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(54) SURVEY COMMUNICATION ACROSS A NETWORK

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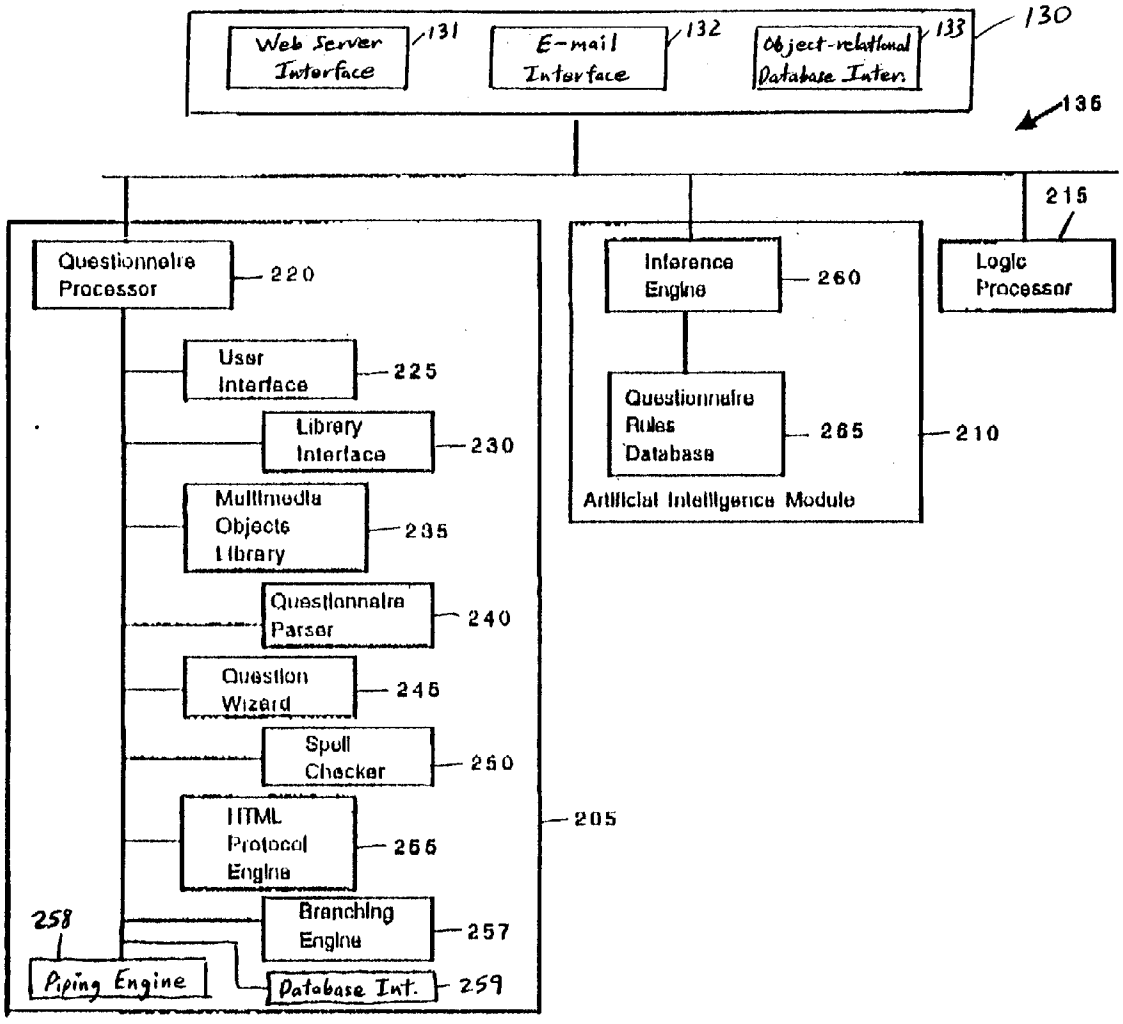
(57) ABSTRACT

A survey network system that allows gathering of information across a network quickly and efficiently, including a questionnaire server, a communication interface, a questionnaire distributor, a questionnaire designer and a questionnaire library.



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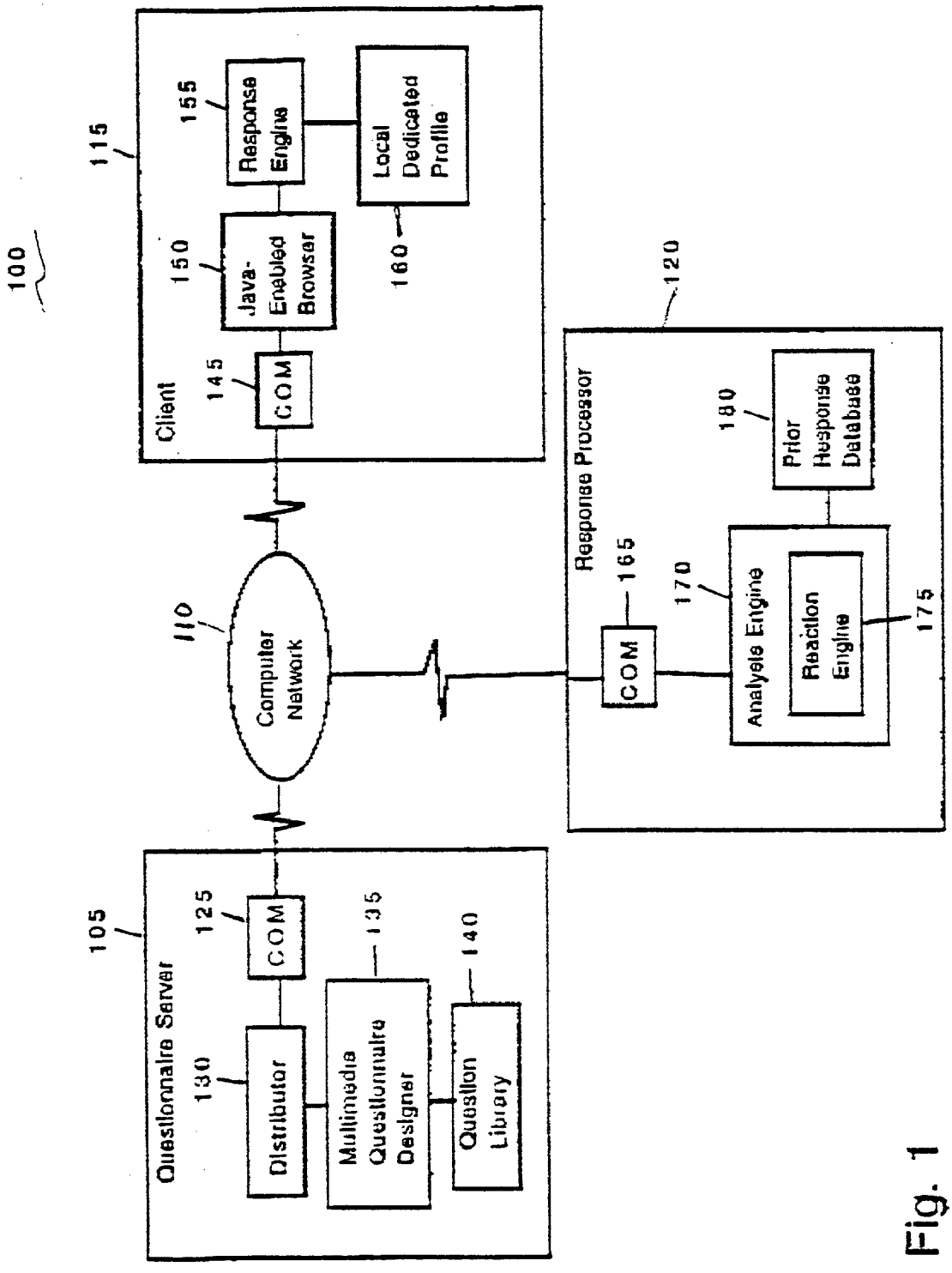
100
115
Client
155
Response Engine
150
Java-Enabled Browser
145
COM
160
Local Dedicated Profile
110
Computer Network
120
Response Processor
165
COM
170
Analysis Engine
Reaction Engine
175
180
Prior Response Database
105
Questionnaire Server
125
COM
130
Distributor
135
Multimedia Questionnaire Designer
140
Question Library

Fig. 1

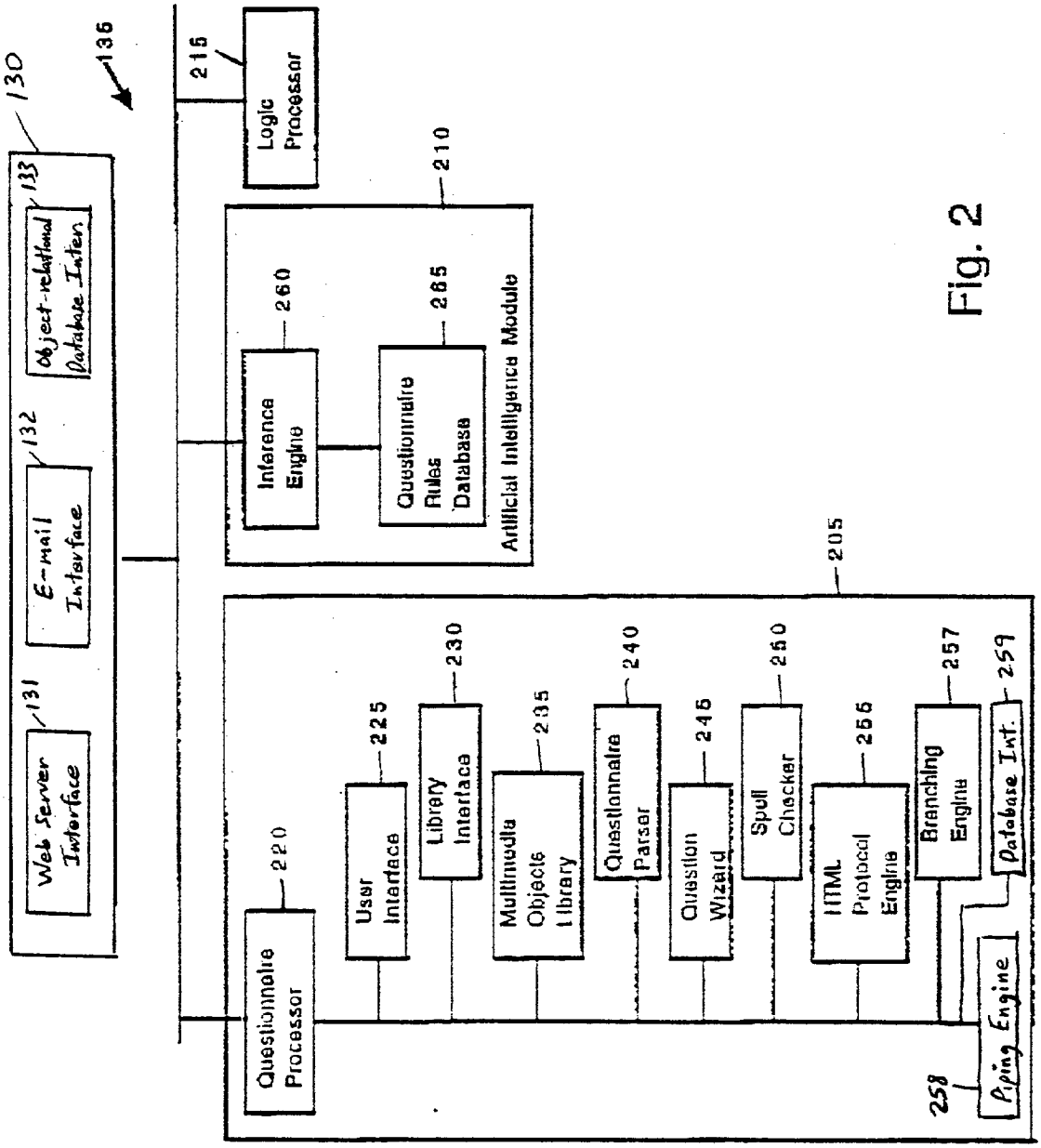
130
136
Web Server Interface
131
E-mail Interface
132
Object-relational Database Inter.
133
215
Logic Processor
210
Inference Engine
260
Questionnaire Rules Database
265
Artificial Intelligence Module
205
Questionnaire Processor
220
User Interface
225
Library Interface
230
Multimedia Objects Library
235
Questionnaire Parser
240
Question Wizard
245
Spell Checker
250
HTML Protocol Engine
255
Branching Engine
257
Database Int.
259
Piping Engine
258

Fig. 2

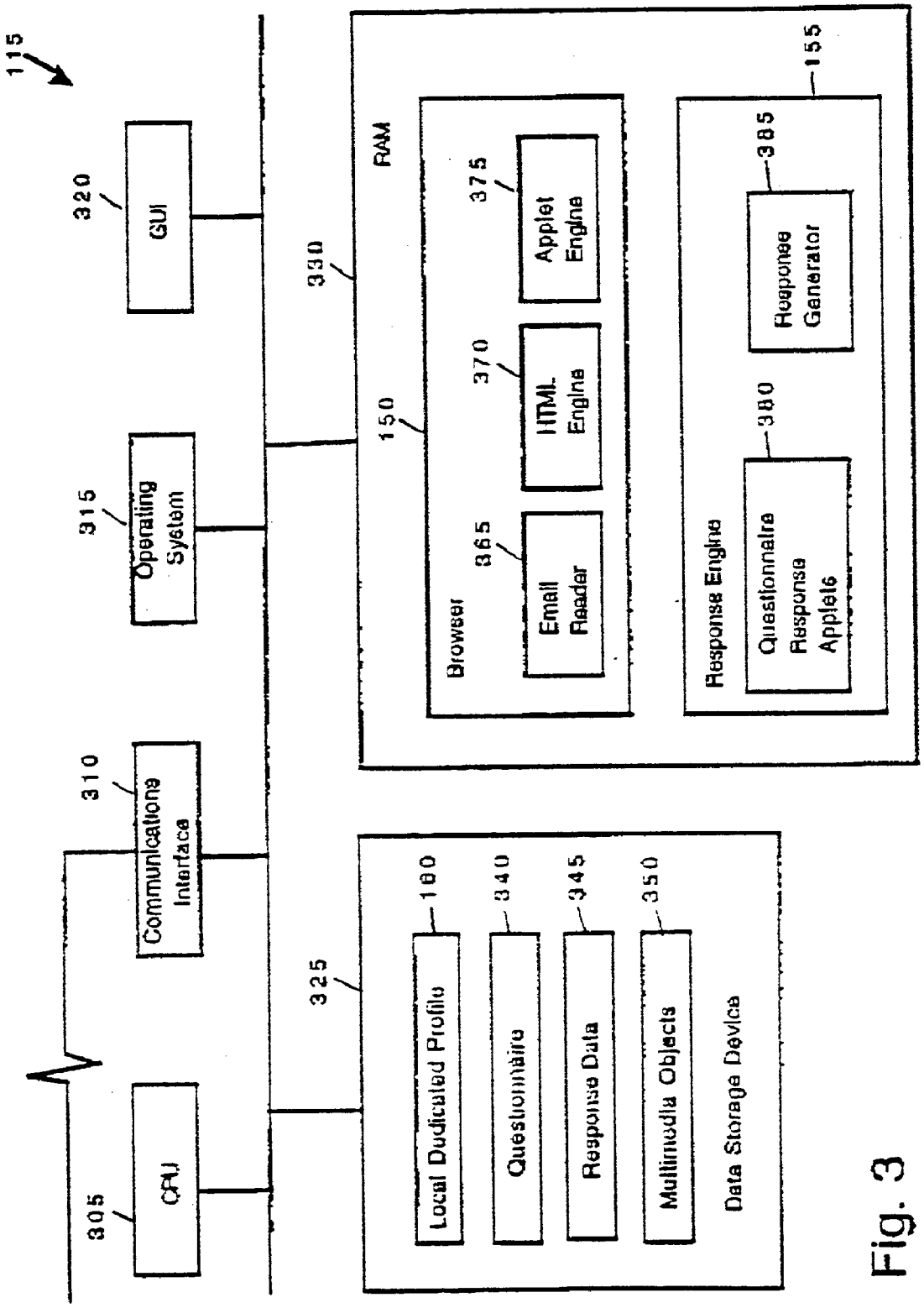
115
320
GUI
315
Operating System
310
Communications Interface
305
CPU
330
RAM
150
Browser
365
Email Reader
370
HTML Engine
375
Applet Engine
155
Response Engine
380
Questionnaire Response Applets
385
Response Generator
325
Data Storage Device
160
Local Dedicated Profile
340
Questionnaire
345
Response Data
350
Multimedia Objects

Fig. 3

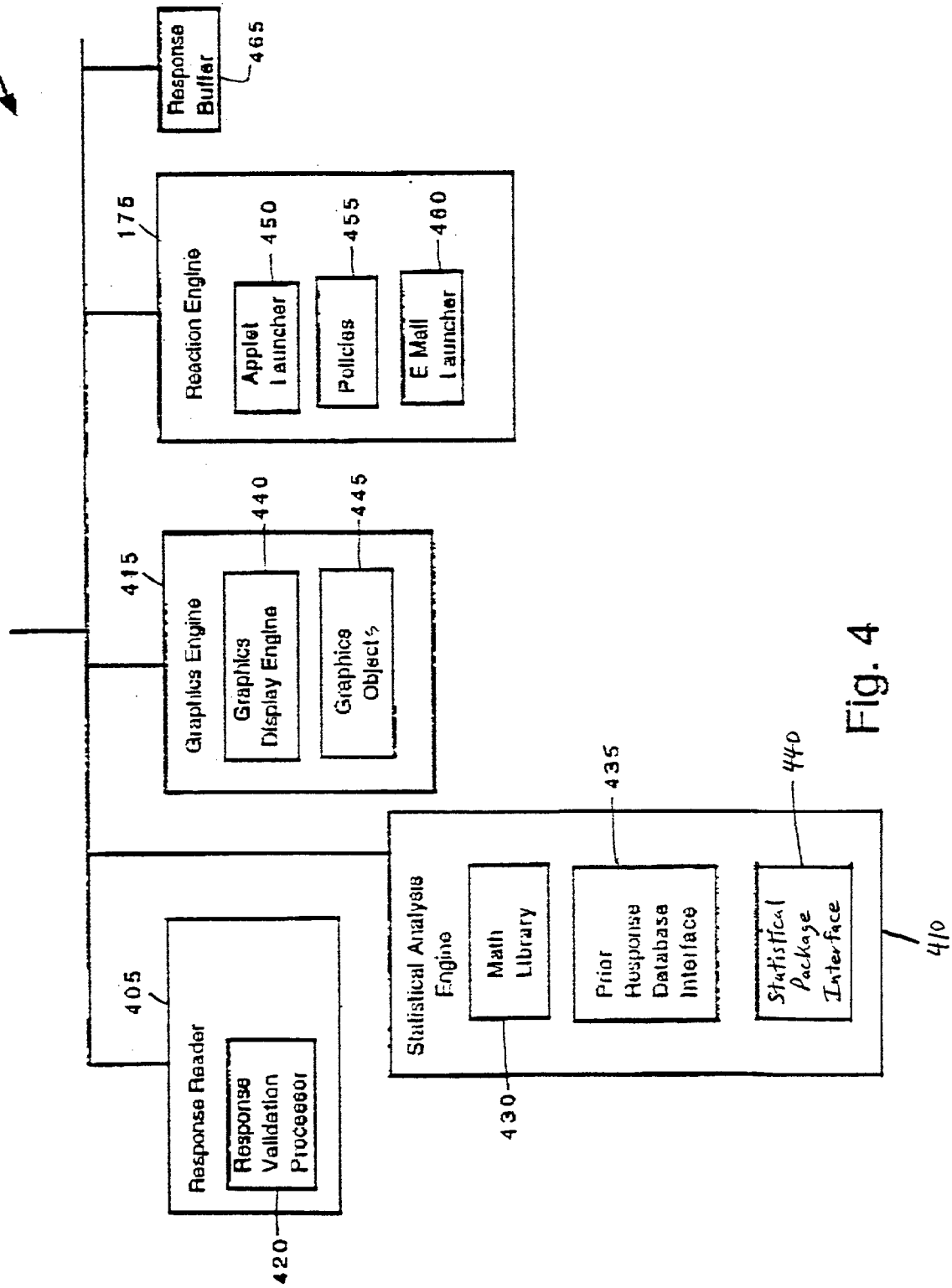
170
Response Buffer
465
175
Reaction Engine
Applet Launcher
450
Policies
455
E Mail Launcher
460
415
Graphics Engine
Graphics Display Engine
440
Graphics Objects
445
405
Response Reader
Response Validation Processor
420
Statistical Analysis Engine
Math Library
430
Prior Response Database Interface
435
Statistical Package Interface
440
410

Fig. 4

SURVEY COMMUNICATION ACROSS A NETWORK

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention relates generally to performing surveys and more particularly to survey communications across a network, such as the Internet/World-Wide-Web.

[0003] 2. Description of the Background Art

[0004] Prior art systems and methods exist to perform surveys over a computer network, but such systems and methods provide limited capabilities in survey questioning and analysis. Many computer companies developed purely e-mail-based survey, distribution and analysis utility programs which were deployed during the time that computer networking was a relatively new technology before the World-Wide-Web (Web) gained popularity.

[0005] Prior art survey utility programs usually allow a designer to create a survey comprised of limited question types, such as multiple choice, fill-in-the-blanks, rating scale (with a maximum of two-dimensions), essay-type and ranking choice. Prior art surveys can be mailed to list of recipients, who can usually activate an attachment in their e-mail program, which brings up a client program that displays the survey. After responding to the survey, the survey takers send the responses to the e-mail box of the designer. The prior art usually analyzes the responses and looks for a proprietary tag, which identifies the survey and the response data, collates them and summarizes the responses. However, the prior art suffers from a number of limitations.

[0006] The prior art usually requires a client program to be launched from every survey respondent's desktop in order to display the survey and enable the respondent to reply. This is fine in a networked environment where every computer desktop has access to a server upon which the client program resides, but it can only work if every single potential respondent has had the client program distributed to their desktop. The prior art does not take advantage of the fact the Web browser has become a de facto "universal client"—it is ubiquitous on peoples' desktops.

[0007] Another limitation of the prior art is that it is tied to proprietary operating system environments.

[0008] Another limitation of the prior art is that it is usually tied to a proprietary windowing system environment.

[0009] Another limitation of the prior art is that it is not linked to a Web server or Web browser in any way. It cannot be associated with the Web, if required to make the survey distribution more targeted or more like a broadcast.

[0010] Another limitation of the prior art is that it has no capability of associating, delivering or receiving multimedia objects such as video clips, audio clips and images to or from survey recipients.

[0011] Another limitation of the prior art is that it has limited analysis capability-only summary reporting for most question types and second order cross-tabulation for rating questions. The prior art cannot support summary tabulation and nth order cross-tabulation with associated graphical display of two or more variables.

[0012] Another limitation of the prior art is that is has no interface to databases or existing survey packages. The prior art does not tie in to Object-Relational Databases.

[0013] Another limitation of the prior art is that it supports only limited types of questions, and even in the common types of questions supported, it has limited flexibility in adding choice types. Many more question types with the ability to mix-and-match choice types between the base question types are not supported by the prior art.

[0014] Another limitation of the prior art is that it does not support "intelligent" survey behavior such as branching or piping. The prior art does not support a survey programming language called "Survey Intermediate Form" which uses common programming language constructs such as macro expansion, conditional and unconditional branching, iterative loops, procedure calls and so forth.

[0015] Another limitation of the prior art is that it works only with proprietary e-mail programs. It does not support Internet mail standards such as MIME.

[0016] A practical survey network system should provide high-capability in gathering of information across a network. Therefore, what is needed is a high-capability system for performing survey communications across a network.

SUMMARY OF THE INVENTION

[0017] One object of the invention is to allow the display of the survey and the response to the survey without requiring a client program to be distributed to and launched from every survey respondent's desktop.

[0018] Another object of the invention is to link the survey system to a Web server or Web browser, so that it can be associated with the Web, or it can be unlinked from the Web if required, to make the survey distribution more targeted or more broadcast-like.

[0019] Another object is to provide a capability to operate independently of proprietary operating system environments and proprietary windowing environments.

[0020] Another object is to provide the capability of associating, delivering or receiving multimedia objects such as video clips, audio clips and images to or from survey recipients.

[0021] Another object is to provide greater analysis capability for most question types, such as supporting summary tabulation and nth order cross-tabulation with associated graphical display of two or more variables.

[0022] Another object is to provide an interface to databases or existing survey packages and tie in to Object-Relational Databases.

[0023] Another object is to provide support for more types of questions, with more flexibility in adding choice types and to allow many more question types with the ability to mix-and-match choice types between the base question types.

[0024] Another object is to provide support for "intelligent" survey behavior such as branching or piping and to provide support for survey programming languages using

common programming language constructs such as macro expansion, conditional and unconditional branching, iterative loops and procedure calls.

[0025] Another object is to support Internet mail standards such as MIME.

[0026] The present invention comprises a survey network system for performing surveys across a communications network including a computer network, a questionnaire server, a client and a response processor. The questionnaire server includes a communication interface, a questionnaire library, a questionnaire designer and a questionnaire distributor. The client includes a communication interface, a browser, a response engine and a local dedicated profile. The response processor includes a communication interface, an analysis engine and a prior response database. This provides a high-capability survey network system.

[0027] These and other objects of the present invention will become apparent to those skilled in the art from the following detailed description and accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0028] **FIG. 1** is a diagram of a survey network system for performing survey communications across a network such as the Internet/World-Wide-Web;

[0029] **FIG. 2** is a diagram illustrating the details of the questionnaire designer and distributor;

[0030] **FIG. 3** is a diagram illustrating the details of the client; and

[0031] **FIG. 4** is a diagram illustrating the details of the analysis engine of the response processor shown in **FIG. 1**.

DETAILED DESCRIPTION OF THE INVENTION

[0032] Survey Communication Across a Network

[0033] **FIG. 1** is a block diagram illustrating a survey network system **100** for performing survey communications across a network **110** such as the Internet/World-Wide-Web. The network system **100** includes a questionnaire server **105** coupled via the computer network **110** to a client **115** and to a response processor **120**.

[0034] The server **105** includes a communications interface **125** coupled to a questionnaire distributor **130** coupled in turn to a multimedia questionnaire designer **135** coupled in turn to a questionnaire library **140**. The multimedia questionnaire designer **135** enables a user to retrieve multimedia questions from the question library **140** and to generate a multimedia-based questionnaire. Examples of multimedia include text, sound, still images, moving pictures, animation, VRML and hyperlinks to other pieces of information. The distributor **130** uses e-mail or a Web server to forward the questionnaire as a self-configurable applet via the communications interface **125** and network **110** to the client **115**.

[0035] The client **115** includes a communications interface **145** coupled to a Java-enabled browser **150** coupled in turn to a response engine **155** coupled in turn to a local dedicated profile **160**. The communications interface **145** receives the questionnaire via the computer network **110** from the questionnaire server **105**. The Java™-enabled browser **150** enables the client user to read the questionnaire. The response engine **155** enables the user to generate and send a response to the response processor **120**. The response may also be multimedia-based. For example, a question may request and the response may include a digital photograph or digital voice sample. The local dedicated profile **160** is a data file storing client user information such as previous responses and user information for authenticating the user. The local dedicated profile **160** may accompany the response for use by the response processor **120**.

[0036] The response processor **120** includes a communications interface **165** coupled to an analysis engine **170** coupled in turn to a prior response database **180**. The communications interface **165** receives the multimedia-based response from the client **115**. The analysis engine **170** retrieves relevant prior responses from the prior response database **180** and performs statistical analyses from the prior responses and current response to generate graphical representations such as pie charts or bar graphs of the results. The analysis engine **170** includes a reaction engine **175** to respond to the client by, for example, sending to the client **115** a customized information package via e-mail to the client or to other individuals based on the client's specific response or sending an applet which adds additional functionality to an application program operated by the client **115**.

[0037] Further, the multimedia questionnaire designer **135** may include means for linking questions so that, based on a response, selected questions are presented. That is, based on the response from the client, the questionnaire may include links to present related questions or may include links to skip unnecessary questions. Thus, more realistic dialogues can be achieved. For example, to the question "Do you have a pet?" if a client responds "no" then the question "Would you be interested in buying a pet?" would be appropriate but the question "What type of pet?" would be inappropriate. This process is termed "branching." Also, based on actual prior responses from the client, substitutions in later questions can be provided. For example, if the question is "What is your favorite pet?" and the client responds "dog" then later questions can automatically insert "dog" wherever specifics are requested such as "Why do you like dogs so much?" This process is termed "piping."

[0038] Details of the Questionnaire Designer and Distributor

[0039] **FIG. 2** is a block diagram illustrating details of the distributor **130** and questionnaire designer **135**. Questionnaire designer **135** includes a questionnaire editor **205**, an artificial intelligence module **210** and a logic processor **215**. The questionnaire editor **205** includes a questionnaire processor **220** coupled to a user interface **225**, a library interface **230**, a multimedia objects library **235**, a questionnaire parser **240**, a question wizard **245**, a spell checker **250**, an HTML protocol engine **255** and a branching engine **257**. The artificial intelligence module **210** includes an inference engine **260** and a question rules database **265**.

[0040] The questionnaire editor **205** is much like a conventional word processor that enables a user to generate and format a multimedia-based questionnaire, preferably in outline or graphical form. More particularly, the user interface **225** enables a user to generate questions or to use the library interface **230** to select questions or parts of questions from

the question library **140** (**FIG. 1**). The multimedia objects library **235** enables the user to include multimedia objects in the questionnaire. The questionnaire parser **240** parses the questionnaire for proper grammar. The question wizard **245** examines the syntax of the questions in the questionnaire. The spell checker **250** checks the spelling in the questionnaire. The HTML protocol engine **255** converts the questionnaire to an HTML format for publication on the computer network **110**. The branching engine **257** enables the user to link related questions so that, based on real-time responses by a client, only appropriate questions will be presented. The piping engine **258** enables the user to substitute the client responses to prior questions in later questions thus tailoring the wording of later questions to suit the client. The object-relational database interface **259** stores the questionnaire information in a persistent storage area for future retrieval and querying.

[**0041**] The inference engine **260** cooperates with questionnaire editor **205** to use and generate rules in questionnaire rules database **265** for checking question consistency. The logic processor **215** is used to insert links to actions corresponding to the questions for enabling the reaction engine **175** (**FIG. 4**) to make efficient use of the question responses.

[**0042**] The distributor **130** consists of a Web server interface **131**, an e-mail interface **132** and an object-relational database interface **133**. The Web server interface **131** enables the questionnaire to be published on a Web site for general deployment whereas the e-mail interface **132** enables the questionnaire to be sent as an e-mail attachment to a targeted audience. The database interface **133** sends information about the distribution (to whom the questionnaire was sent, when it was sent, what are the access passwords to the questionnaire for each respondent, and so on).

[**0043**] Links to multimedia associated with the questionnaire as well as the piping branching and reaction logic are also sent at the time the questionnaire is distributed. When the questionnaire is implemented as a self-configuring Java applet, it is an intelligent program.

[**0044**] Details of the Client

[**0045**] **FIG. 3** is a block diagram illustrating details of the client **115**, which includes a CPU **305**, a communications interface **310**, an operating system **315**, a Graphical User Interface (GUI) **320**, a data storage device **325** and random access memory **330**.

[**0046**] The data storage device **325** stores the local dedicated profile **160**, the questionnaire **340** created by the multimedia questionnaire designer **135**, response data **345** for use by the response engine **155** in generating a response, and common multimedia objects **350** such as sound clips, pictures, etc. for use by the response engine **155** when viewing the questionnaire **340**.

[**0047**] RAM **330** stores the Java™-enabled browser **150**, which includes an e-mail reader **365** for reviewing an e-mail-based questionnaire **340**, an HTML engine **370** for reviewing an HTML-based questionnaire **340** and an applet engine **375** for reviewing a Java™-based questionnaire **340**.

[**0048**] RAM **330** also stores a response engine **155**, which includes questionnaire response applets **380** and a response generator **385**. The questionnaire response applets **380** may have been included in the questionnaire **340** by the multimedia questionnaire designer **135** so that the client **115** could easily respond to the questions. For example, if a question were multiple choice, the corresponding questionnaire response applet **380** may, via the applet engine **375**, poll for one of the proper responses and add the selected response to the response data **345**. Otherwise, the response generator **385** would use a predetermined protocol for generating the response. To control branching, the questionnaire response applets **380** may examine client **115** responses and may instruct the browser **150** to present subsequent questions based on links included in the questionnaire **340**. To control piping, the questionnaire response applets **380** may examine the client **115** responses and may instruct the response engine **155** to substitute the specific response to prior questions in later questions.

[**0049**] Analysis Engine of the Response Processor

[**0050**] **FIG. 4** is a block diagram illustrating details of the analysis engine **170** of the response processor **120**. The analysis engine **170** includes a response reader **405**, a statistical analysis engine **410**, a graphics engine **415**, a reaction engine **175** and a response buffer **465**.

[**0051**] The response reader **405** includes a response validation processor **420** for performing security services to authenticate responses. The statistical analysis engine **410** includes a math library **430** for performing statistical analyses, a prior response database interface **435** for communicating with the prior response database **180** and a statistical package interface **440** for communicating with a commercially available statistical package, for example SAS™ or SPSS™ or a spreadsheet, such as Microsoft Excel™. For example, if the question requested a digital sample of the client **115** user's voice, then the digital sample response is stored in the response buffer **465** for current use and then into the prior response database **180** for future use and analysis. The statistical analysis engine **410** sends its results to the graphics engine **415** and to the reaction engine **175**.

[**0052**] The graphics engine **415** includes a graphics display engine **440** for presenting the results as a graphical representation such as a pie chart or bar graph. Graphics engine **415** also includes graphics objects **445** for establishing the proper formats of the graphical representations.

[**0053**] The reaction engine **175** selects and performs a proper reaction to the response or to the results of the statistical analysis. The reaction engine **175** includes policies **455** for selecting the proper reaction based on the response or on the statistical analysis. For example, the reaction engine **175** includes an applet launcher **450** for launching applets to perform the selected reaction. The applets may add additional functionality to the client **115** or may draft a "thank you" letter. The reaction engine **175** also includes an e-mail launcher **460** for forwarding information back to the client **115** or to other individuals to trigger actions that need to be taken based upon the client response. Other modules may be included in the reaction engine **175** for performing other proper reactions.

[**0054**] Those skilled in the art will recognize that the network survey system described above can be implemented with a variety of configurations, depending on the application. Therefore, the present invention is limited only by the following claims.

What is claimed is:

1. A survey network system for performing surveys across a communications network, comprising:

a questionnaire server;

a client, and

a response processor.

2. A survey network system as in claim 1 further comprising a computer network.

3. The survey network system of claim 2, wherein said analysis engine further comprises a reaction engine.

4. The survey network system of claim 1, wherein said questionnaire server comprises:

a distributor;

a multimedia questionnaire designer; and

a question library.

5. The survey network system of claim 4, wherein said questionnaire server further comprises a communications interface.

6. The survey network system of claim 1 wherein said response processor comprises:

an analysis engine; and

a prior response database.

7. The survey network system of claim 6, wherein said response processor further comprises a communications interface.

8. The survey network system of claim 1 wherein said analysis engine comprises a reaction engine.

9. The survey network system of claim 1, wherein said client comprises:

a browser;

a response engine; and

a local dedicated profile.

10. The survey network system of claim 9, wherein said browser is a Java™-enabled browser.

11. The survey network system of claim 9, wherein said client further comprises a communications interface.

12. The survey network system of claim 11, wherein said browser is a Java™-enabled browser.

13. A survey network system for performing survey communications across a network, comprising:

a computer network;

a questionnaire server linked through a first communications interface to said computer network;

a client linked through a second communications interface to said computer network; and

a response processor linked through a third communications interface to said computer network.

14. The survey network system of claim 13, wherein said questionnaire server comprises:

a distributor;

a multimedia questionnaire designer, including a questionnaire processor, an artificial intelligence module and a logic processor; and

a question library.

15. The survey network system of claim 13, wherein said response processor comprises:

a response buffer;

a response validation processor;

a statistical analysis engine;

a graphics engine;

a reaction engine; and

a prior response database.

16. The survey network system of claim 13, wherein said client comprises:

a browser including an e-mail reader, an Web server and an applet engine;

a response engine including a plurality of questionnaire response applets and a response generator; and

a data storage device including a local dedicated profile, a questionnaire, response data and a plurality of multimedia objects.

17. A method for performing survey communications across a network, comprising the steps of:

distributing questions from a question library; and

processing a response with an analysis engine and a prior response database.

18. The method of claim 17, further comprising the step of communicating with a client by means of said client's browser.

19. The method of claim 17, further comprising the step of processing a response by means of an inference engine and a questionnaire rules database.

20. A method for performing survey communications across a network, comprising the steps of:

receiving a response;

buffering a response in a response buffer;

validating said response with a response validation processor;

statistically analyzing said response with a statistical analysis engine;

graphically displaying said response with a graphics engine; and

reacting to said response with a reaction engine.

* * * * *