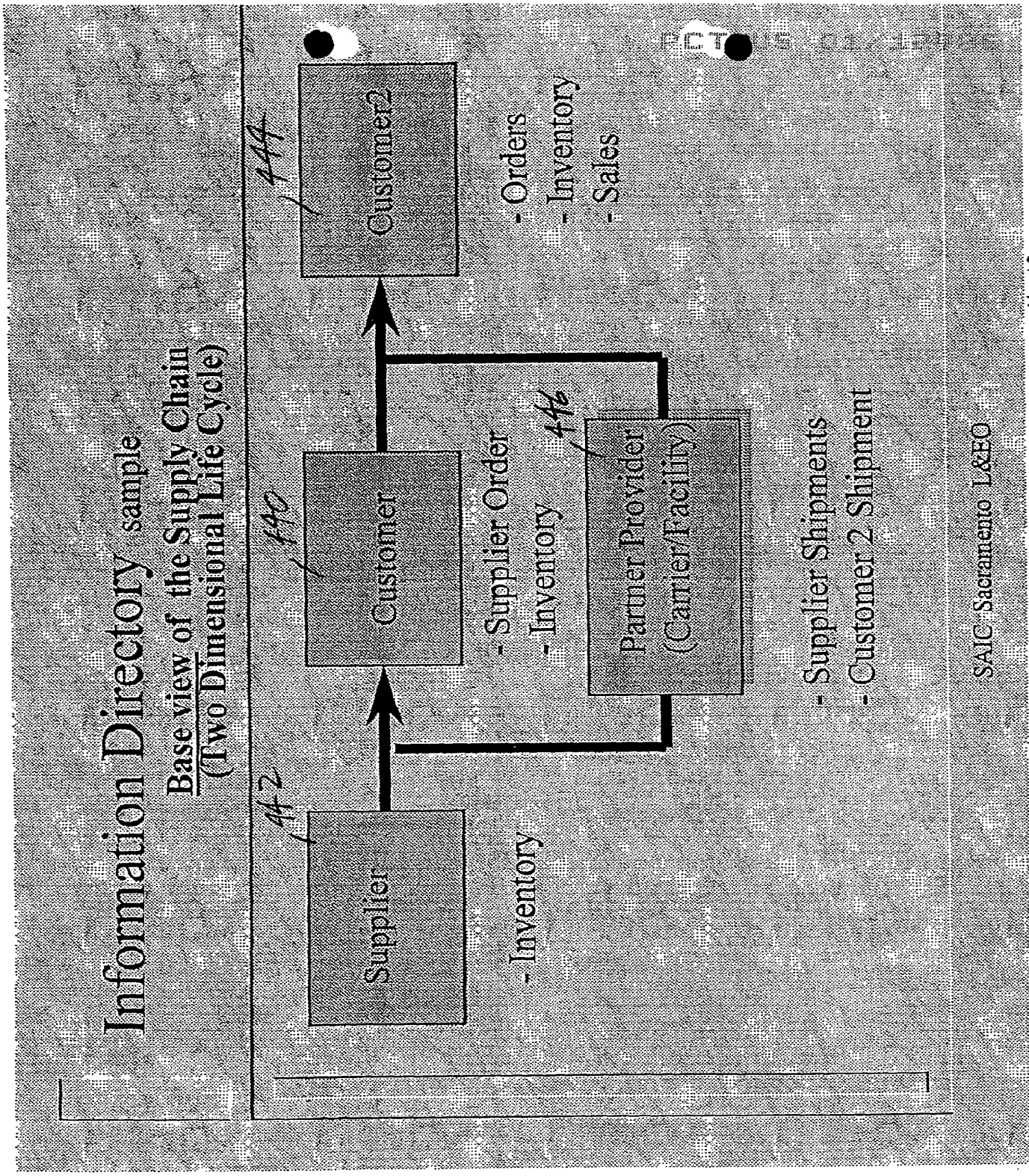


FIG. 10

Uber Exhibit 1002 - p. 340
Uber Technologies, Inc. v. SurgeTech, LLC

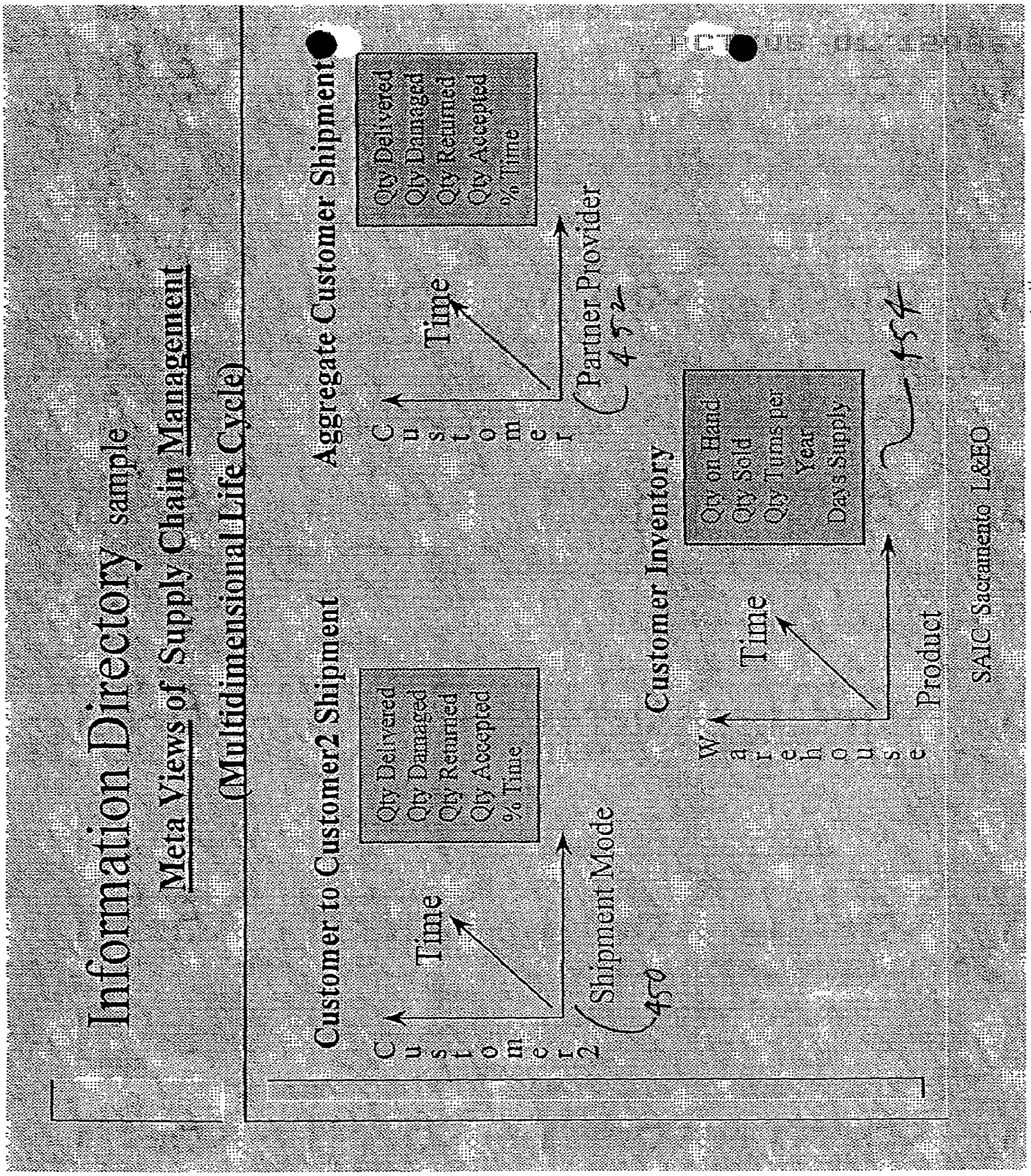


Fig. 11

Uber Exhibit 1002 - p. 341
Uber Technologies, Inc. v. SurgeTech, LLC

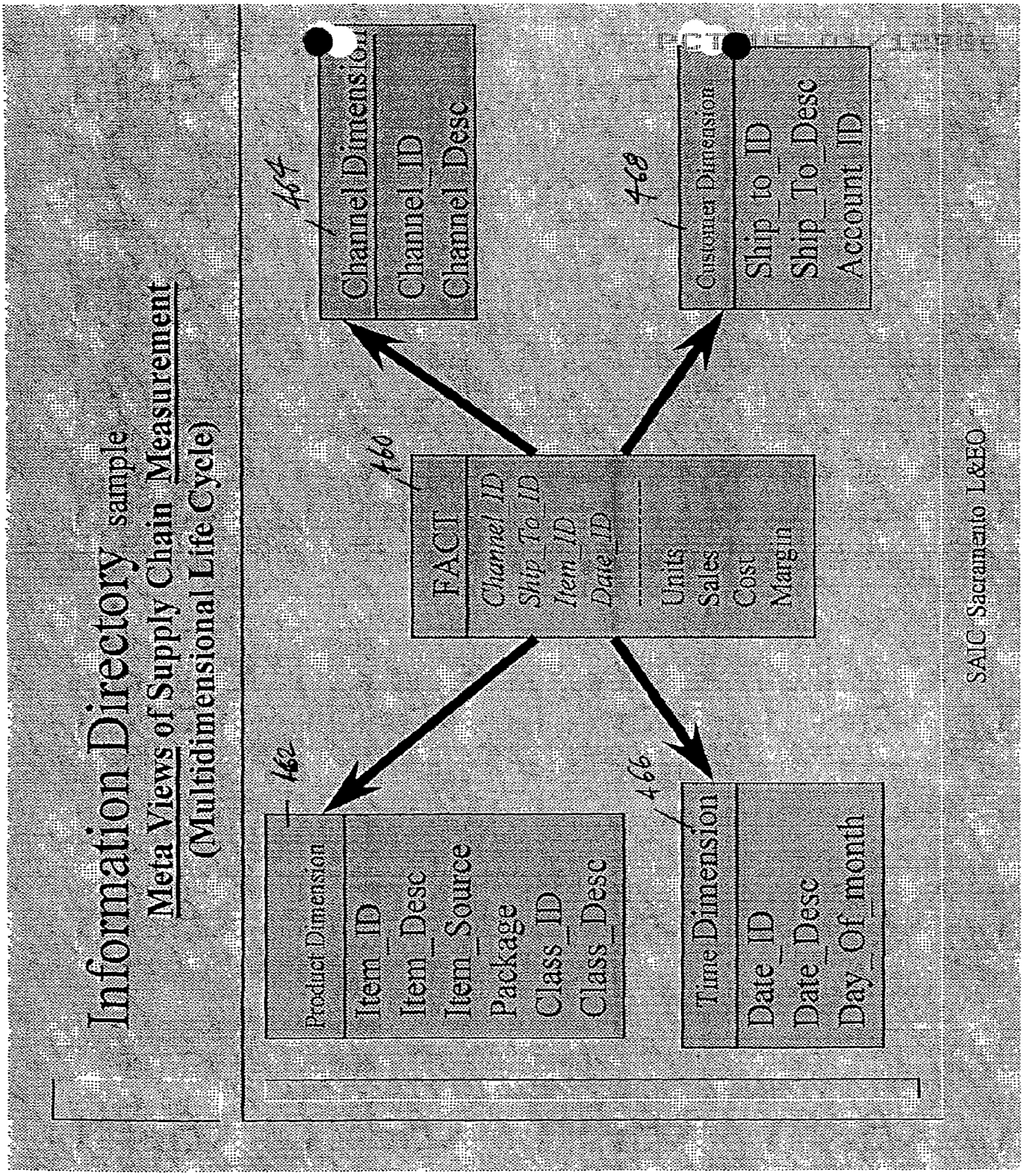


FIG. 12

Uber Exhibit 1002 - p. 342
Uber Technologies, Inc. v. SurgeTech, LLC

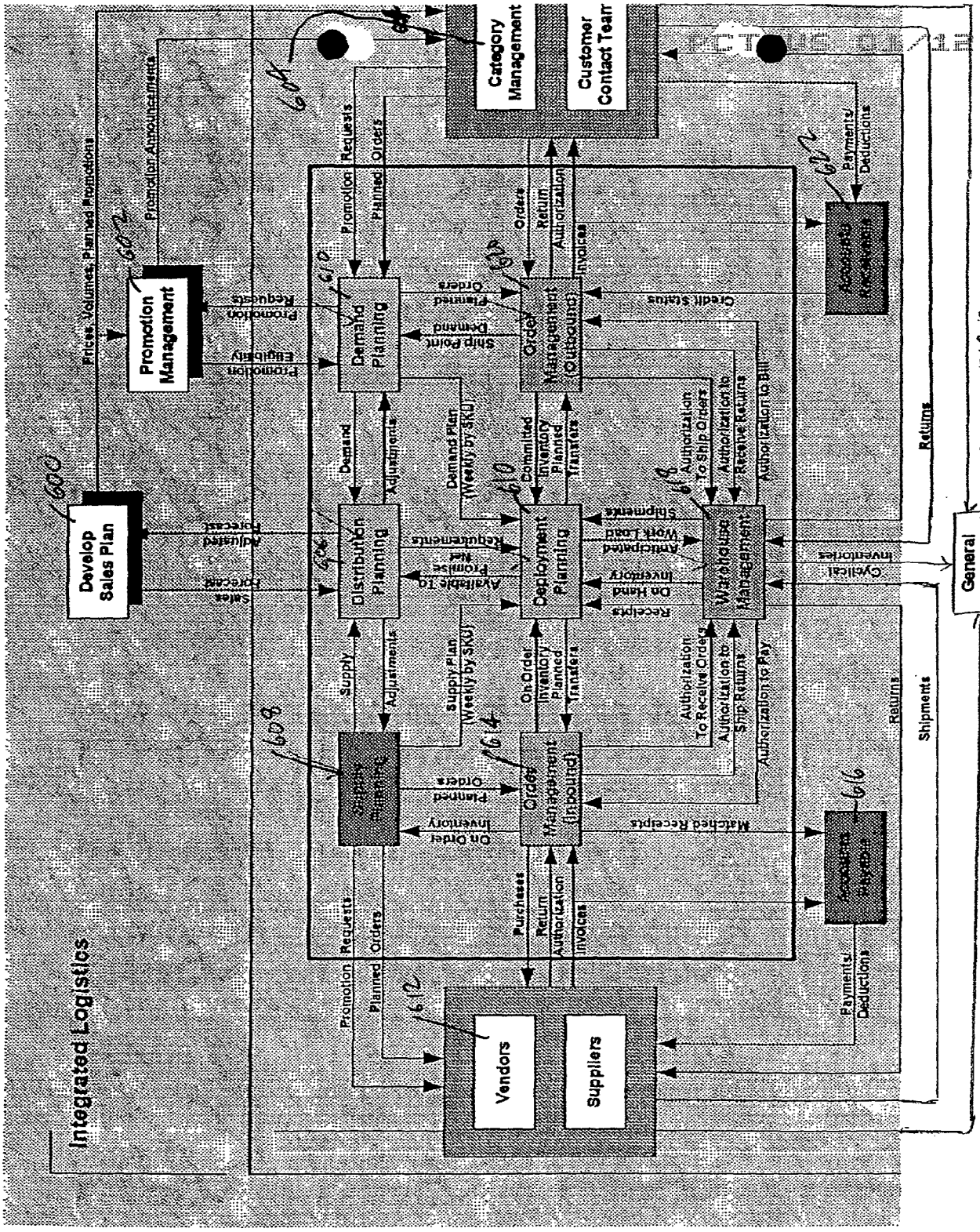


FIG. 13

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Uber Exhibit 1002 - p. 343
Uber Technologies, Inc. v. SurgeTech, LLC

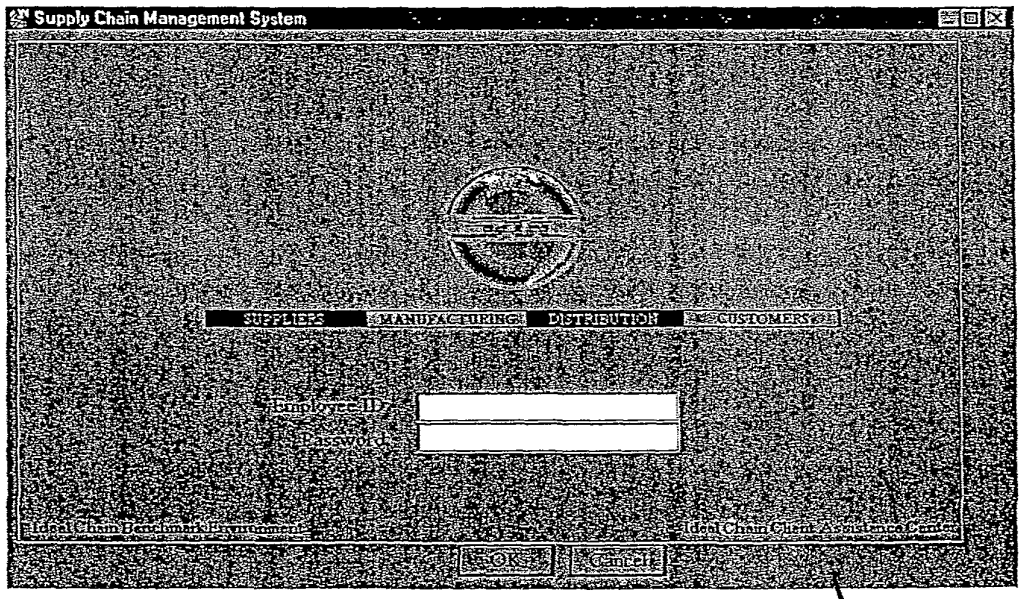


Fig. 14

Uber Exhibit 1002 - p. 344
Uber Technologies, Inc. v. SurgeTech, LLC

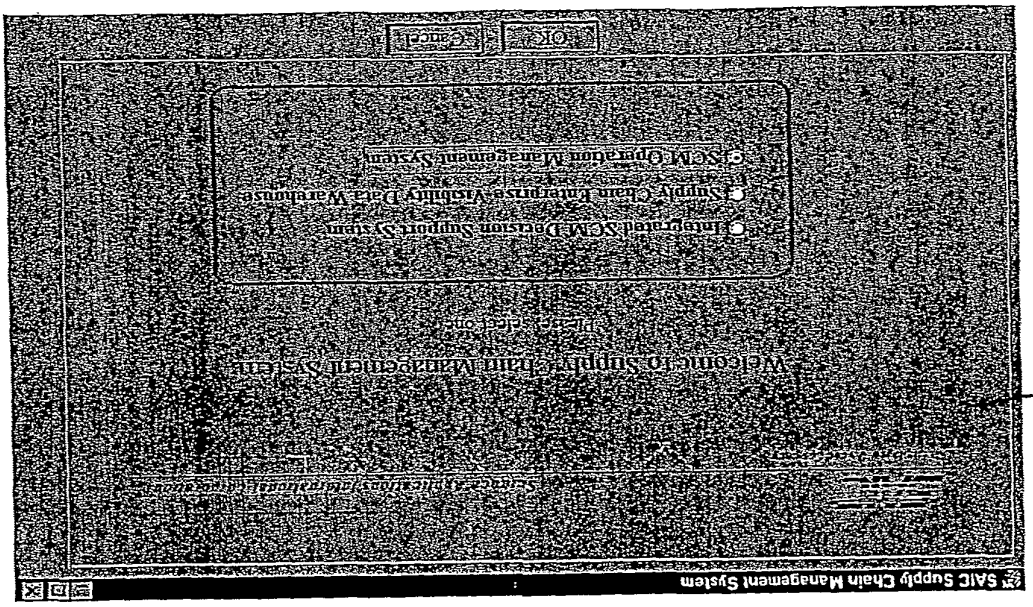


Fig. 15

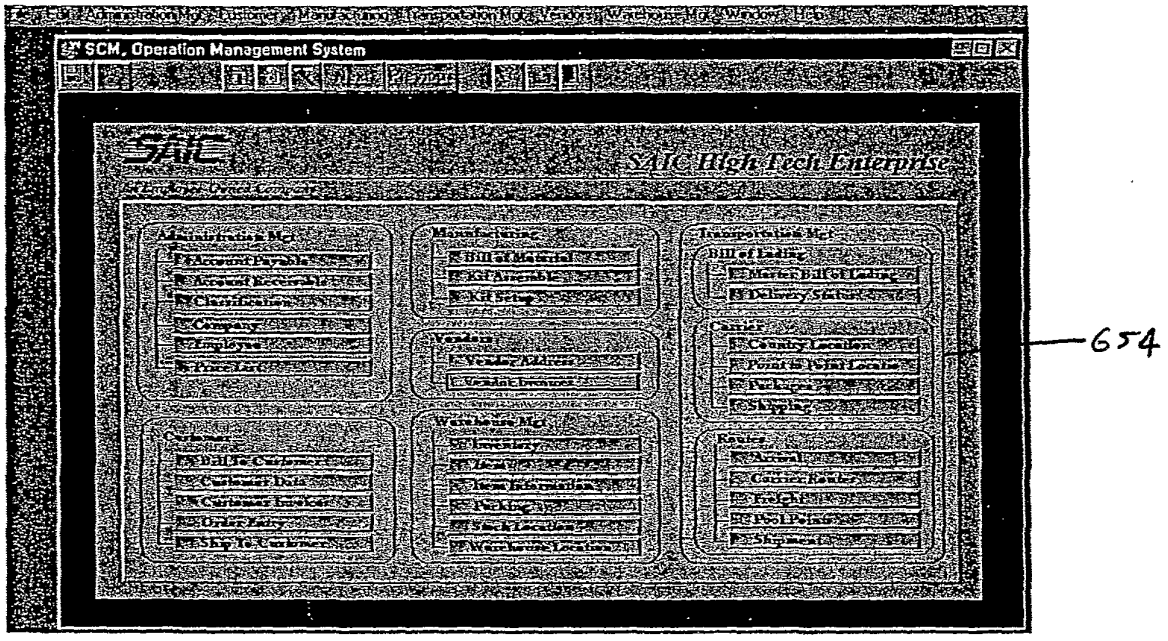


Fig. 16

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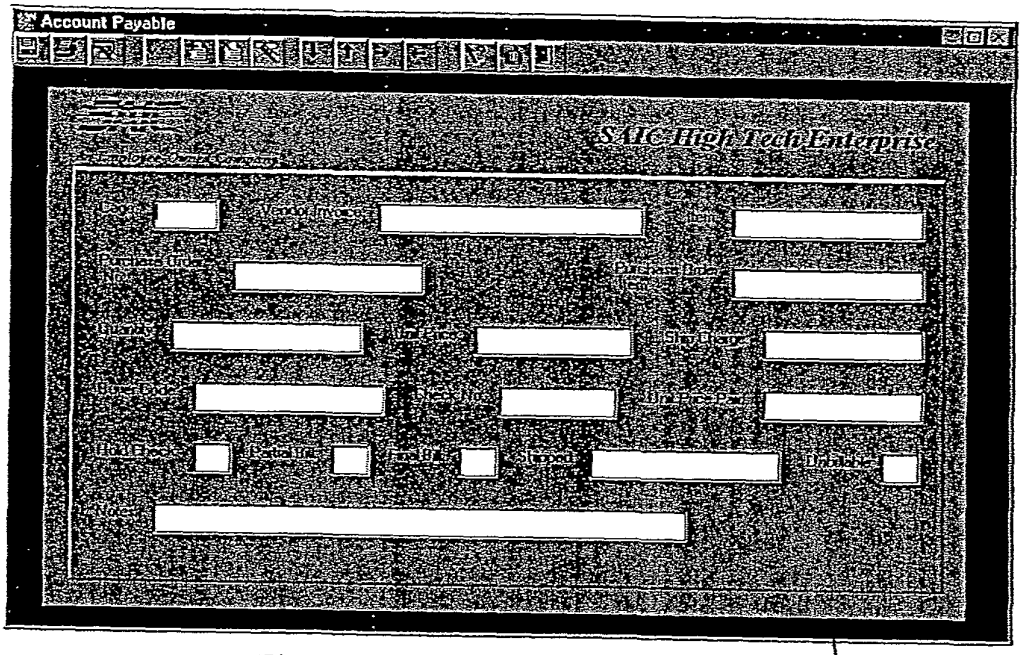
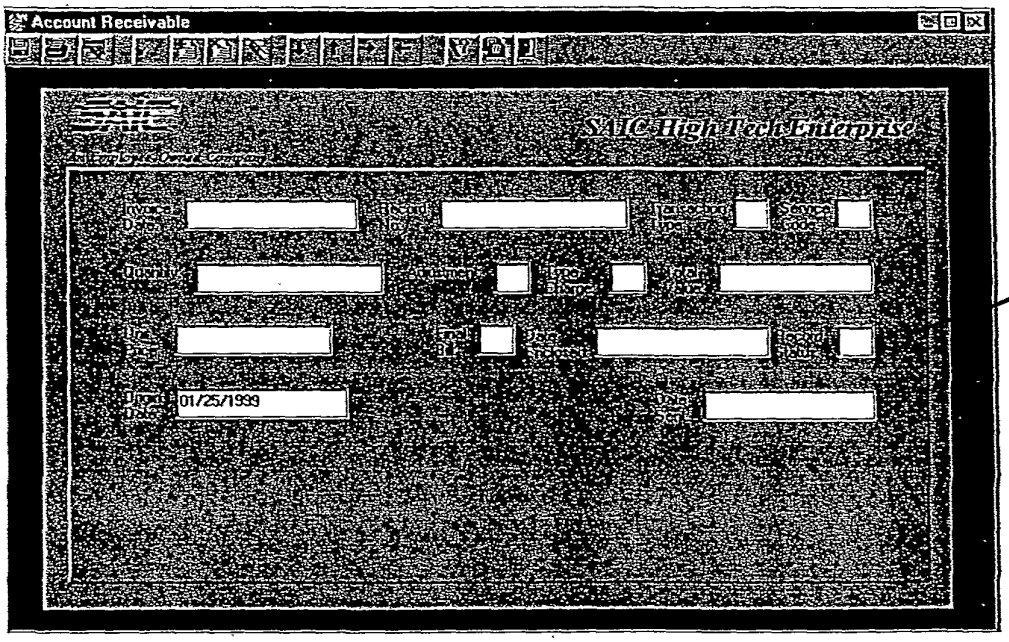


Fig. 17

656



658

Fig. 18

Uber Exhibit 1002 - p. 346
Uber Technologies, Inc. v. SurgeTech, LLC

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US01/12986

A. CLASSIFICATION OF SUBJECT MATTER

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US CL : 705/7,8,10,26,35; 707/10,102

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 705/7,8,10,26,35; 707/10,102

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y,P	US 6,151,582 A (HUANG et al) 21 November 2000 (21.11.2000), column 1 lines 45-65, column 4 lines 35-60.	1
Y,P	Fu et al, Multi-agent Enable Modeling and Simulation Towards Collaborative Inventory Management in Supply Chains, Simulations Conference, 2000. Proceedings December 2000, Pages 1763-1771, especially pages 1764-1766.	1
Y,P	Zang et al, The Modeling, Optimization, Planning and Execution of Supply Chain Management in Enterprises Integration Based on ARIS and SAP/R3, Proceedings of the 3rd Congress on Intelligent Control and Automation, June 2000, Pages 1935-1937.	1

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:

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"P" document published prior to the international filing date but later than the priority date claimed

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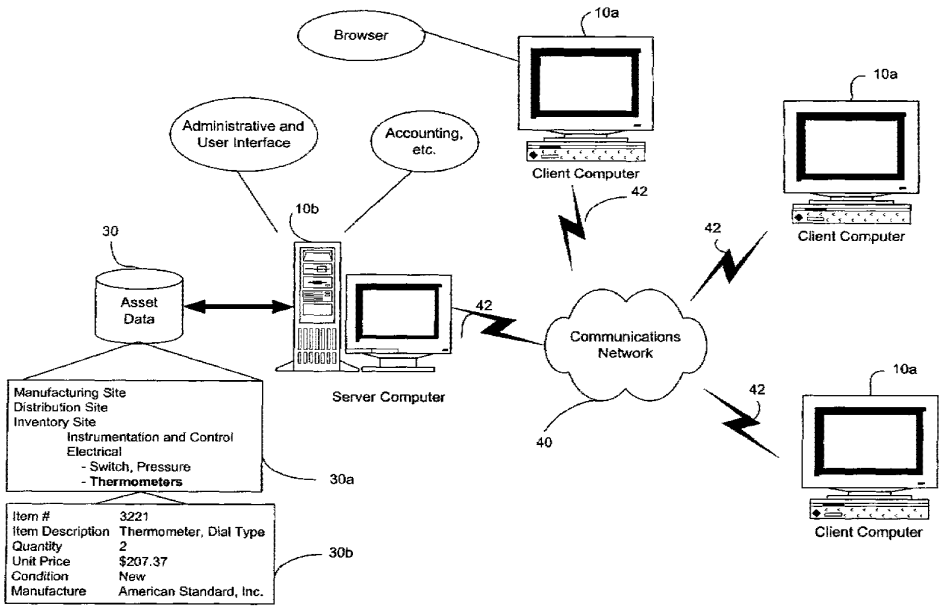
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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: INTERNET-BASED SYSTEMS AND METHODS OR REALLOCATING AND SELLING USED INDUSTRIAL EQUIPMENT AND MACHINERY



(57) Abstract: A service accessible via a network, such as the Internet, provides a fully integrated asset management system for used industrial equipment and machinery. The service provides redeployment methods and systems linking groups and divisions locally or globally so as to provide for the internal reallocation of such equipment and machinery. The service also provides redistribution methods and systems for the external reallocation via direct sales and auctions.

WO 01/84278 A2

INTERNET-BASED SYSTEMS AND METHODS FOR REALLOCATING AND SELLING USED INDUSTRIAL EQUIPMENT AND MACHINERY

Cross Reference to Related Application

This application is entitled to the benefit of the filing date of U.S. Provisional Application Serial No. 60/201,191, filed on May 2, 2000.

Field of the Invention

The present invention relates generally to the field of e-commerce, and more particularly to a system and method for reallocating and selling used industrial machinery and equipment over a network, such as the Internet.

Background of the Invention

E-commerce has rapidly become one of the most revolutionary activities to ever influence national and international economies. While e-commerce has presented itself in a variety of forms, business to business e-commerce has become especially important. The growth in the number of businesses using computers connected to the Internet has been tremendous, dramatically changing the way traditional business activities are conducted. Businesses are now able to sell their goods and services as well as purchase their own supplies and inventory on-line. Businesses can perform real-time market research, administer retirement plans and even hire employees on-line. As a result, business to business e-commerce is projected to soar from $43 billion in 1998 to over $1 trillion by 2003.

The buying and selling of used industrial equipment and machinery has rapidly become an important on-line activity. Although this market has huge potential, manufacturing firms have found it extremely difficult to buy and sell used equipment and machinery over the Internet. The used equipment and machinery marketplace is a large, fragmented market characterized by large margins and poor information flow, and thus is extremely inefficient. Large capital and infrastructure requirements have prevented existing market participants from broadening their participation in the market, as well as the entry of new participants. Market participants have thus been unable to gain significant market share. As a result, the market has been characterized by many small

market participants, each with specific expertise in a particular asset class or industrial application. Mistrust has developed between these market participants as well as between buyers and sellers of used industrial equipment and machinery. Additionally, the small market participants typically have limited professional management skills, and thus are typically unable to implement efficient business processes. As a result of inefficiencies in the market, many intermediate middlemen and transactions have developed between sellers and buyers.

Such markets, however, are ideally suited to benefit from the advantages provided by the Internet. Indeed, the growth of business to business e-commerce can be at least partially explained by the tremendous efficiencies brought to such markets. It is expected that by dramatically increasing information flow, the introduction of the Internet can have dramatic effects for both buyers and sellers in the used industrial equipment and machinery market. While this will be especially threatening to those market participants whose only value is their local or unique information, market participants that embrace this technology can quickly benefit. For example, the Internet can provide a platform for sellers to quickly build scale cost effectively, a major cause of market fragmentation. A market participant's access to capital can increase as a result of the Internet's ability to facilitate quick growth. In sum, the Internet's ability to increase access to information, capital and infrastructure and provide for improved business processes can allow a market participant to become the primary means of servicing the used industrial equipment and machinery marketplace.

Several businesses, including Internet-based businesses, have identified this market and its poor flow of information. Most have attempted to address the inefficiencies of this market by offering Internet exchanges or buyer/seller listing services similar to an on-line auction house (ebay.com, for example). Some businesses (e.g., Dovebid.com) have attempted to combine their existing asset recovery and auction experience with an Internet presence. Other Web-only auction firms (e.g., Tradeout.com, iMark.com and BizSurplus.com) have attempted to provide buyer and seller matching services. Industry specific auction sites have also appeared (including MedMarketAuction.com and LabX.com), as well as firm specific sites (e.g., Campbell Soup's campbells-equipment.com). Retail/consumer sites and industry market makers include ebay, ubid and auctionnet.com. Other Internet firms such as Freemarket and I2I

focus on the auction of technology. While most of these Internet business models simply list surplus assets for sale, assuming buyers will come to transact business, others business models have attempted to attract sellers by listing buyers.

Although these types of exchanges have worked well in commodity type markets where the products are standard and well known, they have not worked well in the used industrial equipment and machinery market. This can be explained by the failure of existing business models to address the issues that are key for successful transactions to occur in this market. While the primary advantage of most existing business models are lower prices for buyers and increased access to buyers for sellers, in most business to business markets, price is usually not the most critical factor. In the used industrial equipment and machinery market, both buyers and sellers are concerned primarily with certain assurances rather than pricing. Because the condition of used assets may range from brand new to almost scrap, buyers need assurances that the asset being purchased exists in the condition specified. Such assurances can take many forms, including asset inspections, appraisals and warranties. Sellers also need assurances that buyers are qualified and capable of closing transactions due to the large amounts of capital involved. Existing business models do not considered these issues.

Existing business models also fail to consider that mainstream markets are reluctant to embrace online technology and typically look to current relationships to assist in the transition to new technology models. Thus, although existing Internet exchanges have attracted some early technology adopters, they have not been able to significantly penetrate the mainstream market. This can be attributed to several factors. Participants in the used industrial equipment and machinery marketplace, for example, are comfortable with their current relationships and are not trusting of newcomers. Customers in this market are extremely loyal and thus managing customer relationships is critical in repelling aggressive customer acquisition strategies by new entries. Existing Internet business models have been unable to address such concerns, and so there has been a limited use of existing Internet exchanges for buying and selling used industrial equipment and machinery. Indeed, the majority of these exchanges have been returning to handling commodity items and surplus inventory. However, the characteristics of this market still suggest that firms with traditional off-line services and existing relationships can leverage these capabilities to more easily take advantage of on-line business models.

Existing on-line and Internet-based business models have also failed to take advantage of those internal opportunities presented by participants in the used industrial equipment and machinery marketplace. For instance, many of the participants in this market are large industrial concerns having many divisions or corporate sites (e.g., manufacturing, inventory and distribution) with large numbers and types of assets and inventory. A particular division or corporate site may no longer be able to utilize a particular asset, while another division or corporate site may have a current use for that asset. For example, while consumers may no longer be interested in an electrical motor currently part of inventory, manufacturing may be able to utilize the motor in their own operations. Internal redeployment (the transfer of assets between divisions or corporate sites of the industrial concern) can be greatly facilitated through the use of on-line, or networking, technology. Moreover, by using on-line technology to integrate an internal redeployment capability with external buyers, the inefficiencies of the used industrial equipment and machinery marketplace can be further reduced. No existing business model presents such an opportunity.

The foregoing discussion makes it clear that there is a need for a network-based, on-line, business to business service that can act as a market maker between buyers and sellers of used industrial equipment and machinery. In addition, there is a need for an on-line service that not only provides price value but also both transaction value and transaction volume. Further, there is a need for an on-line service that provides for the internal reallocation of assets.

Summary of the Invention

The present invention is generally directed to a service accessible via a network, such as the Internet, for providing a fully integrated asset management system for used industrial equipment and machinery. The service provides redeployment methods and systems linking groups and divisions locally or globally so as to provide for the internal reallocation of used industrial equipment and machinery. The service also provides redistribution methods and systems for the external reallocation via direct sales and auctions of used industrial equipment and machinery. In sum, the methods and systems of the present invention provide for a comprehensive asset and database management

system for participants in the used industrial equipment and machinery marketplace. Other aspects of the present invention are described below.

Brief Description of the Drawings

The foregoing summary as well as the following detailed description of preferred embodiments are better understood when read in conjunction with the appended drawings. In the drawings:

Figure 1 is a schematic diagram of a computer network in which aspects of the present invention may be incorporated.

Figure 2 is another schematic diagram of a computer network in which aspects of the present invention may be incorporated.

Figure 3 is a diagram representing an overview of the present invention in accordance with preferred embodiments of the invention.

Figure 4 is a diagram representing assets and inventory in accordance with preferred embodiments of the invention.

Figure 5 is a diagram representing data and information regarding assets and inventory in accordance with preferred embodiments of the invention.

Figure 6 is a diagram listing asset disposition methods in accordance with preferred embodiments of the invention.

Figure 7 is a diagram representing the business flow (e.g., flow of assets) in accordance with a preferred embodiment of the present invention.

Figure 8 is a diagram providing an operational overview of a preferred embodiment of the present invention.

Figure 9 is a diagram providing an operational overview regarding buyers in accordance with a preferred embodiment of the present invention.

Figure 10 is a diagram providing an operational overview regarding sellers in accordance with a preferred embodiment of the present invention.

Figure 11 is another diagram providing an overview of various transactions in accordance with preferred embodiments of the present invention.

Figure 12 is a diagram providing an overview of a marketplace in accordance with preferred embodiments of the present invention.

Figure 13 is a diagram providing an overview of internal redeployment in accordance with preferred embodiments of the present invention.

Figure 14 is a diagram providing an overview of internal redeployment and industry redeployment in accordance with preferred embodiments of the invention.

Figure 15 is another diagram providing an overview of internal redeployment, industry redeployment and external redistribution in accordance with preferred embodiments of the invention.

Detailed Description of Preferred Embodiments

Overview

Traditionally, it has been extremely difficult for manufacturing firms to buy and sell used industrial equipment and machinery. Due to the inefficiencies of the market, large manufacturing firms have found that it is much easier to buy new rather than used industrial equipment and machinery. The primary buyers of used equipment and machinery have thus been second and third tier manufacturing firms that buy used equipment from first tier firms. However, the purchase of new equipment and machinery is expensive and typically involves long lead times. This is in contrast to the purchase of used equipment and machinery, which can be purchased immediately. Many large firms are thus evaluating new business models for the purchase of used industrial equipment and machinery. Due to the tremendous growth in the number of businesses using computers connected to the Internet, firms are particularly interested in on-line and, in particular, Internet-based business models.

The present invention provides for novel on-line business methods and systems, and more particularly an Internet-based service for the used industrial equipment and machinery marketplace. The invention employs novel internal redeployment and external redistribution systems, both of which can be accessed by users via the Internet. A client computer connected to the Internet can download digital information from server computers. Client application software typically accepts commands from a user and obtains data and services by sending requests to server applications running on the server computers. A number of protocols are used to exchange commands and data between computers connected to the Internet. These protocols include the File Transfer

Protocol (FTP), the Hyper Text Transfer Protocol (HTTP), the Simple Mail Transfer Protocol (SMTP) and the Gopher document protocol.

The HTTP protocol is used to access data on the World Wide Web, often referred to as "the Web." The Web is an information service on the Internet providing documents and links between documents. It is made up of numerous Web sites located around the world that maintain and distribute electronic documents. A Web site may use one or more Web server computers that store and distribute documents in a number of formats, including the Hyper Text Markup Language (HTML). An HTML document contains text and metadata (commands providing formatting information), as well as embedded links that reference other data or documents. The referenced documents may represent text, graphics, or video. A Web browser is a client application or an integrated operating system utility that communicates with server computers via FTP, HTTP and Gopher protocols. Web browsers receive electronic documents from the network and present them to a user.

The present invention is most suited, but not limited to, uses in connection with the Internet. For example, the present invention may be used in connection with a local area network (LAN), wide area network (WAN) or an Intranet. The present invention is not limited to any particular client or server technology, such as a particular browser, Web server, or operating system.

The on-line market maker service of the present invention provides for novel business methods and systems for the used industrial equipment and machinery marketplace. The invention provides for several distinct advantages through the use of novel on-line internal redeployment systems as well as on-line and off-line external asset disposition systems. Addressing a primary cause of the inefficiencies of the used industrial equipment and machinery marketplace, the market maker service of the present invention provides users with end-to-end service. For purposes of the present invention, the term "user" can be defined as any individual or entity interacting with the present invention for the potential transfer and/or sale and/or purchase of used industrial equipment and machinery, including sellers and vendors as well as buyers and purchasers. Sellers are provided with a novel system for the internal redeployment of assets globally among internal corporate sites (e.g., manufacturing, inventory, distribution) as well as a multiple channel (i.e., off-line and on-line) system for the

marketing and disposition of surplus assets. Buyers' needs are fulfilled through the listing of both assets for sale and assets desired by buyers. The market maker service also facilitates transactions by providing a variety of on-line and off-line services including asset appraisal, evaluation and valuation as well as necessary assurances including warranties, financing, credit lines and other services. Additionally, the market maker service also acts as a transaction clearinghouse for taxes, duties and other costs of doing business, further facilitating transactions.

The market maker service of the present invention also enhances the value of those transactions performed in the used industrial equipment and machinery marketplace. The service assures sellers access to not only traditional off-line acquisition and disposition services, but also novel on-line internal redeployment, direct sales and auction services. The service also provides sellers with an extended audience of active buyers accessing asset information. In addition, the service assures sellers that buyers not only have access to real-time, accurate and complete asset information, but that buyers have been pre-approved or qualified to ensure that they possess the financial and other qualifications necessary for completing transactions. By partnering with leading off-line firms in key vertical or other market segments, the service assures buyers that they are accessing real-time, accurate and complete information from reputable industry participants. Buyers and sellers are also provided with the security necessary for participating in transactions as the service provides for the cataloguing, appraisal and valuation of assets, along with financial services. Market specialists and principals further provide transactional value by increasing market liquidity to both sellers and buyers.

The market maker service of the invention is also advantageous in that it provides the used industrial equipment and machinery marketplace and its participants with reliability and integrity. Sellers are assured that they are dealing with buyers that have been pre-approved or qualified, by financial and/or other criteria, and are thus capable of completing transactions. The service also provides buyers with exclusive asset listings, as well as assurance regarding the quality and value of assets by providing for the independent cataloguing, appraising, evaluation and valuation of assets. Further reliability and integrity is brought to the market as the service acts as an independent transaction clearinghouse for the transfer of funds, accounting and auditing. The market

maker service of the invention thus provides for those services necessary for transactions to actually occur, thus providing for a reliable marketplace.

The effectiveness of the market maker service of the invention is further enhanced through exclusive and non-exclusive partnering with market leaders possessing broad market knowledge, client relationships and key business processes in the disposition of used industrial equipment and machinery. These partnerships can provide the market marker service with access to a large number of active sellers and qualified buyers worldwide. These partnerships can also provide the market maker service with access to experts in many asset classes, and in many vertical industries.

The business model underlying the present invention can, of course, be replicated and scaled to create a marketplace in key vertical industries and asset classes. Additionally, these partnerships can provide the market maker service with access to financial, logistical and other services for the facilitation of transactions. Most important, these partnerships provide the service with access to top reputations in the industry. By leveraging its partnerships with market leaders, the market maker service of the invention can become the market leader and establish its position as the global marketplace providing all services to buyers and sellers of used industrial equipment and machinery.

Description of Internet-Based System

The following provides an operations overview of several aspects of the present invention in accordance with preferred embodiments. As the present invention allows for customizing the look, feel and functionality of a specific system in order to meet specific on-line inventory and asset recovery needs including any brand image requirements, the following description is intended as a generic representation based on needs identified as common among large industrial asset recovery and procurement groups.

The market maker service of the invention provides for novel internal redeployment and external asset disposition via on-line requisition, direct sale, auction and/or e-commerce type capabilities. It is preferred that these capabilities of the invention provide for comprehensive customer and product database management. These on-line capabilities can include an administrative interface through which

administrators can completely customize any database containing assets, potential customers, auction format information, site configurations, bidders and successful purchasers, and e-mail specifications. This administrative interface is preferably accessible through a standard Web page interface using secure user authentication features. The secure user authentication features can be administered to provide additional users with varied limits of access. The administrative interface can allow for the ability to manually add, delete and modify assets, or control published and non-published assets such as time-frame and other criteria. The administrative interface can also provide the ability to generate reports and view current status regarding purchasers, bidders and product demographic data.

It is preferred that the on-line capabilities of the invention provide for dynamic Web page content. Through the use of HTML page pre-processing, the invention can provide the ability to update the content of requisition, direct sale and auction Web pages dynamically. The invention is thus provided with greater flexibility in providing real-time information that needs to be retrieved from the many databases involved, for example, with the flow of an auction. Further, the invention provides for the addition of new functionalities to a Web page such as real-time advertising of other available asset auctions or possibly even third party advertising spots. Users can thus become more frequently aware of other aspects of the invention due to the flexible nature of the invention's on-line auction technology. For example, multiple bidders can become more frequently aware of other bids due to the flexible nature of the invention's on-line auction technology.

It is preferred that the on-line capabilities of the invention provide for purchase order entry and inquiry. The invention can provide for full cash register-like functionality fitting all direct sale, auction and e-commerce-type specifications. Such functionality can include itemizing customer orders, applying discounts, totaling orders, billing and purchasing functions, tax collection, freight collection, and purchase order tracking. Complete virtual and physical receipt of purchases can be easily designed and graphically matched according to each user's own receipt and purchase order requirements.

It is preferred that the on-line capabilities of the invention provide for on-line payment transaction processing. The invention can include the ability to provide for an

on-line payment processing solution that allows for multiple payment types. Credit cards, by way of example only, can be verified and processed in real-time using industry standard solutions including CyberCash, Verifone, Viacrypt PGP and First Visual. Payments can be customized to the server according to payment type. Payments and transactions can be recorded in the same database as existing asset purchases or a separate database depending on a particular user's requirements. All information can be stored in an encrypted database format to allow bidders to quickly bid on additional auction offerings without re-entering their information. A user database can thus be built over time, creating significant marketing advantages.

It is preferred that the on-line capabilities of the invention provide for an order process shipment management system. Transactions tracked by the virtual cash register capability of the invention can be recorded in existing inventory and purchase order databases. Additionally, the order management system can be customized to automatically update the inventory/shipping database at all distribution/fulfillment facilities. The database servers used for shipping can be different than the servers used for inventory or customer records, thus allowing for the creation of a workflow application that will save money by reducing unnecessary resources. The invention can also allow for customization providing real-time shipment tracking screens for tracking order shipments of commercial courier services. The invention can also provide buyers and administrators first hand information concerning product orders placed. Additional features of the invention can include e-mail notification of shipment processing.

It is preferred that the on-line capabilities of the invention provide for promotions. The invention allows administrators to flag certain auction assets as special promotional items, and to locate such assets in an area outside the normal database. Such promotional assets can be those assets a user wishes to auction quickly. By allowing a user to select a Web page from which promotional assets can be accessed, the invention makes it generally much easier for potential purchasers to find such promotional assets on the site.

It is preferred that the on-line capabilities of the invention provide for e-mail notification. The invention can provide for the ability to notify bidders, potential bidders and potential purchasers about significant events. This notification can be especially significant when such bidders and purchasers are maintaining a passive presence at the

site. For example, bidders can automatically receive notices if and when they are outbid on an asset. Bidders may also automatically receive notices when an auction is set to close so that they may return to the site in order to place another bid. Successful purchasers can be immediately notified and provided with confirmation of payment, as well as shipment terms and requirements.

It is preferred that the on-line capabilities of the invention provide users with communication and administration capabilities. The communication capabilities of the present invention can provide users with the ability to send each other messages, including messages via external e-mail. The administration capabilities of the invention can provide users with the ability to correct, revise and update company or personal data and information previously submitted to the system. Users can also review all purchases, sales and account transactions. Users that maintain catalogs or asset or inventory items on the system are provided with the ability to review, add, delete and/or the update information when necessary.

It is preferred that the on-line auction capabilities of the invention provide for the security of users including buyers, bidders and sellers. Based on a user's security system, a user's database maintenance facility can include the option of limiting the availability of specific auctioned assets to selected sellers and/or bidders. This capability can be fully administered through the standard browser interface.

It is preferred that the on-line technology of the present invention provides for a search engine. In one preferred embodiment, for example, the on-line auction technology of the invention includes the MICROSOFT SQL engine. The SQL-based database can also be included as it is specifically geared to "wide area" usage such as the Internet. Microsoft Exchange software can be fully integrated, providing for a strong mail server, with a proven design and track record for heavy usage. This software can also include the Active Server Pages (ASP), placing the software in the unique position of being able to utilize future development of "distributed database records and functions," with only minor changes in server side scripts. Additionally, incorporated code and search libraries allow for the customization of multiple search indexes and filters according to application requirements. Search features can include powerful search filters for user-friendly data search functions along with flexible multiple keyword entry for fast topic finds and item category lookups.

It is also preferred that the on-line technology of the invention provides for a user browser interface. The user browser interface of the invention can include database product search screens formatted according to, by way of example, auction close times, high bids, asset pricing, availability, and search filter specifications. The user browser interface can provide for retrieved asset review information from other sources, and discount and asset package advertisements. The interface can provide for custom logo presentation screens, as well as visual split screens for orders, products and specials. These and other aspects can be present within certain embodiments of the present invention as described below.

1. Description of an Internal Redeployment System

In one preferred embodiment of the present invention, a client application includes an internal redeployment system for the internal management and redistribution of used industrial equipment and machinery as well as items of inventory. The internal redeployment system can be an on-line system, particularly an Internet-based system, allowing access to pre-assigned internal corporate sites (e.g., manufacturing, inventory, distribution). This system can be a closed-end system, in particular an Intranet type system. This system can allow a client to access, query, order and document corporate asset and inventory transfers globally. The internal redeployment of assets and inventory can occur via requisition, auction and/or other e-commerce type transactions.

The internal redeployment system can provide for the internal redistribution of assets and inventory. Internal redistribution can be provided, by way of example and without limitation, via an internal requisition and/or e-commerce type transactions. In addition, internal redistribution can occur via a direct sale, auction and/or e-commerce type transactions. The system can provide for the consolidated procurement and processing of requisitions and/or e-commerce type transactions between multiple internal corporate locations including corporate operating sites and asset and inventory depot centers. The system can also provide for comprehensive asset and inventory database maintenance, shipping and transaction reconciliation. The system can track equipment and assets internally as they are transferred between corporate operating sites and inventory depot centers.

Figure 1 illustrates an exemplary network environment in which the internal redeployment service of the invention may be employed. Actual network and server environments can, of course, be arranged in a variety of configurations; however, the exemplary environment shown here provides a framework for understanding the type of environment in which the present invention operates. The network can include client computers 10a, a server computer 10b, and database 30 accessible via server computer 10b. The client computers 10a are in electronic communications with the server computer 10b via communications network 40, e.g., an Intranet. Client computers 10a are connected to the communications network 40 by way of communications interfaces 42. Communications interfaces 42 can be any one of the well-known communications interfaces such as Ethernet connections, modem connections, and so on.

Server computer 20b provides management of database 30 by way of server software such as database server system software, described more fully below. As such, server 10b acts as a gatekeeper from a variety of data sources and provides that data to a variety of data consumers. Server computers 10b may maintain data in a relational database. Client computers 10a that desire to access data stored in the database can access the data via communications network 40. In the example wherein server 10b comprises a database server, client computers 10a request the data by way of SQL queries (e.g., update, insert, and delete) on the data stored in database 30.

Where server computers 10b and client computers 10a are connected by way of an Intranet or the Internet, communications may be facilitated by HTML, XML, and so on. Client computers 10a may employ a browser. Client computers 10a may represent asset and inventory depot centers and internal corporate sites including manufacturing, inventory and distribution sites.

The server 10b hosts the internal redeployment service, which is accessible via an Intranet at a plurality of internal corporate sites and asset and inventory depot centers. A central administrator, corporate site or depot center administrator and/or other approved user (e.g., corporate employee, etc.) supplies asset and inventory item data 30 and information including name, description, manufacturer, price and/or other suitable information. Asset and inventory item data 30 and information can be supplied through an administrative interface accessible via a standard Web page. In addition, users can access a user interface via a standard Web page in order to search for and locate a

particular asset or item of inventory. Users may search and locate available assets or items of inventory by type, location, industry or other suitable criteria. For example, users can search and locate asset or item of inventory data 30a by corporate site or depot center and asset or inventory type. Users can also access detailed data descriptions 30b regarding a particular asset or item of inventory. Users may request the transfer of an available asset or item of inventory from its current corporate site or depot center to another corporate site or depot center. Where the internal redeployment service is operating on an e-commerce based model, the available asset or item of inventory may have an associated price or reserve, and the user may be required to purchase the available asset or item of inventory via direct sale or auction. The internal redeployment service of the invention can further facilitate such transactions by acting as an internal transaction clearinghouse providing for accounting services as well as the transfer of funds.

The following two models represent alternative exemplary embodiments for locating and redeploying an asset or item of inventory using the internal redeployment system of the present invention. It should be appreciated that a variety of other models are within the scope of the internal redeployment system of the present invention.

Model #1 Internal Redeployment via Requisition

1. User logs onto Internet site and in order to proceed beyond home page, user enters his/her user ID and password.
2. User is routed to a Web page and directed to select an industry category (e.g., utilities, refining and petrochemical, semiconductors, manufacturing).
3. User is routed to a Web page and asked to select asset or inventory type (e.g., valves, generators, electrical).
4. User is routed to a Web page and directed to select an asset or item of inventory (e.g., pressure switch stock # 3111). Asset and item of inventory descriptions can also be provided.
5. User is provided with the capability to requisition and user requests at least one asset or item of inventory for transfer to another corporate site or depot center.

Model #2 Internal Redeployment via Direct Sale Purchase

1. User logs onto Internet site and is required to enter ID and password.
2. User is routed to a Web page where user is provided with the capability to enter and user enters search criteria (e.g., stock number, corporate site) for assets and items of inventory.
3. User is routed to a Web page listing assets and items of inventory satisfying the search criteria. Detailed asset and inventory information including price can also be listed.
4. User is provided with the capability to purchase and user purchases at least one asset or item of inventory for transfer to another corporate site or depot center.

With reference to Figure 1, the internal redeployment system can also provide for the internal management and maintenance of assets and inventory. This system can provide for asset and inventory adjustments (real-time or otherwise) by asset, item of inventory and/or corporate location including assigned corporate site or depot center. This system can also provide for an asset and inventory accounting system for adjusting stock levels and site location availability instantaneously. For example, where an on-line request for transfer (requisition) and/or purchase of an asset or item of inventory has been made, the data 30-30b stored in the server computer 10b can be automatically adjusted to reflect that the asset or item of inventory has been internally redeployed. The data 30-30b can be instantaneously adjusted to reflect that the asset or item of inventory has been transferred from one corporate site to another. The data 30-30b can be adjusted before or after actual shipment of the asset or item of inventory. As another example, the data 30-30b stored in the server computer 10b can reflect those assets and items of inventory located at a corporate location. The data 30-30b can be automatically adjusted to reflect changes (increase or decreases) in items of inventory, whether through sales, internal redeployment or otherwise. The system can also provide for the automatic readjustment of inventory levels via internal redeployment, external purchase or otherwise, where levels fall below or rise above a set level.

The internal redeployment system of the present invention can also be integrated with the external redistribution system of the present invention. The system provides the

central administrator, corporate site or depot center administrator or other approved user the opportunity to redistribute assets and inventory via the external redistribution capabilities of the invention. In one embodiment of the present invention, the central administrator can elect to redistribute assets externally via on-line direct sale, auction and/or other e-commerce type transaction. It is preferred that assets and items of inventory available internally can be made available to others via the external on-line redistribution capabilities of the invention. It is further preferred that assets and items of inventory as well as detailed information be made available to others through a Web page accessible via the Internet. More preferred is that the assets and inventory are equally available through the internal redeployment and external redistribution capabilities of the present invention.

2. Description of an Industry Redeployment System

In preferred embodiments, the present invention provides for a client application including an industry redeployment system for the management and redistribution of used industrial equipment and machinery as well as inventory within a consortium or other trading group. For purposes of the present invention, a consortium or trading group may be considered to include participants within a particular industry, industries and/or other approved group. Preferably the industry redeployment system manages and redistributes assets and inventory among participants within a vertical market. The industry redeployment system can be an on-line system, particularly an Internet-based system, allowing access by consortium participants. This system can be a closed-end system, in particular an Intranet type system. This system can allow participants to access, query, order and document asset and inventory transfers within the consortium. The industrial redeployment of assets and inventory can occur via requisition, auction, direct sale and/or other e-commerce type transactions.

Figures 14 and 15 provide an overview of the industrial redeployment system in accordance with preferred embodiments of the invention. The industrial redeployment service provides participants (e.g, Co.1, Co. 2, Co. 3) or other approved users of a consortium the opportunity to redistribute assets and inventory among themselves. Preferably the consortium participants are part of a particular vertical market. In accordance with preferred embodiments of the present invention, participants within a

particular industry, industries and/or other trading group may form a consortium by deciding to redeploy assets and inventory among themselves. In other preferred embodiments, a consortium may be formed where the market maker service determines among which participants assets and inventory may be redeployed.

With reference to Figure 14 and 15, the industry redeployment system can be integrated with the internal redeployment system of the present invention. In accordance with preferred embodiments, a consortium participant (e.g, Co.1, Co. 2, Co.3) has access to the industry redeployment system as well as the internal redeployment system for the redeployment of assets and items of inventory among its multiple internal corporate locations (e.g., Ops1, Ops2, Ops3). With reference to Figure 15, the industry redeployment system can also be integrated with the external redistribution system of the present invention. In a preferred embodiment of the present invention, assets and inventory are made available for redeployment via the internal redeployment system, and if not redeployed internally, the assets are made available for redeployment via the industry redeployment system, and if not redeployed within the consortium, the assets are made available for external redistribution.

It is further preferred that assets and items of inventory as well as detailed information be made available to consortium participants through a Web page accessible via an Intranet or the Internet. Consortium participants can access detailed data descriptions regarding particular assets or items of inventory. Consortium participants may redeploy and acquire assets and inventory via requisition, auction, direct sale and/or other e-commerce type transactions. In accordance with certain embodiments, the present invention provides for internal communications allowing for continuous contact with all participants throughout any transaction process. Participants can communicate via e-mail, post bulletin board messages, confirm transactions and make numerous other inquiries. Other on-line and off-line support as described herein can also be available.

3. Description of an External Redistribution System

The present invention provides for a client application including on-line transaction capabilities for the external redistribution of used industrial equipment and machinery. Like the internal redeployment system, the external redistribution system is preferably an on-line system, more preferably an Internet-based system, allowing access

to registered users. In particular, the external redistribution system provides for the management and disposition of assets and items of inventory via external direct sales, auctions and/or other e-commerce type transactions.

Figure 2 illustrates an exemplary network environment in which the external redistribution service of the invention may be employed. Actual network and server environments can, of course, be arranged in a variety of configurations; however, the exemplary environment shown here provides a framework for understanding the type of environment in which the present invention operates. The network can include Internet client computers 400, a Web server computer 300, and database 310 accessible via server computer 300. The Internet client computers 400 are in electronic communications with the server computer 300 via communications network 500, e.g., the Internet. Internet client computers 400 are connected to the communications network 500 by way of communications interfaces 510. Communications interfaces 510 can be any one of the well-known communications interfaces such as Ethernet connections, modem connections, and so on. Additionally, a plurality of Intranet-based internal redeployment systems can be integrated with the external redistribution system, as illustrated by Figure 2. Administrators and users of internal redeployment systems can access the external redistribution system by way of communications interfaces 520. Administrators and users can access the communications network 500 of the external redistribution system via Internet Service Providers (ISP), as illustrated by Figure 2.

Server computer 300 provides management of database 310 by way of server software such as database server system hardware, described more fully below. As such, server 300 acts as a gatekeeper from a variety of data sources and provides that data to a variety of data consumers. Server computers 300 may maintain data in a relational database. Internet client computers 400 that desire to access data stored in the database can access the data via communications network 500. In the example wherein server 300 comprises a database server, Internet client computers 400 request the data by way of SQL queries (e.g., update, insert, and delete) on the data stored in database 310.

Where server computers 300 and Internet client computers 400 are connected by way of an Intranet or Internet, communications may be facilitated by HTML, XML, and so on. Internet client computers 400 may employ a browser. Internet client computers 400 may represent stations where users can interact with the present invention for the

potential transfer and/or sale and/or purchase of used industrial equipment and machinery.

The server 300 hosts the external redistribution system, which is accessible via the Internet at a plurality of Internet client computers, internal corporate sites and asset and inventory depot centers. It is preferred that the external redistribution system provides for the on-line registration, access, qualification and approval of users including both vendors and consumers. It is preferred that access to the system is provided only to registered users. Users are provided with a Web page accessible via the Internet for registering with the external redistribution system of the invention. Users are provided with a Web page including a user input window whereby users are directed to supply (enter or input) certain information in order to register with the system. Such information can include a user's name, address, e-mail address, occupation, credit or financial history and/or any other suitable information. Users are provided with individual user identifiers (IDs) and passwords once registered. It is preferred that users are able to access the system immediately upon registration.

It is preferred that the present invention provides for the on-line qualification and approval of users. While various mechanisms including the telephone are suitable for qualification and approval, users can be provided with a Web page accessible via the Internet for qualification and approval to the system. Users are provided with a Web page including a user input window whereby users are directed to supply certain information for qualification and approval to the system. Information suitable for qualifying or approving potential buyers can include credit or financial check, reference check, industry experience, submission of a deposit or any other suitable information. Although the phrase qualified or approved buyer can have a variety of definitions within the scope of the present invention, within certain embodiments the phrase can be defined as a buyer deemed capable of completing (e.g., financing a purchase) those transactions provided for by the present invention. It is preferred that users are notified via e-mail once qualified and approved.

It is preferred that the present invention provides users with on-line access to the external redistribution system. Users are provided with a Web page accessible via the Internet for accessing the external redistribution capabilities of the invention. Users are provided with the Web page including user input windows whereby users are directed to

supply certain information in order to access the system. This information can include, by way of example, user IDs and passwords. It is preferred that all access within the system is protected through SSL and security encryption.

It is preferred that the on-line direct sale capabilities of the invention include extensive asset listing capabilities. Asset and inventory item data 310 and information can be supplied through an administrative interface accessible via a standard Web page. Users can elect to list assets and items of inventory in on-line catalogs, whether by industry, asset type, asset name and/or any other suitable designation. It is preferred that catalog listings include asset categories and sub-categories. In the context of the used industrial equipment and machinery, categories can include utilities, semi-conductors, manufacturing, refining and petrochemical and industrial parts and equipment. It is also preferred that the present invention provides for administration capabilities enabling users including vendors to administer information regarding itself and its respective on-line asset and inventory catalogs. These administrative tasks can be assigned to numerous individuals within an organization. This self- and catalog- administration can be accomplished through an intuitive form action that requires little training. Data and information including asset and inventory descriptions, quantity, price, bid duration, product information, non-public sales as well as tracking information can be easily specified. The capacity to support images can also be included. In accordance with certain embodiments of the invention, a simple interface prompts for image upload after the entry of asset, inventory and/or product data. Catalog entries can be reviewed prior to final submission to the system's database. Catalog entries can also be added and available for bid instantly or require site administrator approval before going public. Additionally, single or multiple vendor (or inter-departmental, multiple vendor) account setup and access can be either pre-approved or require site administrator approval before allowing items to be actively added to the on-line catalog.

It is preferred that users are provided with powerful search capabilities. Users can access a user interface via a standard Web page in order to search for and locate a particular asset or item of inventory. Users may search and locate available assets or items of inventory by industry, type, location or other suitable criteria. With reference to Figure 2, for example, users can search and locate asset or item of inventory data 310a by industry, asset or inventory category, and asset or inventory type. Users can also

access detailed data descriptions 310b regarding a particular asset or item of inventory. These capabilities can be customized to allow for specific or intuitive search inquiries. Users are provided with access to on-line products and a complete array of services and functionalities. In accordance with certain embodiments, the present invention provides for an internal communications center allowing for continuous contact with all registered users throughout any transaction process. Users can communicate via e-mail, post bulletin board messages to groups, confirm transactions, contact vendors and make numerous other inquiries. Additionally, a help system offers both an on-line tutorial and built-in help section to assist with the full cycle operations of the system. Off-line support can also be available.

a. On-line direct sales

In accordance with certain embodiments, users including vendors can elect to redistribute corporate assets and inventory via the on-line direct sale capabilities of the present invention. Users can access these on-line direct sale capabilities for the redistribution of surplus assets and inventory as well as increasing revenues from standard product lines. The on-line direct sale capabilities can provide for an Internet interface for multiple users including sellers and vendors to redistribute assets. A payment security system can be provided, as well as seller and buyer notification via e-mail. It is preferred that the invention provides for the comprehensive identification, evaluation, appraisal and valuation of used industrial equipment and machinery.

It is preferred that the on-line direct sale capabilities of the invention provide for Internet-based inventory listings with real-time purchase interaction. It is also preferred that the on-line direct sale capabilities of the invention provide for extensive asset and inventory search capabilities. Users including potential buyers are preferably provided with the ability to search asset and inventory catalogs by industry, asset or inventory type, asset or inventory name or any other suitable search criteria. In one embodiment of the invention, users are provided with general search capabilities across all catalogs. Users can perform asset or inventory searches by key terms including item #, asset description or name, or any other suitable criteria. For example, a client is provided with descriptive information concerning a particular electrical motor in response to the key terms A# 4365" and "electrical motor".

In another embodiment of the invention, users are provided with the ability to search by catalog. These catalogs may include industry catalogs. Clients are provided with categories and sub-categories of assets and items of inventory in response to the selection of a particular industry catalog. For example, a user is provided with a listing of assets including boilers and steam generators in response to selecting the catalog "utilities". The user is then provided with a listing of specific boilers in response to selecting the sub-category "boiler". Finally, the user is provided with descriptive information concerning a boiler in response to selecting a particular boiler.

It is preferred that users can make direct purchases of assets and items of inventory via the on-line place order capabilities of the invention. Assets and items of inventory can be purchased on-line via the submission of user information including user address, as well as billing and shipping information. Preferably it is not necessary to submit such information where the information has been previously submitted. It is preferred that the present invention provides for the facilitation of transactions via the providing of services including, by way of example only, asset warranties, insurance and indemnity services, asset financing, escrow services and foreign exchange. Where an asset or item of inventory is not listed on the service of the present invention, users can submit requests to be notified when such items become available.

The following model represents an exemplary embodiment for searching, locating and redistributing an asset or item of inventory using the on-line direct sale capabilities of the present invention.

Model #3 Direct Sale via industry catalog search

1. User logs onto Internet site and in order to proceed beyond home page user must enter his or her user ID and password.
2. User is provided a Web page displaying the vertical industry catalogs available.
3. User is provided a Web page listing categories and sub-categories of assets in response to selecting an industry catalog.
4. User is provided a Web page displaying detailed asset information in response to selecting a sub-category.

5. User is provided with the opportunity and user enters and electronically submits an offer regarding the asset. Receipt of the offer is immediately acknowledged to the user via e-mail or otherwise.

6. Customer representative contacts the user with any questions and to verify information submitted with offer.

7. Customer representative contacts the user to inform the user of the outcome of the offer. An e-mail or other written confirmation is also sent to the user for written confirmation.

8. Where the offer is accepted, the customer representative assists the user with any details (e.g., financing, shipping, warranties) necessary to complete the direct sale.

9. After determining those services that will be provided, the customer representative provides the user with the total amount of the transaction (e.g., US dollars).

10. The user then releases the appropriate funds to the service.

11. Upon receipt of the funds, the service contacts the seller to coordinate shipping.

It should be appreciated that a variety of other models are within the scope of the present invention.

b. On-line auctions

In accordance with certain embodiments, users can elect to redistribute surplus assets and items of inventory via the on-line auction capabilities of the present invention. Users can also access these on-line auction capabilities as an alternative channel for increasing revenues from standard product lines. It is preferred that the on-line auction capabilities of the invention include Internet- and Web- based inventory auctions with real-time bid interaction. The on-line auctions capabilities can provide for not only multiple simultaneous auctions, but also multiple auction formats. The on-line auction capabilities can also provide an interface for multiple vendors to auction product. A payment security system can be provided, as well as seller and buyer notification via e-mail. It is preferred that the invention provides for the comprehensive identification, evaluation, appraisal and valuation of used industrial equipment and machinery. Like

the direct sale capabilities of the invention, the on-line auction capabilities also provide for comprehensive customer, asset and product database management.

It is preferred that the on-line auction capabilities of the present invention provide for multiple concurrent auctions. An on-line auction administrative interface can be provided which allows for multiple concurrent auctions, thus allowing a particular asset to become available almost universally. The on-line auction capabilities of the invention can accommodate different auction styles and formats, although the standard auction sale format is preferred. With the standard auction sale format, an asset is placed on the online auction block for sale. The highest bidder will be the winner until the entire quantity of the offered asset is gone. Successful bidders are determined with reference to the time of bid receipt. Auction can be conducted absolute to the highest bidder or with minimum reserve prices.

It is preferred that the on-line auction capabilities of the invention include both private and public auction services providing comprehensive asset recovery solutions to clients. Like the direct sale capabilities of the invention, the on-line auction capabilities provide for extensive asset listing and inventory search capabilities with catalog listings readily displayed. It is preferred that users including bidders can easily view current bid status, product information and item specifications once a particular asset or item of inventory catches a user's interest. It is also preferred that each online auction site can be readily customized for a specific audience or marketplace, in particular a specific business to business marketplaces.

It is preferred that the on-line auction capabilities of the invention include complete asset registration and processing systems enabling real-time bidding and purchasing of corporate assets. Bid development and selection can be achieved through automated RFP and RTQ modules. In accordance with the present invention, an exemplary bidding process can be described. Users including bidders are provided with a Web page including an icon, for example a "Bid NOW!" icon, that takes a potential bidder to a bidders form and prompts for action. Using pop down lists and "fill in the blank" form standards, the bidder can enter login, password and bid particulars along with shipping method. Once a bid is placed, the Web page can update immediately to reflect current winning bids. The bidder can be notified via e-mail when the bidder has a closing winning bid or is outbid. Where a bidder is outbid, the bidder may be directed to

a "Mybid" Web page where all active bids can be viewed by the bidder. The bidder may, of course, then place another bid via the bidders form. It is preferred that the present invention for product descriptions, current bids and bid actions required that can be easily managed through one consolidated interface. Additionally, the automatic shipment of assets and payment for assets can be provided within these capabilities.

It is preferred that the on-line auction capabilities of the invention provide for comprehensive messaging including the ability to notify clients of on-going bids via e-mail. Banking and accounting features can be customized for transfers through pre-approved third party direct sales or other transfer channels. In addition, customized databases can also be provided for providing historical evaluations, audits and asset management analysis.

The following model represents an exemplary embodiment for searching, locating and redistributing an asset or item of inventory using the on-line auction capabilities of the present invention.

Model # 4

1. User logs onto site and in order to proceed beyond home page, user must enter their user ID and password.
2. User is routed to a Web page displaying detailed information for those assets available in the marketplace as well as various purchase methods enabled.
3. User is routed to a Web page hosting an electronic auction in response to selecting a particular asset.
4. An electronic auction commences in which participants make bids (i.e., offers) on the asset over a fixed time frame.
5. User enters and electronically submits a bid to the electronic marketplace. User is provided with a Web page displaying current bids.
6. User is notified electronically when a higher bid has been submitted for the same asset or item of inventory.
7. User again enters and electronically submits a bid to the electronic marketplace. User is again provided with a Web page displaying current bids.
8. User is notified electronically that the bid is a winner.

9. Details (e.g, financing, warranties, shipping) necessary to complete the transaction are determined.

10. User is notified electronically of the total amount of the transaction (e.g., U.S. dollars).

11. User releases the appropriate funds to the service in order to complete the transaction.

12. Upon receipt of the funds, the service contacts the seller to coordinate the user's purchase.

It should be appreciated that a variety of other models are within the scope of the present invention.

3. Description of an Off-Line Remarketing Network

The market maker service of the present invention also provides for off-line remarketing and asset disposition capabilities. These capabilities can include access to the remarketing and asset disposition networks of top international and national asset disposition firms. In particular, these off-line networks are preferably integrated with the internal redeployment and external redistribution systems and methods of the invention. These off-line networks can provide for several advantage within the context of the present invention. First, the off-line networks instantly supply the market maker service with a large number of active and qualified users including buyers and sellers. Second, the off-line networks supply the on-line aspects of the service with experts in a large number of asset classes and vertical industries. Third, the already international presence of the off-line networks helps provide the service with international on-line presence. Finally, and possibly most important, by creating partnerships with top off-line networks, the present invention is provided with a top reputation as well as brand image in the used equipment and machinery marketplace.

It is preferred that the off-line networks of the invention provide for the independent and fair identification, cataloguing, evaluation, appraisal and/or valuation of used industrial equipment and machinery. The on-line asset reallocation aspects of the invention are thus enhanced through the use of independent asset appraisers for evaluating the condition and value of seller and vendor assets. On-line buyers are thus

assured they receive assets in the condition as specified and for fair value. Sellers are similarly assured of a fair value for their assets while their chances of asset reallocation enhanced.

It is preferred that the off-line networks provide for maintenance and/or logistical support for used industrial equipment and machinery reallocation. The off-line networks thus provide for outsourced on-site or off-site maintenance and hosting of assets, as well as technical support and training capability. The off-line networks also provide for the physical transport of assets reallocated on-line. Through maintenance and logistical support, the market maker service of the invention is better able to facilitate end-to-end value-driven transactions for the used industrial equipment and machinery marketplace.

It is also preferred that the off-line networks provide for additional off-line asset dispositions. Like the on-line capabilities of the invention, the off-line networks provide for both private and public off-line direct sales and auctions. For example, the off-line networks can provide for resales via private placement, off-line private treaty liquidation, sealed bid auction, open bid public auction, consignment or other similar means. In sum, the off-line remarketing networks facilitate and enhance the on-line capabilities of the invention. Through the integration of on-line and off-line networks, the market marker service of the invention facilitates the selling and buying of used industrial equipment and machinery.

Conclusion

The present invention provides improved systems and methods of asset management for the reallocation and sales of used industrial equipment and machinery. An important feature of the preferred embodiments of the service is the use of an Internet- or Intranet- based internal redeployment system for the management and redistribution of used industrial equipment and machinery among internal corporate sites. The preferred embodiments of the service also include the use of an Internet-based redistribution system for the external management and disposition of used industrial equipment and machinery via direct sales and auctions. The service thus provides novel systems and methods for the internal redeployment of assets globally among internal corporate sites as well as multiple channel systems and methods for the marketing and disposition of surplus assets. In sum, the service provides for a comprehensive asset database management system for participants in the used industrial equipment and machinery marketplace.

It should be noted that the present invention may be implemented with a variety of database and database management applications and network configurations. The various techniques described herein may be implemented in hardware or software, or a combination of both. Preferably, the techniques are implemented in computer programs executing on programmable computers. Program code is applied to data entered using an input device to perform the functions described above and to generate output information. The output information is applied to one or more output devices. Each program is preferably implemented in a high level procedural or object oriented programming language to communicate with a computer system. However, the programs can be implemented in assembly or machine language, if desired. In any case, the language may be a compiled or interpreted language. Each such computer program is preferably stored on a storage medium or device (e.g., ROM or magnetic diskette) that is readable by a general or special purpose programmable computer for configuring and operating the computer when the storage medium or device is read by the computer to perform the procedures described above. The system may also be considered to be implemented as a computer-readable storage medium, configured with a computer program, where the storage medium so configured causes a computer to operate in a specific and predefined manner.

It is understood, however, that the invention is susceptible to various modifications and alternative constructions. It should be understood that there is no intention to limit the invention to the specific constructions described herein. On the contrary, the invention is intended to cover all modifications, alternative constructions, and equivalents falling within the scope and spirit of the invention.

CLAIMS

What is claimed is:

1. A network-based method for the reallocation of assets or items of inventory between and among corporate sites and/or companies, comprising:

providing a first database of assets available for internal redeployed among sites within a first company;

permitting users within the first company to access the first database for the purpose of determining whether such users wish to acquire any of the assets represented therein; and

if an asset represented in the first database is not acquired by a user within the first company, then storing data representative of such asset in a second database which is accessible to users external to the first company, whereby assets of the first company that are not internally redeployed are made available, via a network, for purchase by other companies.

2. A method as recited in claim 1, wherein the method further comprises the use of an internal redeployment model for locating and redeploying an asset or item of inventory, said internal redeployment model comprising:

asking a user to select an industry category from a list on a Web page;

asking the user to select an asset or inventory type;

asking the user to select an asset or item of inventory of the type selected; and

permitting the user to requisition the selected asset or item of inventory, so as to cause the asset or item of inventory to be transferred to a designated corporate site or depot center.

3. A method as recited in claim 1, wherein the method further comprises the use of an internal redeployment model for locating and redeploying an asset or item of inventory, said internal redeployment model comprising:

receiving from a user, via a Web page, search criteria for assets or items of inventory;

providing to the user a listing of assets or items of inventory satisfying the search criteria; and

permitting the user to purchase at least one asset or item of inventory from the list, so as to cause the asset or item of inventory to be transferred to a designated corporate site or depot center.

4. A method as recited in claim 1, wherein said users external to the company are members of a consortium or trading group.

5. A method as recited in claim 4, wherein the method further includes managing and redistributing assets or inventory among participants within a vertical market.

6. A method as recited in claim 1, wherein the method further comprises the use of an external redistribution system providing for the management and disposition of assets or items of inventory via electronic transactions carried out over the Internet.

7. A method as recited in claim 6, wherein said electronic transactions include external, on-line direct sales.

8. A method as recited in claim 6, wherein said direct sales include the use of a direct sale model comprising:

providing to a user a Web page displaying a plurality of vertical industry catalogs;

providing a listing of categories and sub-categories of assets or items of inventory in response to the user having selected an industry catalog;

displaying detailed asset information in response to the user having selected a sub-category;

receiving from the user an electronically-submitted offer regarding the asset, and acknowledging receipt of the offer;

informing the user whether the offer is accepted or rejected; and

if the offer has been accepted, assisting the user with aspects of financing, shipping, and/or warranty necessary to complete the direct sale.

9. A method as recited in claim 6, wherein said electronic transactions include

on-line auctions.

10. A method as recited in claim 9, wherein said on-line auctions include the use of an on-line auction model comprising:

displaying, via a Web page, information concerning assets or items of inventory available;

routing the user to a Web page hosting an electronic auction in response to the user having selected a particular asset or item of inventory;

permitting the user to bid on the particular asset or item of inventory;

when and if the user is deemed to have submitted a winning bid, notifying the user electronically that the user's bid is a winner; and

assisting the user with aspects of financing, shipping, and/or warranty necessary to complete the sale; and

11. A method as recited in claim 6, further comprising providing for on-line qualification and approval of users.

12. A method as recited in claim 1, further comprising the use of an off-line remarketing system.

13. A method as recited in claim 12, wherein said off-line remarketing system is integrated with internal redeployment and external redistribution systems.

14. A network-based system for the reallocation of assets or items of inventory between and among corporate sites and/or companies, comprising:

a first database of assets available for internal redeployed among sites within a first company;

a second database that is accessible to users external to the first company;

computer network means for permitting users within the first company to access the first database for the purpose of determining whether such users wish to acquire any of the assets represented therein, and if an asset represented in the first database is not acquired by a user within the first company, then storing

data representative of such asset in the second database, whereby assets of the first company that are not internally redeployed are made available, via a network, for purchase by other companies.

Figure 1

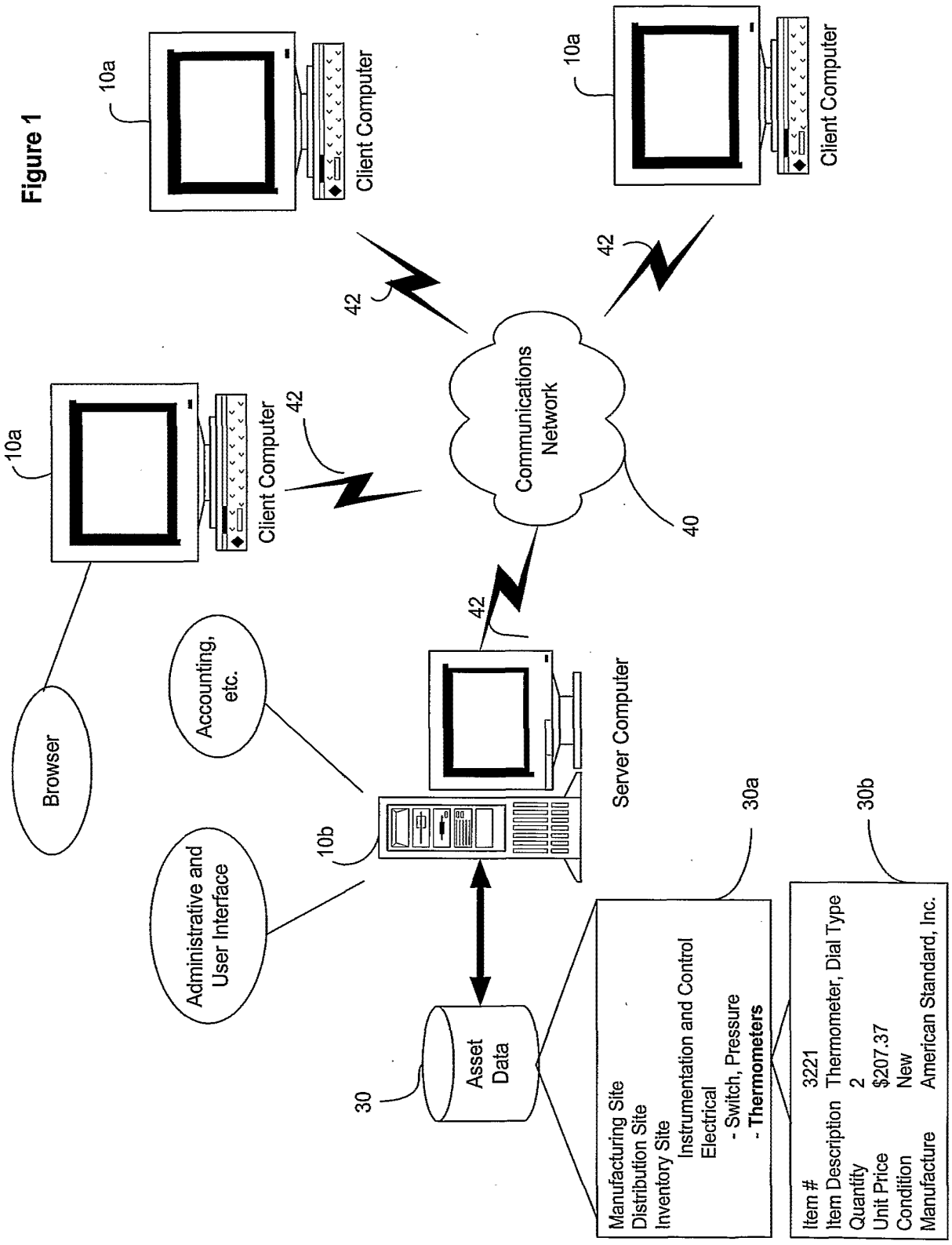
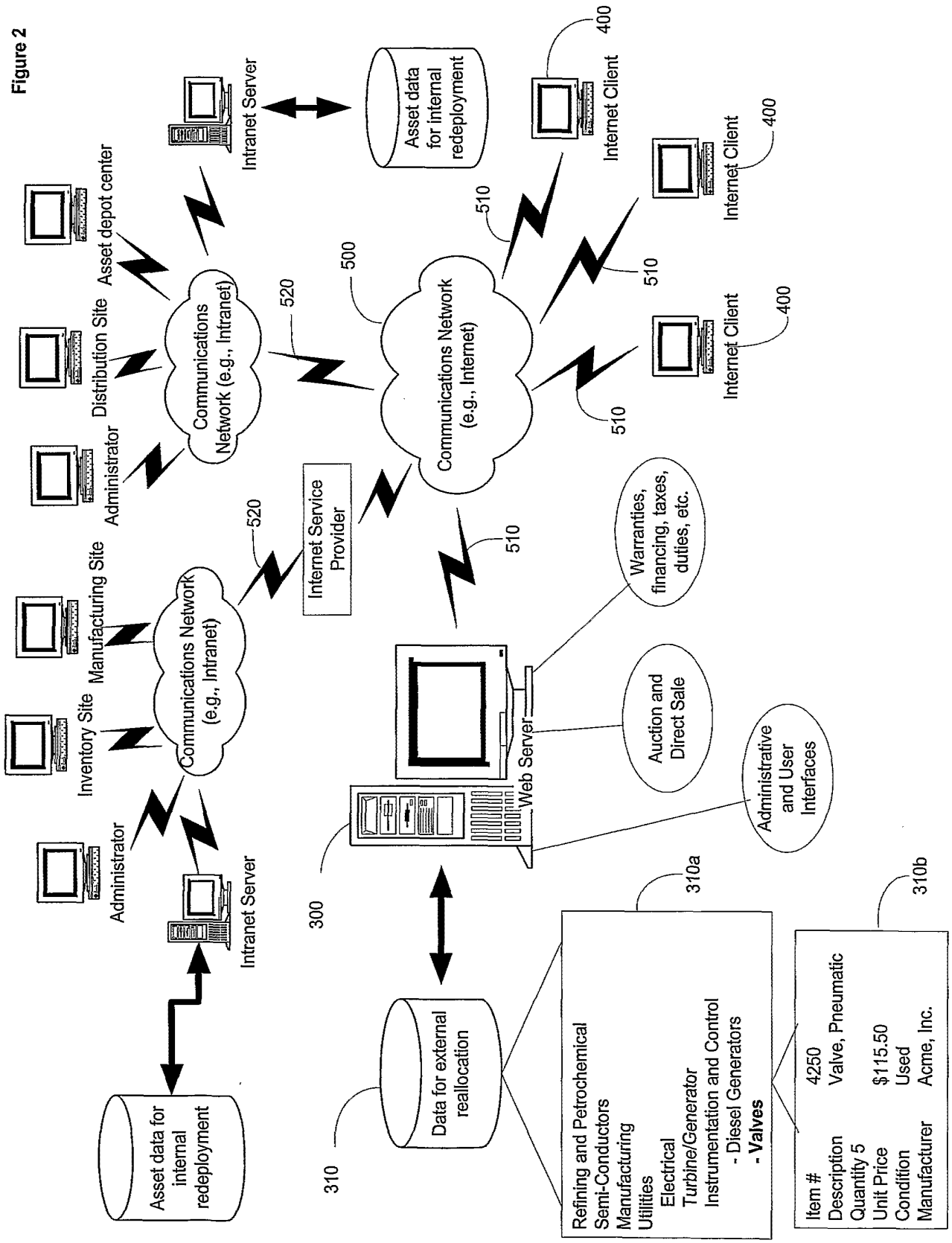

10a
Client Computer
42
Communications Network
40
Server Computer
10b
Browser
Accounting, etc.
Administrative and User Interface
30
Asset Data
30a
Manufacturing Site
Distribution Site
Inventory Site
Instrumentation and Control
Electrical
- Switch, Pressure
- Thermometers
30b
Item # 3221
Item Description Thermometer, Dial Type
Quantity 2
Unit Price $207.37
Condition New
Manufacture American Standard, Inc.

Figure 2



Uber Exhibit 1002 - p. 384
Uber Technologies, Inc. v. SurgeTech, LLC

Figure 3

Overview

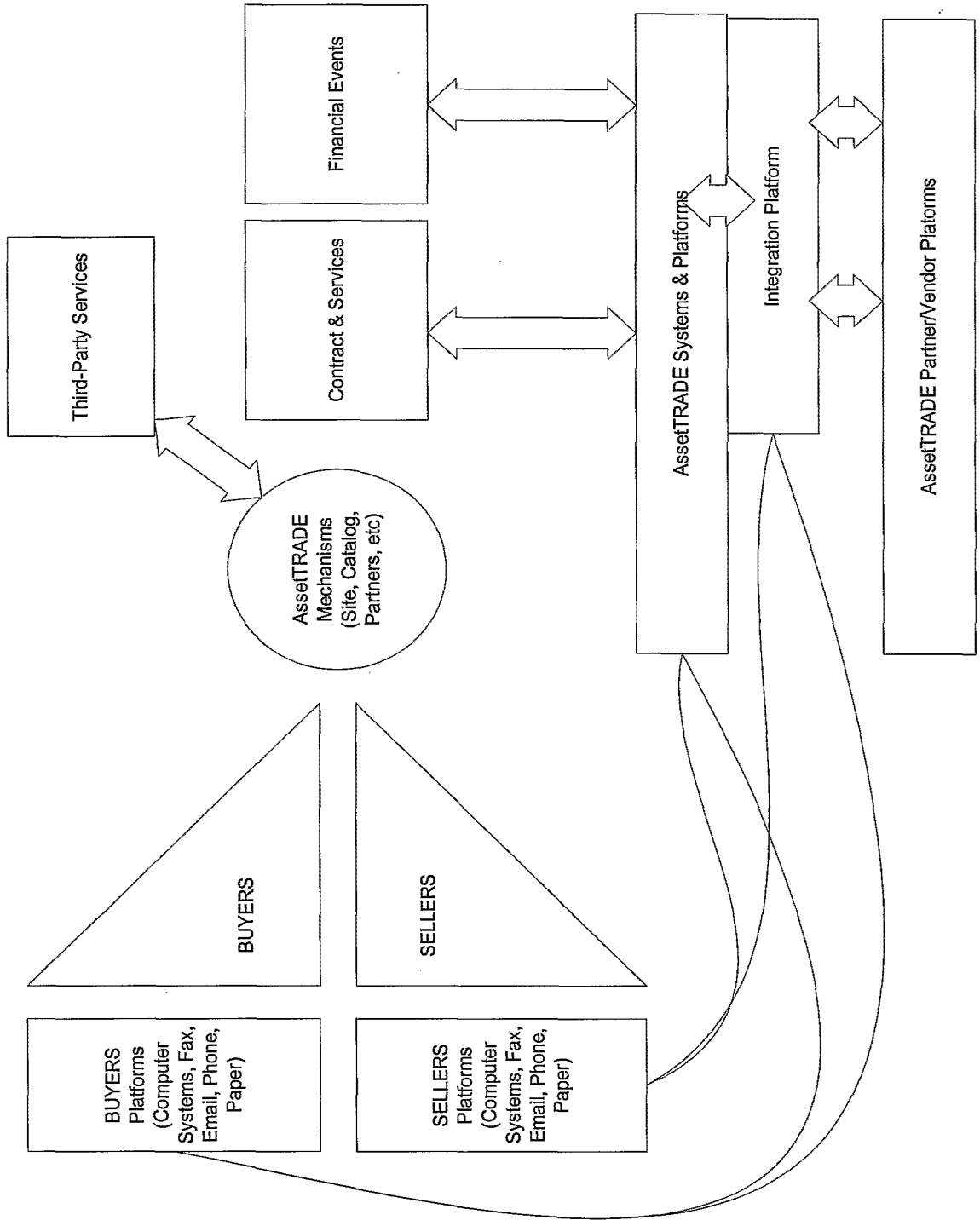
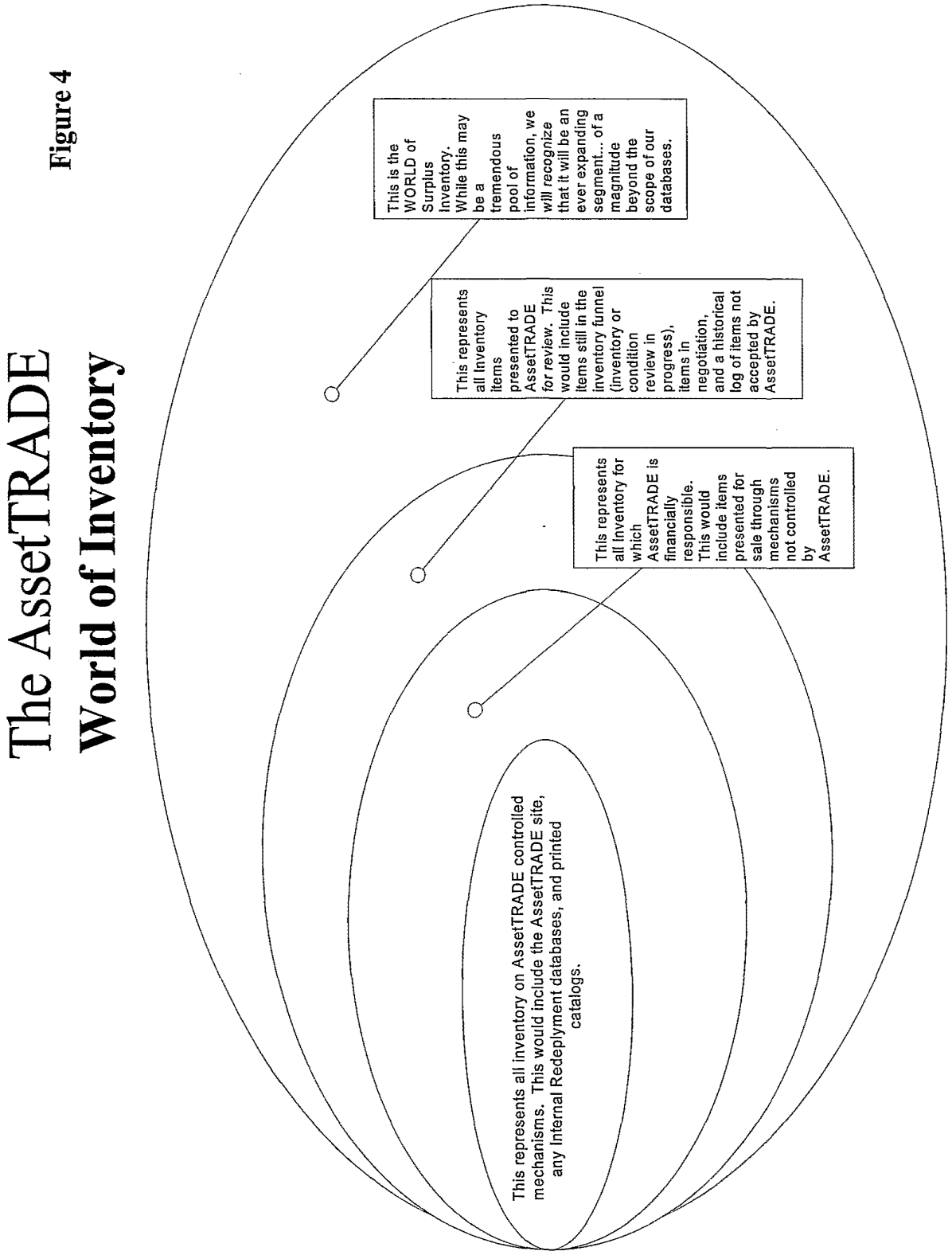
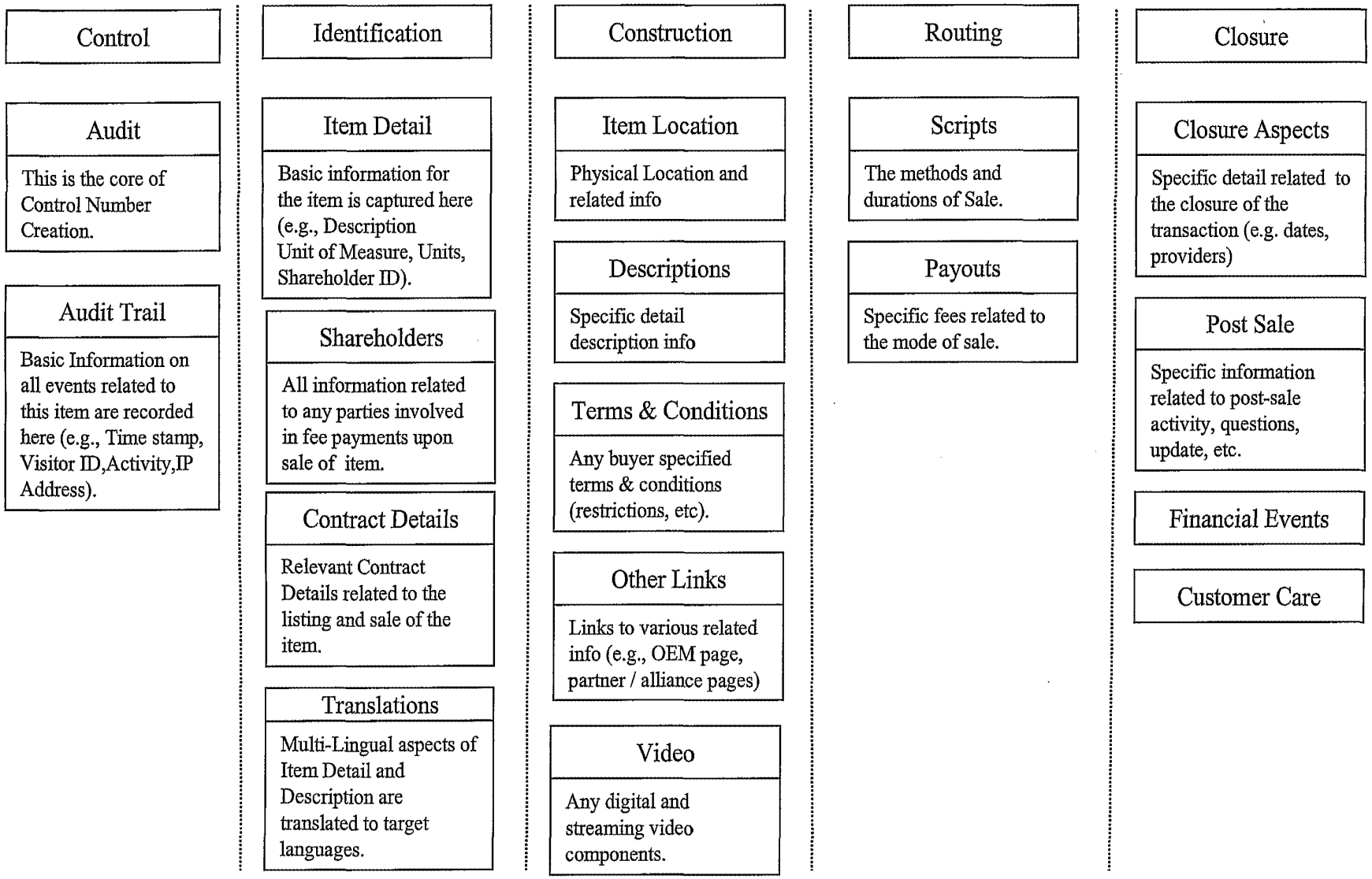


Figure 4


The AssetTRADE
World of Inventory
This is the WORLD of Surplus Inventory. While this may be a tremendous pool of information, we will recognize that it will be an ever expanding segment... of a magnitude beyond the scope of our databases.
This represents all Inventory items presented to AssetTRADE for review. This would include items still in the inventory funnel (inventory or condition review in progress), items in negotiation, and a historical log of items not accepted by AssetTRADE.
This represents all inventory for which AssetTRADE is financially responsible. This would include items presented for sale through mechanisms not controlled by AssetTRADE.
This represents all inventory on AssetTRADE controlled mechanisms. This would include the AssetTRADE site, any Internal Redeployment databases, and printed catalogs.

The Inventory Master

Figure 5



Uber Exhibit 1002 - p. 387
Uber Technologies, Inc. v. SurgeTech, LLC

Figure 6

Our Array Of Disposition Methods

- AssetTRADE Internal Redeployment
- Various Vertical Consortiums
- The AssetTRADE MarketPlace
- Traditional and Online Disposition Methods

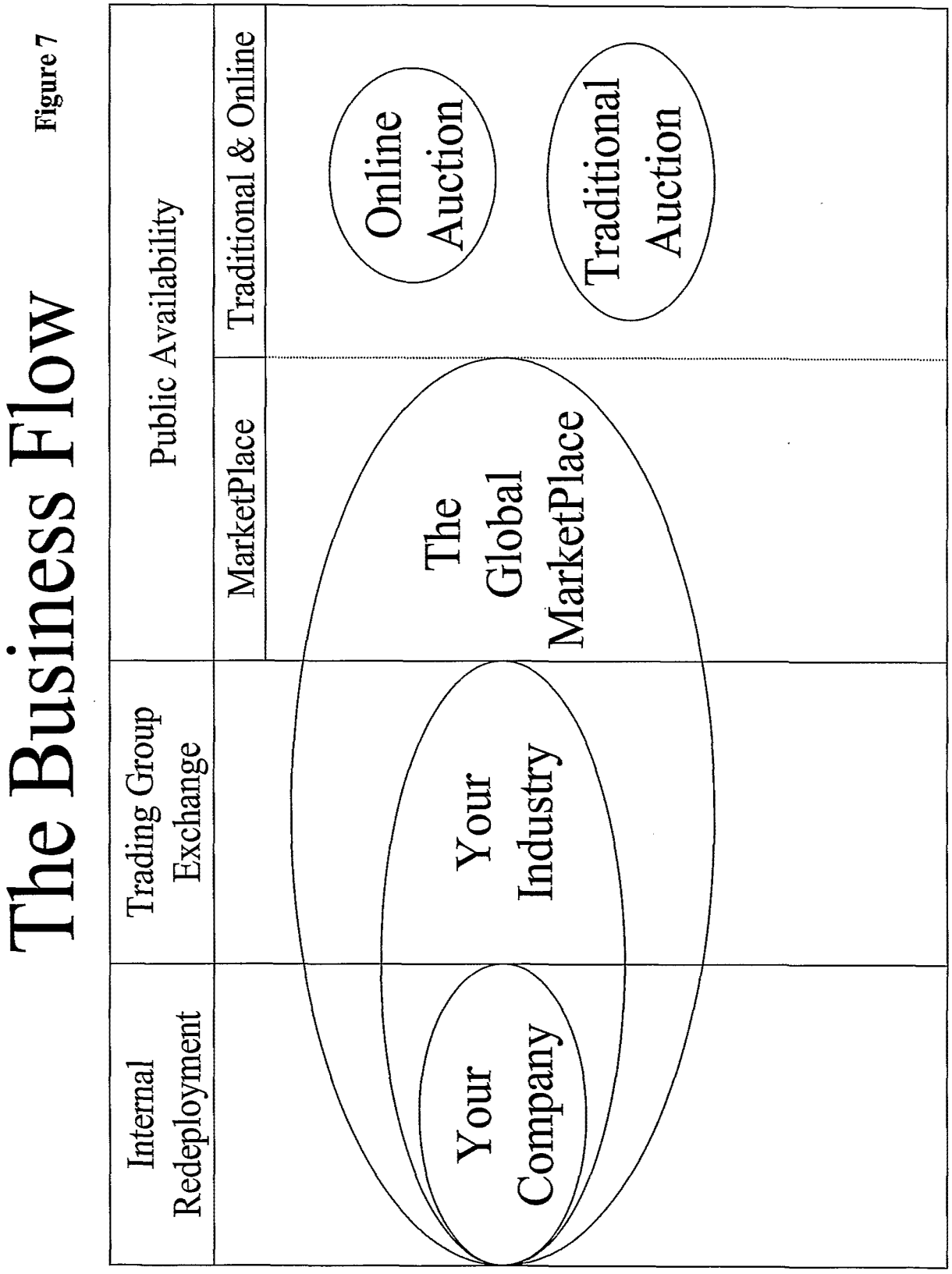

The Business Flow
Internal Redeployment
Trading Group Exchange
Public Availability
MarketPlace
Traditional & Online
Your Company
Your Industry
The Global MarketPlace
Online Auction
Traditional Auction

Figure 7

Figure 8

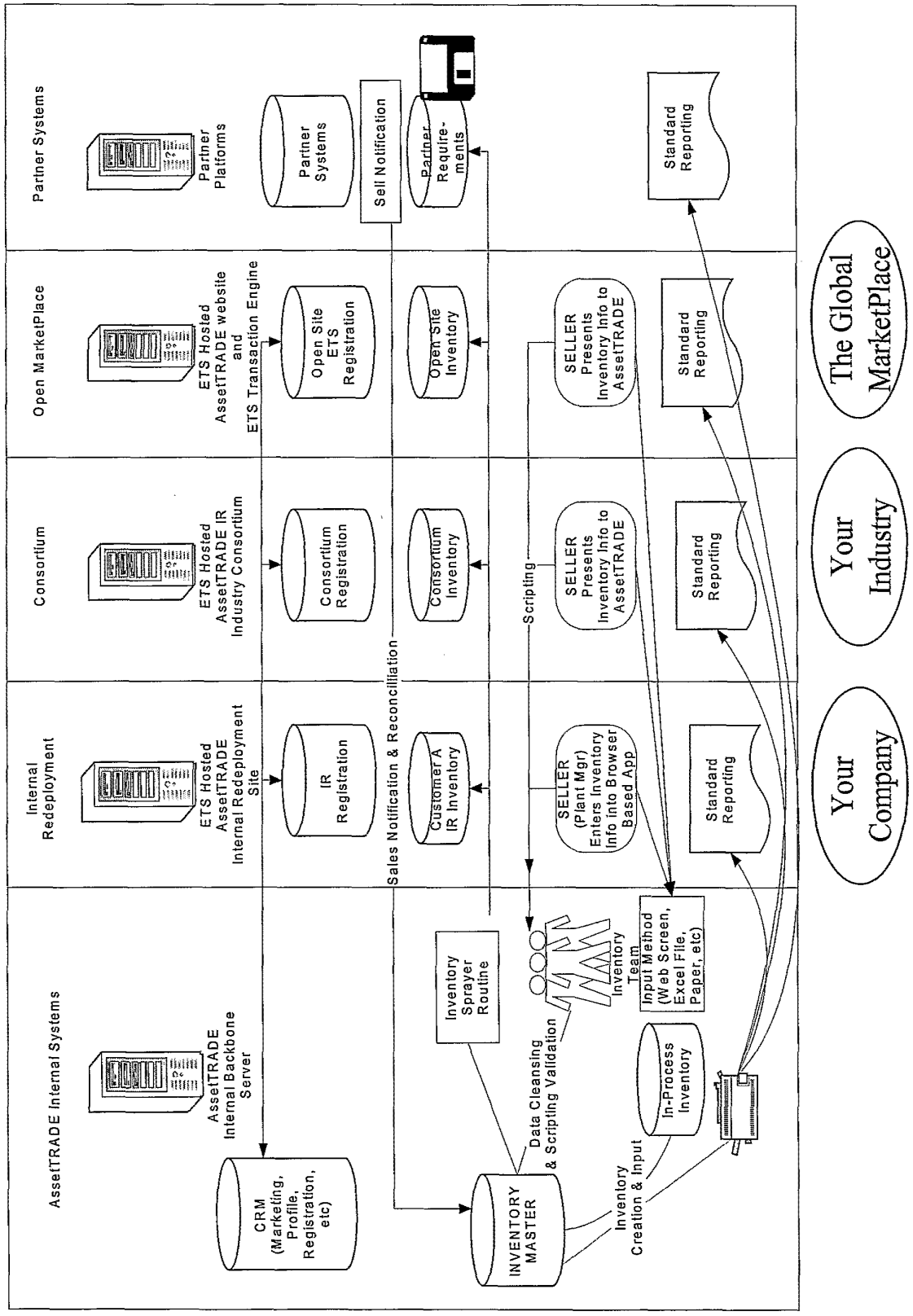

The World of AssetTRADE
AssetTRADE Internal Systems
Internal Redeployment
Consortium
Open MarketPlace
Partner Systems
AssetTRADE Internal Backbone Server
ETS Hosted AssetTRADE Internal Redeployment Site
ETS Hosted AssetTRADE IR Industry Consortium
ETS Hosted AssetTRADE website and ETS Transaction Engine
Partner Platforms
CRM (Marketing, Profile, Registration, etc)
IR Registration
Consortium Registration
Open Site ETS Registration
Partner Systems
Partner Require-ments
Sell Notification
Sales Notification & Reconciliation
Customer A IR Inventory
Consortium Inventory
Open Site Inventory
Scripting
SELLER (Plant Mgr) Enters Inventory Info into Browser Based App
SELLER Presents Inventory Info to AssetTRADE
SELLER Presents Inventory Info to AssetTRADE
Standard Reporting
Standard Reporting
Standard Reporting
Standard Reporting
Inventory Sprayer Routine
Data Cleansing & Scripting Validation
Inventory Team
Input Method (Web Screen, Excel File, Paper, etc)
In-Process Inventory
INVENTORY MASTER
Inventory Creation & Input
Your Company
Your Industry
The Global MarketPlace

Figure 9

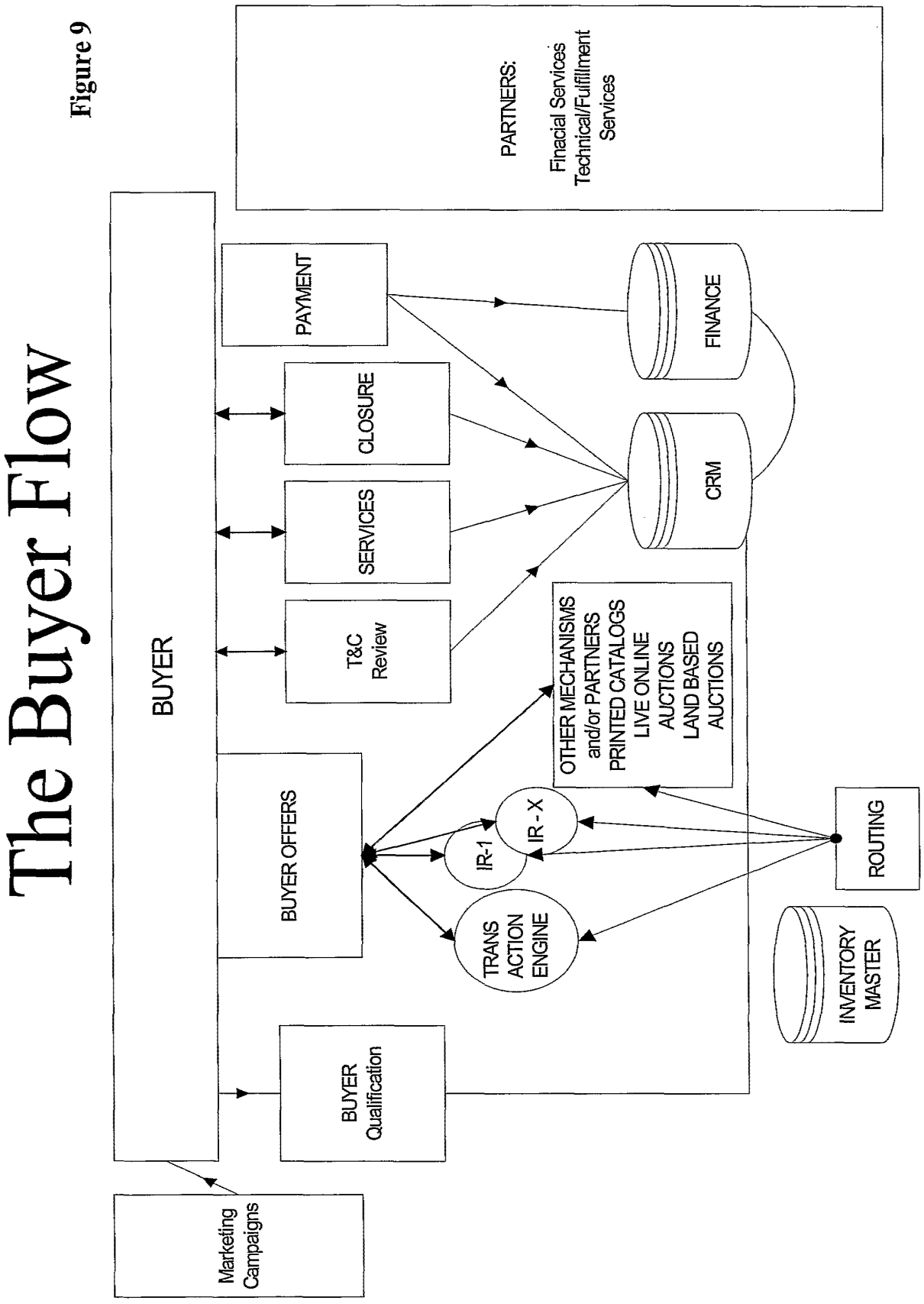

The Buyer Flow
PARTNERS:
Finacial Services
Technical/Fulfillment
Services
BUYER
PAYMENT
CLOSURE
SERVICES
T&C
Review
FINANCE
CRM
OTHER MECHANISMS
and/or PARTNERS
PRINTED CATALOGS
LIVE ONLINE
AUCTIONS
LAND BASED
AUCTIONS
BUYER OFFERS
IR-1
IR - X
TRANS
ACTION
ENGINE
ROUTING
INVENTORY
MASTER
BUYER
Qualification
Marketing
Campaigns

Figure 10

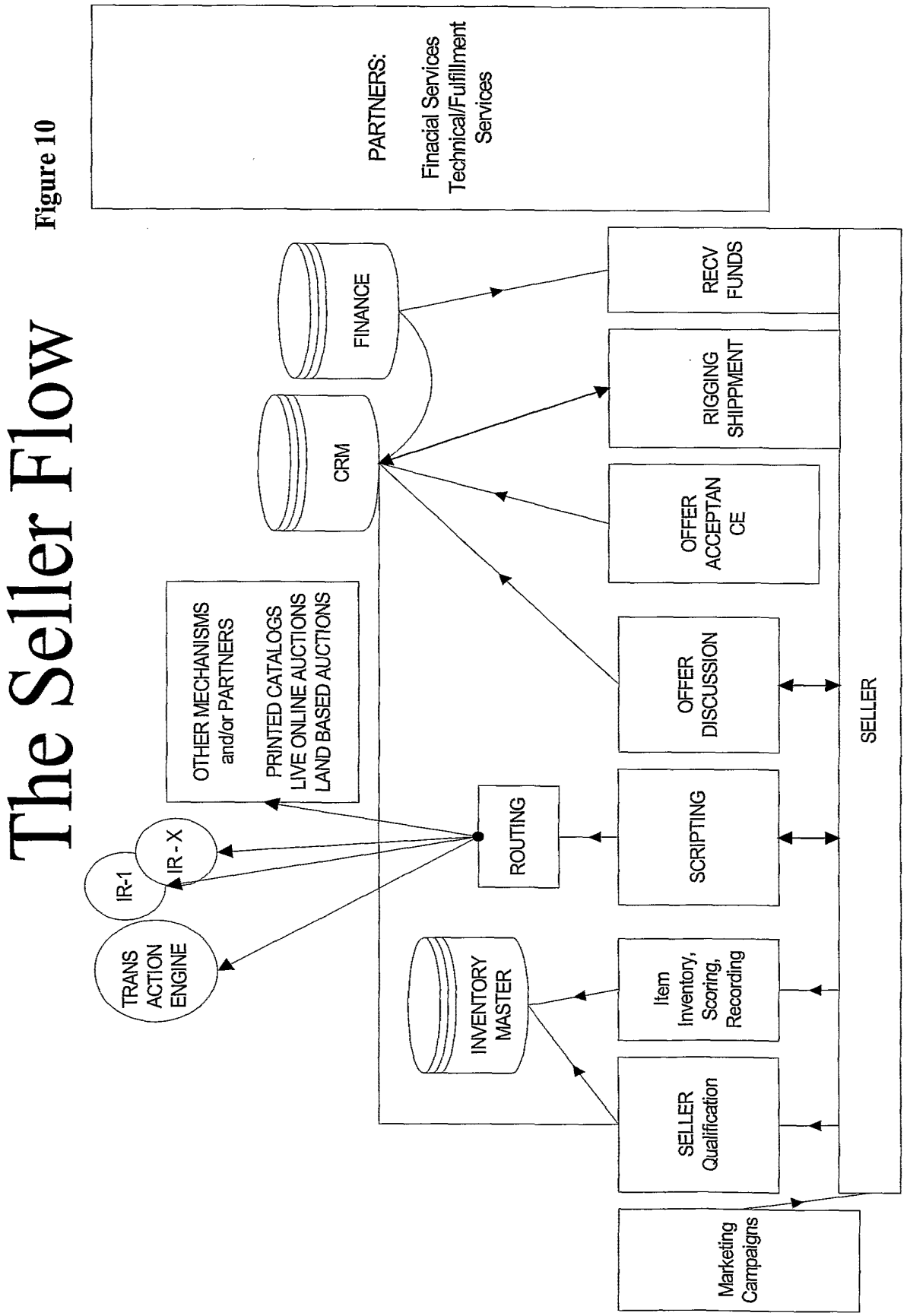
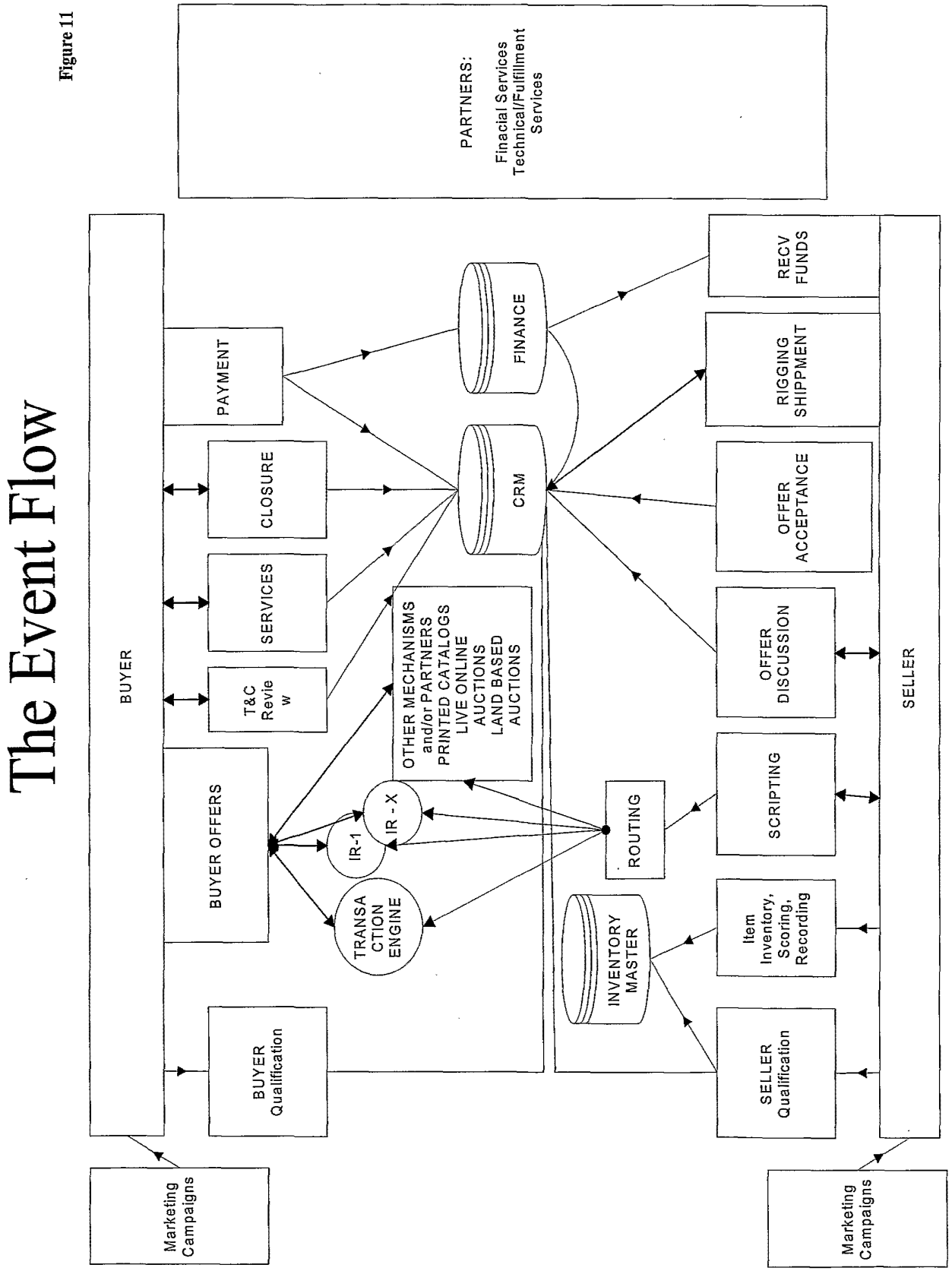

The Seller Flow
PARTNERS:
Finacial Services
Technical/Fulfillment
Services
FINANCE
CRM
OTHER MECHANISMS
and/or PARTNERS
PRINTED CATALOGS
LIVE ONLINE AUCTIONS
LAND BASED AUCTIONS
IR-1
IR - X
TRANS
ACTION
ENGINE
ROUTING
INVENTORY
MASTER
SELLER
Qualification
Item
Inventory,
Scoring,
Recording
SCRIPTING
OFFER
DISCUSSION
OFFER
ACCEPTAN
CE
RIGGING
SHIPPMENT
RECV
FUNDS
SELLER
Marketing
Campaigns

Figure 11


The Event Flow
PARTNERS:
Finacial Services
Technical/Fulfillment
Services
BUYER
PAYMENT
CLOSURE
SERVICES
T&C
Revie
w
BUYER OFFERS
BUYER
Qualification
Marketing
Campaigns
FINANCE
CRM
OTHER MECHANISMS
and/or PARTNERS
PRINTED CATALOGS
LIVE ONLINE
AUCTIONS
LAND BASED
AUCTIONS
IR-1
IR - X
TRANSA
CTION
ENGINE
ROUTING
INVENTORY
MASTER
RECV
FUNDS
RIGGING
SHIPPMENT
OFFER
ACCEPTANCE
OFFER
DISCUSSION
SCRIPTING
Item
Inventory,
Scoring,
Recording
SELLER
Qualification
SELLER
Marketing
Campaigns

MarketPlace Overview

Figure 12

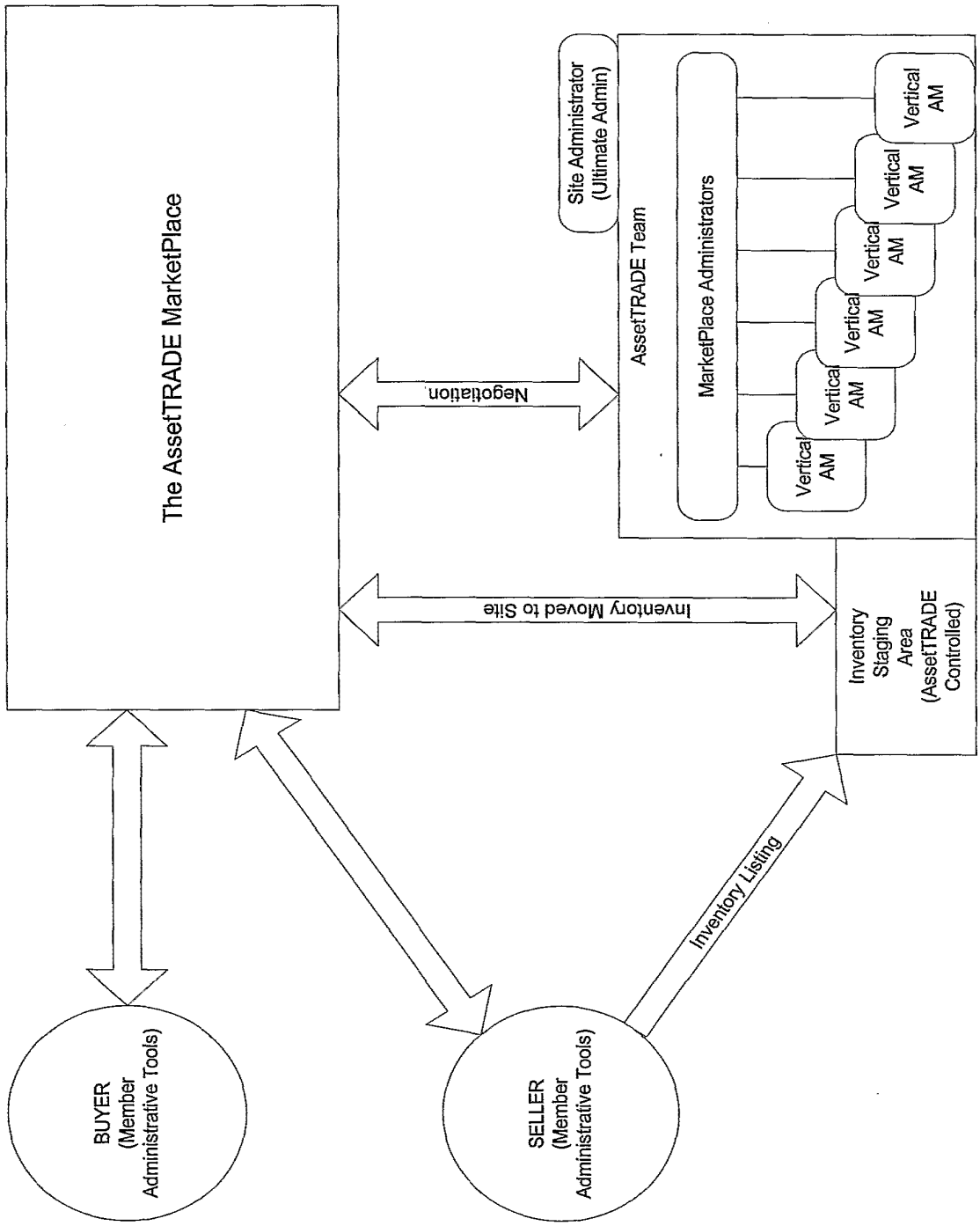


Figure 13

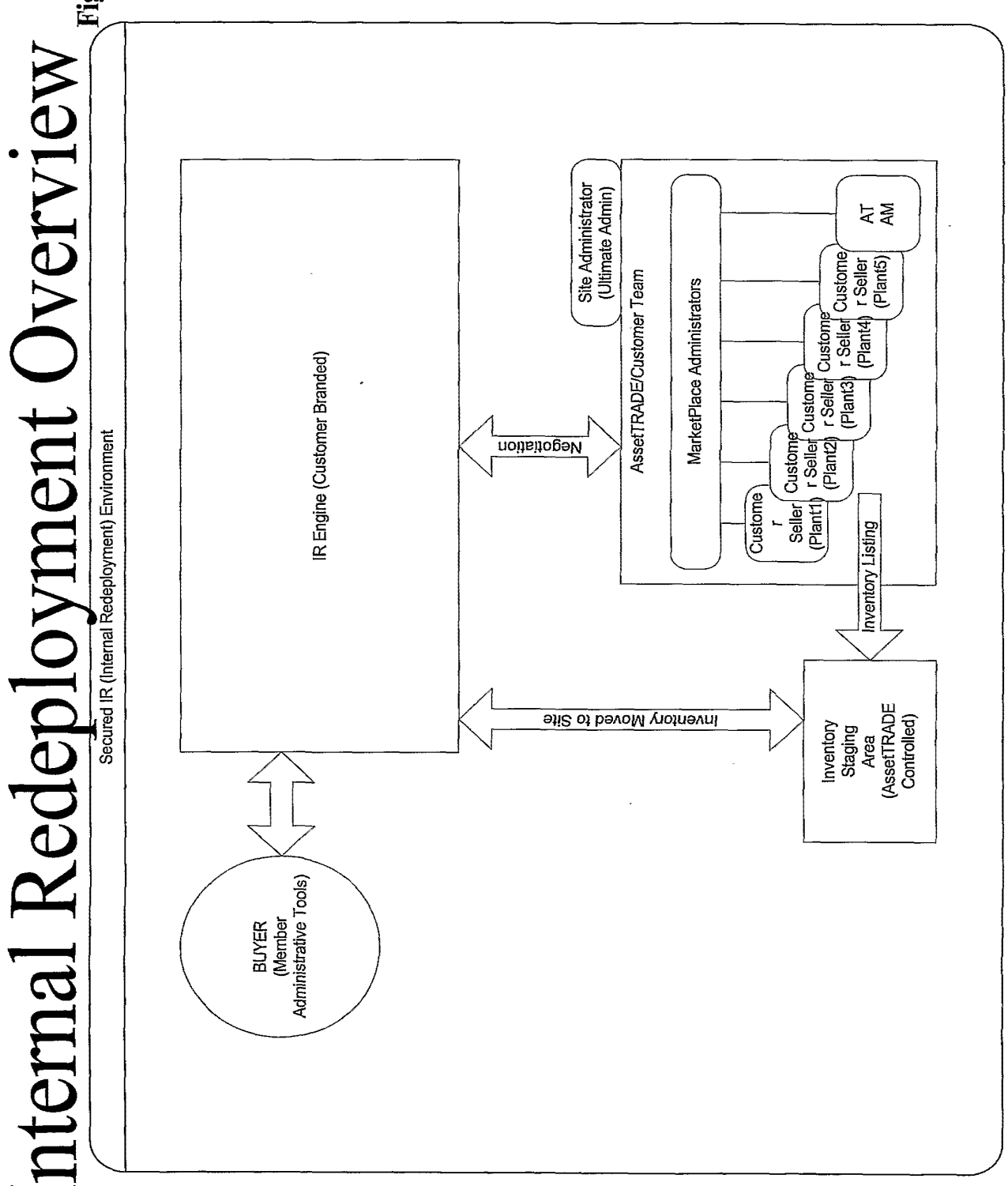

Internal Redeployment Overview
Secured IR (Internal Redeployment) Environment
IR Engine (Customer Branded)
Site Administrator (Ultimate Admin)
AssetTRADE/Customer Team
MarketPlace Administrators
Custome r Seller (Plant1)
Custome r Seller (Plant2)
Custome r Seller (Plant3)
Custome r Seller (Plant4)
Custome r Seller (Plant5)
AT AM
Negotiation
Inventory Listing
Inventory Moved to Site
Inventory Staging Area (AssetTRADE Controlled)
BUYER (Member Administrative Tools)

Figure 14

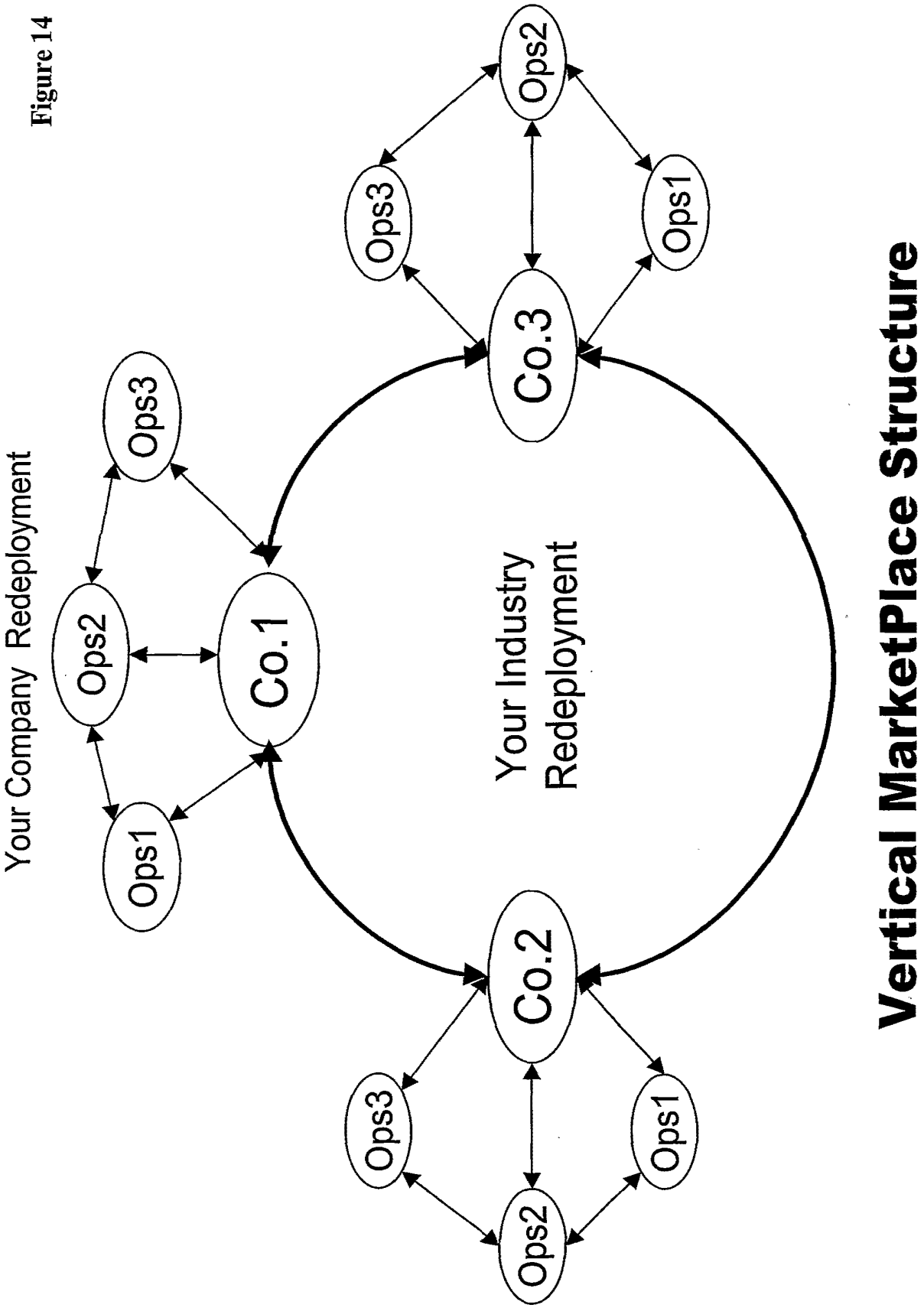
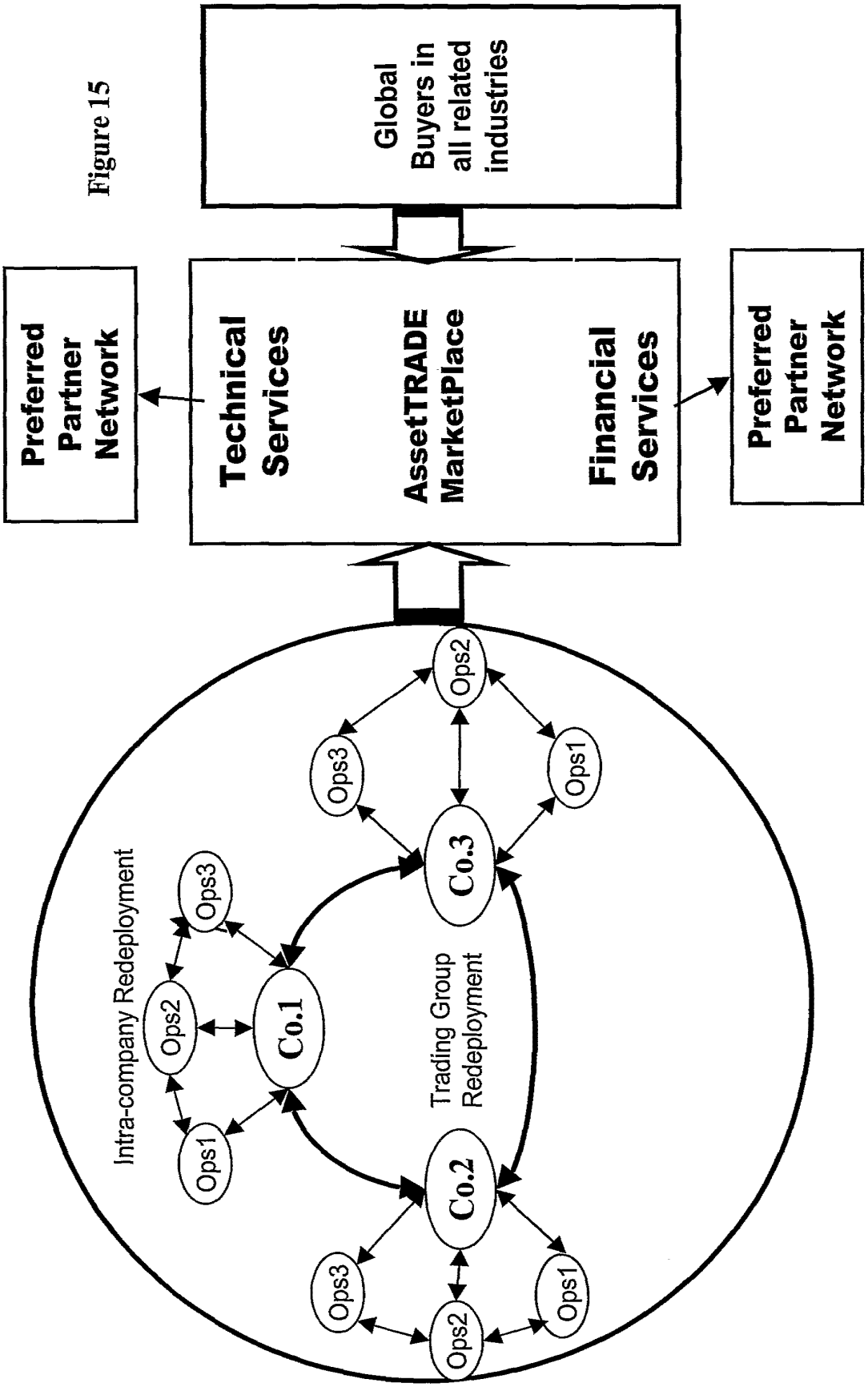

Vertical MarketPlace Structure
Your Company Redeployment
Your Industry Redeployment
Co.1
Co.2
Co.3
Ops1
Ops2
Ops3

Figure 15



AssetTRADE MarketPlace Structure

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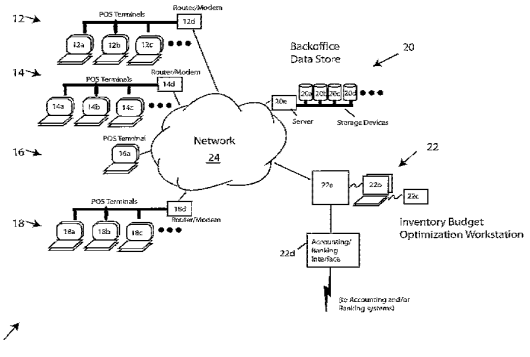
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(54) Title: METHODS AND APPARATUS FOR RETAIL INVENTORY BUDGET OPTIMIZATION AND GROSS PROFIT MAXIMIZATION



(57) Abstract: The invention provides methods and apparatus for determining optimum inventory allocations across retail stores and departments. According to one aspect of the invention, such methods include inputting an historical return on investment for each of plural merchandise departments and/or stores (collectively, "departments") in a retail enterprise. This return on investment can be, for example, a gross margin return on investment (GMROI) that is a function of the inventory allocated to each respective department in each of one or more prior periods, e.g., selling seasons, as well as the financial return achieved by that department based on that inventory. The method further includes determining inter-departmental (or inter-store) risks in the historical returns on investment (e.g.,GMROI's). This can be determined, for example, as a function of the covariance between the historical GMROI's of each pair of departments in the plurality of departments. Still further, the method includes determining an optimal allocation of inventory budget to each of the departments for a current or future time period, e.g., a current or future selling season. That optimization is determined by maximizing the total return (e.g., gross margin dollars, if GMROI is used as the return on investment measure) for those departments, as a whole, as a function of one or more constraints - at least one of which is a tolerance of risk in the return on investment (e.g., GMROI) for the plural departments, as a whole. That optimum allocation is displayed, according to the method, in a report to an general merchandise manager or other person. Alternatively, or in addition, the optimum allocation is used to fund accounts used by the departments to acquire inventory.

WO 2005/001615 A2

Methods And Apparatus For Retail Inventory Budget Optimization And Gross Profit Maximization

Background

This application claims the benefit of priority of United States Provisional Patent Application Serial No. 60/475,875, filed June 4, 2003, entitled "Applying Portfolio Management Ideas to Merchandising," the teachings of which are incorporated herein by reference.

The invention pertains to digital data processing and, more particularly, to determining an optimum allocation of inventory among retail stores or departments. The invention has application, by way of non-limiting example, in the fashion apparel trade, the department store trade, and other business that retail a variety of merchandises in several departments and/or several geographic locations.

Retailing can be an unpredictable business. This is especially true where fashion, fads or other volatile external factors drive purchasing decisions. Thus, for example, an article of clothing that is in vogue this month among teens may fall out of favor next month, only to become popular four months later among thirty-somethings.

To compensate for this, chain stores and other large retailers typically employ general merchandise managers (GMMs). These individuals are often responsible for setting overall merchandising strategy, ensuring that pricing, promotions and marketing improve the bottom line, e.g., in the face of changes in demand. GMMs are also responsible for allocating inventory budgets for the departments so that stock available throughout the buying season will meet but, preferably, not exceed demand.

To this end, typically a GMM (or CFO) is given an overall inventory budget. He is charged with maximizing the return on that budget while honoring constraints such as the minimum inventory investment needed for each department, e.g., due to traffic considerations, the extent of square footage that is available, and so on. Often the departmental allocations are based on the prior year's figures, modified to accommodate any inventory overruns or shortages that occurred, changes in pricing, and so forth. To the extent that GMMs take risk into account in any explicit manner, it is based on a gut feel about how each individual department is expected to fare in the upcoming season.

Uber Exhibit 1002 - p. 399
Uber Technologies, Inc. v. SurgeTech, LLC

An object of this invention is to provide improved methods of digital data processing and, particularly, for example, improved methods for determining optimum allocations of inventory among retail departments and/or geographic locations.

Yet another object is to provide such methods as can be implemented using historical retail data and conventional departmental constraints.

Still another object is to provide such methods as are applicable in a range of retailing environments, including fashion apparel retail.

Uber Exhibit 1002 - p. 400
Uber Technologies, Inc. v. SurgeTech, LLC

Summary

The aforementioned are among the objects attained by the invention which provides methods and apparatus for determining optimum inventory budget allocations across retail stores and departments. Those allocations can be used, for example, to generate reports (e.g., for use by a general merchandise manager or other personnel) and/or for funding inventory acquisition accounts.

According to one aspect of the invention, such methods include inputting an historical return on investment for each of plural merchandise departments and/or stores (collectively, "departments") in a retail enterprise. This return on investment can be, for example, a gross margin return on investment (GMROI) that is a function of the inventory allocated to each respective department in each of one or more prior periods, e.g., selling seasons, as well as the financial return achieved by that department based on that inventory.

The method further includes determining inter-departmental (or inter-store) risks in the historical returns on investment (e.g., GMROI's). This can be determined, for example, as a function of the covariance between the historical GMROI's of each pair of departments in the plurality of departments.

Still further, the method includes determining an optimal allocation of inventory budget to each of the departments for a current or future time period, e.g., a current or future selling season. That optimization is determined by maximizing the total return (e.g., gross margin dollars, if GMROI is used as the return on investment measure) for those departments, as a whole, as a function of one or more constraints — at least one of which is a tolerance of risk in the return on investment (e.g., GMROI) for the plural departments, as a whole. That optimum allocation is displayed, according to the method, in a report to an general merchandise manager or other person. Alternatively, or in addition, the allocation can be used (e.g., via an accounting and/or banking interface module) to fund accounts from which the departments acquire inventory.

Related aspects of the invention include methods as described above in which the optimal allocation is determined by executing an optimization tool, such as the Solver program in Microsoft Excel, on a digital data processor.

Further related aspects of the invention include methods as described in which the risk in a GMROI for the plural departments, as a whole, is determined as a function of (i) a candi-

Uber Exhibit 1002 - p. 401
Uber Technologies, Inc. v. SurgeTech, LLC

date allocation of inventory budgets to each of the departments, and (ii) covariance between historical GMROI's of each pair of departments in the plurality.

Other aspects of the invention include methods as described above in which the optimal allocation is determined as a function of constraints that include, not only tolerance of risk in return on investment (e.g., GMROI) for the plural departments, as a whole, but also one or more of the following: (i) a maximum budget for those plural departments, as a whole, (ii) a minimum allocation of inventory budget to one or more of the departments, and (iii) a maximum space required for inventory.

Yet still other aspects of the invention include methods of optimizing allocation of inventory budgets as described above in which at least the optimization step is executed on a digital data processor.

These and other aspects of the invention are evident in the drawings and in the description that follows.

Uber Exhibit 1002 - p. 402
Uber Technologies, Inc. v. SurgeTech, LLC

Brief Description of the Drawings

A more complete understanding of the invention may be attained by reference to the drawings, in which:

Figure 1 depicts a digital data processing system of the type in which the invention is embodied;

Figure 2 is a flowchart depicting steps performed in an optimization system according to one practice of the invention;

Figure 3 depicts a table of GMROIs used as an input to a system according to the invention;

Figure 4 depicts a table of covariances generated during execution of a system according to one practice of the invention; and

Figure 5 depicts a report produced by a system according to the invention.

Uber Exhibit 1002 - p. 403
Uber Technologies, Inc. v. SurgeTech, LLC

Detailed Description of Invention

Figure 1 depicts an environment in which the invention is practiced. While this may be a retailing enterprise of international, national, local (or other) scale, in the illustrated embodiment, the environment is a retail store 10 comprising (among other things) retail departments 12 – 18, "back office" data store 20, and inventory budget optimization workstation 22. These are interconnected for communication via a local area network 24, as illustrated.

Departments 12 – 18 represent conventional (or non-conventional) retail departments such as, by way of non-limiting example, apparel, housewares, jewelry, furniture, beauty, electronics, and so forth. Typically, these departments have separate inventories and inventory budgets. Moreover, the departments typically experience different monetary returns from sales, lending or leasing (collectively, "sales") of the respective inventories, e.g., on account of differences in costs, pricing and/or demand.

Although the text that follows largely addresses inventory budget allocation among merchandising departments within a single-store "enterprise," the invention is equally applicable to inventory budget allocation among stores (or across departments) within larger retail enterprise, e.g., of international, national or other scope. As above, these stores have separate inventories and inventory budgets. And, as above, the stores typically experience different monetary returns from sales of their respective inventories. In such environments, "departments" 12 – 18 represent those stores (or other retail outlets) and/or some or all of their constituent departments. In this regard, the term "retail sites" can be substituted for the term "departments" in this patent specification and the claims that follow. Likewise, the term "inter-site" can be substituted for the term "inter-departmental," and so forth.

In the drawing, each department is represented by one or more interconnected point of sale (POS) terminals 12a – 18c. These provide for inventory tracking and management, as well as for collection of monies from retail patrons at the time of sale. Though POS terminals are used for these purposes in the illustrated embodiment, it will be appreciated that in other embodiments these functions may be exercised by other mechanisms known in the art, automated or otherwise.

Back office data store 20 represents a repository of sales information from departments 12 – 18, as well as information regarding their inventory budgets, during prior time periods, e.g., fiscal years, selling seasons, and the like. This may be part of a general back office management function, e.g., that additionally includes overall corporate financial tracking and management, or otherwise. In the illustrated embodiment, the store 20 comprises storage devices

Uber Exhibit 1002 - p. 404
Uber Technologies, Inc. v. SurgeTech, LLC

20a – 20d, which are coupled to network 24, via server and/or database management system 20e. Information regarding sales from inventory is communicated from the POS terminals in each of the departments to store 20 via router/modems 12d, 14d, 16d, 18d and network 24, though in other embodiments that information may be communicated by other means. Of course, in some embodiments, data store 20 may be contained in or obtained from other, multiple and/or distributed sources.

Inventory budget optimization workstation 22 comprises a personal computer, workstation, mainframe or other digital data processing system of the type commonly available in the marketplace, as programmed in accord with the teachings hereof for determining optimum inventory allocations and reporting those allocations and/or funding inventory acquisition accounts. The workstation 22 comprises processor section 22a (comprising a central processing unit, dynamic storage, input/output control, and the like), a monitor, keyboard and other user input/output devices 22b, and printers or other output devices 22c, networked, or otherwise — again, all of the type commercially available in the marketplace.

The invention is based in part on the discovery that retail merchandise inventory investment decisions can be made by applying the otherwise unrelated theory of financial portfolio optimization. This capitalizes on a similarity not appreciated by artisans in either the retail merchandise inventory investment field or the portfolio management field. The inventor hereof has realized that problems in these two otherwise disparate fields have some commonality and that workstation 22 — or other digital data processing apparatus operating in accord with the invention — can be adapted to optimize retail merchandise inventory investment decisions (e.g., for reporting purposes and/or purposes of funding inventory accounts) for departments 12 – 18 using ideas from the theory of portfolio optimization.

Most notably, as discussed in detail below, workstation 22 models the merchandise inventory investment decision problem in a manner that reflects, not just return on inventory "investments" by each of departments 12 – 18, but also the risk associated with those "investments." By optimizing inventory investment decisions among all departments based on such a model, general merchandise mangers (GMMs), CFOs or other retail decision-makers (collectively, "general merchandise managers" or "GMMs"), can be made cognizant of and given the ability to manage the risk associated with their inventory allocation decisions, while maximizing their return on investment.

At the start of each planning period, the GMM is given a budget that has to be allocated among multiple departments. He is charged with maximizing the return on the budget while

Uber Exhibit 1002 - p. 405
Uber Technologies, Inc. v. SurgeTech, LLC

honoring constraints such as the minimum inventory investment needed for each department, e.g., due to traffic considerations, the extent of square footage that is available, and so on.

Comparing the considerations made by a GMM with those made by a conventional investment portfolio manager, it is clear that retail decision-makers don't think about risk in an explicit way, certainly, not in a quantitative way and, still more certainly, not in a quantitative way that takes into account how risks associated with department-level buying decisions add up to total risk for the overall retail inventory "investment." Rather, prior art retail decision-makers think about risk in an ill-defined, gut feel sort of way. This qualitative assessment is usually at the department level, not the overall store or enterprise level.

However, the inventor has realized that, given nature of retailing and especially, for example, the fickle nature of certain of its sectors (such as fashion apparel), a quantitative assessment of risk associated with inventory investments, at both departmental and store/enterprise levels, can facilitate optimizing allocation of inventory budgets.

To this end, analogizing to the financial world, the risk of allocating budgets to (or "investment" in) the inventory of a single retail department can be defined as the standard deviation of that department's percentage returns over time. Here, "return" is defined as the monetary recoupment from sales of the inventory by that department. That return is referred to below as "general merchandise return on investment" or "GMROI." It will be appreciated that the GMROI metric described below is merely one way to measure "return on investment." Those skilled in the art will appreciate that other metrics for return on investment may be used instead or in addition.

If the quarterly percentage return (GMROI) of, say, the Jewelry department for the past three years has been 80% every quarter, then the risk associated with that department is zero (since the returns are constant). On the other hand, if the quarterly returns are 98%, 64%, 142%, 153%, 136%, 101%, 111%, 147%, 72%, 85%, 130%, and 106%, then the mean return is 112% and the risk (i.e., standard deviation) is 81%. What this means is that roughly two-thirds of the time, the quarterly return of Jewelry department will be within 81% of the average return of 112%. More simply put, a department with fairly steady GMROI will have a lower GMROI risk compared to a department with high GMROI one year and terrible GMROI the next year.

Moving on to the calculation of risk of an inventory budget as a whole., i.e., the risk associated with multiple retail departments in a store or enterprise, inter-departmental covariance comes into play. This is a quantification of the notion that overall risk can be reduced by

Uber Exhibit 1002 - p. 406
Uber Technologies, Inc. v. SurgeTech, LLC

diversification — or, analogizing (again) to the financial world, that the total risk of an entire stock portfolio is less than the sum of the risks of the individual stocks.

The inventor has discovered that using pair-wise covariances is one way to calculate the risk of the retail inventory budget as a whole. If a certain pair of departments has a highly positive covariance, it means that historically their GMROIs tend to sink or swim together. If a department pair has a highly negative covariance, then when one does well, the other tends to do badly and vice-versa. Using these pair-wise historical GMROI covariances, the illustrated embodiment determines the GMROI risk of the retail inventory budget as a whole, i.e., across all departments.

Figure 2 is a flowchart showing steps executed by workstation 22 in optimizing the expected return of a portfolio of merchandise inventory investments — and, thereby, optimizing allocation of inventory budgets — for a current or future sales period, taking GMROI risk and other constraints of the retailer into consideration.

In step 30, the workstation accepts inputs for the budget optimization. These can be input by a user, operating keyboard 22b, loaded from a file on store 20, downloaded or obtained directly from the departments 12 – 18, or otherwise. In the illustrated embodiment, these include the GMROIs of the departments (for which budget optimization is being performed) for the prior planning periods; the total available budget for inventory across all departments for the current (or future) sales period (for which the optimization is being performed); and the average space intensity (i.e., square footage needed for every $1000 of inventory) for each retail department.

By way of example, the departmental GMROIs for prior periods could be the prior twelve quarterly GMROI for each department, as indicated in the table 50 in Figure 3. Of course, GMROIs for epochs other than quarters could be used, as could numbers of those epochs be other than twelve (though, for purposes of calculation, it is preferable to have the same number of epochs for each of the departments). And, of course, it will be appreciated that the specific departments identified in the table, and used throughout this disclosure, are merely examples.

In step 32, the workstation accepts constraints used in determining the budget optimization. Typically, these are input by a user, operating keyboard 22b, though the constraints may also be loaded from a file on store 20, downloaded or obtained directly from the departments 12 – 18, or otherwise. In the illustrated embodiment, the constraints include the tolerance of risk in the GMROI for the departments as a whole, i.e., the risk the GMM is willing to accept

Uber Exhibit 1002 - p. 407
Uber Technologies, Inc. v. SurgeTech, LLC

on investment of the entire budget amount across all of the retail departments 12 – 18. The constraints may also include the minimum inventory budget for each department (e.g., the minimum investment in inventory based on traffic considerations or otherwise); and, total available square footage for retailing. Other embodiments may utilize more or less constraints.

In step 34, the workstation determines historical GMROI covariances for each pair of departments as a means of determining interdepartmental risk. Such covariances can be determined in any manner known in the art, though, in the illustrated embodiment, they are computed using the relation:

$$Cov(X,Y) = \frac{1}{n}\sum_{1}^{n}(x_i - \mu_x)(y_i - \mu_y)$$

where,

Cov(X,Y) is the covariance between historical GMROIs for the pair of retail departments X and Y;

n is the number of prior historical GMROIs provided for each of the departments X and Y;

μ_x and μ_y are the means GMROIs of historical GMROIs provided for each of departments X and Y

Figure 4 is a table 60 of interdepartmental risks determined from the values in table 50 in accord with the above, i.e., table 60 is a table of pair-wise covariances.

In step 36, the workstation 22 determines the minimum overall budget, minimum retail square footage, and minimum risk necessary to satisfy the department traffic minimums. In the illustrated embodiment, the minimum overall budget in this regard is the total sum of the minimum investments in inventory for the departments based on traffic considerations. Likewise, the minimum retail square footage is the total sum of the products, for each department, of that department's minimum investment based on traffic considerations and that department's average space intensity. To determine the risk needed to satisfy the department traffic minimums, the workstation 22 of the illustrated embodiment performs a matrix multiplication of (i) an array containing the minimum investments in inventory for the departments, and (ii) the pair-wise covariance matrix represented by table 60. The resulting matrix is multiplied by a transpose of the array of minimum investments. The workstation 22 then takes the square root

Uber Exhibit 1002 - p. 408
Uber Technologies, Inc. v. SurgeTech, LLC

of the resulting value to yield a risk needed to satisfy the department traffic minimums. Those skilled in the art will appreciate that the minimum overall budget, retail square footage, and risk needed to satisfy the department traffic minimums may be determined in other ways.

In step 38, the workstation 22 initializes a general-purpose optimization tool that can solve quadratic programming problems here, the Solver program that is part of Microsoft Excel, in order to determine the optimum allocation of the total available budget among the plural departments while honoring the constraints. Those skilled in the art will appreciate that other optimization tools can be used instead (or in addition) in order to determine the maximization described below. However, in an embodiment in which the workstation 22 executes the Solver tool within an Excel spreadsheet to make that determination, this entails identifying the following:

- A cell defining the metric to maximized by the Solver (or other optimization tool). In the illustrated embodiment, that cell defines an expected gross-margin based on the total sum of the products, for each department, of that department's average historical GMROI and that department's candidate budget allocation (i.e., the allocation determined for that department by Solver during its execution in step 40).

- An array of cells defining the departments' respective candidate budget allocations. It is this array, as alluded to above, that is manipulated by Solver during its execution in step 40. This array is referred to below as the Decision Vector or dv.

- A cell defining the total investment in inventory for each set of candidate budget allocations made by Solver. In the illustrated embodiment, it defines the investment as the sum of the candidate budget allocations, i.e., a sum of the values in vector dv. It is used in defining a constraint to maximization of the gross margin by Solver, specifically, a constraint that limits the summed amount to being less than or equal to the total available budget input in step 30.

- A cell defining the total retail space required for each set of candidate budget allocations made by Solver. In the illustrated embodiment, it defines that space as the total sum of the products, for each department, of that department's candidate budget allocation and that department's average space intensity input in step 30. That cell is used in defining a constraint to maximization of the gross margin by Solver, specifically, a constraint that limits the total sum to being less than or equal to the total available square footage input in step 32.

Uber Exhibit 1002 - p. 409
Uber Technologies, Inc. v. SurgeTech, LLC

- A cell defining the total risk on investment for the departments, as a whole, based on each set of candidate budget allocations made by Solver. In the illustrated embodiment, it defines that risk in a calculation that entails: (i) performing a matrix multiplication of the array dv and the matrix represented by Table 60, (ii) multiplying the resulting matrix by the transpose of dv, (iii) taking the square root of the result of step (ii). That amount represented in that cell is used in defining a constraint to maximization of the gross margin by Solver, specifically, a constraint that limits that amount to being less than or equal to the tolerance of risk in the GMROI for the departments, as a whole, entered in step 32.

As part of step 38, the initialization also includes defining a constraint to maximization of the gross margin by Solver to insure that any of the specific departmental candidate budget allocations exceed the minimum inventory budget for each department entered in step 32.

In step 40, the optimization tool is executed in order to maximize gross margin in view of the constraints defined in step 38. Assuming a valid solution set exists, this results in an estimation of a maximum gross margin that can be attained for the departments, as a whole, given the defined constraints. At the same time, it results in the set of candidate budget allocations that achieve that maximum gross margin.

In step 42, this information can be output in a report for use by the GMM, CFO or other decision maker in determining budget allocations for the individual departments in the current or upcoming period. It can also be used to report estimated gross margins to be attained from that allocation. Alternatively, or in addition, the set of candidate budget allocations associated with the maximum gross margin drives an accounting and/or banking interface module 22d — shown in Figure 1 coupled to workstation 22, by way of non-limiting example — that automatically or semi-automatically funds (e.g., via e-commerce, electronic or other communications with accounting and/or banking systems, as indicated in the drawing) actual or virtual bank accounts from which the respective departments draw for purposes of inventory acquisition.

Turning to Figure 5, there is shown a report of the type generated in step 42 combining the information determined in step 40, as well as the inputs and constraints used in that determination and discussed above.

Referring to that figure, inputs made in Step 30 are denoted by cells 72 (total available budget for inventory across all departments for the current (or future) sales period) and 74 (average space intensity for each retail department). GMROIs of the departments for the prior planning periods are entered via another screen (not shown) or directly from a file, or other-

Uber Exhibit 1002 - p. 410
Uber Technologies, Inc. v. SurgeTech, LLC

wise, as discussed above. Likewise, constraints entered in Step 32 are denoted by cells 76 (tolerance of risk in the GMROI for the departments as a whole); 78 (minimum inventory budget for each department); and 80 (total available square footage for retailing).

Figure 5 additionally shows the results of determinations made in step 36. These are denoted by cells 82 – 86, displaying the minimum overall budget, retail square footage, and risk needed to satisfy the department traffic minimums, respectively. Likewise, it identifies cells utilized in connection with step 38, namely, 88 (cell defining gross margin metric to be maximized); 90 (the array of cells, dv, defining the departments' respective candidate budget allocations); 92 (cell defining the total investment in inventory for each set of candidate budget allocations); 94 (cell defining the total retail space required for each set of candidate budget allocations made); and 96 (cell defining the total risk on investment for the departments, as a whole, based on each set of candidate budget allocations).

An additional set of optimized financials, based on the foregoing, are shown in cells 98. The last of those figures, labelled Risk-Adjusted Return, equates with the so-called Sharpe Ratio used in financial portfolio management.

Those skilled in the art will appreciate that Figure 5 represents only one of many reports that can be produced with the figures generated in Step 40. In addition, a suitably equipped workstation 22 could utilize the optimum budget allocations determined in that step to update store/enterprise records, e.g., of the type maintained in store 20.

Described above are methods meeting the aforementioned objects. It will be appreciated that these are only some examples of the invention and that embodiments incorporating modifications thereto fall within the scope of the invention. Thus, for example, it will be appreciated that one or more of the steps described above can be performed other than by a digital data processor. Moreover, it will be appreciated that systems operating according to the invention can be used to optimize budgets for multiple planning periods extending into the store/enterprise future.

In view of the foregoing, what I claim is:

Uber Exhibit 1002 - p. 411
Uber Technologies, Inc. v. SurgeTech, LLC

1. A method of optimizing allocation of inventory budgets to each of plural merchandise departments and/or stores in a retail enterprise, the method comprising

A. inputting a historical return on investment by each of the plural departments and/or stores (collectively, "departments") in a retail enterprise, individually,

B. determining inter-departmental risks in the historical returns on investment for the plural departments,

C. determining an optimal allocation of inventory budget to at least one of the plural departments for a current or future time period by maximizing total return on investment for those departments, as a whole, where such maximization is a function of one or more constraints, at least one of which is a tolerance of risk in the return on investment for the plural departments, as a whole,

D. utilizing the optimum allocation determined in step (C) by any of (i) displaying that optimum allocation in a report to an general merchandise manager or other person, and (ii) funding one or more accounts for use by the departments in acquiring inventory.

2. The method of claim 1, comprising executing step (C) on a digital data processor.

3. The method of claim 2, wherein the maximizing step of step (C) comprises executing an optimization tool on the digital data processor.

4. The method of claim 1, wherein step (A) comprises inputting, as the historical return on investment by each of the plural departments, an historical gross margin return on investment (GMROI) of each of the plural departments, where the historical GMROI of each department is determined as function of (i) the inventory allocated to that department in each of one or more prior periods, and (ii) the gross margin earned by that department.

5. The method of claim 4, wherein step (B) comprises determining the inter-departmental risk in the historical returns on investment for the plural departments as a function of covariance between the historical GMROI's of each pair of departments in that plurality.

6. The method of claim 4, wherein step (C) comprises determining a risk in GMROI for the plural departments, as a whole.

Uber Exhibit 1002 - p. 412
Uber Technologies, Inc. v. SurgeTech, LLC

7. The method of claim 4, wherein step (C) comprises determining the risk in the GMROI plural departments, as a whole, as a function of (i) a candidate allocation of inventory budgets to those departments and (ii) covariance between historical GMROI's of each pair of departments in that plurality.

8. The method of claim 4, wherein step (C) includes maximizing a gross margin for the plural departments, as a whole, in view of constraints on at least one of (i) a maximum budget for those plural departments, as a whole, (ii) a minimum allocation of inventory budget to one or more of the departments, and (iii) a maximum space required for inventory.

9. The method of claim 1, wherein step (C) includes maximizing a rate of return for the plural departments, as a whole, in view of constraints on at least one of (i) a maximum budget for those plural departments, as a whole, (ii) a minimum allocation of inventory budget to one or more of the departments, and (iii) a maximum space required for inventory.

10. In a method of optimizing allocation of inventory budgets to each of a plural merchandise departments or stores in a retail enterprise that sell from inventory, the improvement comprising executing on a digital data processor the steps of

A. determining a covariance between historical returns on investment of each pair of departments and/or stores (collectively, "departments") in a retail enterprise in the plural departments,

B. determining an optimal allocation of inventory budgets to each of the plural departments by maximizing a return on investment for those departments, as a whole, in view of one or more constraints, at least one of which is a tolerance of risk in return on investment for the plural departments, as a whole, and

C. utilizing the optimum allocation determined in step (B) by any of (i) displaying that optimum allocation in a report to an general merchandise manager or other person, and (ii) funding one or more accounts for use by the departments in acquiring inventory.

11. In the method of claim 10, the further improvement wherein step (B) comprises determining the risk in return on investment for the plural departments, as a whole, as a function of (i) a candidate allocation of inventory budgets and (ii) the covariance

Uber Exhibit 1002 - p. 413
Uber Technologies, Inc. v. SurgeTech, LLC

between historical returns on investment of each pair of departments in the plural departments.

12. In the method of claim 11, the further improvement comprising executing steps (A) - (C) on a digital data processor.

13. In the method of claim 11, the further improvement wherein step (A) comprises determining, as the covariance between historical returns on investment of each pair of departments in the plural departments, a covariance between historical gross margin returns on investment (GMROI) of each pair of departments in the plural departments, where the historical GMROI of each department is determined as function of (i) the inventory allocated to that department in each of one or more prior periods, and (ii) the gross margin earned by that department

14. In the method of claim 13, the further improvement, wherein step (B) comprises determining the risk in return on investment for the plural departments as a whole as a function of (i) a candidate allocation of inventory budgets and (ii) the covariance between historical GMROI's of each pair of departments in the plural departments.

15. In the method of claim 10, the further improvement wherein the maximizing step of step (B) comprises executing an optimization tool on the digital data processor.

16. In the method of claim 10, the further improvement wherein step (B) includes maximizing the return on investment for the plural departments, as a whole, in view of constraints on at least one of (i) a maximum budget for the plurality of departments, as a whole, (ii) a minimum allocation of inventory budget to one or more of the departments, and (iii) a maximum space required for inventory.

Uber Exhibit 1002 - p. 414
Uber Technologies, Inc. v. SurgeTech, LLC

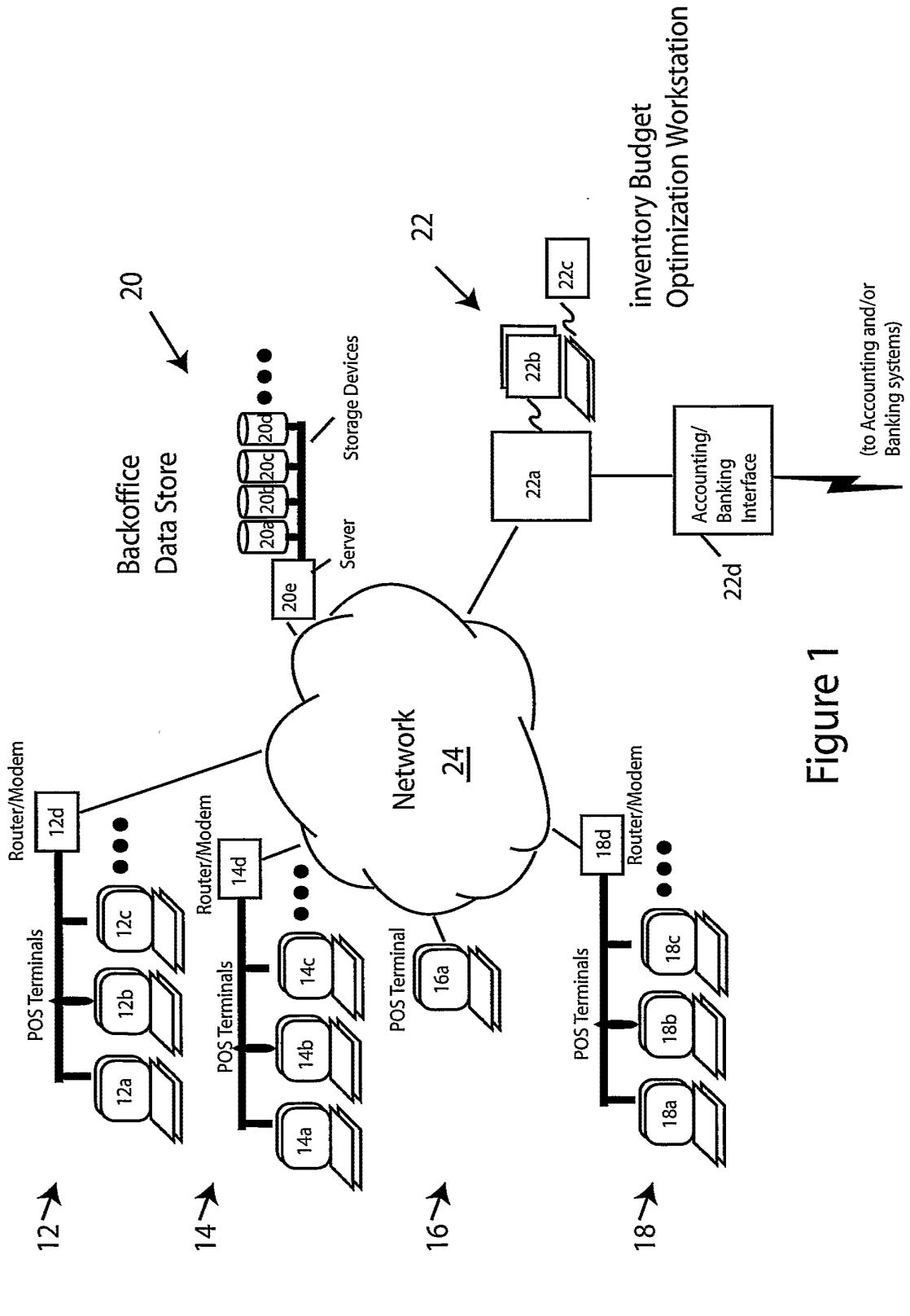


Figure 1

Uber Exhibit 1002 - p. 415
Uber Technologies, Inc. v. SurgeTech, LLC

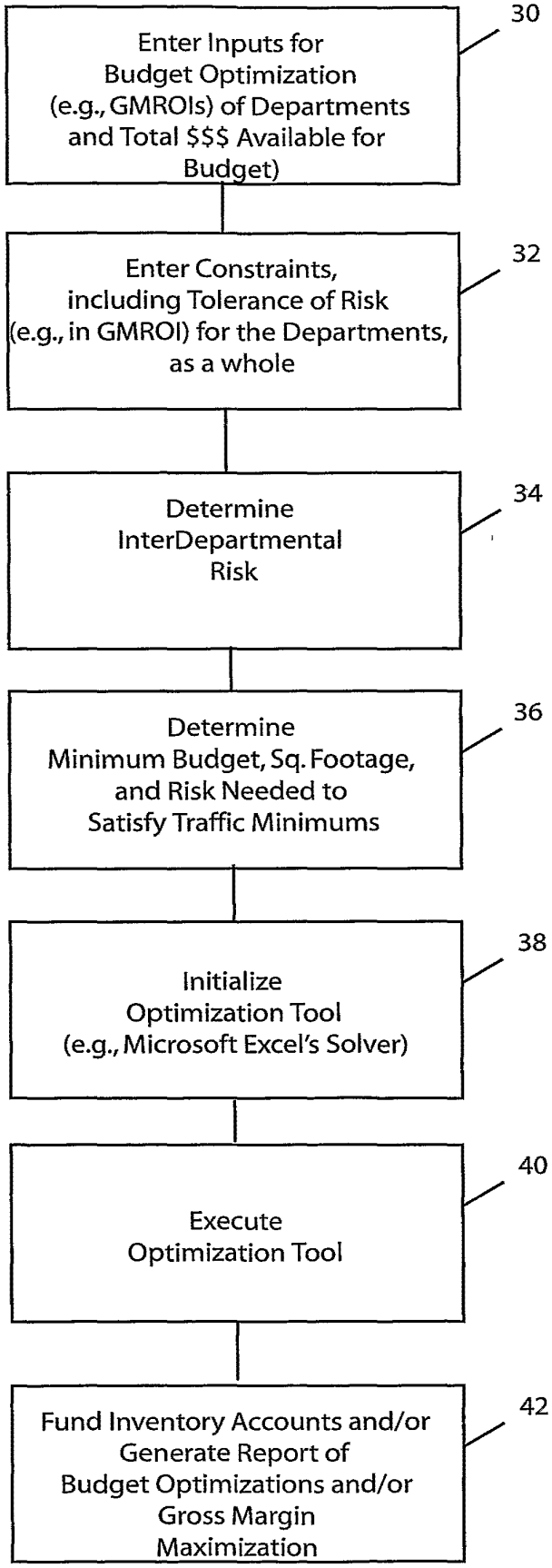


Figure 2

Uber Exhibit 1002 - p. 416
Uber Technologies, Inc. v. SurgeTech, LLC

50

	Q2-2000	Q3-2000	Q4-2000	Q1-2001	Q2-2001	Q3-2001	Q4-2001	Q1-2002	Q2-2002	Q3-2002	Q4-2002	Q1-2003
Apparel	235	121	183	106	260	259	264	263	193	277	297	227
Housewares	162	87	216	176	75	86	194	220	224	142	75	219
Jewelry	98	64	142	153	136	101	111	147	72	85	130	106
Furniture	90	67	106	69	76	69	60	113	88	61	96	53
Beauty	113	102	92	92	76	103	112	85	76	106	71	88
Electronics	106	109	78	106	78	107	128	100	104	93	119	84

Historical Departmental GMROIs

Figure 3

Uber Exhibit 1002 - p. 417
Uber Technologies, Inc. v. SurgeTech, LLC

60

	Apparel	*Housewares*	*Jewelry*	*Furniture*	*Beauty*	*Electronics*
Apparel	3423.6875	-630.833333	135.938	122.3333	-63.9167	62.75
Housewares	-630.8333	3428.888889	224.806	213.3333	36.25	-134.17
Jewelry	135.9375	224.8055556	807.743	221.4167	-136.417	-91.417
Furniture	122.33333	213.3333333	221.417	340.8333	-101.5	-27.583
Beauty	-63.91667	36.25	-136.417	-101.5	188.667	58
Electronics	62.75	-134.166667	-91.4167	-27.5833	58	218.667

Historical Indepartmental Risks (i.e., pair-wise covariances)

Figure 4

Uber Exhibit 1002 - p. 418
Uber Technologies, Inc. v. SurgeTech, LLC

Figure 5

Uber Exhibit 1002 - p. 419
Uber Technologies, Inc. v. SurgeTech, LLC

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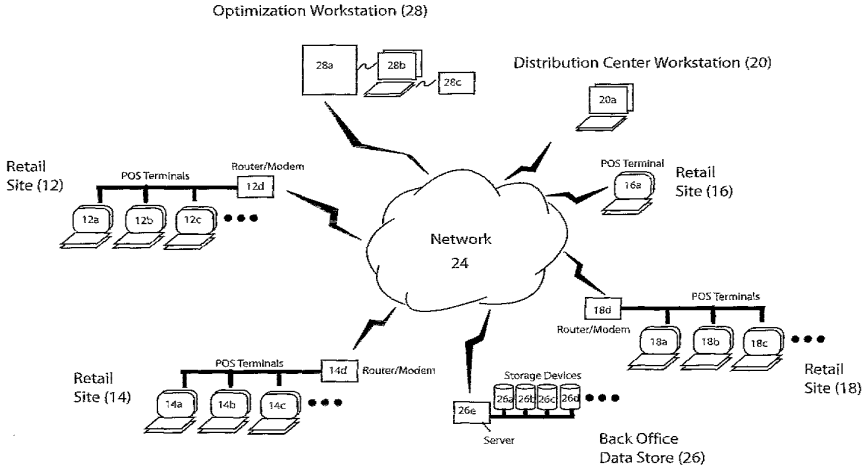
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(57) Abstract: The invention provides methods of, and systems for, optimizing the allocation of inventory to, and pricing of, goods sold by multiple retail sites, e.g., in a store, chain or other retail enterprise. Such a method includes generating a plurality of possible or "candidate" allocations of a given inventory among the multiple retail sites. That inventory can be, for example, a supply of the same or like goods at a distribution center that serves the retail sites. Each candidate allocation comprises an assignment of a respective share of that inventory to each of the sites. For each of the candidate allocations, an optimal price of the goods at *each* of the retail sites is estimated. The optimal price is one that will return an optimal gross margin to the respective site, given its assignment of the respective share of the inventory for the particular candidate allocation. For each of the candidate allocations, a sum is determined of the optimal gross margins across all the retail sites. From substantially all possible allocations, the candidate allocation that results in a largest total optimal gross margin is efficiently chosen.

WO 2005/010675 A2

METHODS AND APPARATUS FOR INVENTORY ALLOCATION AND PRICING

Background of the Invention

This application claims the benefit of priority of United States Provisional Patent Application Serial No. 60/487,546, filed July 15, 2003, entitled "Model for Optimizing In-Season Tactical Decisions," the teachings of which are incorporated by reference herein.

The invention pertains to digital data processing and, more particularly, to methods and apparatus for optimizing inventory allocations and pricing for goods sold by multiple retail sites, e.g., retail stores and/or departments. The invention has application, by way of non-limiting example, in facilitating in-season tactical decisions by retail chains and other enterprises.

In current practice, retail enterprises (e.g., national or regional retail chains) handle in-season allocations of on-hand inventory at distribution centers (DCs) to retail sites (e.g., stores or departments) in a simple way based on the sites' own respective on-hand inventory positions and recent sales histories. This process typically involves (i) adding up the DC's on-hand inventory and the sites' on-hand inventory positions to get the total on-hand inventory; (ii) assigning that total inventory to each site in proportion to that site's recent sales history, e.g., the last four weeks of sales (for example, a site that sold a large amount of inventory during the last four weeks will be assigned a large share of the total inventory); and (iii) adjusting this assignment with each site's on-hand inventory position. If a site's on-hand inventory is more than its assigned inventory (as determined in step (ii)), no additional inventory is allocated to that site. If it is less, the difference between the assigned and on-hand amounts is sent to the site.

More sophisticated systems handle in-season allocations differently: they may use a forward four-week sales forecast (as opposed to the last four weeks' of sales) to divide up the total inventory. Regardless, the in-season allocation decisions made by these prior art systems do not take sufficient account of the retail sites' ability to sell or otherwise dispose of inventory that is allocated to them via appropriate pricing actions.

An object of this invention is to provide improved methods and apparatus for facilitating in-season tactical decisions in retailing.

A more particular object is to provide such methods and apparatus as facilitate inventory allocations among retail sites (e.g., stores and/or departments) within a retail enterprise.

Uber Exhibit 1002 - p. 421
Uber Technologies, Inc. v. SurgeTech, LLC

A related object is to provide such methods and apparatus as take into account the retail sites' varying ability to sell or otherwise dispose of inventory that is allocated to them.

Another related object is to provide such methods and apparatus as facilitate pricing decisions in connection with inventory allocation.

Still another object is to provide such methods and apparatus as can be readily implemented in existing and future business process systems, automated or otherwise.

Uber Exhibit 1002 - p. 422
Uber Technologies, Inc. v. SurgeTech, LLC

Summary of the Invention

The foregoing objects are among those attained by the invention which provides, in some aspects, a methods of optimizing the allocation of inventory and pricing of goods sold by multiple retail sites (e.g., stores and/or departments) in a store, chain or other retail enterprise.

Such a method, according to one aspect of the invention, contemplates generating a plurality of possible or "candidate" allocations of a given inventory among the multiple retail sites. That inventory may be, for example, a supply of the same or like goods at a distribution center that serves the retail sites. Each candidate allocation comprises an assignment of a respective share of that inventory to each of the sites.

For each of the candidate allocations, an optimal price of the goods at *each* of the retail sites is estimated. The "optimal" price is one that will return an optimal gross margin (that is, a highest gross margin) to the respective site, given its assignment of a respective share of the inventory for the particular candidate allocation. The method also determines, for each of the candidate allocations, a sum of the optimal gross margins across all the retail sites. From this, the method choses as the "best" candidate allocation, i.e., that which results in a largest total of all optimal gross margin across all sites.

A report is generated, according to one aspect of the invention, showing the candidate allocation and, particularly, of one or more of the sites' respective assigned shares under that allocation. The report can likewise show the optimal prices determined for those share assignments.

Related aspects of the invention provide a method as described above in which the candidate allocations that are generated and used for estimating the optimal pricing comprise substantially all possible candidate allocations of the given inventory. This is achieved, according to some practices of the invention, by use of an optimization tool — for example, one that utilizes a non-linear programming model. Such a tool can be used to choose the allocation that results in a largest sum total optimal gross margin across all of the sites.

Other aspects of the invention provide methods as described above in which one or more of the per-site shares assigned under the chosen allocation and/or the corresponding per-site optimal pricing are used to effect picking, distribution and/or stocking of actual inventory to the retail sites, e.g., via communication with manual and/or automated inventory distribution systems.

Uber Exhibit 1002 - p. 423
Uber Technologies, Inc. v. SurgeTech, LLC

Still other aspects of the invention provide methods as described above in which the estimation of each site's optimal pricing takes into account, not only a share of the candidate allocation of inventory, but also the price elasticity of the goods, the seasonality of the goods and/or the cost of the goods. Yet still other aspects of the invention provide such methods in which the optimal per-site pricing is determined from the sum of (i) inventory already on-hand at that site (or otherwise previously allocated to that site) and (ii) that site's share of the candidate distribution.

Still further aspects of the invention provide methods as described above in which the estimation of optimal price at which the goods can be sold by a retail site is determined in accord with the relation:

$$\text{MarkdownPrice} = \left(\frac{B \times Seas}{OH + Alloc} \right)^{\frac{1}{Elas}} \times InitP$$

where,

MarkdownPrice is an estimate of the optimal price of the goods at the retail site;

B is the rate of sale of the goods at the initial price;

Seas is a sum of the seasonality indexes for the goods over the planned selling period at the retail site;

OH is the inventory of goods on-hand at the retail site;

Alloc is a quantity of goods in the share (of the total inventory) assigned to the retail site;

Elas is the price elasticity of the goods;

InitP is the initial price of the goods.

Yet still other aspects of the invention provide systems configured and operating in accord with the methods above. These and other aspects of the invention are evident in the drawings and in the text that follows.

Uber Exhibit 1002 - p. 424
Uber Technologies, Inc. v. SurgeTech, LLC

Brief Description

A more complete understanding of the invention may be attained by reference to the drawings, in which:

Figure 1 depicts a physical environment 10 in which the invention is practiced;

Figure 2 depicts a digital data processing environment 10 in which the invention is practiced;

Figure 3 depicts a spreadsheet-based embodiment of the invention;

Figure 4 depicts a relationship between gross margin per site and inventory; and

Figure 5 depicts how optimal revenues and cost of goods sold vary with increasing on-hand inventory at a retail site.

Uber Exhibit 1002 - p. 425
Uber Technologies, Inc. v. SurgeTech, LLC

Detailed Description of the Illustrated Embodiment

Figure 1 depicts a physical environment 10 in which the invention is practiced. In the illustrated embodiment, that environment is a retailing enterprise of international, national, local (or other) scale comprising retail sites 12 – 18, inventory distribution center (DC) 20 and enterprise headquarter 21. That retailing enterprise (in this case, retail stores) can be a "chain" of commonly named and owned stores, though, it may be a looser (or tighter) collection of related stores, that are presumably (though not necessarily) under common control or management. Moreover, although the retail sites depicted and discussed here are stores, they may also be departments or other retail outlets (physical, virtual, online, or otherwise).

Illustrated retail sites 12 – 18 are conventional (or non-conventional) retail outlets, such as, by way of non-limiting example, clothing stores, department stores, jewelry stores, furniture stores, beauty supply shops, consumer electronics stores, and so forth. These sites maintain separate inventories which may be stored on-hand and/or, optionally, in an associated warehousing facility (not shown), e.g., nearby to each respective retail site.

In the discussion that follows and without loss of generality, such inventory is referred to as "on-hand" at a particular site, regardless of whether it is actually maintained at that site or at another retail site (or warehousing facility), e.g., within the same region or "zone," with which it exchanges inventory. Inventory stored at the distribution center 20 is not deemed on-hand to any of the sites, except the distribution center itself.

Distribution center 20 maintains inventory for in-season distribution to the retail sites 20. That inventory can be distributed to the sites 20 via overland carrier, here, represented by truck 22 and roads 24, or via other means, such as via airways or waterways, or, depending on the nature of the goods, electronically. Though only one distribution center 20 is shown in the drawing, it will be appreciated that the invention has equal application in embodiments having multiple distribution centers.

To simplify the discussion that follows, the inventory stocked by distribution center 20 inventory is assumed to comprise only "similar" goods — i.e., goods of a single brand, style, size and color (e.g., mens' navy-colored Levi's® 517® loose boot cut jeans, waist 34, length 30). In this regard, the optimization workstation 28 (Figure 2) discussed below determines optimum in-season inventory allocation and markdown pricing of such "similar" goods to and by the retail sites 12 – 18. That optimum allocation and pricing is one that maximizes total gross margin to the retail enterprise (e.g., chain) for the sale (or other disposal) of those similar goods by the retail sites 12 – 18. In embodiments where the distribution center 20 stocks many vari-

Uber Exhibit 1002 - p. 426
Uber Technologies, Inc. v. SurgeTech, LLC

eties of goods, the optimization workstation 28 likewise, but separately, determines optimum in-season inventory allocation and/or markdown pricing for each other group of "similar" goods stocked by the DC 20.

Enterprise headquarters 21 represents any facility and/or functionality from which inventory allocation and/or pricing decisions are made. Though illustrated as being housed in a separate facility in the drawing, that headquarters may be cohoused and/or coextensive with one or more of the retail sites 12 – 18 and/or distribution center 20.

In the illustrated embodiment, the sites 12-21 are electronically linked for the transfer of information as indicated by the satellite dishes depicted atop the respective facilities. In practice, the transfer of information between and amongst locations 12 –22 may take place over any number of electronic and/or physical media known in the art, e.g., by way of non-limiting example, wireless and/or wired transmission over a WAN, Internet or other network 24, as shown in Figure 2.

More particularly, Figure 2 depicts a digital data processing environment 10 in which the invention is practiced. Here, the aforementioned information transfer is shown taking place over network 24, though, in practice other media can be used instead or in addition. Referring to the drawing, each retail site 12 – 18 includes one or more interconnected point of sale (POS) terminals 12a – 18c. These provide for inventory tracking, as well as for pricing and collection of monies from retail patrons at the time of sale. Though POS terminals are used for these purposes in the illustrated embodiment, it will be appreciated that in other embodiments these functions may be exercised by other mechanisms known in the art, automated or otherwise.

Distribution center 20 is includes a workstation 20a that tracks inventory at the center. This can be a personal computer, mainframe, other digital data processor or apparatus of the type known in the art for inventory tracking, as adapted for communication with optimization workstation 28, e.g., via a router, modem or other communications device (not shown), for practice of the inventions described herein. As shown in Figure 1, that workstation can form part of an automated inventory control system 20b.

Back office data store 26 represents a repository of inventory and sales information from retail sites 12 – 18, as well as inventory information from DC 20. This may be part of a general back office management function, e.g., that additionally includes overall corporate financial tracking and management, or otherwise. In the illustrated embodiment, the store 26 comprises storage devices 26a – 26d, which are coupled to network 24, via server and/or database management system 26e. Information regarding inventory and sales therefrom is com-

Uber Exhibit 1002 - p. 427
Uber Technologies, Inc. v. SurgeTech, LLC

municated from the POS terminals in each of the sites 12 –18 to data store 26 via router/modems 12d, 14d, 16d, 18d and network 24. Inventory information is likewise communicated from the DC workstation 20a, as discussed above, via network 24. Of course, in other embodiments information may be communicated among back office store 26, sites 12 – 18 and DC 20 by other means. And, in some embodiments, data store 20 may be contained in or obtained from other, multiple and/or distributed sources.

Optimization workstation 28 comprises a personal computer, workstation, mainframe or other digital data processing system of the type commonly available in the marketplace, as programmed in accord with the teachings hereof for optimizing in-season inventory allocations and/or markdown pricing as among DC 20 and retail sites 12 – 18. The workstation 28 comprises processor section 28a (comprising a central processing unit, dynamic storage, input/output control, and the like), a monitor, keyboard and other user input/output devices 28b, and printers or other output devices 28c, networked or otherwise — again, all of the type commercially available in the marketplace. The workstation 28 can be coupled for communications with back office data store 26, via network 24 or otherwise, to gather sales and inventory information from sites 12 – 18 and DC 20. Workstation 28 uses that information to determine optimal inventory allocations and/or pricing (as described below), to print reports for review and implementation by personnel acting on the enterprise's behalf, and/or to directly implement optimal allocation and/or pricing conclusions.

As noted previously, in the prior art, in-season tactical decisions relating to allocations and markdowns are made independently. This leads to significant loss in gross margin, e.g., because the allocation system and the markdown system may compensate for site-level performance in inconsistent ways.

Take, for example, a chain that utilizes chain-wide markdown pricing that is independent of allocation. If the pricing system, detects poor chain-wide sales performance of an item, it may effect (or recommend) an immediate chain-wide discount on that item in order to stimulate sales. When the allocation system detects high rates of sale (ROS) on that item by certain sites in the chain, it may effect (or recommend) an immediate allocation of inventory to those sites — notwithstanding that the recent markdown triggered the high ROS for some of these sites. In other words, the allocation system will not distinguish between sites with a high ROS caused by high "natural" demand and sites that have a high ROS due to "markdown induced" demand. For another example, a site may have a high ROS (in total) over the last 4 weeks, but this high total may mask the fact that the most recent one or two weeks may have been very slow. If this is the case, the pricing system would be likely to recommend a markdown very soon, leading to a situation where the allocation system is sending merchandise to stores that

Uber Exhibit 1002 - p. 428
Uber Technologies, Inc. v. SurgeTech, LLC

are about to take markdowns. The end result: the allocation system sends merchandise to the wrong sites.

Put another way, when the markdown and allocation systems act independently, "weak" stores get merchandise that should have gone to "strong" stores. Particularly, the weak stores get merchandise they should not have received in the first place, and they have to mark down it down to get rid of it. Further, when pricing is performed at the chain level, the strong stores have to mark down the merchandise, as well, even though they can move the merchandise without doing so. The end result is a loss of gross margin dollars.

If markdown pricing by the chain effected at the retail site level (or at some level below chain level), the mis-allocation problems caused by the independence of prior art markdown and allocation system are further exacerbated. In site-level pricing, prices (and therefore margins) may vary from site-to-site. However, since prior art allocation systems do not take margins into account, they may send more merchandise to low-margin stores and less merchandise to high-margin stores. This can be referred to as "margin leak." This is in addition to the consequences described above for the chain-level pricing case. In other words, even if the allocation system is smart enough to feed the strong sites and starve the weak sites, if it does not take margins into account, it may end up feeding low-margin strong stores at the expense of high-margin strong stores.

With respect to markdown pricing, prior art site-level pricing systems may make markdown recommendations taking into account only site-level on-hand inventory positions. They do not take into account that inventory which the independent allocation system will recommend sending to the sites in the near future. The result may be a recommendation for no markdown, even though a large shipment is due to arrive soon. When that happens, it may prove necessary to cut prices drastically to clear the merchandise.

These problems are avoided in systems according to the invention, which jointly optimize in-season allocations and markdowns taking into account, for example, (i) retail site-level (or zone-level) on-hand inventory positions, prices and margins, and (ii) on-hand inventory positions at the distribution center. Strong stores are allocated inventory instead of the weak stores so that they can sell it at higher margins. In the case of chain-level pricing, markdown recommendations are not triggered prematurely. While in the case of site-level pricing (or, again, when pricing is made at some level below the chain level), markdowns are made in conjunction with allocation decisions. In all cases, gross margin is optimized.

Uber Exhibit 1002 - p. 429
Uber Technologies, Inc. v. SurgeTech, LLC

It will be appreciated that simply providing visibility from the allocation system into the markdown system, and *vice versa*, does not solve the problems raised by the prior art wholly satisfactorily due to a chicken-and-egg nature of the pricing and allocation problem. For example, knowing a big shipment will arrive next week at a retail site may help the markdown system make a better recommendation for that store. However, it raises a further question: should the allocation system have even sent merchandise to that store in the first place?

The inventor has discovered that the correct way to solve this problem is to view allocation and markdown decisions as part of a single problem. This permits solutions that jointly optimize both decisions. To get some insight into this, the essence of the problem is demonstrated in the following example.

Assume a retail enterprise sells just one type of good and has two retail sites, A and B, each with some units of inventory on-hand selling at current prices that are, possibly, already marked down. Also assume that the sites take inventory from a single distribution center, with exactly one unit of the good in its on-hand inventory. The question is how to set the price of the good at the respective retail sites for the coming week and how to allocate the single unit of inventory (from the distribution center) between the sites so as to maximize total gross margin to the enterprise.

Option A is to allocate the single unit at the DC to retail site A. The optimal markdown required to maximize gross margin for each site is then independently determined, e.g., in the conventional manner known in the art. The sum total of those maximum gross margins is referred to as GM-A. Option B, alternatively, is to allocate the single unit at the DC to retail site B. Again, the optimal markdown required to maximize gross margin for each site is independently determined. The sum total of those gross margins is referred to as GM-B. In this simple example, if GM-A is greater than GM-B, Option A is selected as the one that optimizes enterprise gross margin. Otherwise, Option B is selected.

As evident here, given a specific allocation of distribution center inventory to the sites, solving the joint problem of allocation and pricing involves solving a markdown optimization problem for each site independently. Conceptually, this direct approach can be summarized as involving the following steps:

1. Listing all (or substantially all) possible allocations of DC inventory to the sites;

2. For every listed allocation:

Uber Exhibit 1002 - p. 430
Uber Technologies, Inc. v. SurgeTech, LLC

i. Independently determining, for each site, the markdown that optimizes the gross margin for that site;

ii. Adding up the optimal gross margins across all sites to get the total enterprise gross margin for the given allocation.

3. Picking the allocation (and corresponding markdown determinations) that results in the highest total enterprise gross margin.

While the approach outlined above is conceptually sound, it glosses over a serious impediment to putting it into practice: the number of possible allocations (i.e., creating the list referred to in the very first step of the approach above) is large even for small problems. As an example, for a single distribution center with 100 units of on-hand inventory and ten stores, the number of possible allocations to the stores is over 10^{100} (i.e., 10 to the 100th power). Moreover, for each of these allocations, it is necessary to determine ten times the markdown that optimizes the individual site gross margin (one determination for each of the stores). The problem is compounded as the size of the on-hand inventory at the distribution center, the number of retail sites served by the distribution center, and the number of different types of goods increases. For example, it is not uncommon for on-hand inventories at distribution centers to be in the hundreds of thousands and the number of retail sites served by a distribution center to be in the hundreds.

To overcome the impracticality of the direct approach described above but still attain the same objective, the inventor has realized a practical approach that can be effected in two steps:

1. Given a candidate allocation of inventory as between the retail sites, estimate the optimal markdown price recommendation — that is, the recommendation that maximizes gross margin for that site (given its share of the candidate allocation) — preferably, without extensive computation. Repeat this step, if and as necessary, to cover all desired candidate allocations.

2. Pick the candidate allocation from step 1 that maximizes the sum total gross margin for all sites without explicitly considering every possible candidate allocation. This implicit and efficient consideration of every possible candidate allocation is made possible by the use of advanced mathematical techniques.

Uber Exhibit 1002 - p. 431
Uber Technologies, Inc. v. SurgeTech, LLC

Figure 3 depicts an embodiment of the invention in accord with this approach. The embodiment comprises a Microsoft Excel spreadsheet 40, as described below, executing on optimization workstation 28 (Figure 2). Those skilled in the art will appreciate that such spreadsheets provide a combined declarative and procedural programming platform and that other platforms (e.g., purely procedural, purely declarative, a combination thereof, or otherwise) or can be used instead, or in addition, based on the teachings herein. In the drawing, selected cells of the spreadsheet are designated by dark rectangles and are discussed below.

The spreadsheet 40 includes a first input section 40a wherein retail chain-level specifics of the goods are provided. In the illustrated embodiment, this includes unit cost of the goods (here, labelled, "unit cost of item"), initial price of the goods, salvage value of the goods, and on-hand inventory at the distribution center (DC). Other embodiments may utilize greater or fewer chain-level inputs. As used in this paragraph, "chain" refers to any group of retail sites serviced by a common distribution center or centers. Depending on use, this may be an entire international, national, regional or local chain. It may also be a subset of such a chain. Values in section 40a may be supplied by the user or operator of workstation 28, they may also be supplied automatically, e.g., by batch download or otherwise, from back office data store 26, or otherwise.

Illustrated spreadsheet 40 includes a second input section 40b wherein site-level specifics of the goods are provided for each of the sites, here, labelled by way of non-limiting example "Store 1" – "Store 5." Those specifics include current on-hand inventory of the goods at each site, sum of seasonality indices for the goods at each site for the planned selling period, price elasticity of the goods at each site, estimate of base demand for the goods at each site, and current price of the goods at each site. Other embodiments may utilize greater or fewer site-level inputs. As above, values in section 40a may be supplied by the user or operator of workstation 28. They may also be supplied automatically, e.g., by batch download or otherwise, from back office data store 26, or otherwise.

Optimization and output section 40c of spreadsheet 40 utilizes values in the input sections 40a, 40b to determine an optimal allocation of inventory to the retail sites that maximizes chain-wide gross margin. Again, here, the term "chain" refers to any group of retail sites serviced by a common distribution center or centers.

Section 40c comprises cells 42a – 42e for storing candidate and final allocations of inventory from the DC to the sites. The values of these cells can be set by the user or otherwise, though, in the illustrated embodiment they are set by optimization tool discussed below.

Uber Exhibit 1002 - p. 432
Uber Technologies, Inc. v. SurgeTech, LLC

Cells 44a – 44e comprise price markdown functionality that determines, for a given or final allocation to a site (as reflected in cells 42a – 42e, respectively), a price markdown that would optimize the gross margin to that site. In the illustrated embodiment, each cell 44a – 44e determines the respective price markdown as a function of the candidate allocation, price elasticity of the good at the site, the seasonality of the good at the site and the cost of the good — though fewer or greater input factors may be taken into account.

In the illustrated embodiment, each cell 44a – 44e is implemented as an Excel formula, as set forth below, though other programmatic methods could be used instead or in addition:

$$\text{MarkdownPrice} = \left(\frac{B \times Seas}{OH + Alloc}\right)^{\frac{1}{Elas}} \times InitP$$

where,

MarkdownPrice is an estimate of the optimal price of the goods at the retail site;

B is the rate of sale of the goods at the initial price;

Seas is a sum of the seasonality indexes for the goods over the planned selling period at the retail site;

OH is the inventory of goods on-hand at the retail site;

Alloc is a quantity of goods in the share (of the total inventory) assigned to the retail site;

Elas is the price elasticity of the goods;

InitP is the initial price of the goods.

Though site-level price elasticities and seasonalities are used in the illustrated embodiment, as noted above, they are not required or used in other practices of the invention. However, as will be evident to those skilled in the art, the inclusion of such elasticities and seasonalities means that practices of the invention that use them can exploit site-level variations in buying behavior. Thus, for example, sites that serve price-insensitive customers can be treated very differently from stores that server price-sensitive shoppers. Other things being

Uber Exhibit 1002 - p. 433
Uber Technologies, Inc. v. SurgeTech, LLC

equal, this permits capturing incremental margin by diverting merchandise from low-elasticity stores to high-elasticity stores.

Cells 46a – 46e of the illustrated embodiment determine the optimal gross margin to each site corresponding to the optimal markdown price and candidate allocation in cells 44a – 44e and cells 42a –42e, respectively. In the illustrated embodiment, this is expressed by the following relation:

Optimized Gross Margin Per Site = (Optimized MarkdownPrice – Cost of Good) x (On-Hand Inventory + Candidate Allocation from DC)

The relations represented in cells 44a – 44e and 46a – 46e are essentially a low-overhead shortcut to answering the question of how the optimal markdown price and corresponding per-site gross margin can be estimated as a function of a candidate on-hand inventory level. Those relations can be used to capture the relationship graphically illustrated in Figure 4. That drawing shows how the optimal gross margin for each retail site varies as a function of the inventory of goods sold by that site.

To better understand the curve of Figure 4, it is useful to look at how optimal revenues and cost of goods sold vary with increasing on-hand inventory. This is shown in Figure 5. As the on-hand inventory gets bigger and bigger (given a fixed number of weeks in the planned selling period), the optimal markdown must get deeper and deeper to clear the inventory. Assuming a price elasticity greater than one, with every price cut, revenues increase. But as the price gets very small, the incremental increase in revenue is very little so the revenue curve flattens out. On the other hand, as the on-hand inventory gets bigger and bigger, the cost of those goods increases linearly.

Since the gross margin per site is the difference between revenues and cost of goods sold, the optimal gross margin versus inventory curve is the difference between the revenue curve and the cost curve. Intuitively, when the incremental gain in revenue starts to fall below the unit cost, the per site gross margin curve turns down and when the price falls below unit cost, the gross margin curve goes negative.

Cell 48 is a sum of cells 46a – 46e and represents the overall chain or enterprise gross margin. In the illustrated embodiment, cell 48 is configured as the target of a general-purpose optimization tool that utilizes a non-linear programming model to simultaneously find the combination of candidate allocations and optimized per-site gross margins, represented by cells

Uber Exhibit 1002 - p. 434
Uber Technologies, Inc. v. SurgeTech, LLC

42a – 42e and 46a – 46e, respectively, which maximizes sum cell 48. This model implicitly considers every possible allocation of DC on-hand inventory to the stores and approximates the optimal site-level markdown recommendations and optimal gross margin for every allocation.

The optimization tool of the illustrated embodiment is the Solver program, which is part of Microsoft Excel, though other optimization tools can be used in addition or instead. Here, Solver is configured to maximize cell 48 by changing the candidate allocations in cells 42a – 42e, subject to the constraint that total allocated inventory (i.e., the sum of cells 42a – 42e) does not exceed the inventory on-hand at the distribution center and, where applicable, to the constraint that the allocation is of integer (or other valid) allocable quantities of the good from the DC.

The end result of execution of the optimization tool (e.g., Solver) are suggested per-site allocations (stored in cells 42a – 42e), suggested optimized price markdowns (stored in cells 44a – 44e) and an estimate of the overall, chain-level gross margin attainable by that allocation and pricing. The latter is reflected in cell 48, as shown in the drawing. In the illustrated embodiments, this information is presented in a report, e.g., of the type reflected by spreadsheet 40 of Figure 2, for use by the chain (or other enterprise) inventory manager or other personnel in allocating inventory and setting prices.

In other embodiments, the allocations and optimized price markdowns generated by the optimization tool are transmitted by workstation 28 to the distribution center workstation 20, e.g., via network 24. The workstation 20 controls automated inventory system 20b, e.g., for automatic picking of goods off shelving in accord with those allocations and placing it on truck 22 (or other delivery mechanisms) for transfer to the retail sites 12 – 18. This, too, can be governed automatically, e.g., through routing or other control of the distribution mechanisms. Once at those sites, workstation 20 or retail site digital data processors can similarly govern unloading and stocking of the inventory into on-hand shelving (not shown). Simultaneously, workstation 28 can control pricing of the goods at the sites 12 – 18, e.g., through transmission of price markdown information to the POS terminals, radio frequency identification (RFID) pricing displays and/or or other price indicating mechanisms.

Described above are systems and methods attaining the desired objects. It will be appreciated that the illustrated embodiment is merely an example of the invention and that other embodiments incorporating changes therein fall within the scope of the invention. In view thereof, what I claim is:

Uber Exhibit 1002 - p. 435
Uber Technologies, Inc. v. SurgeTech, LLC

Claims

1. A method of pricing of goods by, and allocation of a given inventory of goods to, a plurality of retail sites, the method comprising

A. for each of a plurality of candidate allocations of the given inventory among the plurality of retail sites, where each candidate allocation comprises assignment of a respective share of the given inventory to each of the plurality of sites, performing the steps of

i. estimating an optimal price of the goods at each retail site, which optimal price will return an optimal gross margin to that site in view of its assignment of the respective share of the inventory,

ii. determining, for the plurality of sites, the sum of the optimal gross margins determined in step (i),

B. choosing the candidate allocation that results in a maximum sum of optimal gross margins,

C. displaying in a report to an inventory manager or pricing manager or other person at least one of

(i) at least one site's respective share of the candidate allocation of inventory chosen in step (B), and

(ii) the optimal price associated with at least one site's respective share of the candidate allocation of inventory chosen in step (B).

2. The method of claim 1, wherein step (A) comprises performing steps (A)(i) – (A)(ii) for substantially all possible candidate allocations of the given inventory among the retail sites.

3. The method of claim 1, wherein step (A) includes utilizing an optimization tool that generates the plurality of candidate allocations by varying assignment of respective shares of the given inventory to the plurality of retail sites.

Uber Exhibit 1002 - p. 436
Uber Technologies, Inc. v. SurgeTech, LLC

4. The method of claim 3, wherein step (B) includes utilizing the optimization tool to choose the candidate allocation that results in the maximum sum of optimal gross margins.

5. The method of claim 1, wherein step (A)(i) includes taking elasticity of the goods, seasonality of the goods and cost of the goods into account in estimating the optimal price of the goods at each retail site for its respective share of the inventory.

6. The method of claim 5, wherein step (A)(i) includes taking into account inventory on-hand, or otherwise previously allocated to, a retail site in estimating the optimal price of the goods at each retail site.

7. The method of claim 6, wherein step (A)(i) includes estimating the optimal price of the goods at each retail site as a function of the relation

$$\text{MarkdownPrice} = \left(\frac{B \times Seas}{OH + Alloc}\right)^{\frac{1}{Elas}} \times InitP$$

where,

MarkdownPrice is an estimate of the optimal price of the goods at the retail site;

B is a rate of sale of the goods at an initial price of the goods;

Seas is a sum of seasonality indexes for the goods over a planned selling period at the retail site;

OH is an inventory of goods on-hand at the retail site;

Alloc is a quantity of goods in the respective share assigned to the retail site;

Elas is a price elasticity of the goods;

InitP is the initial price of the goods.

8. A method of pricing of goods by, and allocation of a given inventory of goods to, a plurality of retail sites, the method comprising

Uber Exhibit 1002 - p. 437
Uber Technologies, Inc. v. SurgeTech, LLC

A. with an optimization tool, performing the steps of

(i) generating a plurality of candidate allocations of the given inventory among the plurality of retail sites, where each candidate allocation comprises assignment of a respective share of the given inventory to each of the plurality of sites,

(ii) for each of the plurality of candidate allocations, estimating an optimal price for the goods at each retail site which will return an optimal gross margin to that site in view of its assignment of the respective share of the inventory,

B. determining, for the plurality of sites, the sum of the optimal gross margins determined in step (A)(i),

C. choosing the candidate allocation that results in a maximum sum of optimal gross margins.

9. The method of claim 8, comprising providing functionality for estimating a said optimal price for the goods at a said retail site for a said assignment of a said respective share of the inventory, and invoking that functionality with the optimization tool in order to estimate the said optimal prices for the said retail sites.

10. The method of claim 8, comprising displaying in a report to an inventory manager or pricing manager or other person at least one of

(i) at least one site's respective share of the candidate allocation of inventory chosen in step (B), and

(ii) the optimal price associated with at least one site's respective share of the candidate allocation of inventory chosen in step (B).

11. The method of claim 8, wherein step (A)(i) comprises generating the plurality of candidate allocations to cover substantially all possible candidate allocations of the given inventory among the retail sites.

12. The method of claim 8, wherein step (B) includes utilizing the optimization tool to choose the candidate allocation that results in the maximum sum of optimal gross margins.

Uber Exhibit 1002 - p. 438
Uber Technologies, Inc. v. SurgeTech, LLC

13. The method of claim 8, wherein step (A)(ii) includes estimating the optimal price of the goods at each retail site as a function of the relation

$$\text{MarkdownPrice} = \left(\frac{B \times Seas}{OH + Alloc}\right)^{\frac{1}{Elas}} \times InitP$$

where,

MarkdownPrice is an estimate of the optimal price of the goods at the retail site;

B is a rate of sale of the goods at an initial price of the goods;

Seas is a sum of seasonality indexes for the goods over a planned selling period at the retail site;

OH is an inventory of goods on-hand at the retail site;

Alloc is a quantity of goods in the respective share assigned to the retail site;

Elas is a price elasticity of the goods;

InitP is the initial price of the goods.

14. In a method of automated inventory control, the improvement comprising

A. for each of a plurality of candidate allocations of the given inventory among the plurality of retail sites, where each candidate allocation comprises assignment of a respective share of the given inventory to each of the plurality of sites, performing the steps of

i. estimating an optimal price of the goods at each retail site, which optimal price will return an optimal gross margin to that site in view of its assignment of the respective share of the inventory,

ii. determining, for the plurality of sites, the sum of the optimal gross margins determined in step (i),

B. choosing the candidate allocation that results in a maximum sum of optimal gross margins,

Uber Exhibit 1002 - p. 439
Uber Technologies, Inc. v. SurgeTech, LLC

C. transmitting an indication of at least one site's respective share of the candidate allocation of inventory chosen in step (B) and/or the optimal price associated therewith for purposes of automatic control of at least one of pricing, picking, distribution, and stocking of the goods with respect to that site.

15. The method of claim 14, wherein step (A) comprises performing steps (A)(i) – (A)(ii) for substantially all possible candidate allocations of the given inventory among the retail sites.

16. The method of claim 14, wherein step (A) includes utilizing an optimization tool that generates the plurality of candidate allocations by varying assignment of respective shares of the given inventory to the plurality of retail sites.

17. The method of claim 16, wherein step (B) includes utilizing the optimization tool to choose the candidate allocation that results in the maximum sum of optimal gross margins.

18. The method of claim 14, wherein step (A)(i) includes taking elasticity of the goods, seasonality of the goods and cost of the goods into account in estimating the optimal price of the goods at each retail site for the respective share of the inventory.

19. The method of claim 18, wherein step (A)(i) includes taking into account inventory on-hand, or otherwise previously allocated to, a retail site in estimating the optimal price of the goods at each retail site.

20. The method of claim 19, wherein step (A)(i) includes estimating the optimal price of the goods at each retail site as a function of the relation

$$\text{MarkdownPrice} = \left(\frac{B \times Seas}{OH + Alloc}\right)^{\frac{1}{Elas}} \times InitP$$

where,

MarkdownPrice is an estimate of the optimal price of the goods at the retail site;

B is a rate of sale of the goods at an initial price of the goods;

Uber Exhibit 1002 - p. 440
Uber Technologies, Inc. v. SurgeTech, LLC

Seas is a sum of seasonality indexes for the goods over a planned selling period at the retail site;

OH is an inventory of goods on-hand at the retail site;

Alloc is a quantity of goods in the respective share assigned to the retail site;

Elas is a price elasticity of the goods;

InitP is the initial price of the goods.

Uber Exhibit 1002 - p. 441
Uber Technologies, Inc. v. SurgeTech, LLC

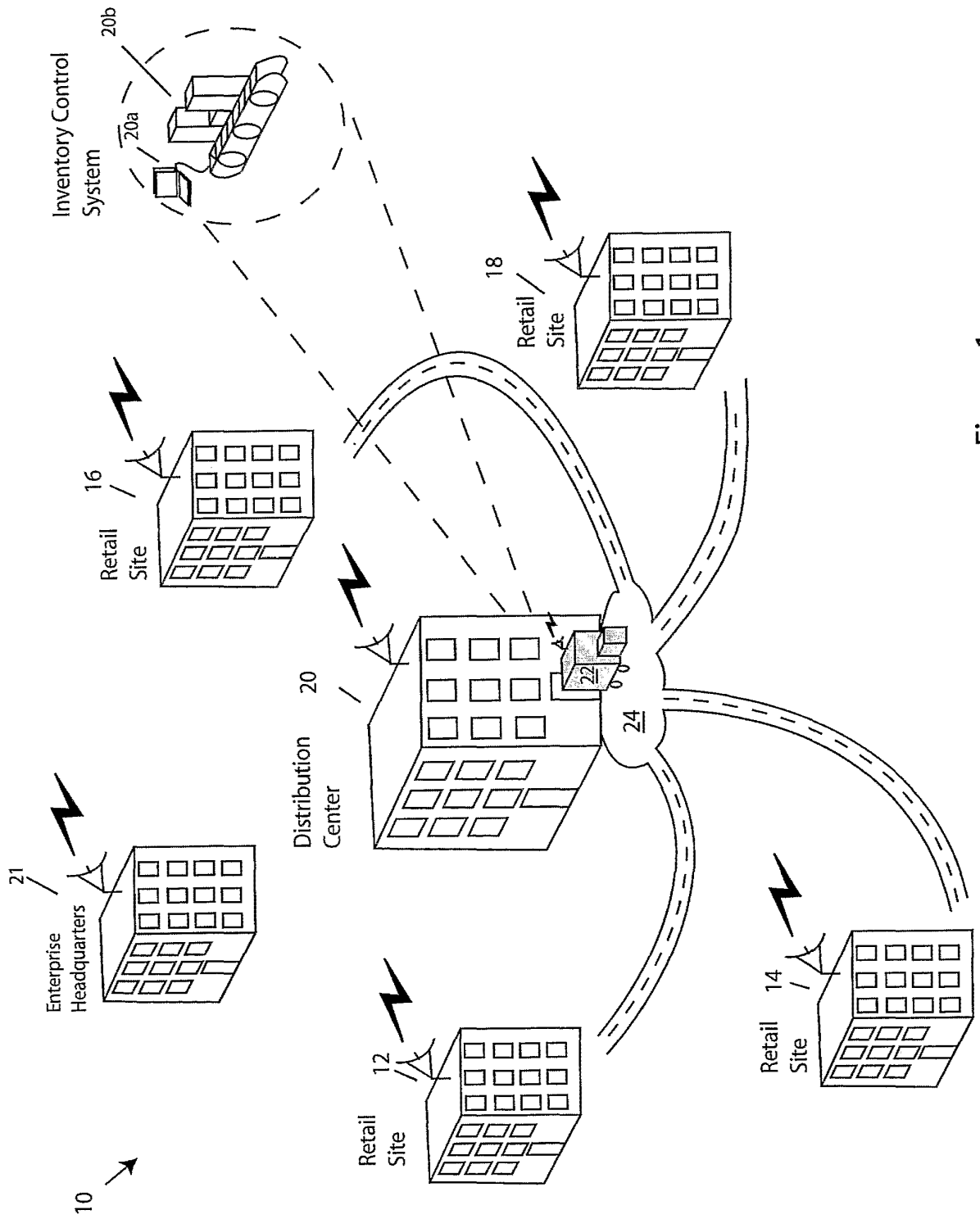

Inventory Control System
20b
20a
18
Retail Site
16
Retail Site
20
Distribution Center
22
24
21
Enterprise Headquarters
12
Retail Site
14
Retail Site
10

Figure 1

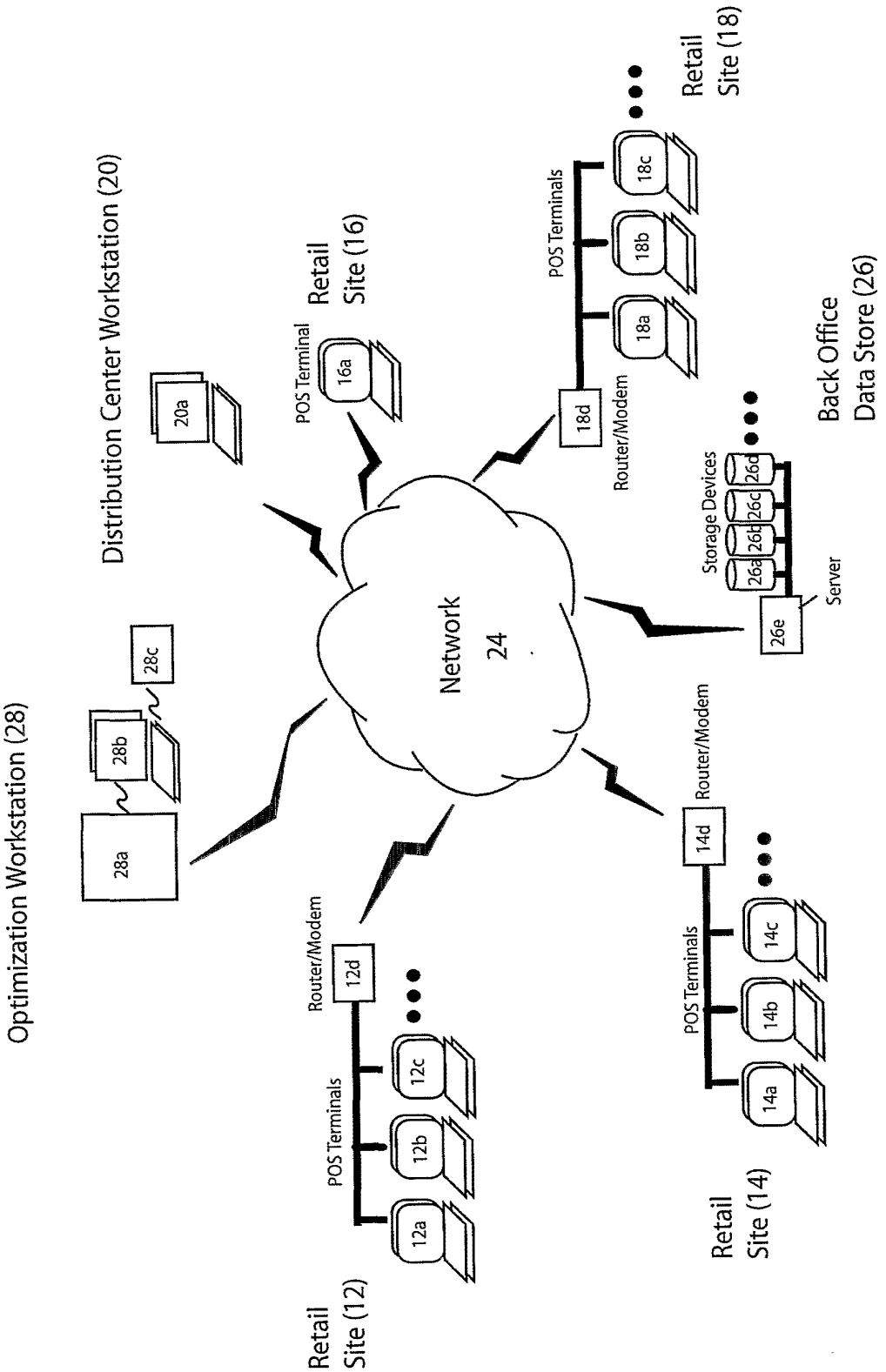

Optimization Workstation (28)
28a
28b
28c
Distribution Center Workstation (20)
20a
Network
24
Retail
Site (16)
POS Terminal
16a
Retail
Site (18)
POS Terminals
18a
18b
18c
Router/Modem
18d
Back Office
Data Store (26)
Storage Devices
26a
26b
26c
26d
Server
26e
Retail
Site (12)
Router/Modem
12d
POS Terminals
12a
12b
12c
Retail
Site (14)
Router/Modem
14d
POS Terminals
14a
14b
14c

Figure 2

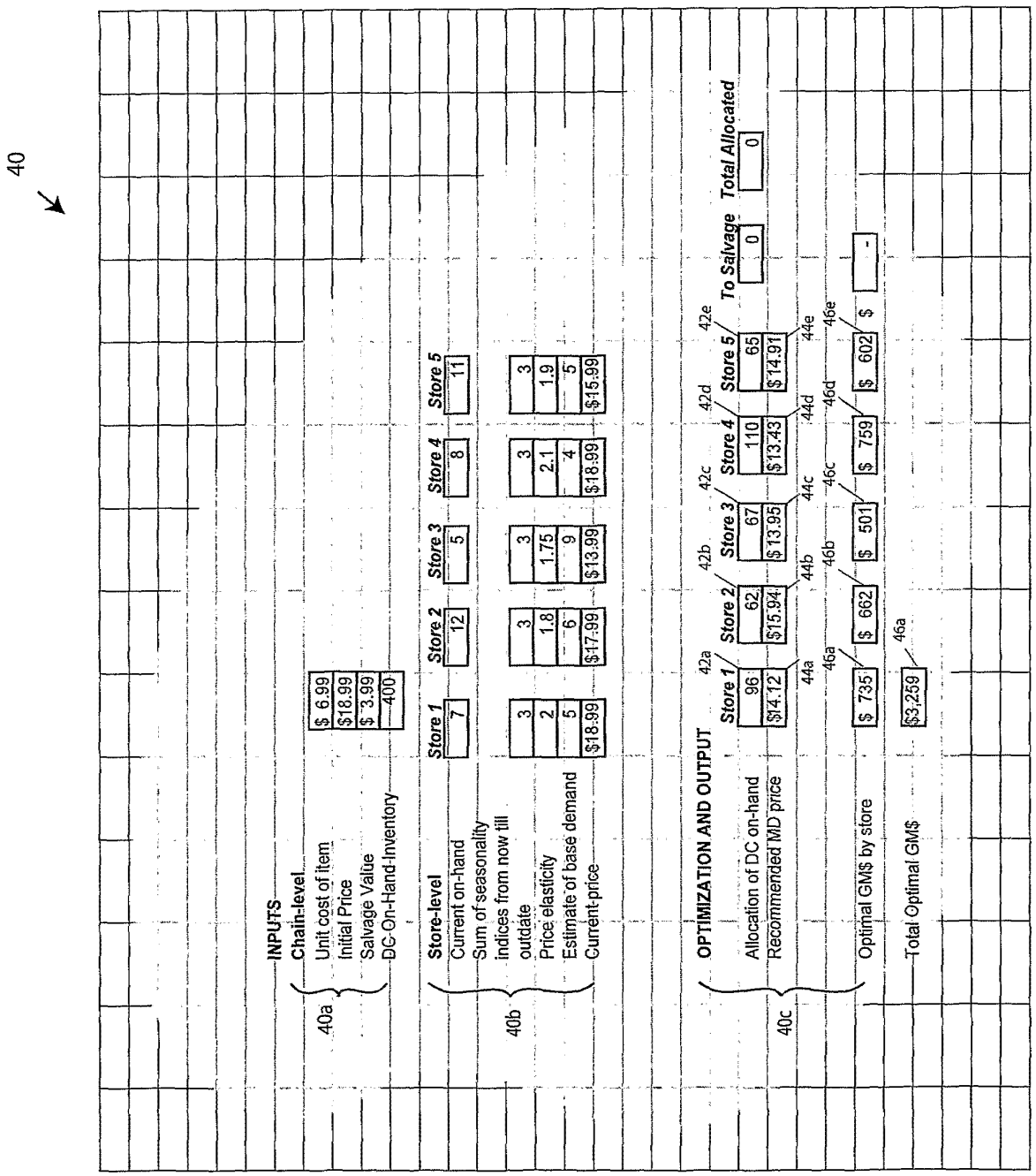

40
INPUTS
Chain-level
40a
Unit cost of item $ 6.99
Initial Price $18.99
Salvage Value $ 3.99
DC On-Hand-Inventory 400
Store-level
40b
Store 1 Store 2 Store 3 Store 4 Store 5
Current on-hand 7 12 5 8 11
Sum of seasonality indices from now till outdate 3 3 3 3 3
2 1.8 1.75 2.1 1.9
Price elasticity 5 6 9 4 5
Estimate of base demand $18.99 $17.99 $13.99 $18.99 $15.99
Current price
OPTIMIZATION AND OUTPUT
40c
Store 1 42a Store 2 42b Store 3 42c Store 4 42d Store 5 42e To Salvage Total Allocated
Allocation of DC on-hand 96 62 67 110 65 0 0
Recommended MD price $14.12 $15.94 $13.95 $13.43 $14.91
44a 44b 44c 44d 44e
Optimal GM$ by store $ 735 $ 662 $ 501 $ 759 $ 602 $ -
46a 46b 46c 46d 46e
Total Optimal GM$ $3,259
46a

Figure 3

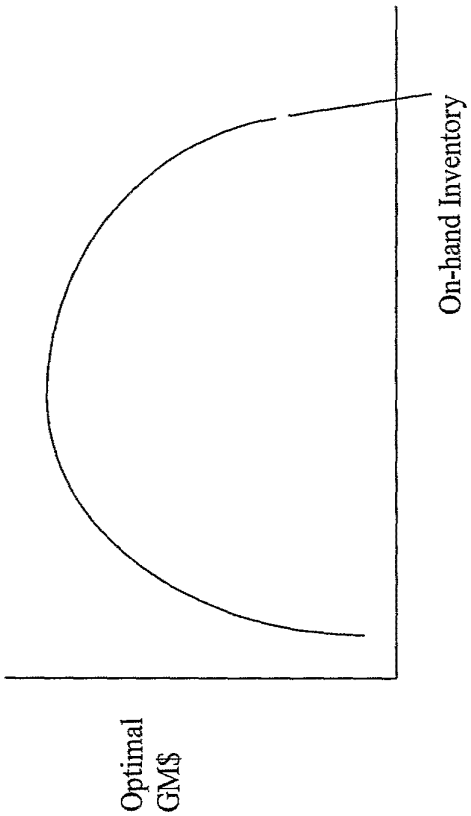


Figure 4

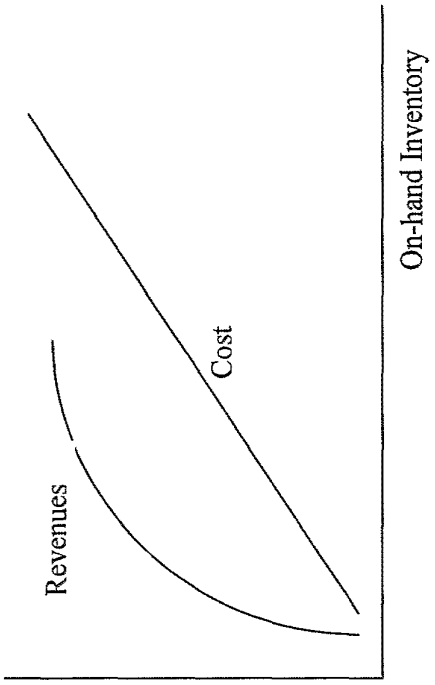


Figure 5

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference ALL02.001I	**FOR FURTHER ACTION**	See Form PCT/IPEA/416
International application No. **PCT**/AU2007/000684	International filing date *(day/month/year)* 18 May 2007	Priority date *(day/month/year)* 18 May 2006

International Patent Classification (IPC) or national classification and IPC

Int. Cl. ***G06Q 30/00*** (2006.01) ***G06Q 10/00*** (2006.01)

Applicant

ALLOTZ.COM LIMITED et al

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 3 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
   a. [X] *(sent to the applicant and to the International Bureau)* a total of **5** sheets, as follows:
      - [X] sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
      - [ ] sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.

   b. [ ] *(sent to the International Bureau only)* a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or table related thereto, in electronic form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:

[X]	Box No. I	Basis of the report
[ ]	Box No. II	Priority
[ ]	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
[ ]	Box No. IV	Lack of unity of invention
[X]	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
[ ]	Box No. VI	Certain documents cited
[ ]	Box No. VII	Certain defects in the international application
[ ]	Box No. VIII	Certain observations on the international application

Date of submission of the demand	Date of completion of this report
20 November 2007	21 April 2008
Name and mailing address of the IPEA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaustralia.gov.au Facsimile No. +61 2 6283 7999	Authorized Officer **CHARLES BERKO** AUSTRALIAN PATENT OFFICE (ISO 9001 Quality Certified Service) Telephone No. (02) 6283

Uber Exhibit 1002 - p. 447
Uber Technologies, Inc. v. SurgeTech, LLC

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/AU2007/000684

Box No. I Basis of the report

1. With regard to the **language,** this report is based on:

[X] The international application in the language in which it was filed

[ ] A translation of the international application into , which is the language of a translation furnished for the purposes of:

[ ] international search (under Rules 12.3(a) and 23.1 (b))

[ ] publication of the international application (under Rule 12.4(a))

[ ] international preliminary examination (Rules 55.2(a) and/or 55.3(a))

2. With regard to the **elements** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

[ ] the international application as originally filed/furnished

[X] the description:

pages **1-45** as originally filed/furnished
pages* received by this Authority on with the letter of
pages* received by this Authority on with the letter of

[X] the claims:

pages as originally filed/furnished
pages* as amended (together with any statement) under Article 19
pages* **46-50** received by this Authority on **20 November 2007** with the letter of **the same**
pages* received by this Authority on with the letter of

[X] the drawings:

pages **1-5** as originally filed/furnished
pages* received by this Authority on with the letter of
pages* received by this Authority on with the letter of

[ ] a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing.

3. [ ] The amendments have resulted in the cancellation of:

[ ] the description, pages
[ ] the claims, Nos.
[ ] the drawings, sheets/figs
[ ] the sequence listing *(specify)*:
[ ] any table(s) related to the sequence listing *(specify)*:

4. [ ] This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

[ ] the description, pages
[ ] the claims, Nos.
[ ] the drawings, sheets/figs
[ ] the sequence listing *(specify)*:
[ ] any table(s) related to the sequence listing *(specify)*:

5. [ ] This report has been established taking into account **the rectification of an obvious mistake** authorized by or notified to the Authority under Rule 91 (Rule 70.2(e)).

* *If item 4 applies, some or all of those sheets may be marked "superseded."*

Uber Exhibit 1002 - p. 448
Uber Technologies, Inc. v. SurgeTech, LLC

Box No. V **Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Claims **1-21**	**YES**
	Claims	**NO**
Inventive step (IS)	Claims **1-21**	**YES**
	Claims	**NO**
Industrial applicability (IA)	Claims **1-21**	**YES**
	Claims	**NO**

2. Citations and explanations (Rule 70.7)

Relevant documents cited in the search report:

D1: WO 2001/067356 A (INVINITY SYSTEMS CORPORATION)
D2 WO 2001/084278 A (ASSETTRADE)
D3 WO 2005/010675 A (PROFITLOGIC, INC.)
D4 WO 2005/001615 A (PROFITLOGIC, INC.)
D5 GB 2302427 A (i2 TECHNOLOGIES INC.)
D6 WO 2001/082135 A (SCIENCE APPLICATIONS INTERNATIONAL CORPORATION)
D7 US 20040153359 A (HO et al.)
D8 US 20030088616 A (ETESSAMI ET AL.)

NOVELTY (N).& INVENTIVE STEP (IS). Claims 1-21

None of the cited art individually or in any combination obvious to a person skilled in the art, discloses all of the combination of features/integers of the claimed invention as amended. The closest D1 (INVINITY), for example, is directed to an inventory control system that allows a third-party tracking capability in a concept commonly referred to as Vendor Managed Inventory (VMI). In particular, none of the documents disclose a system for managing inventory allocations in which price of inventory allotments are adjusted based on sales performance from data received and re-allocated to re-sellers according to sales performance data involving calculation of performance indicators in the form of a function that includes a ratio of number of allotments sold to at least a number allocated and a number available for sale, as claimed.

INDUSTRIAL APPLICABILITY

The claimed invention is industrially applicable

Uber Exhibit 1002 - p. 449
Uber Technologies, Inc. v. SurgeTech, LLC

CLAIMS

1. A method of managing inventory allocations, the method including the steps of:

receiving, in a data processing apparatus, data relating to the sale of inventory allotments allocated to respective re-sellers;

processing, in the data processing apparatus, said data to obtain data relating to sales performance of at least one of said respective re-sellers by calculating a performance indicator for each re-seller in the form of at least one function that includes a ratio of a number of allotments sold to at least one of a number of allotments allocated to the re-seller for sale and a number of allotments available for sale by the re-seller; and

carrying out at least the following steps in the data processing apparatus:

adjusting a price for which inventory allotments allocated to at least that said respective re-seller is to be sold by that respective re-seller; and

re-allocating inventory allotments to or from at least that said respective re-seller respectively from or to other respective re-sellers depending on said data relating to the sales performance of the respective re-sellers.

2. A method as claimed in claim 1, in which said at least one function includes a ratio of a number of allotments sold in a predetermined time period to at least one of a number of allotments allocated to the re-seller for sale and a number of allotments available for sale by the re-seller.

3. A method as claimed in claim 1, in which the step of processing the data includes the step of comparing the performance indicator for a particular re-seller to the performance indicators of other re-sellers, the inventory allotments associated with respective re-sellers having at least one common characteristic.

4. A method as claimed in claim 3, in which the step of comparing the performance indicators includes the step of comparing the performance indicator of said particular re-seller to an average of the performance indicators of said other re-sellers.

5. A method as claimed in claim 4, in which the step of comparing the performance indicators includes the step of obtaining a percentage change (PC) of the performance indicator of said particular re-seller relative to said average of the performance indicators and applying the following equation to PC:

$Z_j = \frac{PC_j - Mean(PC)}{St.Dev(PC)/\sqrt{n}}$, where n is the number of re-sellers having said at least one common characteristic, $j = 1$ *to* n, and Z is an adjustment rate to a price of the inventory allotment.

6. A method as claimed in claim 5, which includes the step of adjusting a price of the inventory allotments allocated to said particular re-seller by a factor of Z.

7. A method as claimed in claim 1, in which the step of processing said data includes the step of carrying out a statistical analysis of said data relating to sales performance.

8. A system for managing inventory allocations, the system including a data processing apparatus that is configured to carry out the following steps:

receiving data relating to the sale of inventory allotments allocated to respective re-sellers;

processing, in the data processing apparatus, said data to obtain data relating to sales performance of at least one of said respective re-sellers by calculating a performance indicator for each re-seller in the form of at least one function that includes a ratio of a number of allotments sold to at least one of a number of such allotments allocated to the re-seller for sale and a number of allotments available for sale by the re-seller; and

carrying out at least the following steps in the data processing apparatus:

adjusting a price for which inventory allotments allocated to at least that said respective re-seller is to be sold by that respective re-seller; and

re-allocating inventory allotments to or from at least that said respective re-seller respectively from or to other respective re-sellers depending on said data relating to the sales performance of the respective re-sellers.

9. A system as claimed in claim 8, in which said at least one function includes a ratio of a number of allotments sold in a predetermined time period to at least one of a number of allotments allocated to the re-seller for sale and a number of allotments available for sale by the re-seller.

10. A system as claimed in claim 8, in which the data processing apparatus is configured to compare the performance indicator for a particular re-seller to the performance indicators

Uber Exhibit 1002 - p. 451
Uber Technologies, Inc. v. SurgeTech, LLC

of other re-sellers, the inventory allotments associated with respective re-sellers having at least one common characteristic.

11. A system as claimed in claim 8, in which the data processing apparatus is configured to compare the performance indicator of said particular re-seller to an average of the performance indicators of said other re-sellers.

12. A system as claimed in claim 11, in which the data processing apparatus is configured to obtain a percentage change (PC) of the performance indicator of said particular re-seller relative to said average of the performance indicators and to apply the following equation to PC:

$$Z_j = \frac{PC_j - Mean(PC)}{St.Dev(PC)/\sqrt{n}}$$, where n is the number of re-sellers having said at least one common characteristic, $j = 1$ *to* n, and Z is an adjustment rate to a price of the inventory allotment.

13. A system as claimed in claim 12, in which the data processing apparatus is configured to adjust a price of the inventory allotment allocated to said particular re-seller by a factor of Z.

14. A system as claimed in claim 8, in which the data processing apparatus is configured to carry out a statistical analysis of said data relating to sales performance.

15. A software product for managing inventory allocations, the software product being executable by a data processing apparatus and being configured so that, when executed, the data processing apparatus carries out the following steps:

receives, in a data processing apparatus, data relating to the sale of inventory allotments allocated to respective re-sellers;

processes, in the data processing apparatus, said data to obtain data relating to sales performance of at least one of said respective re-sellers by calculating a performance indicator for each re-seller in the form of at least one function that includes a ratio of a number of allotments sold to at least one of a number of allotments allocated to the re-seller for sale and a number of allotments available for sale by the re-seller; and

carries out at least the following steps in the data processing apparatus:

Uber Exhibit 1002 - p. 452
Uber Technologies, Inc. v. SurgeTech, LLC

adjusts a price for which inventory allotments allocated to at least that said respective re-seller is to be sold by that respective re-seller; and

re-allocates inventory allotments to or from at least that said respective re-seller respectively from or to other respective re-sellers depending on said data relating to the sales performance of the respective re-sellers.

16. A software product as claimed in claim 15, in which said at least one function includes a ratio of a number of allotments sold in a predetermined time period to at least one of a number of allotments allocated to the re-seller for sale and a number of allotments available for sale by the re-seller.

17. A software product as claimed in claim 15, which, when executed by a data processing apparatus, causes the data processing apparatus to compare the performance indicator for a particular re-seller to the performance indicators of other re-sellers, the inventory allotments associated with respective re-sellers having at least one common characteristic.

18. A software product as claimed in claim 15, which, when executed by a data processing apparatus, causes the data processing apparatus to compare the performance indicator of said particular re-seller to an average of the performance indicators of said other re-sellers.

19. A software product as claimed in claim 18, which, when executed by the data processing apparatus, causes the data processing apparatus to obtain a percentage change (PC) of the performance indicator of said particular re-seller relative to said average of the performance indicators and to apply the following equation to PC:

$$Z_j = \frac{PC_j - Mean(PC)}{St.Dev(PC)/\sqrt{n}}$$, where n is the number of re-sellers having said at least one common characteristic, $j = 1$ *to* n, and Z is an adjustment rate to a price of the inventory allotment.

20. A software product as claimed in claim 19, which, when executed by a data processing apparatus, causes the data processing apparatus to adjust a price of the inventory allotment allocated to said particular re-seller by a factor of Z.

21. A software product as claimed in claim 15, which, when executed by a data processing apparatus, causes the data processing apparatus to carry out a statistical analysis of said data relating to sales performance.

Uber Exhibit 1002 - p. 454
Uber Technologies, Inc. v. SurgeTech, LLC

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU2007/000684

A. CLASSIFICATION OF SUBJECT MATTER

Int. Cl.

G06Q 30/00 (2006.01) ***G06Q 10/00*** (2006.01)

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
DWPI + keywords: stock+, inventory(ies), supply chain+, retail+, wholesal+, warehous+, manage+, control+, transact+, vendor+, +sell+, +buy+, pric+, +allocat+, Vendor Managed Inventory (VMI), adjust+, updat+, upgrad+, statistical analysis

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X, Y	WO 2001/067356 A (INVINITY SYSTEMS CORPORATION) 13 September 2001 Entire document. See in particular: abstract, page 1 to page 4 line 2; page 8 lines 3 to the penultimate paragraph; page 12 paragraph 3 to page 17 paragraph 1; page 32 2nd table; and drawings.	1-21
X, Y	WO 2001/084278 A (ASSETTRADE) 8 November 2001 Entire document. See in particular : abstract, page 4 line 16 to page 5 line 1; page 6 line 25 to page 10 line 30, page 13 line 11 to page 22 line 1; and drawings.	1-21
Y	WO 2005/010675 A (PROFITLOGIC, INC.) 3 February 2005 Entire document. See in particular: abstract, pages 1-4, page 8 last paragraph to page 10 paragraph 1, and drawings.	1-21

[X] Further documents are listed in the continuation of Box C [X] See patent family annex

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
27 July 2007	- 3 AUG 2007
Name and mailing address of the ISA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaustralia.gov.au Facsimile No. (02) 6285 3929	Authorized officer **CHARLES BERKO** AUSTRALIAN PATENT OFFICE (ISO 9001 Quality Certified Service) Telephone No : (02) 6283

Form PCT/ISA/210 (second sheet) (April 2007)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU2007/000684

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 2005/001615 A (PROFITLOGIC, INC) 6 January 2005 Entire document. See in particular: abstract, pages 6-10, claims 10, 13, 14	1-21
Y	GB 2302427 A (i2 TECHNOLOGIES INC) 15 January 1997 Entire document. See in particular: abstract, drawings, page 6 lines 2-33, page 7 lines 17-33, page 14 line 28 to page 16 line 13.	1-21
Y	WO 2001/082135 A (SCIENCE APPLICATIONS INTERNATIONAL CORPORATION) 1 November 2001. Entire document. See in particular : abstract, page 2 lines 3-13, page 3 lines 1-10 and 20-22; page 12 lines 1-17, 13 lines 16-26, page 23 lines 3-16.	1-21
Y	US 20040153359 A (HO et al.) 5 August 2004 Entire document. See in particular: abstract, drawings paragraphs: [2] to [11]; [34], [65] to [71]; [77] to [85], [91], [92].	1-21
Y	US 20030088616 A (ETESSAMI ET AL.) 8 May 2003 Entire document. See in particular: abstract, drawings, paragraphs: [5], [9] to [11], [16], [31] to [33].	1-21
A	Marketing Management. http://en.wikipedia.org/wiki/Marketing_management [Retrieved: 23 July 2007]	1-21
A	Inventory. http://en.wikipedia.org/wiki/Marketing_management. [Retrieved: 23 July 2007]	1-21
A	Statistics. http://en.wikipedia.org/wiki/Statistical_analysis. [Retrieved: 23 July 2007]	1-21

Uber Exhibit 1002 - p. 456
Uber Technologies, Inc. v. SurgeTech, LLC

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/AU2007/000684

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report		Patent Family Member					
WO	0167356	AU	49104/01	BR	0109095	CA	2402350
		CN	1427974	EP	1281142	EP	1766330
		MX	PA02008814	US	6996538	US	2001051905
		US	2004230503	US	2005197929	US	2006020512
		US	2006038010	US	2006041329	US	2006100937
		US	2006116936	US	2007055586	US	2007124216
		WO	2006007414				
WO	0184278	AU	61127/01	US	2002116281		
WO	2005010675	CA	2527796	EP	1652141	US	7171376
		US	2005060270				
WO	2005001615	CA	2527720	EP	1636670	US	2005027621
GB	2302427	AU	55990/96	BR	9608946	CA	2176530
		EP	776590	JP	9006862	US	6167380
		US	6188989	US	7085729	WO	199700489
WO	0182135	AU	57154/01				
US	2004153359	AU	2003293446	WO	2004070518		
US	2003088616	NONE					

Due to data integration issues this family listing may not include 10 digit Australian applications filed since May 2001.

END OF ANNEX

Uber Exhibit 1002 - p. 457
Uber Technologies, Inc. v. SurgeTech, LLC

PATENT COOPERATION TREATY

From the:
INTERNATIONAL SEARCHING AUTHORITY

To:

Eagar & Buck
PO Box 509
Spring Hill
QLD 4004 Australia

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

Date of mailing *(day/month/year)* - 3 AUG 2007

Applicant's or agent's file reference
ALL02.001I

FOR FURTHER ACTION
See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/AU2007/000684	18 May 2007	18 May 2006

International Patent Classification (IPC) or both national classification and IPC
Int. Cl.

G06Q 30/00 (2006.01) ***G06Q 10/00*** (2006.01)

Applicant
ALLOTZ.COM LIMITED et al

1. This opinion contains indications relating to the following items:

- [X] Box No. I Basis of the opinion
- [ ] Box No. II Priority
- [ ] Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- [ ] Box No. IV Lack of unity of invention
- [X] Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- [ ] Box No. VI Certain documents cited
- [ ] Box No. VII Certain defects in the international application
- [ ] Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA	Date of completion of this opinion	Authorized Officer
AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaustralia.gov.au Facsimile No. (02) 6285 3929	27 July 2007	**CHARLES BERKO** AUSTRALIAN PATENT OFFICE (ISO 9001 Quality Certified Service) Telephone No. (02) 6283 2169

Uber Exhibit 1002 - p. 458
Uber Technologies, Inc. v. SurgeTech, LLC

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/AU2007/000684

Box No. I Basis of this opinion

1. With regard to the **language,** this opinion has been established on the basis of:

   [X] The international application in the language in which it was filed

   [ ] A translation of the international application into, , which is the language of a translation furnished for the purposes of international search (under Rules 12.3(a) and 23.1(b)).

2. [ ] This opinion has been established taking into account **the rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of:

   a. type of material

      [ ] a sequence listing

      [ ] table(s) related to the sequence listing

   b. format of material

      [ ] on paper

      [ ] in electronic form

   c. time of filing/furnishing

      [ ] contained in the international application as filed.

      [ ] filed together with the international application in electronic form.

      [ ] furnished subsequently to this Authority for the purposes of search.

4. [ ] In addition, in the case that more than one version or copy of a sequence listing and/or table(s) relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/AU2007/000684

Box No. V **Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Claims **2-7, 9-14, 16-21**	**YES**
	Claims **1, 8, 15**	**NO**
Inventive step (IS)	Claims	**YES**
	Claims **1-21**	**NO**
Industrial applicability (IA)	Claims **1-21**	**YES**
	Claims	**NO**

2. Citations and explanations:

Relevant documents cited in the search report:

D1: WO 2001/067356 A (INVINITY SYSTEMS CORPORATION)
D2 WO 2001/084278 A (ASSETTRADE)
D3 WO 2005/010675 A (PROFITLOGIC, INC.)
D4 WO 2005/001615 A (PROFITLOGIC, INC.)
D5 GB 2302427 A (i2 TECHNOLOGIES INC.)
D6 WO 2001/082135 A (SCIENCE APPLICATIONS INTERNATIONAL CORPORATION)
D7 US 20040153359 A (HO et al.)
D8 US 20030088616 A (ETESSAMI ET AL.)

NOVELTY (N). Claims 1, 8, and 15

Prima facie, it would appear that none of the cited art individually discloses all of the combination of features/integers of the claimed invention specifically. However, D1 (INVINITY), for example, is directed to an inventory control system that allows a third-party tracking capability in a concept commonly referred to as Vendor Managed Inventory (VMI) considered to be relevant to the invention defined in independent claims 1, 8 and 15. The document does not explicitly disclose **adjustment of price of allocated inventory depending on data relating to sales performance, and re-allocation of inventory items to other respective sellers**. It does, however, include in its disclosure a server and software that allow customers and suppliers to change various information including **price changes, editing** (removing/adding) vendors and products etc [see page 16 last paragraph to page 17 first paragraph for example]. The independent claims each include within their scope a requirement for just one of the two steps of the claims to be carried out, subsequently the step of **re-allocating inventory items to other re-sellers** (or even price adjusting) is considered to be inherent in the editing feature(s) disclosed in the cited art, ***and at the very least would require no ingenuity to arrive at.***

INVENTIVE STEP (IS). Claims 1-21

Claims 1, 8, 15: as above.

Claims 2-7, 9-14, 16-21:

Citation D2 *(ASSETTRADE)* is directed to **re-allocation and selling** industrial equipment. While to specifically concerned *prima facie* with managing inventory allocations, it does disclose "a server 300" that hosts its external redistribution system accessible to a host of clients including **inventory depot centres**. See page 20 lines 3-5 for example.

Uber Exhibit 1002 - p. 460
Uber Technologies, Inc. v. SurgeTech, LLC

Supplemental Box

In case **the space in any of the preceding boxes is not sufficient.**

Continuation of: **Box V**

D3 *(PROFITLOGIC, INC)* directed to inventory allocation and pricing involves allocation of inventory in connection with historical sales performance. See page 9 for example.

D4 *(PROFITLOGIC, INC)* directed to retail inventory budget optimization and gross profit maximisation also involves historical sales performance as well as reliance on statistical analysis factors. The use of percentage/standard deviation as an analytical tool and performance factor is common place.

D6 (SCIENCE APPLICATIONS INTERNATIONAL CORPORATION) directed to supply chain management system involves the input of a number of business key performance indicators and metrics from data warehouse when consolidating history of transactions across disparate systems.

D5 *(i2 TECHNOLOGIES INC.)* directed to managing available -to-promise and promise to fulfil customer requests includes a supply chain model representing a chain of supply involving hierarchical levels of sellers/resellers and a capability of adjusting prices in relation to sales performance [see chapter on "Allocation to Sellers" for example.

D7 *(HO et al.)* directed to an integrated supply chain management involves a vendor management inventory module that generates electronic orders based on historical data to provide automated adjustable control over inventory levels within a supply chain.

D8 (ETESSAMI ET AL.) directed to a system for customer service application, customization, integration, and distribution, calls for distribution of a hosted product to first-level business entities, which in turn customize, and resell the products(s) to one or more second e-business entities

The documents disclose various aspects of the claimed invention, all in the same technical field, such if documents D3 to D8 are combined individually or severally with document D1 and/or D2 read in light of common general knowledge (exemplified by the background articles retrieved from WIKIPEDIA in the search report) as would be obvious to a person skilled in the art, the features of the claimed invention are disclosed.

The claimed invention is considered not to involve an inventive step.

INDUSTRIAL APPLICABILITY

The claimed invention is industrially applicable

Uber Exhibit 1002 - p. 461
Uber Technologies, Inc. v. SurgeTech, LLC

Electronic Acknowledgement Receipt

EFS ID:	39953034
Application Number:	16924395
International Application Number:	
Confirmation Number:	5073
Title of Invention:	THE CONTROL OF DISTRIBUTED DATABASES
First Named Inventor/Applicant Name:	Martin MCCONNACHIE
Correspondence Address:	NK Patent Law - 4917 Waters Edge Dr. Suite 275 Raleigh NC 27606 US 7045625012 docket@nkpatentlaw.com
Filer:	Gregory Morgan Evans/Donna Donovan
Filer Authorized By:	Gregory Morgan Evans
Attorney Docket Number:	898/2/3 UTIL
Receipt Date:	09-JUL-2020
Filing Date:	
Time Stamp:	11:36:02
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	898-2-3UTIL-20200709-IDS.pdf	1035528 545769e07b556fee5cd06eee0e135705a0cc7f78	no	7
Warnings:					
Information:					
2	Foreign Reference	F1-GB2302427A.pdf	1012449 90825e8885cc111c04a735e8c0e1531c6768be33	no	27
Warnings:					
Information:					
3	Foreign Reference	F2-JP2001350826.pdf	300469 1ddc4cb43acdc097be87a804335f07cdda82086a	no	5
Warnings:					
Information:					
4	Foreign Reference	F3-WO03048893_A2.pdf	2268741 713c9a5abb80098f9fa94ff03ebac0a017a4e9ed	no	61
Warnings:					
Information:					
5	Foreign Reference	F4-WO03094068_A1.pdf	2475590 5d5a428729a9b2567e4fd1053d36e24c534b0a8f	no	66
Warnings:					
Information:					
6	Foreign Reference	F5-WO2001067356.pdf	1881723 3d23c7d39e50fe6ddd70587b2b8deefe61dfbdc4	no	46
Warnings:					
Information:					
7	Foreign Reference	F6-WO2001082135.pdf	6264158 fe24c20d3decd0cec0a24ec348327186f7123941	no	42
Warnings:					
Information:					

8	Foreign Reference	F7-WO2001084278.pdf	2337623 76e90bc6a65743e825e3f211b8820c84b4ae9fac	no	50
Warnings:					
Information:					
9	Foreign Reference	F8-WO2005001615.pdf	1037029 920e964f698d88b31b267e3c3b9cb5bd37381a6e	no	22
Warnings:					
Information:					
10	Foreign Reference	F9-WO2005010675.pdf	1214772 f32c80a5e29a0a973b928e00a18b37ed720dce14	no	27
Warnings:					
Information:					
11	Non Patent Literature	NPL1-PCTAU2007000684-IPRP-20081118.pdf	379721 3f3077ef79c74403ca61edf6f475fff53512dce6	no	8
Warnings:					
Information:					
12	Non Patent Literature	NPL2-PCTAU2007000684-20070803-SearchReportandWrittenOpinion.pdf	373277 f92f664b7167c3518baa673fceaada38f1aa46ae	no	7
Warnings:					
Information:					
13	Non Patent Literature	NPL3-898-2-2UTIL-20200205-NFOA.pdf	638611 22db4741d40e98ca5c79fff47c993409b2924679	no	18
Warnings:					
Information:					
		Total Files Size (in bytes):	21219691		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

DocCode – SCORE

SCORE Placeholder Sheet for IFW Content

Application Number: 16924395 Document Date: 07/09/2020

The presence of this form in the IFW record indicates that the following document type was received in electronic format on the date identified above. This content is stored in the SCORE database.

Since this was an electronic submission, there is no physical artifact folder, no artifact folder is recorded in PALM, and no paper documents or physical media exist. The TIFF images in the IFW record were created from the original documents that are stored in SCORE.

- Drawing

At the time of document entry (noted above):

- USPTO employees may access SCORE content via DAV or via the SCORE web page.
- External customers may access SCORE content via PAIR using the Supplemental Content tab.

Form Revision Date: March 1, 2019

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 16/924,395

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY FEE($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	75		N/A	
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	330		N/A	
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	380		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	21 minus 20 =	* 1	x 50 =	50	OR		
INDEPENDENT CLAIMS (37 CFR 1.16(h))	3 minus 3 =	*	x 230 =	0.00			
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			0.00			
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				0.00			
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	835		TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT A	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE($)	ADDITIONAL FEE($)		RATE($)	ADDITIONAL FEE($)
AMENDMENT B	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
16/924,395	07/09/2020		835	898/2/3 UTIL	21	3

CONFIRMATION NO. 5073

FILING RECEIPT

115007
NK Patent Law
4917 Waters Edge Dr.
Suite 275
Raleigh, NC 27606

OC000000118535253

Date Mailed: 07/20/2020

Receipt is acknowledged of this non-provisional utility patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF FIRST INVENTOR, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection.

Please verify the accuracy of the data presented on this receipt. If an error is noted on this Filing Receipt, please submit a written request for a corrected Filing Receipt, including a properly marked-up ADS showing the changes with strike-through for deletions and underlining for additions. If you received a "Notice to File Missing Parts" or other Notice requiring a response for this application, please submit any request for correction to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections provided that the request is grantable.

Inventor(s)

Martin MCCONNACHIE, Paradise Point, AUSTRALIA;
Helen JOHNSON, Red Hill, AUSTRALIA;
Geoffrey TOOGOOD, Forest Lake, AUSTRALIA;
Daniel Paul RUUL, Labrador, AUSTRALIA;

Applicant(s)

Allotz.com Limited, Bundall, AUSTRALIA;

Power of Attorney: None

Domestic Priority data as claimed by applicant

This application is a CON of 16/150,799 10/03/2018
which is a CON of 14/877,669 10/07/2015 PAT 10198494
which is a CIP of 12/227,451 12/18/2009 ABN
which is a 371 of PCT/AU2007/000684 05/18/2007

Foreign Applications (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.)
AUSTRALIA 2006902685 05/18/2006 No Access Code Provided

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: Yes

Uber Exhibit 1002 - p. 468
Uber Technologies, Inc. v. SurgeTech, LLC

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

If Required, Foreign Filing License Granted: 07/17/2020

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 16/924,395**

Projected Publication Date: 10/29/2020

Non-Publication Request: No

Early Publication Request: No
**** SMALL ENTITY ****
Title

CONTROL OF DISTRIBUTED DATABASES

Preliminary Class

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific

countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

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The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

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The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

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No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

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Uber Exhibit 1002 - p. 470
Uber Technologies, Inc. v. SurgeTech, LLC

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Uber Exhibit 1002 - p. 471
Uber Technologies, Inc. v. SurgeTech, LLC

REMARKS

If any issues remain outstanding, or if a phone call could resolve any pending issues, the Commissioner is encouraged to call the attorney identified below in order to expeditiously resolve these matters.

DEPOSIT ACCOUNT

The Commissioner is hereby authorized to charge any otherwise unpaid fees or credit any overpayment of fees associated with the filing of this correspondence to Deposit Account No. **50-6191**.

Respectfully submitted,

Date: September 1, 2020

/Gregory M. Evans/
Gregory M. Evans
Reg. No. 72,169

NK Patent Law, PLLC
4917 Waters Edge Drive, Suite 275
Raleigh, NC 27606
Telephone: (919) 348-2194
Facsimile: (919) 882-8195

Uber Exhibit 1002 - p. 472
Uber Technologies, Inc. v. SurgeTech, LLC

AMENDMENTS TO THE CLAIMS

Please amend the claims as follows:

What is claimed is:

1-21. (Canceled)

22. (New) A computer-implemented method of managing inventory allocations, the computer-implemented method comprising the steps of:

receiving sale data cyclically, in near real time, from respective distribution channels and relating to sale of inventory items allocated to the respective distribution channels;

processing the sale data cyclically, the processing of the sale data including carrying out calculations to obtain a performance rating for each of the respective distribution channels;

querying whether the performance rating of each of the respective distribution channels is greater than a performance rating of other distribution channels; and

based on the query, carrying out at least one of the following steps:

adjusting a price of inventory items allocated to each of the respective distribution channels; and

re-allocating inventory items to or from said each of the respective distribution channels from or to the other distribution channels.

23. (New) The computer-implemented method as claimed in claim 22, which includes the step of storing inventory item data and distribution channel data in a database.

24. (New) The computer-implemented method as claimed in claim 23, which includes the step of associating distribution channels with inventory items.

25. (New) The computer-implemented method as claimed in claim 22, in which the sale data is in a form of data relating to at least one of the following: sale price of each inventory item, rate

Uber Exhibit 1002 - p. 473
Uber Technologies, Inc. v. SurgeTech, LLC

of commission for the sale of each inventory item and number of inventory items sold over a predetermined length of time.

26. (New) The computer-implemented method as claimed in claim 22, in which the step of processing the sale data includes a determination of whether or not a supply of inventory items exceeds demand or vice versa per distribution channel.

27. (New) The computer-implemented method as claimed in claim 22, in which the step of processing the sale data includes the step of calculating a sale rate index for each distribution channel, in a form of a ratio of a number of items sold in a predetermined time to a number of items available for sale in that distribution channel.

28. (New) The computer-implemented method as claimed in claim 27, which includes the steps of, for each distribution channel:

setting a predetermined price of the inventory items;

calculating the sale rate index;

querying whether demand exceeds supply; and

if demand does not exceed supply, decreasing price by a predetermined percentage, or, if demand does exceed supply, comparing the performance rating of the distribution channel with other distribution channels.

29. (New) The computer-implemented method as claimed in claim 28, which includes the steps of, for each distribution channel:

querying whether the performance rating of the distribution channel is greater than the other distribution channels; and

if the performance rating of the distribution channel is greater than the performance rating of the other distribution channels, removing inventory items from lower performing channels and adding them to the distribution channel.

30. (New) A computing device comprising:

a memory; and

Uber Exhibit 1002 - p. 474
Uber Technologies, Inc. v. SurgeTech, LLC

at least one processor configured to perform a method for managing inventory allocations, the method comprising:

receiving sale data cyclically, in real time, from respective distribution channels and relating to sale of inventory items allocated to the respective distribution channels;

processing the sale data cyclically, the processing of the sale data including carrying out calculations to obtain a performance rating for each of the respective distribution channels;

querying whether the performance rating of each of the respective distribution channels is greater than a performance rating of other distribution channels; and

based on the query, carrying out at least one of the following steps:

adjusting a price of inventory items allocated to each of the respective distribution channels; and

re-allocating inventory items to or from said each of the respective distribution channels from or to the other distribution channels.

31. (New) A non-transitory computer-readable storage medium, the non-transitory computer-readable storage medium storing computer instructions to be implemented on at least one computing device including at least one processor, the computer instructions when executed by the at least one processor cause the at least one computing device to perform a method for managing inventory allocations, the method comprising:

receiving sale data cyclically, in real time, from respective distribution channels and relating to sale of inventory items allocated to the respective distribution channels;

processing the sale data cyclically, the processing of the sale data including carrying out calculations to obtain a performance rating for each of the respective distribution channels;

querying whether the performance rating of each of the respective distribution channels is greater than a performance rating of other distribution channels; and

based on the query, carrying out at least one of the following steps:

adjusting a price of inventory items allocated to each of the respective distribution channels; and

re-allocating inventory items to or from said each of the respective distribution channels from or to the other distribution channels.

Uber Exhibit 1002 - p. 475
Uber Technologies, Inc. v. SurgeTech, LLC

Amendments to the Specification:

On Page 1 of the specification, please amend the title as follows:

~~CONTROL OF DISTRIBUTED DATABASES~~

A COMPUTER-IMPLEMENTED METHOD FOR MANAGING INVENTORY ALLOCATIONS

Uber Exhibit 1002 - p. 476
Uber Technologies, Inc. v. SurgeTech, LLC

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.	:	16/924,395	Confirmation No.:	5073
Applicant	:	Allotz.com Limited		
Inventor	:	Martin McConnachie et al.		
Filing Date	:	July 9, 2020		
TC/A.U.	:	3687		
Examiner	:	---		
Docket No.	:	898/2/3UTIL		
Customer No.	:	115007		

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Preliminary Amendment

Sir:

Applicants submit the following for consideration and entry into the record:

Amendments to the Specification begin on page 2;

Amendments to the Claims in the listing of claims begin on page 3; and

Remarks begin on page 6.

Uber Exhibit 1002 - p. 477
Uber Technologies, Inc. v. SurgeTech, LLC

Electronic Acknowledgement Receipt

EFS ID:	40436297
Application Number:	16924395
International Application Number:	
Confirmation Number:	5073
Title of Invention:	CONTROL OF DISTRIBUTED DATABASES
First Named Inventor/Applicant Name:	Martin MCCONNACHIE
Customer Number:	115007
Filer:	Gregory Morgan Evans/Donna Donovan
Filer Authorized By:	Gregory Morgan Evans
Attorney Docket Number:	898/2/3 UTIL
Receipt Date:	01-SEP-2020
Filing Date:	09-JUL-2020
Time Stamp:	08:40:45
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		898-2-3UTIL-20200901-Preliminary-Amendment.pdf	34171 0808ee9df850d276353fa55f509275e4ddf50c0d	yes	6

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Amendment/Req. Reconsideration-After Non-Final Reject	6	6
	Claims	3	5
	Specification	2	2
	Preliminary Amendment	1	1
Warnings:			
Information:			
	Total Files Size (in bytes):	34171	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
16/924,395	07/09/2020	Martin MCCONNACHIE	898/2/3 UTIL

CONFIRMATION NO. 5073

115007
NK Patent Law
4917 Waters Edge Dr.
Suite 275
Raleigh, NC 27606

PUBLICATION NOTICE



Title:CONTROL OF DISTRIBUTED DATABASES

Publication No.US-2020-0342004-A1
Publication Date:10/29/2020

NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

The publication may be accessed through the USPTO's publically available Searchable Databases via the Internet at www.uspto.gov. The direct link to access the publication is currently http://www.uspto.gov/patft/.

The publication process established by the Office does not provide for mailing a copy of the publication to applicant. A copy of the publication may be obtained from the Office upon payment of the appropriate fee set forth in 37 CFR 1.19(a)(1). Orders for copies of patent application publications are handled by the USPTO's Public Records Division. The Public Records Division can be reached by telephone at (571) 272-3150 or (800) 972-6382, by facsimile at (571) 273-3250, by mail addressed to the United States Patent and Trademark Office, Public Records Division, Alexandria, VA 22313-1450 or via the Internet.

In addition, information on the status of the application, including the mailing date of Office actions and the dates of receipt of correspondence filed in the Office, may also be accessed via the Internet through the Patent Electronic Business Center at www.uspto.gov using the public side of the Patent Application Information and Retrieval (PAIR) system. The direct link to access this status information is currently https://portal.uspto.gov/pair/PublicPair. Prior to publication, such status information is confidential and may only be obtained by applicant using the private side of PAIR.

Further assistance in electronically accessing the publication, or about PAIR, is available by calling the Patent Electronic Business Center at 1-866-217-9197.

Office of Data Managment, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

Uber Exhibit 1002 - p. 480
Uber Technologies, Inc. v. SurgeTech, LLC

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/924,395	07/09/2020	Martin MCCONNACHIE	898/2/3 UTIL	5073

115007 7590 08/17/2021

NK Patent Law
4917 Waters Edge Dr.
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Raleigh, NC 27606

EXAMINER	
CRAWLEY, TALIA F	

ART UNIT	PAPER NUMBER
3687	

NOTIFICATION DATE	DELIVERY MODE
08/17/2021	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

docket@nkpatentlaw.com
eofficeaction@appcoll.com
usptomail@nkpatentlaw.com

Office Action Summary	Application No. 16/924,395	Applicant(s) MCCONNACHIE et al.	
	Examiner TALIA F CRAWLEY	Art Unit 3687	AIA (FITF) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☑ Responsive to communication(s) filed on 09 July 2020.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☐ This action is **FINAL.** 2b) ☑ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5) ☑ Claim(s) 1-31 is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6) ☐ Claim(s) _____ is/are allowed.

7) ☑ Claim(s) 22-31 is/are rejected.

8) ☐ Claim(s) _____ is/are objected to.

9) ☐ Claim(s) _____ are subject to restriction and/or election requirement

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to **PPHfeedback@uspto.gov.**

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☑ The drawing(s) filed on 09 July 2020 is/are: a)☑ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☑ Notice of References Cited (PTO-892)

2) ☑ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date 20200709.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date _____.

4) ☐ Other: _____.

DETAILED ACTION

Drawings

Notice of Pre-AIA or AIA Status

1. The present application is being examined under the pre-AIA first to invent provisions.

Double Patenting

A rejection based on double patenting of the "same invention" type finds its support in the language of 35 U.S.C. 101 which states that "whoever invents or discovers any new and useful process... may obtain a patent therefor..." (Emphasis added). Thus, the term "same invention," in this context, means an invention drawn to identical subject matter. See *Miller v. Eagle Mfg. Co.*, 151 U.S. 186 (1894); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Ockert*, 245 F.2d 467, 114 USPQ 330 (CCPA 1957).

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory double patenting rejection is appropriate where the claims at issue are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed.

Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the reference application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement. A terminal disclaimer must be signed in compliance with 37 CFR 1.321(b).

The USPTO internet Web site contains terminal disclaimer forms which may be used. Please visit http://www.uspto.gov/forms/. The filing date of the application will determine what form should be used. A web-based eTerminal Disclaimer may be filled out completely online using web-screens. An eTerminal Disclaimer that meets all requirements is auto-processed and approved immediately upon submission. For more information about eTerminal Disclaimers, refer to http://www.uspto.gov/patents/process/file/efs/guidance/eTD-info-I.jsp.

Claims 22-31 are rejected on the ground of non-statutory double patenting as being unpatentable over claims 1-20 of U.S. Patent No. 10,740,354. Although the claims at issue are not identical, they are not patentably distinct from each other because the disclosure of the aforementioned United States Patent number 10,740,354 obviates the language of the pending claims as currently written.

The invention as recited in the pending claims are a system and method of controll8ing distributed databases. As recited in at least independent claim 1 of the pending application, the method is configured to receive sales data, determining from said sales data a performance rating, querying said performance rating for each of the distribution channels, and adjusting inventory pricing and reallocate inventory between distribution channels based on said ratings.

US Patent Number 10,740,354 *(which was also assigned to Allotz.com Limited at the time of invention)* also recites at a system and method for managing inventory allocations *(see at least Abstract, US 10,740,354).* For example, at least claim 1 recites A computer-implemented method for managing inventory allocations, the computer-implemented method comprising: receiving sale data, the sale data relating to a sale, in a time period, of inventory allotments allocated to respective distribution channels; upon receipt of the sale data, processing the sale data to obtain performance data relating to sales performance the respective distribution channels in the time period by calculating a performance rating for each channel, the performance rating being a function of at least a proportion of a number of allotments sold in that channel in the time period relative to at least one of: a number of allotments allocated to that channel for sale; a number of allotments available for sale in the channel; and a total number of allotments sold across the respective distribution channels in the time period; and using the performance rating in near real-time, carrying out at least one: adjusting a price for which inventory allotments allocated to at least that respective channel is to be sold; and re-allocating inventory allotments to or from at least that said respective channel from or to other channels." *(see at least independent claim 1 of US 10,740,354).*

The examiner submits, that although the claims as currently recited in the pending claim are not identical to those recited in US Patent 10,740,354, the language of the claims as disclosed in the aforementioned patent at minimum obviates the language of the claims as recited in independent claims 1, 30, and 31, and the claims that depend therefrom. Based on the reasoning as recited above, the examiner submits that the language of the pending claims is at minimum obviated by the language of US Patent No 10,740,354, and because the pending application and the aforementioned patent were commonly owned at the time of invention, that a Terminal Disclaimer is necessary to overcome the pending rejection.

Conclusion

1. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- The examiner has considered all references listed on the Notice of References Cited, PTO-892.
- The examiner has considered all references cited on the Information Disclosure Statement submitted by Applicant, PTO-1449.

2. Any inquiry concerning this communication or earlier communications from the examiner should be directed to TALIA F CRAWLEY whose telephone number is (571)270-5397. The examiner can normally be reached on Monday thru Thursday; 8:30 AM-4:30 PM EST.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Fahd A Obeid can be reached on 571-270-3324. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/TALIA F CRAWLEY/
Primary Examiner, Art Unit 3687

Notice of References Cited	Application/Control No. 16/924,395	Applicant(s)/Patent Under Reexamination MCCONNACHIE et al.	
	Examiner TALIA F CRAWLEY	Art Unit 3687	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-20030105684-A1	06-2003	Dunn, Robert M.	G06Q10/087	705/28
*	B	US-20070208630-A1	09-2007	Chatter; Mukesh	G06Q30/0611	705/26.3
*	C	US-20040230503-A1	11-2004	Lucas, Michael T.	G06Q30/0601	705/28
*	D	US-20020116281-A1	08-2002	Costello, Thomas	G06Q30/0625	705/26.3
*	E	US-20070143155-A1	06-2007	Whitsett; Troy	G06Q10/047	705/5
*	F	US-20050004818-A1	01-2005	Liman, Hartono	G06Q10/087	705/5
*	G	US-20030033205-A1	02-2003	Nowers, D.K.	G06Q30/0605	705/26.2
*	H	US-20030200006-A1	10-2003	Penkar, Rajan C.	G06Q10/087	700/214
	I					
	J					
	K					
	L					
	M					

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

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*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/924,395	MCCONNACHIE et al.
	Examiner	Art Unit
	TALIA F CRAWLEY	3687

CPC - Searched*		
Symbol	Date	Examiner
G06F16/273	08/12/2021	TFC

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner

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Search Notes		
Search Notes	Date	Examiner
EAST	08/12/2021	TFC
NON PATENT LITERATURE SEARCH	08/12/2021	TFC
INVENTOR AND CONTINUITY SEARCH	08/12/2021	TFC

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner

/TALIA F CRAWLEY/ Primary Examiner, Art Unit 3687	

Uber Exhibit 1002 - p. 489
Uber Technologies, Inc. v. SurgeTech, LLC

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/924,395	MCCONNACHIE et al.
	Examiner	Art Unit
	TALIA F CRAWLEY	3687

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

CLAIMS

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	08/12/2021								
	1	-								
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	18	-								
	19	-								
	20	-								
	21	-								
	22	✓								
	23	✓								
	24	✓								
	25	✓								
	26	✓								
	27	✓								
	28	✓								
	29	✓								
	30	✓								
	31	✓								

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (02-18)
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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	16924394
Filing Date	2020-07-09
First Named Inventor	Martin McConnachie
Art Unit	-
Examiner Name	-
Attorney Docket Number	898/2/3 UTIL

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	5787415	A	1998-07-28	Jacobson et al.	
	2	7275131	B2	2007-09-25	Goodman	
	3	7912748		2011-03-22	Rosenberg et al.	
	4	9280591		2016-03-08	Kharatishvili et al.	
	5	9430541		2016-08-30	Johnson et al.	

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Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20020174000	A1	2002-11-21	Katz et al.	

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16924394
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	Art Unit	-
	Examiner Name	-
	Attorney Docket Number	898/2/3 UTIL

	2	20020174103	A1	2002-11-21	Hsiao Hui-I et al.	
	3	20030033179	A1	2003-02-13	Katz et al.	
	4	20030033205	A1	2003-02-13	Nowers D.K. et al.	
	5	20030088616		2003-05-08	Etessami, et al.	
	6	20030105684		2003-06-05	Dunn, et al.	
	7	20030200006		2003-10-23	Penkar, et al.	
	8	20040153359		2004-08-05	Ho, et al.	
	9	20040230503		2004-11-18	Lucas	
	10	20050004818	A1	2005-01-06	Liman	
	11	20050060270	A1	2005-03-17	Ramakrishnan	
	12	20070143155	A1	2007-06-21	Whitsett et al.	

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	First Named Inventor	Martin McConnachie
	Art Unit	-
	Examiner Name	-
	Attorney Docket Number	898/2/3 UTIL

	13	20070208630	A1	2007-09-06	Chatter et al.	
	14	20080086449	A1	2008-04-10	Matsuzawa et al.	
	15	20110231363	A1	2011-09-22	Rathod	
	16	20120078847	A1	2012-03-29	Bryant et al.	
	17	20050144052	A1	2005-06-30	Harding, et al.	
	18	20060200370	A1	2006-09-07	Ratliff, et al.	
	19	20020116281	A1	2002-08-22	Costello, et al.	

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	1	2302427	GB	A	1997-01-15	Brian M. Kennedy		
	2	2001350826	JP	A	2001-12-21	Hayashi Hiroshi		

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16924394
	Filing Date	2020-07-09
	First Named Inventor	Martin McConnachie
	Art Unit	-
	Examiner Name	-
	Attorney Docket Number	898/2/3 UTIL

	3	03048893	WO	A2	2003-06-12	Neal, Michael		
	4	03094068	WO	A1	2003-11-13	Ikeuchi, Kiyokazu		
	5	2001067356	WO	A1	2003-09-13	Lucas, Michael		
	6	2001082135	WO	A1	2001-11-01	Newell, et al.		
	7	2001084278	WO	A2	2001-11-08	Kohn, et al.		
	8	2005001615	WO	A2	2005-01-06	Ramakrishnan, Vishwamitra, S		
	9	2005010675	WO	A2	2005-02-03	Ramakrishnan, Vishwamitra, S		

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	1	PCT, International Preliminary Report on Patentability in International Application No. PCT/AU2007/000684 dated November 18, 2008	
	2	PCT, International Search Report and Written Opinion in International Application No. PCT/AU2007/000684 dated August 3, 2007	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16924394
	Filing Date	2020-07-09
	First Named Inventor	Martin McConnachie
	Art Unit	-
	Examiner Name	-
	Attorney Docket Number	898/2/3 UTIL

	3	USPTO, Non-Final Office Action in U.S. Patent Application No. 16/250,799 dated February 5, 2020	

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EXAMINER SIGNATURE

Examiner Signature	/TALIA F CRAWLEY/	Date Considered	08/12/2021

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	16924394
Filing Date	2020-07-09
First Named Inventor	Martin McConnachie
Art Unit	-
Examiner Name	-
Attorney Docket Number	898/2/3 UTIL

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Gregory M. Evans/	Date (YYYY-MM-DD)	2020-07-09
Name/Print	Gregory M. Evans	Registration Number	72169

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EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	2,880	(G06F16/273).cpc.	US-PGPUB; USPAT	OR	OFF	2021/08/12 13:00
L2	5	"10740354"	US-PGPUB; USPAT	OR	OFF	2021/08/12 13:06
L3	100	inventory same reallocat$3 same distribut$3	US-PGPUB; USPAT	OR	OFF	2021/08/12 13:16
L4	4	inventory same reallocat$3 same distribut$3 same performance	US-PGPUB; USPAT	OR	OFF	2021/08/12 13:16
S1	10	("20020116281" | "20030033205" | "20030088616" | "20030105684" | "20030200006" | "20040153359" | "20040230503" | "20050004818" | "20070143155" | "20070208630").PN.	US-PGPUB; USPAT	OR	OFF	2018/05/14 06:54
S2	1	systematic$5 same refresh$3 same "distributed databases"	US-PGPUB; USPAT	OR	OFF	2018/05/14 10:02
S3	9	refresh$3 same "distributed databases"	US-PGPUB; USPAT	OR	OFF	2018/05/14 10:02
S4	61	"5787415"	US-PGPUB; USPAT	OR	OFF	2018/05/14 10:04
S5	1	"20020174103"	US-PGPUB; USPAT	OR	OFF	2018/05/14 10:05
S6	0	"."	US-PGPUB; USPAT	OR	OFF	2018/05/14 10:05
S7	3	"7275131"	US-PGPUB; USPAT	OR	OFF	2018/05/14 10:05
S8	2	"20110231363"	US-PGPUB; USPAT	OR	OFF	2018/05/14 10:05
S9	74	continuous$3 same updat$3 same "distributed database"	US-PGPUB; USPAT	OR	OFF	2018/05/14 10:06

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S10	18	refresh same "distributed database"	US-PGPUB; USPAT	OR	OFF	2018/05/14 10:55
S11	1	refresh same "distributed database".clm.	US-PGPUB; USPAT	OR	OFF	2018/05/14 11:19
S12	219	updat$3 same "distributed database".clm.	US-PGPUB; USPAT	OR	OFF	2018/05/14 11:19

8/12/2021 1:16:50 PM
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Application Number	16/924,395
Filing Date	2020-07-09
First Named Inventor	Martin MCCONNACHIE
Title	CONTROL OF DISTRIBUTED DATABASES
Art Unit	3687
Examiner Name	CRAWLEY, TALIA F
Attorney Docket Number	898/2/3 UTIL

SIGNATURE of Applicant or Patent Practitioner

Signature	/Gregory M. Evans/	Date (Optional)	2021-08-17
Name	Gregory M. Evans	Registration Number	72169
Title (if Applicant is a juristic entity)			
Applicant Name (if Applicant is a juristic entity)			

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. If more than one applicant, use multiple forms.

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Application Number	Filing Date

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Signature		Date (Optional)	03/04/16
Name	MARTIN McCONNACHIE		
Title	PRESIDENT		

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Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Acknowledgement Receipt

EFS ID:	43525505
Application Number:	16924395
International Application Number:	
Confirmation Number:	5073
Title of Invention:	CONTROL OF DISTRIBUTED DATABASES
First Named Inventor/Applicant Name:	Martin MCCONNACHIE
Customer Number:	115007
Filer:	Gregory Morgan Evans/Sandra Hess
Filer Authorized By:	Gregory Morgan Evans
Attorney Docket Number:	898/2/3 UTIL
Receipt Date:	17-AUG-2021
Filing Date:	09-JUL-2020
Time Stamp:	08:53:10
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Power of Attorney	898-2-3UTIL-20210817-POA-signed-with-TransLetter.pdf	908826 95b395d7cb3e0dceb0119fa492ac06fd38ef4a70	no	3

Warnings:

Information:	
Total Files Size (in bytes):	908826

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
16/924,395	07/09/2020	Martin MCCONNACHIE	898/2/3 UTIL

CONFIRMATION NO. 5073

POA ACCEPTANCE LETTER

115007
NK Patent Law
4917 Waters Edge Dr.
Suite 275
Raleigh, NC 27606

OC000000127783346

Date Mailed: 08/20/2021

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 08/17/2021.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/qtran/

Uber Exhibit 1002 - p. 505
Uber Technologies, Inc. v. SurgeTech, LLC

DocuSign Envelope ID: CA19B80D-A07D-4BA3-B1DD-567F2838D291

Document Description: Power of Attorney

PTO/AIA/82A (07-13)
Approved for use through 03/31/2021. OMB 0651-0035
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

TRANSMITTAL FOR POWER OF ATTORNEY TO ONE OR MORE REGISTERED PRACTITIONERS

NOTE: This form is to be submitted with the Power of Attorney by Applicant form (PTO/AIA/82B) to identify the application to which the Power of Attorney is directed, in accordance with 37 CFR 1.5, unless the application number and filing date are identified in the Power of Attorney by Applicant form. If neither form PTO/AIA/82A nor form PTO/AIA82B identifies the application to which the Power of Attorney is directed, the Power of Attorney will not be recognized in the application.

Application Number	16924395
Filing Date	July 9, 2020
First Named Inventor	Martin McConnachie
Title	A COMPUTER-IMPLEMENTED METHOD FOR MANAGING INVENTORY ALLOCATIONS
Art Unit	3687
Examiner Name	Crawley, Talia F.
Attorney Docket Number	

SIGNATURE of Applicant or Patent Practitioner

Signature	/Samuel K. Simpson/	Date (Optional)	11/30/2021
Name	Samuel K. Simpson	Registration Number	53596
Title (if Applicant is a juristic entity)			
Applicant Name (if Applicant is a juristic entity)			

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. If more than one applicant, use multiple forms.

☐ *Total of _____ forms are submitted.

This collection of information is required by 37 CFR 1.131, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

DocuSign Envelope ID: CA19B80D-A07D-4BA3-B1DD-567F2838D291

Document Description: Power of Attorney

PTO/AIA/82B (07-13)
Approved for use through 03/31/2021. OMB 0651-0035
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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POWER OF ATTORNEY BY APPLICANT

I hereby revoke all previous powers of attorney given in the application identified in either the attached transmittal letter or the boxes below.

Application Number	Filing Date
16924395	07/09/2020

(Note: The boxes above may be left blank if information is provided on form PTO/AIA/82A.)

☑ I hereby appoint the Patent Practitioner(s) associated with the following Customer Number as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above: 65449

OR

☐ I hereby appoint Practitioner(s) named in the attached list (form PTO/AIA/82C) as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the patent application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above. (Note: Complete form PTO/AIA/82C.)

Please recognize or change the correspondence address for the application identified in the attached transmittal letter or the boxes above to:

☑ The address associated with the above-mentioned Customer Number

OR

☐ The address associated with Customer Number:

OR

☐ Firm or Individual Name					
Address					
City		State		Zip	
Country					
Telephone		Email			

I am the Applicant (if the Applicant is a juristic entity, list the Applicant name in the box):

☐ Inventor or Joint Inventor (title not required below)

☐ Legal Representative of a Deceased or Legally Incapacitated Inventor (title not required below)

☑ Assignee or Person to Whom the Inventor is Under an Obligation to Assign (provide signer's title if applicant is a juristic entity)

☐ Person Who Otherwise Shows Sufficient Proprietary Interest (e.g., a petition under 37 CFR 1.46(b)(2) was granted in the application or is concurrently being filed with this document) (provide signer's title if applicant is a juristic entity)

SIGNATURE of Applicant for Patent

The undersigned (whose title is supplied below) is authorized to act on behalf of the applicant (e.g., where the applicant is a juristic entity).

Signature	DocuSigned by: Michael R. Love 74FFBFDA8834FB...	Date (Optional)	11/30/2021
Name	Michael R. Love		
Title	Director		

NOTE: Signature - This form must be signed by the applicant in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. If more than one applicant, use multiple forms.

☐ Total of forms are submitted.

This collection of information is required by 37 CFR 1.131, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

DocuSign Envelope ID: CA19B80D-A07D-4BA3-B1DD-567F2838D291

PTO/AIA/82C (07-13)
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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number

POWER OF ATTORNEY BY APPLICANT

No more than ten (10) patent practitioners total may be appointed as set forth below by name and registration number. This page need not be submitted if appointing the Patent Practitioner(s) associated with a Customer Number (see form PTO/AIA/82B):

Name	Registration Number

DocuSign Envelope ID: CA19B80D-A07D-4BA3-B1DD-567F2838D291

Privacy Act Statement

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The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.
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3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
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7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Doc Code: R48.REQ
Document Description: Request under Rule 48 correcting inventorship

PTO/AIA/40 (04-18)
Approved for use through 11/30/2020. OMB 0651-0031
U.S. Patent and Trademark Office, U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

REQUEST FOR CORRECTION IN A PATENT APPLICATION RELATING TO INVENTORSHIP OR AN INVENTOR NAME, OR ORDER OF NAMES, OTHER THAN IN A REISSUE APPLICATION (37 CFR 1.48)

Application Number	16924395
Filing Date	July 9, 2020
First Named Inventor	Martin McConnachie
Art Unit	3687
Examiner Name	Crawley, Talia F.
Practitioner Docket Number	

To: Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Applicant hereby **requests that the inventorship be corrected or changed, or that the name of the inventor or a joint inventor, or the order of the names of joint inventors, be changed,** in the above-identified application. **Note**: 37 CFR 1.48 applies to any request to correct inventorship filed on or after September 16, 2012, regardless of the application filing date. **Do not submit this form after payment of the issue fee or if the application has been patented.** See 37 CFR 1.324 for correction of inventorship in a patent.

Please check the applicable box(es) below.

For a nonprovisional application:

☒ 1. This request is to correct or change the inventorship in a **nonprovisional** application (**under 37 CFR 1.48(a)**) and includes:

☒ An application data sheet (ADS) in accordance with 37 CFR 1.76(c) with the corrected or updated information shown with markings (*e.g.*, underlining for insertions, strikethrough for deletions). See the Manual of Patent Examining Procedure (MPEP) section 601.05(a) for information about filing an ADS in an application filed on/after September 16, 2012. For information about filing a Supplemental ADS in an application filed before September 16, 2012, see MPEP 601.05(b).

☒ The processing fee set forth in 37 CFR 1.17(i). $ 70.00

☒ An inventor is being added. An inventor's oath or declaration by any actual inventor who has not yet executed an oath or declaration is required (see 37 CFR 1.48(b)). See MPEP 602.01(a) for information about an inventor's oath or declaration for an application filed on/after September 16, 2012 (*e.g.*, form **PTO/AIA/01**). For information about an inventor's oath or declaration for an application filed before September 16, 2012 (*e.g.*, form **PTO/SB/01**), see MPEP 602.01(b).

☒ This request is being filed after the first Office action on the merits has been given or mailed (see 37 CFR 1.48(c) and 1.17(d)). Check one of the following:

☐ This request to correct or change the inventorship is due solely to the cancellation of claims in the application.

OR

☒ The fee set forth in 37 CFR 1.17(d) is due (in addition to the fee set forth in 37 CFR 1.17(i)). $ 320.00

This collection of information is required by 37 CFR 1.48. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

PTO/AIA/40 (04-18)
Approved for use through 11/30/2020. OMB 0651-0031
U.S. Patent and Trademark Office, U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

REQUEST FOR CORRECTION IN A PATENT APPLICATION RELATING TO INVENTORSHIP OR AN INVENTOR NAME, OR ORDER OF NAMES, OTHER THAN IN A REISSUE APPLICATION (37 CFR 1.48)

☐ 2. This request is to correct or update the name of the inventor or a joint inventor, or the order of names of joint inventors, in a **nonprovisional** application (**under 37 CFR 1.48(f)**) and includes:

☐ An application data sheet in accordance with 37 CFR 1.76(c) identifying the complete inventive entity, including the corrected or updated name of the inventor, or the new order of names shown with markings (*e.g.*, underlining for insertions, strikethrough for deletions). See the MPEP 601.05(a) for information about filing an ADS in an application filed on/after September 16, 2012. For information about filing a Supplemental ADS in an application filed before September 16, 2012, see MPEP 601.05(b).

☐ The processing fee set forth in 37 CFR 1.17(i). $ _____

For a provisional application:

☐ This request is to change or correct the inventorship, or correct or update the name of the inventor or a joint inventor, in a **provisional** application (**under 37 CFR 1.48(d)**) and includes:

☐ **Attached hereto** is a document that is signed by a party set forth in 37 CFR 1.33(b) and identifies each inventor by his or her legal name, in the preferred order. Note: the document may be an application data sheet in accordance with 37 CFR 1.76(c) that identifies the changes with markings (underlining for insertions, strikethrough for deletions).

☐ The processing fee set forth in 37 CFR 1.17(q). $ _____

Fee Payment Information:

■ Applicant asserts small entity status. See 37 CFR 1.27.

☐ Applicant certifies micro entity status. See 37 CFR 1.29.
Form PTO/SB/15A or B or equivalent must either be enclosed or have been submitted previously

☐ A check in the amount of the fee is enclosed.

☐ Payment by credit card. Form PTO-2038 is attached.

☐ The Director is hereby authorized to charge any fees which may be required, or credit any overpayment to Deposit Account No. _____.

■ Payment made via EFS-Web.

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

I am the

☐ Applicant*

☐ attorney or agent of record
Registration number _____

■ attorney or agent acting under 37 CFR 1.34
Registration number 53596

Signature /Samuel K. Simpson/

Typed or printed name Samuel K. Simpson

Date November 30, 2021

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. *Juristic entities must be represented by a patent practitioner (See 37 CFR 1.31, applicable to any paper filed on or after September 16, 2012 that is presented on behalf of a juristic entity, regardless of application filing date). Submit multiple forms if more than one signature is required, see below**.

☐ ** Total of _____ forms are submitted.

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

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6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
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9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

PTO/AIA/14 (11-15)
Approved for use through 04/30/2017. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	898/2/3 UTIL
	Application Number	
Title of Invention	THE CONTROL OF DISTRIBUTED DATABASES	

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.
This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.

Secrecy Order 37 CFR 5.2:

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Inventor Information:

Inventor 1 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	~~Martin~~ Andrew		~~MCGONNAGHIE~~ Loch	

Residence Information (Select One) US Residency ● Non US Residency Active US Military Service

City	~~Paradise Point, QLD~~ Worongary	Country of Residence i	AU

Mailing Address of Inventor:

Address 1	~~35 The Peninsula, Sovereign Islands~~ 37 Quambone Street
Address 2	

City	~~Paradise Point, QLD~~ Worongary	State/Province	Queensland
Postal Code	~~4216~~ 4213	Country i	AU

Inventor 2 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Helen		JOHNSON	

Residence Information (Select One) US Residency ◉ Non US Residency Active US Military Service

City	Red Hill, QLD	Country of Residence i	AU

Mailing Address of Inventor:

Address 1	26 Thom Street
Address 2	

City	Red Hill, QLD	State/Province	
Postal Code	4059	Country i	AU

Inventor 3 Remove

Legal Name

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	898/2/3 UTIL
	Application Number	
Title of Invention	THE CONTROL OF DISTRIBUTED DATABASES	

Prefix	Given Name	Middle Name	Family Name	Suffix
	Geoffrey		TOOGOOD	

Residence Information (Select One) US Residency ◉ Non US Residency Active US Military Service

City	Forest Lake, QLD	Country of Residence i	AU

Mailing Address of Inventor:

Address 1	18 Pinaster Street		
Address 2			
City	Forest Lake, QLD	State/Province	
Postal Code	4078	Country i	AU

Inventor 4 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Daniel	Paul	RUUL	

Residence Information (Select One) US Residency ◉ Non US Residency Active US Military Service

City	Labrador, QLD	Country of Residence i	AU

Mailing Address of Inventor:

Address 1	35 McMillan Street		
Address 2	Unit 6		
City	Labrador, QLD	State/Province	
Postal Code	4215	Country i	AU

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the **Add** button. Add

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below.
For further information see 37 CFR 1.33(a).

☐ **An Address is being provided for the correspondence Information of this application.**

Customer Number	~~115007~~ 65449		
Email Address	~~docket@nkpatentlaw.com~~ ssimpson@patentingenuity.com	Add Email	Remove Email

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	898/2/3 UTIL
	Application Number	
Title of Invention	THE CONTROL OF DISTRIBUTED DATABASES	

Application Information:

Title of the Invention	THE CONTROL OF DISTRIBUTED DATABASES		
Attorney Docket Number	~~898/2/3 UTIL~~ - SPPH-00121-US	**Small Entity Status Claimed**	☒
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	12	**Suggested Figure for Publication (if any)**	1

Filing By Reference:

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

☐ **Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32).
Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Please Select One:	● Customer Number	US Patent Practitioner	○ Limited Recognition (37 CFR 11.9)
Customer Number	~~115007~~ - 65449		

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	898/2/3 UTIL
	Application Number	
Title of Invention	THE CONTROL OF DISTRIBUTED DATABASES	

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim information in the Application Data Sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.
When referring to the current application, please leave the "Application Number" field blank.

Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
	Continuation of	16150799	2018-10-03
Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
16150799	Continuation of	14877669	2015-10-07
Prior Application Status	Abandoned		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
14877669	Continuation in part of	12227451	2009-12-18
Prior Application Status	Expired		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
12227451	a 371 of international	PCT/AU2007000684	2007-05-18

Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button. Add

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)[i] the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

Remove

Application Number	Country[i]	Filing Date (YYYY-MM-DD)	Access Code[i] (if applicable)
2006902685	AU	2006-05-18	

Additional Foreign Priority Data may be generated within this form by selecting the **Add** button. Add

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	898/2/3 UTIL
	Application Number	
Title of Invention	THE CONTROL OF DISTRIBUTED DATABASES	

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.
NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

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Approved for use through 04/30/2017. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	898/2/3 UTIL
	Application Number	
Title of Invention	THE CONTROL OF DISTRIBUTED DATABASES	

Authorization or Opt-Out of Authorization to Permit Access:

When this Application Data Sheet is properly signed and filed with the application, applicant has provided written authority to permit a participating foreign intellectual property (IP) office access to the instant application-as-filed (see paragraph A in subsection 1 below) and the European Patent Office (EPO) access to any search results from the instant application (see paragraph B in subsection 1 below).

Should applicant choose not to provide an authorization identified in subsection 1 below, applicant **must opt-out** of the authorization by checking the corresponding box A or B or both in subsection 2 below.

NOTE: This section of the Application Data Sheet is **ONLY** reviewed and processed with the **INITIAL** filing of an application. After the initial filing of an application, an Application Data Sheet cannot be used to provide or rescind authorization for access by a foreign IP office(s). Instead, Form PTO/SB/39 or PTO/SB/69 must be used as appropriate.

1. Authorization to Permit Access by a Foreign Intellectual Property Office(s)

A. Priority Document Exchange (PDX) - Unless box A in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the State Intellectual Property Office of the People's Republic of China (SIPO), the World Intellectual Property Organization (WIPO), and any other foreign intellectual property office participating with the USPTO in a bilateral or multilateral priority document exchange agreement in which a foreign application claiming priority to the instant patent application is filed, access to: (1) the instant patent application-as-filed and its related bibliographic data, (2) any foreign or domestic application to which priority or benefit is claimed by the instant application and its related bibliographic data, and (3) the date of filing of this Authorization. See 37 CFR 1.14(h)(1).

B. Search Results from U.S. Application to EPO - Unless box B in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the EPO access to the bibliographic data and search results from the instant patent application when a European patent application claiming priority to the instant patent application is filed. See 37 CFR 1.14(h)(2).

The applicant is reminded that the EPO's Rule 141(1) EPC (European Patent Convention) requires applicants to submit a copy of search results from the instant application without delay in a European patent application that claims priority to the instant application.

2. Opt-Out of Authorizations to Permit Access by a Foreign Intellectual Property Office(s)

☐ A. Applicant **DOES NOT** authorize the USPTO to permit a participating foreign IP office access to the instant application-as-filed. If this box is checked, the USPTO will not be providing a participating foreign IP office with any documents and information identified in subsection 1A above.

☐ B. Applicant **DOES NOT** authorize the USPTO to transmit to the EPO any search results from the instant patent application. If this box is checked, the USPTO will not be providing the EPO with search results from the instant application.

NOTE: Once the application has published or is otherwise publicly available, the USPTO may provide access to the application in accordance with 37 CFR 1.14.

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	898/2/3 UTIL
	Application Number	
Title of Invention	THE CONTROL OF DISTRIBUTED DATABASES	

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Applicant 1 — Remove

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

Clear

● Assignee	Legal Representative under 35 U.S.C. 117	Joint Inventor
Person to whom the inventor is obligated to assign.	Person who shows sufficient proprietary interest	

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor:

If the Applicant is an Organization check here. ☒

Organization Name	~~Allotz.com Limited~~ Surge Pricing Patent Holdings, LLC		
Mailing Address Information For Applicant:			
Address 1	~~Level 5, 128 Bundall Road~~ 1925 Lovering Avenue		
Address 2			
City	~~Bundall~~ Wilmington	**State/Province**	DE
Country	~~AU~~ US	Postal Code	~~4217~~ 19806
Phone Number		Fax Number	
Email Address			

Additional Applicant Data may be generated within this form by selecting the Add button. Add

Assignee Information including Non-Applicant Assignee Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	898/2/3 UTIL
	Application Number	
Title of Invention	THE CONTROL OF DISTRIBUTED DATABASES	

Assignee 1

Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication. An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.

Remove

If the Assignee or Non-Applicant Assignee is an Organization check here. ☐

Prefix	**Given Name**	Middle Name	**Family Name**	Suffix

Mailing Address Information For Assignee including Non-Applicant Assignee:

Address 1			
Address 2			
City		**State/Province**	
Country i		Postal Code	
Phone Number		Fax Number	
Email Address			

Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button. Add

Signature:

Remove

NOTE: This Application Data Sheet must be signed in accordance with 37 CFR 1.33(b). **However, if this Application Data Sheet is submitted with the INITIAL filing of the application and either box A or B is not checked in subsection 2 of the "Authorization or Opt-Out of Authorization to Permit Access" section, then this form must also be signed in accordance with 37 CFR 1.14(c).**

This Application Data Sheet **must** be signed by a patent practitioner if one or more of the applicants is a **juristic entity** (e.g., corporation or association). If the applicant is two or more joint inventors, this form must be signed by a patent practitioner, **all** joint inventors who are the applicant, or one or more joint inventor-applicants who have been given power of attorney (e.g., see USPTO Form PTO/AIA/81) on behalf of **all** joint inventor-applicants.

See 37 CFR 1.4(d) for the manner of making signatures and certifications.

Signature	~~/Gregory M. Evans/~~ /Samuel K. Simpson/	Date (YYYY-MM-DD)	~~2020-07-08~~ 2021-11-30
First Name	~~Gregory~~ Samuel	Last Name	~~Evans~~ Simpson
Registration Number	~~72160~~ 53596		

Additional Signature may be generated within this form by selecting the Add button. Add

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Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	898/2/3 UTIL
	Application Number	
Title of Invention	THE CONTROL OF DISTRIBUTED DATABASES	

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1 The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3 A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent CooperationTreaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

SCHWEGMAN ■ LUNDBERG ■ WOESSNER

United States Patent Application

COMBINED DECLARATION AND POWER OF ATTORNEY

As a below named inventor I hereby declare that: my residence, post office address and citizenship are as stated below next to my name; that

I verily believe I am the original, first and joint inventor of the subject matter which is claimed and for which a patent is sought on the invention entitled: **THE MANAGEMENT OF INVENTORY ALLOCATIONS**,

the specification of which was filed on November 18, 2008 as application serial no. 12/227,451 and was amended on November 18, 2008.

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to patentability of this application in accordance with 37 C.F.R. § 1.56 (attached hereto). I also acknowledge my duty to disclose all information known to be material to patentability which became available between a filing date of a prior application and the national or PCT international filing date in the event this is a Continuation-In-Part application in accordance with 37 C.F.R. § 1.63(e).

I hereby claim foreign priority benefits under 35 U.S.C. §119(a)-(d) or 365(b) of any foreign application(s) for patent or inventor's certificate, or 365(a) of any PCT international application which designated at least one country other than the United States of America, listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on the basis of which priority is claimed:

Foreign application(s), if any, claiming priority under 35 U.S.C. § 119:

Application Number	Country	Day/Month/Year Filed
2006902685	Australia	18/05/2006

I hereby claim the benefit under 35 U.S.C. § 119(e) of any United States provisional application(s) listed below:

No such claim for priority is being made at this time.

I hereby claim the benefit under 35 U.S.C. § 120 or 365(c) of any United States and PCT international application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT international application in the manner provided by the first paragraph of 35 U.S.C. § 112, I acknowledge the duty to disclose material information as defined in 37 C.F.R. § 1.56(a) which became available between the filing date of the prior application and the national or PCT international filing date of this application:

Application Number	Filing Date	Status
PCTAU2007000684	May 18, 2007	Published

I hereby appoint the attorneys associated with the customer number listed below to prosecute this application and to transact all business in the Patent and Trademark Office connected herewith:

Customer Number: 21186

I hereby authorize them to act and rely on instructions from and communicate directly with the person/assignee/attorney/firm/organization/who/which first sends/sent this case to them and by whom/which I hereby declare that I have consented after full disclosure to be represented unless/until I instruct Schwegman, Lundberg & Woessner, P.A. to the contrary.

Please direct all correspondence in this case to **Schwegman, Lundberg & Woessner, P.A. at** the address indicated below:
Customer Number. 21186

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full Name of joint inventor number 1 : **Andrew Loch**
Citizenship: **Australia** Residence: **Worongary, QLD Australia**
Post Office Address: 37 Quambone Street
Worongary, QLD 4213
Australia

Signature: _____ Date: 17/12/2009
Andrew Loch

Full Name of joint inventor number 2 : **Helen Johnson**
Citizenship: **Australia** Residence: **Red Hill, QLD Australia**
Post Office Address: 26 Thorn Street
Red Hill, QLD 4059
Australia

Signature: _____ Date: 18/12/09
Helen Johnson

Full Name of joint inventor number 3 : **Geoffrey Toogood**
Citizenship: **Australia** Residence: **Greenslopes, QLD Australia**
Post Office Address: 83 Renman Street
Greenslopes, QLD 4120
Australia

Signature: _____ Date: 17/12/2009
Geoffrey Toogood

X Additional inventors are being named on separately numbered sheets, attached hereto.

Full Name of joint inventor number 4 : **Daniel Paul Ruul**
Citizenship: **Australia** Residence: **Labrador, QLD Australia**
Post Office Address: Unit 6, 35 McMillan Street
Labrador, QLD 4215
Australia

Signature: _____ Date: _____
Daniel Paul Ruul

§ 1.56 Duty to disclose information material to patentability.

(a) A patent by its very nature is affected with a public interest. The public interest is best served, and the most effective patent examination occurs when, at the time an application is being examined, the Office is aware of and evaluates the teachings of all information material to patentability. Each individual associated with the filing and prosecution of a patent application has a duty of candor and good faith in dealing with the Office, which includes a duty to disclose to the Office all information known to that individual to be material to patentability as defined in this section. The duty to disclose information exists with respect to each pending claim until the claim is canceled or withdrawn from consideration, or the application becomes abandoned. Information material to the patentability of a claim that is canceled or withdrawn from consideration need not be submitted if the information is not material to the patentability of any claim remaining under consideration in the application. There is no duty to submit information which is not material to the patentability of any existing claim. The duty to disclose all information known to be material to patentability is deemed to be satisfied if all information known to be material to patentability of any claim issued in a patent was cited by the Office or submitted to the Office in the manner prescribed by §§ 1.97(b)-(d) and 1.98. However, no patent will be granted on an application in connection with which fraud on the Office was practiced or attempted or the duty of disclosure was violated through bad faith or intentional misconduct. The Office encourages applicants to carefully examine:

(1) prior art cited in search reports of a foreign patent office in a counterpart application, and

(2) the closest information over which individuals associated with the filing or prosecution of a patent application believe any pending claim patentably defines, to make sure that any material information contained therein is disclosed to the Office.

(b) Under this section, information is material to patentability when it is not cumulative to information already of record or being made of record in the application, and

(1) It establishes, by itself or in combination with other information, a prima facie case of unpatentability of a claim; or

(2) It refutes, or is inconsistent with, a position the applicant takes in:

(i) Opposing an argument of unpatentability relied on by the Office, or

(ii) Asserting an argument of patentability.

A prima facie case of unpatentability is established when the information compels a conclusion that a claim is unpatentable under the preponderance of evidence, burden-of-proof standard, giving each term in the claim its broadest reasonable construction consistent with the specification, and before any consideration is given to evidence which may be submitted in an attempt to establish a contrary conclusion of patentability.

(c) Individuals associated with the filing or prosecution of a patent application within the meaning of this section are:

(1) Each inventor named in the application:

(2) Each attorney or agent who prepares or prosecutes the application; and

(3) Every other person who is substantively involved in the preparation or prosecution of the application and who is associated with the inventor, with the assignee or with anyone to whom there is an obligation to assign the application.

(d) Individuals other than the attorney, agent or inventor may comply with this section by disclosing information to the attorney, agent, or inventor.

Electronic Patent Application Fee Transmittal

Application Number:	16924395
Filing Date:	09-Jul-2020
Title of Invention:	CONTROL OF DISTRIBUTED DATABASES
First Named Inventor/Applicant Name:	Martin MCCONNACHIE
Filer:	Samuel Simpson
Attorney Docket Number:	898/2/3 UTIL

Filed as Small Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
PROCESSING FEE, EXCEPT PROV. APPLS.	2830	1	70	70
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
CORRECTION OF INVENTORSHIP ON MERITS	2819	1	320	320
		Total in USD ($)		**390**

Electronic Acknowledgement Receipt

EFS ID:	44401017
Application Number:	16924395
International Application Number:	
Confirmation Number:	5073
Title of Invention:	CONTROL OF DISTRIBUTED DATABASES
First Named Inventor/Applicant Name:	Martin MCCONNACHIE
Customer Number:	115007
Filer:	Samuel Simpson
Filer Authorized By:	
Attorney Docket Number:	898/2/3 UTIL
Receipt Date:	30-NOV-2021
Filing Date:	09-JUL-2020
Time Stamp:	18:49:24
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	EFT
Payment was successfully received in RAM	$390
RAM confirmation Number	E2021ATI49563699
Deposit Account	
Authorized User	
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Assignee showing of ownership per 37 CFR 3.73	SPPH-00121-US_AssignmentStatement.pdf	114229 752debfd47c58c8b15ad2e240ec49ea6e9e579af	no	3
Warnings:					
Information:					
2	Req to correct/update/change appl name until pay issue fee	SPPH-00121-US_RequestToUpdate.pdf	194907 50ae899f51c36a90377618e4f08ee545ae9ddde9	no	2
Warnings:					
Information:					
3	Power of Attorney	SPPH-00121-US____PowerOfAttorney.pdf	7725214 832f4b5d359c765d502a4bdf33bfd161252837c9	no	4
Warnings:					
Information:					
4	Request under Rule 48 correcting inventorship	SPPH-00121-US_Request_To_Correct_Inventorship.pdf	5628034 5299597ccb97cb276cfaf03e954e617aeaf30774	no	3
Warnings:					
Information:					
5	Application Data Sheet	SPPH-00121-US_ApplicationDataSheet____Revised.pdf	15907900 837c37747ebeb4b6e2cb738fff127dd44bfd2cd0	no	10
Warnings:					
Information:					
6	Oath or Declaration filed	AndrewLoch_Declaration.pdf	182429 becd2e9e9fee60756f810c2115d2c48c2f879316	no	4
Warnings:					
Information:					

7	Fee Worksheet (SB06)	fee-info.pdf	40293 f803335901534e7c23fa3a631f4ad32deee17670	no	2

Warnings:	
Information:	
Total Files Size (in bytes):	29793006

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/AIA/96 (08-12)
Approved for use through 11/30/2020. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

STATEMENT UNDER 37 CFR 3.73(c)

Applicant/Patent Owner: Surge Pricing Patent Holdings, LLC

Application No./Patent No.: 16924395 Filed/Issue Date: 07/09/2020

Titled: A COMPUTER-IMPLEMENTED METHOD FOR MANAGING INVENTORY ALLOCATIONS

Surge Pricing Patent Holdings, LLC, a limited liability company

(Name of Assignee) (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that, for the patent application/patent identified above, it is (choose **one** of options 1, 2, 3 or 4 below):

1. ☑ The assignee of the entire right, title, and interest.

2. ☐ An assignee of less than the entire right, title, and interest (check applicable box):

   ☐ The extent (by percentage) of its ownership interest is _____%. Additional Statement(s) by the owners holding the balance of the interest must be submitted to account for 100% of the ownership interest.

   ☐ There are unspecified percentages of ownership. The other parties, including inventors, who together own the entire right, title and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

3. ☐ The assignee of an undivided interest in the entirety (a complete assignment from one of the joint inventors was made). The other parties, including inventors, who together own the entire right, title, and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

4. ☐ The recipient, via a court proceeding or the like (*e.g.*, bankruptcy, probate), of an undivided interest in the entirety (a complete transfer of ownership interest was made). The certified document(s) showing the transfer is attached.

The interest identified in option 1, 2 or 3 above (not option 4) is evidenced by either (choose **one** of options A or B below):

A. ☐ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel _____, Frame _____, or for which a copy thereof is attached.

B. ☑ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: Andrew Loch, Helen Johnson, Geoffrey Toogood, and Daniel Paul Ruul To: Allotz.com Limited

   The document was recorded in the United States Patent and Trademark Office at
   Reel 053161, Frame 0661, or for which a copy thereof is attached.

2. From: Martin McConnachie To: Allotz.com Limited

   The document was recorded in the United States Patent and Trademark Office at
   Reel 053161, Frame 0563, or for which a copy thereof is attached.

This collection of information is required by 37 CFR 3.73(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

PTO/AIA/96 (08-12)
Approved for use through 11/30/2020. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

STATEMENT UNDER 37 CFR 3.73(c)

3. From: Allotz.com Limited via Receiver James Patrick Downey To: Southbank Capital Pty Ltd

The document was recorded in the United States Patent and Trademark Office at
Reel 057248, Frame 0195, or for which a copy thereof is attached.

4. From: Southbank Capital Pty Ltd To: Surge Pricing Patent Holdings, LLC

The document was recorded in the United States Patent and Trademark Office at
Reel 057878, Frame 0103, or for which a copy thereof is attached.

5. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

6. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

☐ Additional documents in the chain of title are listed on a supplemental sheet(s).

☐ As required by 37 CFR 3.73(c)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/Samuel K. Simpson/	November 30, 2021
Signature	Date
Samuel K. Simpson	53596
Printed or Typed Name	Title or Registration Number

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Doc Code: R46C.REQ
Document Description: Request under 37 CFR 1.46(c) to correct, update or change the applicant.

PTO/AIA/41 (04-15)
Approved for use through 11/30/2020. OMB 0651-0031
U.S. Patent and Trademark Office, U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

REQUEST TO CORRECT OR UPDATE THE NAME OF THE APPLICANT UNDER 37 CFR 1.46(c)(1), OR CHANGE THE APPLICANT UNDER 37 CFR 1.46(c)(2)

(FOR USE ONLY IN APPLICATIONS FILED ON OR AFTER SEPTEMBER 16, 2012)

Application Number	16924395
Filing Date	July 9, 2020
First Named Inventor	Martin McConnachie
Art Unit	3687
Examiner Name	Crawley, Talia F.
Practitioner Docket Number	

To: Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Applicant hereby **requests that the name of the applicant be corrected or updated under 37 CFR 1.46(c)(1), or that the applicant be changed under 37 CFR 1.46(c)(2),** in the above-identified application. **Requests under 37 CFR 1.46(c)(1) or (c)(2) cannot be submitted after payment of the issue fee or if the application has been patented.**

Please check the applicable box(es) below.

☐ 1. This request is to **correct or update the name of the applicant** (**under 37 CFR 1.46(c)(1)**) and includes:

☐ An application data sheet (ADS) in accordance with 37 CFR 1.76(c) with the corrected or updated information shown with markings (*e.g.*, underlining for insertions, strikethrough for deletions). A Corrected Web-based ADS may be used.

Note: Requests under 37 CFR 1.46(c)(1) may be filed to correct typographical errors in the name of the § 1.46 applicant, or for updating the name of the § 1.46 applicant (*i.e.*, where there is no change in the applicant itself but just in the applicant's name). See the Manual of Patent Examining Procedure (MPEP) section 605.01.

☒ 2. This request is to **change the applicant** (**under 37 CFR 1.46(c)(2)**) and includes:

☒ An application data sheet (ADS) in accordance with 37 CFR 1.76(c) that identifies the changes with proper markings (underlining for insertions and strikethrough for deletions). A Corrected Web-based ADS may be used.

☒ A Statement Under 37 CFR 3.73(c) (Form PTO/AIA/96 or equivalent). See MPEP 325.

I am the

☐ applicant* ☐ attorney or agent of record Registration number _____ ☒ attorney or agent acting under 37 CFR 1.34 Registration number 53596

Signature /Samuel K. Simpson/

Typed or printed name /Samuel K. Simpson/

Date November 30, 2021

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. *Juristic entities must be represented by a patent practitioner (See 37 CFR 1.31, applicable to any paper filed on or after September 16, 2012 that is presented on behalf of a juristic entity, regardless of application filing date). Submit multiple forms if more than one signature is required, see below**.

☐ ** Total of _____ forms are submitted.

This collection of information is required by 37 CFR 1.36. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
16/924,395	07/09/2020	Martin MCCONNACHIE	898/2/3 UTIL

CONFIRMATION NO. 5073

POWER OF ATTORNEY NOTICE

115007
NK Patent Law
4917 Waters Edge Dr.
Suite 275
Raleigh, NC 27606

OC000000130164152

Date Mailed: 12/03/2021

NOTICE REGARDING CHANGE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 11/30/2021.

- The Power of Attorney to you in this application has been revoked by the applicant. Future correspondence will be mailed to the new address of record(37 CFR 1.33).

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/nbekele/

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
16/924,395	07/09/2020	Martin MCCONNACHIE	898/2/3 UTIL

CONFIRMATION NO. 5073

65449
PATENT INGENUITY, P.C.
9701 Wilshire Boulevard
Suite 1000
Beverly Hills, CA 90212

POA ACCEPTANCE LETTER

OC000000130164162

Date Mailed: 12/03/2021

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 11/30/2021.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/nbekele/

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
16/924,395	07/09/2020	3687	835	898/2/3 UTIL	21	3

CONFIRMATION NO. 5073

CORRECTED FILING RECEIPT

65449
PATENT INGENUITY, P.C.
9701 Wilshire Boulevard
Suite 1000
Beverly Hills, CA 90212

OC000000130164219

Date Mailed: 12/03/2021

Receipt is acknowledged of this non-provisional utility patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF FIRST INVENTOR, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection.

Please verify the accuracy of the data presented on this receipt. If an error is noted on this Filing Receipt, please submit a written request for a corrected Filing Receipt, including a properly marked-up ADS showing the changes with strike-through for deletions and underlining for additions. If you received a "Notice to File Missing Parts" or other Notice requiring a response for this application, please submit any request for correction to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections provided that the request is grantable.

Inventor(s)

Andrew Loch, Worongary, AUSTRALIA;
Helen JOHNSON, Red Hill, AUSTRALIA;
Geoffrey TOOGOOD, Forest Lake, AUSTRALIA;
Daniel Paul RUUL, Labrador, AUSTRALIA;

Applicant(s)

Surge Pricing Patent Holdings, LLC, Wilmington, DE;

Power of Attorney: The patent practitioners associated with Customer Number 65449

Domestic Priority data as claimed by applicant

This application is a CON of 16/150,799 10/03/2018 PAT 10740354
which is a CON of 14/877,669 10/07/2015 PAT 10198494
which is a CIP of 12/227,451 12/18/2009 ABN
which is a 371 of PCT/AU2007/000684 05/18/2007

Foreign Applications (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.)
AUSTRALIA 2006902685 05/18/2006 No Access Code Provided

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: Yes

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

If Required, Foreign Filing License Granted: 07/17/2020

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 16/924,395**

Projected Publication Date: Not Applicable

Non-Publication Request: No

Early Publication Request: No

**** SMALL ENTITY ****

Title

CONTROL OF DISTRIBUTED DATABASES

Preliminary Class

707

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific

countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

SelectUSA

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The U.S. offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to promote and facilitate business investment. SelectUSA provides information assistance to the international investor community; serves as an ombudsman for existing and potential investors; advocates on behalf of U.S. cities, states, and regions competing for global investment; and counsels U.S. economic development organizations on investment attraction best practices. To learn more about why the United States is the best country in the world to develop

Uber Exhibit 1002 - p. 541
Uber Technologies, Inc. v. SurgeTech, LLC

technology, manufacture products, deliver services, and grow your business, visit http://www.SelectUSA.gov or call +1-202-482-6800.

Uber Exhibit 1002 - p. 542
Uber Technologies, Inc. v. SurgeTech, LLC

Doc Code: DIST.E.FILE Document Description: Electronic Terminal Disclaimer - Filed	PTO/SB/26 U.S. Patent and Trademark Office Department of Commerce

Electronic Petition Request	**TERMINAL DISCLAIMER TO OBVIATE A DOUBLE PATENTING REJECTION OVER A "PRIOR" PATENT**
Application Number	16924395
Filing Date	09-Jul-2020
First Named Inventor	Andrew Loch
Attorney Docket Number	SPPH-00121-US
Title of Invention	CONTROL OF DISTRIBUTED DATABASES

☒ Filing of terminal disclaimer does not obviate requirement for response under 37 CFR 1.111 to outstanding Office Action

☒ This electronic Terminal Disclaimer is not being used for a Joint Research Agreement.

Owner	Percent Interest
Surge Pricing Patent Holdings, LLC	100%

The owner(s) with percent interest listed above in the instant application hereby disclaims, except as provided below, the terminal part of the statutory term of any patent granted on the instant application which would extend beyond the expiration date of the full statutory term of prior patent number(s)

10740354

as the term of said prior patent is presently shortened by any terminal disclaimer. The owner hereby agrees that any patent so granted on the instant application shall be enforceable only for and during such period that it and the prior patent are commonly owned. This agreement runs with any patent granted on the instant application and is binding upon the grantee, its successors or assigns.

In making the above disclaimer, the owner does not disclaim the terminal part of the term of any patent granted on the instant application that would extend to the expiration date of the full statutory term of the prior patent, "as the term of said prior patent is presently shortened by any terminal disclaimer," in the event that said prior patent later:
- expires for failure to pay a maintenance fee;
- is held unenforceable;
- is found invalid by a court of competent jurisdiction;
- is statutorily disclaimed in whole or terminally disclaimed under 37 CFR 1.321;
- has all claims canceled by a reexamination certificate;
- is reissued; or
- is in any manner terminated prior to the expiration of its full statutory term as presently shortened by any terminal disclaimer.

◉ Terminal disclaimer fee under 37 CFR 1.20(d) is included with Electronic Terminal Disclaimer request.

○ I certify, in accordance with 37 CFR 1.4(d)(4), that the terminal disclaimer fee under 37 CFR 1.20(d) required for this terminal disclaimer has already been paid in the above-identified application.
Applicant claims the following fee status: ◉ Small Entity ○ Micro Entity ○ Regular Undiscounted I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.
THIS PORTION MUST BE COMPLETED BY THE SIGNATORY OR SIGNATORIES I certify, in accordance with 37 CFR 1.4(d)(4) that I am: ◉ An attorney or agent registered to practice before the Patent and Trademark Office who is of record in this application Registration Number 53596 ○ A sole inventor ○ A joint inventor; I certify that I am authorized to sign this submission on behalf of all of the inventors as evidenced by the power of attorney in the application ○ A joint inventor; all of whom are signing this request

Signature	/Samuel K. Simpson/
Name	Samuel K. Simpson

*Statement under 37 CFR 3.73(b) is required if terminal disclaimer is signed by the assignee (owner).
Form PTO/SB/96 may be used for making this certification. See MPEP § 324.

Electronic Patent Application Fee Transmittal

Application Number:	16924395
Filing Date:	09-Jul-2020
Title of Invention:	CONTROL OF DISTRIBUTED DATABASES
First Named Inventor/Applicant Name:	Andrew Loch
Filer:	Samuel Simpson
Attorney Docket Number:	SPPH-00121-US

Filed as Small Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
STATUTORY OR TERMINAL DISCLAIMER	2814	1	170	170
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**170**

Doc Code: DISQ.E.FILE
Document Description: Electronic Terminal Disclaimer – Approved

Application No.: 16924395

Filing Date: 09-Jul-2020

Applicant/Patent under Reexamination: Loch

Electronic Terminal Disclaimer filed on December 3, 2021

☒ APPROVED

This patent is subject to a terminal disclaimer

☐ DISAPPROVED

Approved/Disapproved by: Electronic Terminal Disclaimer automatically approved by EFS-Web

U.S. Patent and Trademark Office

Electronic Acknowledgement Receipt

EFS ID:	44433222
Application Number:	16924395
International Application Number:	
Confirmation Number:	5073
Title of Invention:	CONTROL OF DISTRIBUTED DATABASES
First Named Inventor/Applicant Name:	Andrew Loch
Customer Number:	65449
Filer:	Samuel Simpson
Filer Authorized By:	
Attorney Docket Number:	SPPH-00121-US
Receipt Date:	03-DEC-2021
Filing Date:	09-JUL-2020
Time Stamp:	16:52:17
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	EFT
Payment was successfully received in RAM	$170
RAM confirmation Number	E2021B3G52132226
Deposit Account	
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Terminal Disclaimer-Filed (Electronic)	eTerminal-Disclaimer.pdf	41185 8794fbd1667082964683a941172b06ea7234edcd	no	2
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	37923 c11f2c125c03210d9605ce52ec37e7dca0b2e24d	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	79108		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 16/924,395	Filing Date 07/09/2020	☐ To be Mailed

ENTITY: ☐ LARGE ☑ SMALL ☐ MICRO

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		x $50 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $230 =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).				
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))					
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT	12/03/2021	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 10	Minus	** 20	= 0		x $50 =	0
	Independent (37 CFR 1.16(h))	* 3	Minus	*** 3	= 0		x $240 =	0
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	0

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=		x $0 =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=		x $0 =	
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.	LIE
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".	/VENICE M WILLIAMS/
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".	
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.	

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

PTO/AIA/22 (10-20)
Approved for use through 11/30/2020. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PETITION FOR EXTENSION OF TIME UNDER 37 CFR 1.136(a)

Docket Number (Optional): SPPH-00121-US

Application Number: 16/924,395

Filed: July 9, 2020

For: A COMPUTER-IMPLEMENTED METHOD FOR MANAGING INVENTORY ALLOCATIONS

Art Unit: 3687

Examiner: Crawley, Talia F.

This is a request under the provisions of 37 CFR 1.136(a) to extend the period for filing a reply in the above-identified application.

The requested extension and fee are as follows (check time period desired and enter the appropriate fee below):

		Fee	Small Entity Fee	Micro Entity Fee	
☑	One month (37 CFR 1.17(a)(1))	$220	$110	$55	$ 110
☐	Two months (37 CFR 1.17(a)(2))	$640	$320	$160	$
☐	Three months (37 CFR 1.17(a)(3))	$1,480	$740	$370	$
☐	Four months (37 CFR 1.17(a)(4))	$2,320	$1,160	$580	$
☐	Five months (37 CFR 1.17(a)(5))	$3,160	$1,580	$790	$

☑ Applicant asserts small entity status. See 37 CFR 1.27.

☐ Applicant certifies micro entity status. See 37 CFR 1.29.
Form PTO/SB/15A or B or equivalent must either be enclosed or have been submitted previously.

☐ A check in the amount of the fee is enclosed.

☐ Payment by credit card. Form PTO-2038 is attached.

☐ The Director has already been authorized to charge fees in this application to a Deposit Account.

☐ The Director is hereby authorized to charge any fees which may be required, or credit any overpayment, to Deposit Account Number _____.

☑ Payment made via EFS-Web.

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

I am the

☐ applicant.

☑ attorney or agent of record. Registration number 53596.

☐ attorney or agent acting under 37 CFR 1.34. Registration number _____.

/Samuel K. Simpson/ — Signature

December 3, 2021 — Date

Samuel K. Simpson — Typed or printed name

(310) 860-6141 — Telephone Number

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. Submit multiple forms if more than one signature is required, see below*.

☐ * Total of _____ forms are submitted.

This collection of information is required by 37 CFR 1.136(a). The information is required to obtain or retain a benefit by the public, which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 6 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Mail Stop PCT, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Patent Application Fee Transmittal

Application Number:	16924395
Filing Date:	09-Jul-2020
Title of Invention:	CONTROL OF DISTRIBUTED DATABASES
First Named Inventor/Applicant Name:	Andrew Loch
Filer:	Samuel Simpson
Attorney Docket Number:	SPPH-00121-US

Filed as Small Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension - 1 month with $0 paid	2251	1	110	110
Miscellaneous:				
SUBMISSION- INFORMATION DISCLOSURE STMT	2806	1	130	130
		Total in USD ($)		**240**

Electronic Acknowledgement Receipt

EFS ID:	44434593
Application Number:	16924395
International Application Number:	
Confirmation Number:	5073
Title of Invention:	CONTROL OF DISTRIBUTED DATABASES
First Named Inventor/Applicant Name:	Andrew Loch
Customer Number:	65449
Filer:	Samuel Simpson
Filer Authorized By:	
Attorney Docket Number:	SPPH-00121-US
Receipt Date:	03-DEC-2021
Filing Date:	09-JUL-2020
Time Stamp:	18:52:34
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	EFT
Payment was successfully received in RAM	$240
RAM confirmation Number	E2021B3I53033907
Deposit Account	
Authorized User	
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	SPPH-00121-US_InformationDisclosureStatement.pdf	1035391 680b08198187b8b933a5cfed9f65f55fdf989341	no	6
Warnings:					
Information:					
2	Amendment/Req. Reconsideration-After Non-Final Reject	SPPH-00121-US_ResponseOfficeAction.pdf	137714 269f4ad64fce6403b647f7669a4a4561ee790e70	no	6
Warnings:					
Information:					
3	Extension of Time	SPPH-00121-US_Extension.pdf	178259 b67e2d31d228d25e9de1a6ac8ad4d9b6d054002b	no	2
Warnings:					
Information:					
4	Non Patent Literature	CentralizedCompetitiveInventoryModelsDemandSubstitution__Reference.pdf	10722200 7371e6614f093f743f4ce55f863aed0682e5156c	no	8
Warnings:					
Information:					
5	Non Patent Literature	YieldManagement__Reference.pdf	2548190 a2fea0992cf2d15f574810c1e50c86396a0bb4c8	no	3
Warnings:					
Information:					
6	Non Patent Literature	AirTravelDemand__Reference.pdf	13000041 f73eff4e232b6301b97f0236902f17430c383b5f	no	237
Warnings:					
Information:					

7	Fee Worksheet (SB06)	fee-info.pdf	40351 27dfadedf31a55216eee1f8999cbba1b43d62aba	no	2

Warnings:	
Information:	
Total Files Size (in bytes):	27662146

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	Surge Pricing Patent Holdings, LLC	Examiner:	Crawley, Talia F.
Serial No.:	16/924,395	Group Art Unit:	3687
Filed:	July 9, 2020	Docket No.:	SPPH-00121-US
Customer No.:	65449	Confirmation No.:	5073
Title:	A COMPUTER-IMPLEMENTED METHOD FOR MANAGING INVENTORY ALLOCATIONS		

CERTIFICATE OF TRANSMISSION

I hereby certify that this document is being transmitted electronically to the United States Patent and Trademark office via the EFS Web e-Filing system on December 3, 2021.

/Samuel K. Simpson/

Samuel K. Simpson

RESPONSE TO OFFICE ACTION

MAIL STOP: AMENDMENT
Commissioner for Patents
Post Office Box 1450
Alexandria, Virginia 22313-1450

Sir/Madam:

A petition for a one month extension is provided herewith. Please enter the following:

Listing of the Claims begins on page 2 of this paper.

Remarks begin on page 6 of this paper.

Uber Exhibit 1002 - p. 558
Uber Technologies, Inc. v. SurgeTech, LLC