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Application Number: 16234553 Document Date: 12/27/2018

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Tessell Exhibit 1002
Tessell v. Nutanix

PTO/AIA/96 (08-12)
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STATEMENT UNDER 37 CFR 3.73(c)

Applicant/Patent Owner: Nutanix, Inc.

Application No./Patent No.: Unassigned Filed/Issue Date: 12/27/2018

Titled: SYSTEM AND METHOD FOR PROVISIONING DATABASES IN A HYPERCONVERGED INFRASTRUCTURE SYSTEM

Nutanix, Inc., a Corporation

(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: _____ To: _____

   The document was recorded in the United States Patent and Trademark Office at

   Reel _____, Frame _____, or for which a copy thereof is attached.

2. From: _____ To: _____

   The document was recorded in the United States Patent and Trademark Office at

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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**.

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PTO/AIA/96 (08-12)
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STATEMENT UNDER 37 CFR 3.73(c)

3. From: _____ To: _____

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6. From: _____ To: _____

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☐ 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.

/Paul S. Hunter/	December 27, 2018
Signature	Date
Paul S. Hunter	44,787
Printed or Typed Name	Title or Registration Number

[Page 2 of 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.

Electronic Acknowledgement Receipt	
EFS ID:	34706092
Application Number:	16234553
International Application Number:	
Confirmation Number:	2275
Title of Invention:	SYSTEM AND METHOD FOR PROVISIONING DATABASES IN A HYPERCONVERGED INFRASTRUCTURE SYSTEM
First Named Inventor/Applicant Name:	BALASUBRAHMANYAM KUCHIBHOTLA
Customer Number:	147491
Filer:	Paul S. Hunter/Walter Lau
Filer Authorized By:	Paul S. Hunter
Attorney Docket Number:	115539-0217
Receipt Date:	27-DEC-2018
Filing Date:	
Time Stamp:	23:44:05
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$1720
RAM confirmation Number	122818INTEFSW23450700
Deposit Account	190741
Authorized User	Walter Lau
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: 37 CFR 1.16 (National application filing, search, and examination fees) 37 CFR 1.17 (Patent application and reexamination processing fees)	

37 CFR 1.19 (Document supply fees)

37 CFR 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Transmittal of New Application	115539-0217-Application_Transmittal.pdf	141826 715b1c4f3c291f637ec2db7075795f9d7926de11	no	4
Warnings:					
Information:					
2	Application Data Sheet	115539-0217-ADS.pdf	1863182 f444ff283adea8a4b9e43b97379a87c287dd59b0	no	9
Warnings:					
Information:					
3	Oath or Declaration filed	115539-0217-Executed_Declaration.pdf	253377 b73c3d740dbfd73e0f7471b9617b67742dd205f9	no	5
Warnings:					
Information:					
4	Power of Attorney	115539-0217_POA.pdf	171099 bd3ca12cfaf368e9692420ca0f8e165560820e30	no	1
Warnings:					
Information:					
5	Assignee showing of ownership per 37 CFR 3.73	115539-0217-373C_Statement.pdf	572758 2509420e7cac626b417f0fd472d9248d19de3d5c	no	3
Warnings:					
Information:					
6	Assignee showing of ownership per 37 CFR 3.73	115539-0217-Executed_Assignment.pdf	243357 2b6fac45bc9a669766699950d2d3cd2b5665078dd	no	3
Warnings:					
Information:					

7		115539-0217-Application.pdf	356969 1999620d9991b048e5acdf9ec1f284bd98e0240f	yes	78
	Multipart Description/PDF files in .zip description				
	Document Description		**Start**	**End**	
	Specification		1	71	
	Claims		72	77	
	Abstract		78	78	
Warnings:					
Information:					
8	Drawings-other than black and white line drawings	115539-0217-Drawings.pdf	4841644 02ed170f845efb47398ce7bede9e39bc1c87b829	no	31
Warnings:					
Information:					
9	Fee Worksheet (SB06)	fee-info.pdf	34880 ae22704e09d8c5889424f544716498c6f74d5aed	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	8479092		

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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.

CLAIMS

What is claimed is:

1. A method comprising:

receiving, by a database engine of a database system associated with a virtual computing system, a user request via a dashboard for provisioning a source database with the database system;

receiving, by the database engine via the dashboard, selection of a database engine type;

receiving, by the database engine via the dashboard, selection of a Service Level Agreement ("SLA") and a protection schedule;

provisioning, by the database engine, the source database based upon the database engine type;

creating, by the database engine, an instance of a database protection system based upon the SLA and the protection schedule, including associating the instance of the database protection system with the source database; and

displaying, by the database engine, the source database within the dashboard.

2. The method of claim 1, further comprising:

receiving, by the database engine via the dashboard, selection of a first set of parameters; and

creating, by the database engine, a source database virtual machine based on the first set of parameters, wherein the source database resides on the source database virtual machine.

3. The method of claim 2, wherein the first set of parameters comprises at least one of a software profile, a compute profile, a network profile, and a database parameters profile.

4. The method of claim 1, further comprising:

receiving, by the database engine via the dashboard, a size of the source database;

converting, by the database engine, the size into a number of virtual disks; and

associating, by the database engine, the virtual disks with the source database.

5. The method of claim 1, wherein provisioning comprises creating a new database as the source database within the database system.

6. The method of claim 1, wherein provisioning comprises registering an existing database as the source database with the database system.

7. The method of claim 1, wherein the protection schedule comprises a frequency of capturing snapshots and a frequency of capturing transactional logs for protecting the source database.

8. The method of claim 1, further comprising:

presenting, by the database engine via the dashboard, a group of the database engine types that are supported by the database system; and

receiving, by the database engine, one of the group of the database engine types as the selection of the database engine type.

9. The method of claim 1, further comprising:

presenting, by the database engine via the dashboard, a sample set of parameters for creating a source database virtual machine;

receiving, by the database engine, selection of at least one of the sample set of parameters; and

creating, by the database engine, the source database virtual machine based upon the at least one of the sample set of parameters.

10. The method of claim 1, further comprising:

presenting, by the database engine via the dashboard, a plurality of levels of the SLA; and

receiving, by the database engine via the dashboard, selection of one of the plurality of levels of the SLA.

11. The method of claim 1, wherein the protection schedule comprises a time period for designating at least one of a daily snapshot, a weekly snapshot, a monthly snapshot, and a quarterly snapshot.

12. A database system of a virtual computing system, the database system comprising:

a dashboard;

a database engine configured to receive input from and provide output to the dashboard; and

a database storage system configured to store a source database upon provisioning,

wherein the database engine is configured to:

receive a user request via the dashboard for provisioning the source database;

receive selection of a database engine type via the dashboard;

receive selection of a Service Level Agreement ("SLA") and a protection schedule via the dashboard;

provision the source database based upon the database engine type and store the source database within the database storage system;

create an instance of a database protection system based upon the SLA and the protection schedule, including associating the instance of the database protection system with the source database; and

display the source database within the dashboard.

13. The database system of claim 12, wherein the database engine is configured to communicate with the dashboard via an Application Programing Interface.

14. The database system of claim 12, wherein the database storage system is further configured to store a cloned database created from the source database.

15. The database system of claim 12, wherein the instance of the database protection system is configured to capture snapshots and transactional logs from the source database based upon the SLA and the protection schedule.

16. The database system of claim 12, wherein the database engine is further configured to receive parameters for creating a source database virtual machine, and associating the source database with the source database virtual machine.

17. The database system of claim 12, wherein the database engine is configured to receive a size of the source database, and wherein the database engine is configured to convert the size into a number of virtual disks to be associated with the source database.

18. The database system of claim 12, wherein the database engine is configured to receive selection of using an existing source database virtual machine, and wherein the database engine is configured to create the source database on the existing source database virtual machine.

19. A non-transitory computer readable media with computer-executable instructions embodied thereon that, when executed by a processor of a database engine associated with a database system of a virtual computing system, cause the database engine to perform a process comprising:

receiving a user request via a dashboard for provisioning a source database with the database system;

receiving, via the dashboard, selection of a database engine type;

receiving, via the dashboard, selection of a Service Level Agreement ("SLA") and a protection schedule;

provisioning the source database based upon the database engine type;

creating an instance of a database protection system based upon the SLA and the protection schedule, including associating the instance of the database protection system with the source database; and

displaying the source database within the dashboard.

20. The non-transitory computer readable media of claim 19, wherein provisioning the source database comprises receiving selection, by the database engine via the dashboard, for creating a new database or registering an existing database.

Electronic Patent Application Fee Transmittal

Application Number:	
Filing Date:	
Title of Invention:	SYSTEM AND METHOD FOR PROVISIONING DATABASES IN A HYPERCONVERGED INFRASTRUCTURE SYSTEM
First Named Inventor/Applicant Name:	BALASUBRAHMANYAM KUCHIBHOTLA
Filer:	Paul S. Hunter/Walter Lau
Attorney Docket Number:	115539-0217

Filed as Large Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
UTILITY APPLICATION FILING	1011	1	300	300
UTILITY SEARCH FEE	1111	1	660	660
UTILITY EXAMINATION FEE	1311	1	760	760
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**1720**

ABSTRACT OF THE DISCLOSURE

A system and method include receiving, by a database engine of a database system associated with a virtual computing system, a user request via a dashboard for provisioning a source database with the database system, receiving, by the database engine via the dashboard, selection of a database engine type, and receiving, by the database engine via the dashboard, selection of a Service Level Agreement ("SLA") and a protection schedule. The system and method also include provisioning, by the database engine, the source database based upon the database engine type, creating, by the database engine, an instance of a database protection system based upon the SLA and the protection schedule, including associating the instance of the database protection system with the source database, and displaying, by the database engine, the source database within the dashboard.

PTO/AIA/80 (07-12)
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POWER OF ATTORNEY TO PROSECUTE APPLICATIONS BEFORE THE USPTO

I hereby revoke all previous powers of attorney given in the application identified in the attached statement under 37 CFR 3.73(c).

I hereby appoint:

■ Practitioners associated with Customer Number: 147491

OR

☐ Practitioner(s) named below (if more than ten patent practitioners are to be named, then a customer number must be used):

Name	Registration Number	Name	Registration Number

As attorney(s) or agent(s) to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with any and all patent applications assigned only to the undersigned according to the USPTO assignment records or assignments documents attached to this form in accordance with 37 CFR 3.73(c).

Please change the correspondence address for the application identified in the attached statement under 37 CFR 3.73(c) to:

■ The address associated with Customer Number: 147491

OR

☐

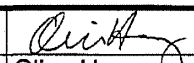
Firm or Individual Name			
Address			
City		State	Zip
Country			
Telephone		Email	

Assignee Name and Address: NUTANIX, INC.
1740 TECHNOLOGY DRIVE,
SUITE 150
SAN JOSE, CALIFORNIA 95110

A copy of this form, together with a statement under 37 CFR 3.73(c) (Form PTO/AIA/96 or equivalent) is required to be Filed in each application in which this form is used. The statement under 37 CFR 3.73(c) may be completed by one of The practitioners appointed in this form, and must identify the application in which this Power of Attorney is to be filed.

SIGNATURE of Assignee of Record

The individual whose signature and title is supplied below is authorized to act on behalf of the assignee

Signature		Date	9/12/17
Name	Olive Huang	Telephone	
Title	Associate General Counsel and Secretary		

This collection of information is required by 37 CFR 1.31, 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.**

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DocuSign Envelope ID: D727EBBB-B845-4AEF-9E97-FFE8E0121992

Atty. Dkt. No. 115539-0217

ASSIGNMENT - WORLDWIDE

For good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, each undersigned inventor (hereinafter referred to singly and collectively as "ASSIGNOR") has sold, assigned, and transferred, and by these presents hereby sells, assigns, and transfers, unto

Nutanix, Inc.
1740 Technology Drive
Suite 150
San Jose, California 95110

(hereinafter referred to as "ASSIGNEE") its successors and assigns, the full and exclusive right, title and interest for the United States, its territories and possessions, and all foreign countries in and to this invention relating to

SYSTEM AND METHOD FOR PROVISIONING A DATABASE IN A HYPER CONVERGED INFRASTRUCTURE SYSTEM

as set forth in this United States Patent Application

check one [X] executed concurrently herewith,
[ ] executed on _____,
[ ] Serial No. _____ Filed _____

as well as in and to (a) all improvements and modifications of the above-identified invention or inventions, (b) the above-identified application and all other applications for Letters Patent of the United States and countries foreign thereto for above-identified invention or inventions and all improvements and modifications thereof, (c) all Letters Patent which may issue from said applications in the United States and countries foreign thereto, (d) all divisions, continuations, reissues, and extensions of said applications and Letters Patent, and (e) the right to claim for any of said applications the full benefits and priority rights under the Patent Cooperation Treaty, the Paris Convention and any other international agreement; such right, title, and interest to be held and enjoyed by ASSIGNEE, its successors and assigns, to the full end of the term or terms for which any and all such Letters Patent may be granted as fully and entirely as would have been held and enjoyed by ASSIGNOR had this Assignment not been made.

ASSIGNOR HEREBY AUTHORIZES ASSIGNEE to file patent applications in any or all countries on the above-identified invention or inventions in the name of the undersigned or in the name of ASSIGNEE or otherwise as ASSIGNEE may deem advisable under the International Convention or otherwise.

DocuSign Envelope ID: D727EBBB-B845-4AEF-9E97-FFE8E0121992

ASSIGNOR HEREBY AUTHORIZES AND REQUESTS the Commissioner of Patents and Trademarks to issue said Letters Patent to ASSIGNEE as assignee of the entire interest, for the sole use and benefit of ASSIGNEE, its successors and assigns.

ASSIGNOR HEREBY AGREES (a) to communicate to ASSIGNEE, its successors and assigns, or their representative or agents, all facts and information known or available to ASSIGNOR respecting said invention or inventions, improvements, and modifications including evidence for interference, reexamination, reissue, opposition, revocation, extension, or infringement purposes or other legal, judicial, or administrative proceedings, whenever requested by ASSIGNEE; (b) to testify in person or by affidavit as required by ASSIGNEE, its successors and assigns, in any such proceeding in the United States or a country foreign thereto; (c) to execute and deliver, upon request by ASSIGNEE, all lawful papers including, but not limited to, original, divisional, continuation, and reissue applications, renewals, assignments, powers of attorney, oaths, affidavits, and declarations, depositions; and (d) to provide all reasonable assistance to ASSIGNEE, its successors and assigns, in obtaining and enforcing proper title in and protection for said invention or inventions, improvements, and modifications under the intellectual property laws of the United States and countries foreign thereto.

ASSIGNOR HEREBY REPRESENTS AND WARRANTS that ASSIGNOR has the full and unencumbered right to sell, assign, and transfer the interests sold, assigned, and transferred herein, and that ASSIGNOR has not executed and will not execute any document or instrument in conflict herewith.

ASSIGNOR HEREBY GRANTS to the law firm of **Foley & Lardner LLP** the power and authority to insert in this Assignment any further identification which may be necessary or desirable to comply with the rules of the U.S. Patent and Trademark Office for recordation of this Assignment.

ASSIGNOR UNDERSTANDS AND AGREES that the attorneys and agents of the law firm of **Foley & Lardner LLP** do not personally represent ASSIGNOR OR ASSIGNOR's legal interests, but instead represent the interests of ASSIGNEE; since said attorneys and agents cannot provide legal advice to ASSIGNOR with respect to this Assignment, ASSIGNOR acknowledges its right to seek its own independent legal counsel.

NAME AND SIGNATURE OF INVENTOR

Name: BALASUBRAHMANYAM KUCHIBHOTLA

SIGNATURE DocuSigned by: BALASUBRAHMANYAM KUCHIBHOTLA 5046EB798D084DB...

DATE November 30, 2018

NAME AND SIGNATURE OF INVENTOR

Name: KAMALDEEP KHANUJA

SIGNATURE DocuSigned by: KAMALDEEP KHANUJA

DATE November 29, 2018

NAME AND SIGNATURE OF INVENTOR

Name: JEREMY LAUNIER

SIGNATURE DocuSigned by: Jeremy Launier 6121A43481C143C...

DATE November 29, 2018

NAME AND SIGNATURE OF INVENTOR

Name: SUJIT MENON

SIGNATURE DocuSigned by: sujith menon DDED94A58492408...

DATE November 29, 2018

NAME AND SIGNATURE OF INVENTOR

Name: MANEESH RAWAT

SIGNATURE DocuSigned by: maneesh rawat 648DB2987AC8451...

DATE November 30, 2018

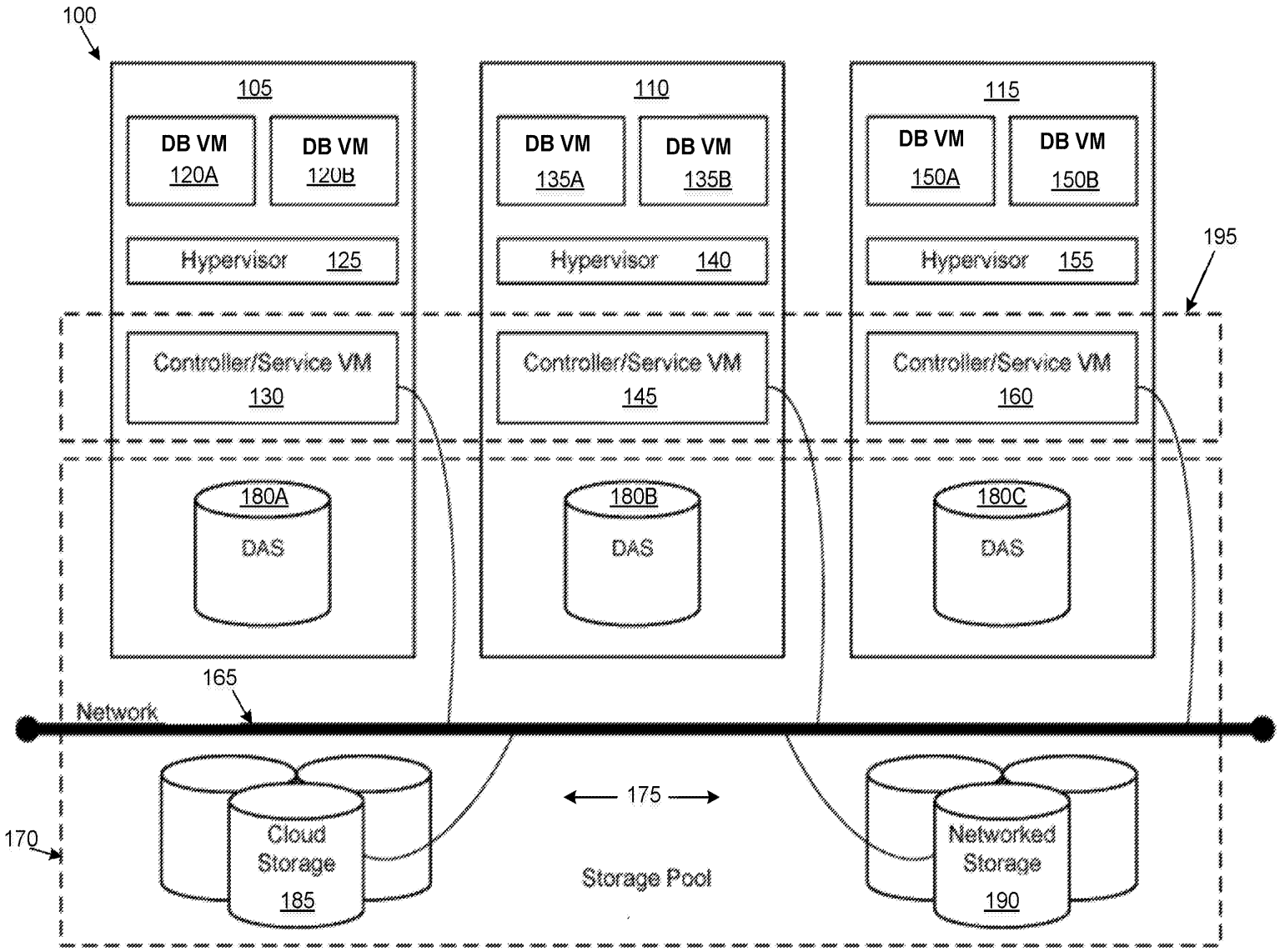

100
105
DB VM
120A
DB VM
120B
Hypervisor 125
Controller/Service VM
130
110
DB VM
135A
DB VM
135B
Hypervisor 140
Controller/Service VM
145
115
DB VM
150A
DB VM
150B
Hypervisor 155
Controller/Service VM
160
195
180A
DAS
180B
DAS
180C
DAS
165
Network
175
170
Cloud
Storage
185
Storage Pool
Networked
Storage
190

FIG. 1

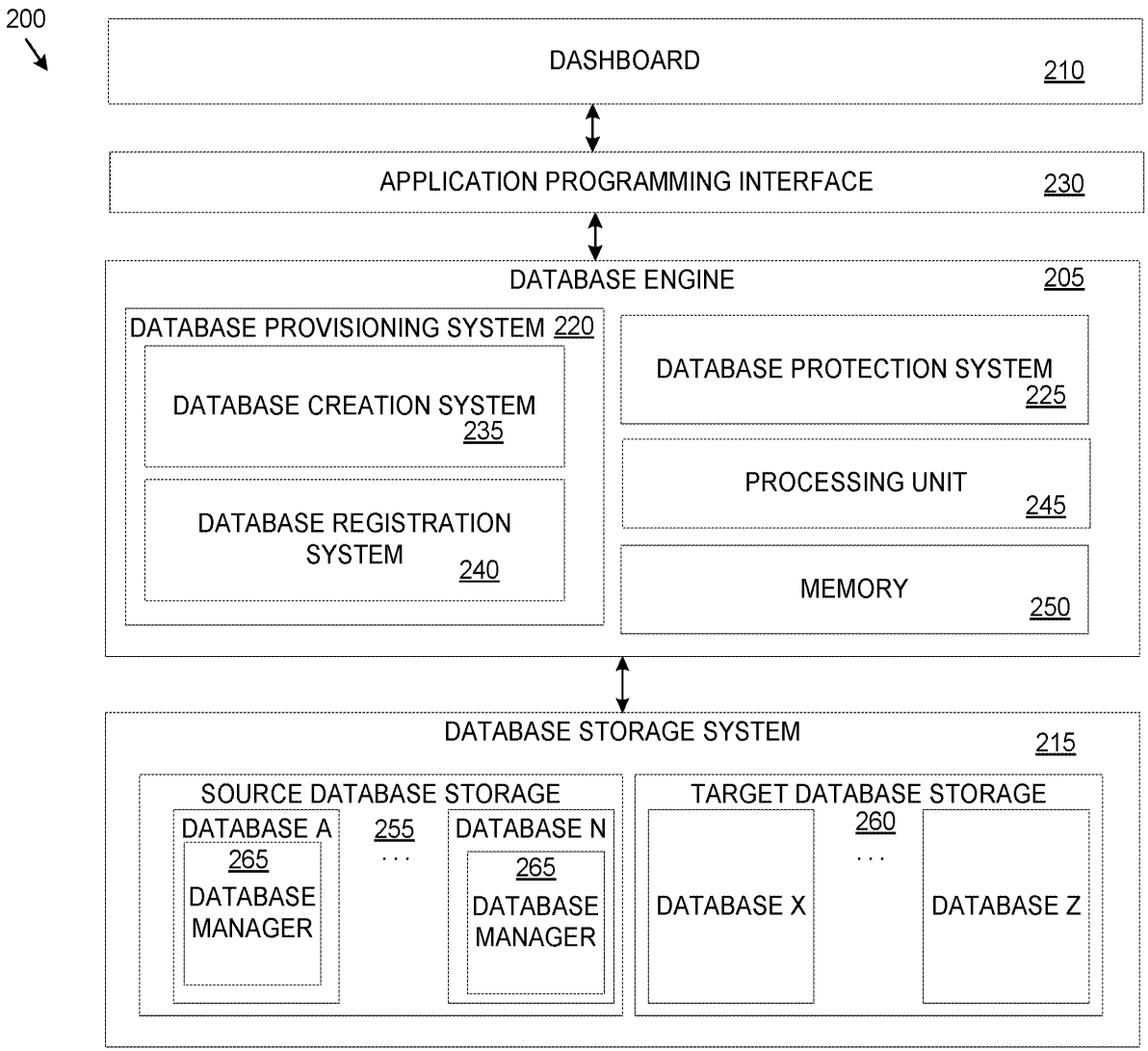

200
DASHBOARD
210
APPLICATION PROGRAMMING INTERFACE
230
DATABASE ENGINE
205
DATABASE PROVISIONING SYSTEM 220
DATABASE CREATION SYSTEM
235
DATABASE REGISTRATION SYSTEM
240
DATABASE PROTECTION SYSTEM
225
PROCESSING UNIT
245
MEMORY
250
DATABASE STORAGE SYSTEM
215
SOURCE DATABASE STORAGE
DATABASE A
265
DATABASE MANAGER
255
DATABASE N
265
DATABASE MANAGER
TARGET DATABASE STORAGE
260
DATABASE X
DATABASE Z

FIG. 2

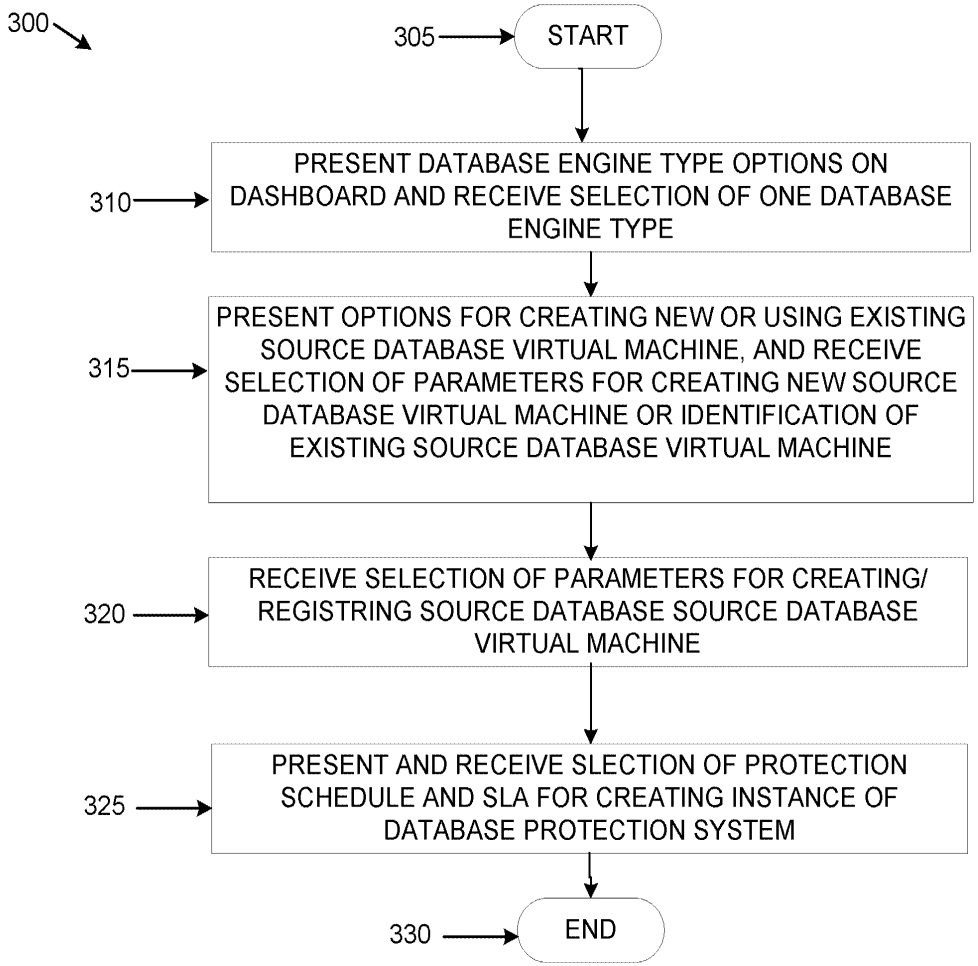

300
305
START
PRESENT DATABASE ENGINE TYPE OPTIONS ON DASHBOARD AND RECEIVE SELECTION OF ONE DATABASE ENGINE TYPE
310
PRESENT OPTIONS FOR CREATING NEW OR USING EXISTING SOURCE DATABASE VIRTUAL MACHINE, AND RECEIVE SELECTION OF PARAMETERS FOR CREATING NEW SOURCE DATABASE VIRTUAL MACHINE OR IDENTIFICATION OF EXISTING SOURCE DATABASE VIRTUAL MACHINE
315
RECEIVE SELECTION OF PARAMETERS FOR CREATING/ REGISTRING SOURCE DATABASE SOURCE DATABASE VIRTUAL MACHINE
320
PRESENT AND RECEIVE SLECTION OF PROTECTION SCHEDULE AND SLA FOR CREATING INSTANCE OF DATABASE PROTECTION SYSTEM
325
END
330

FIG. 3

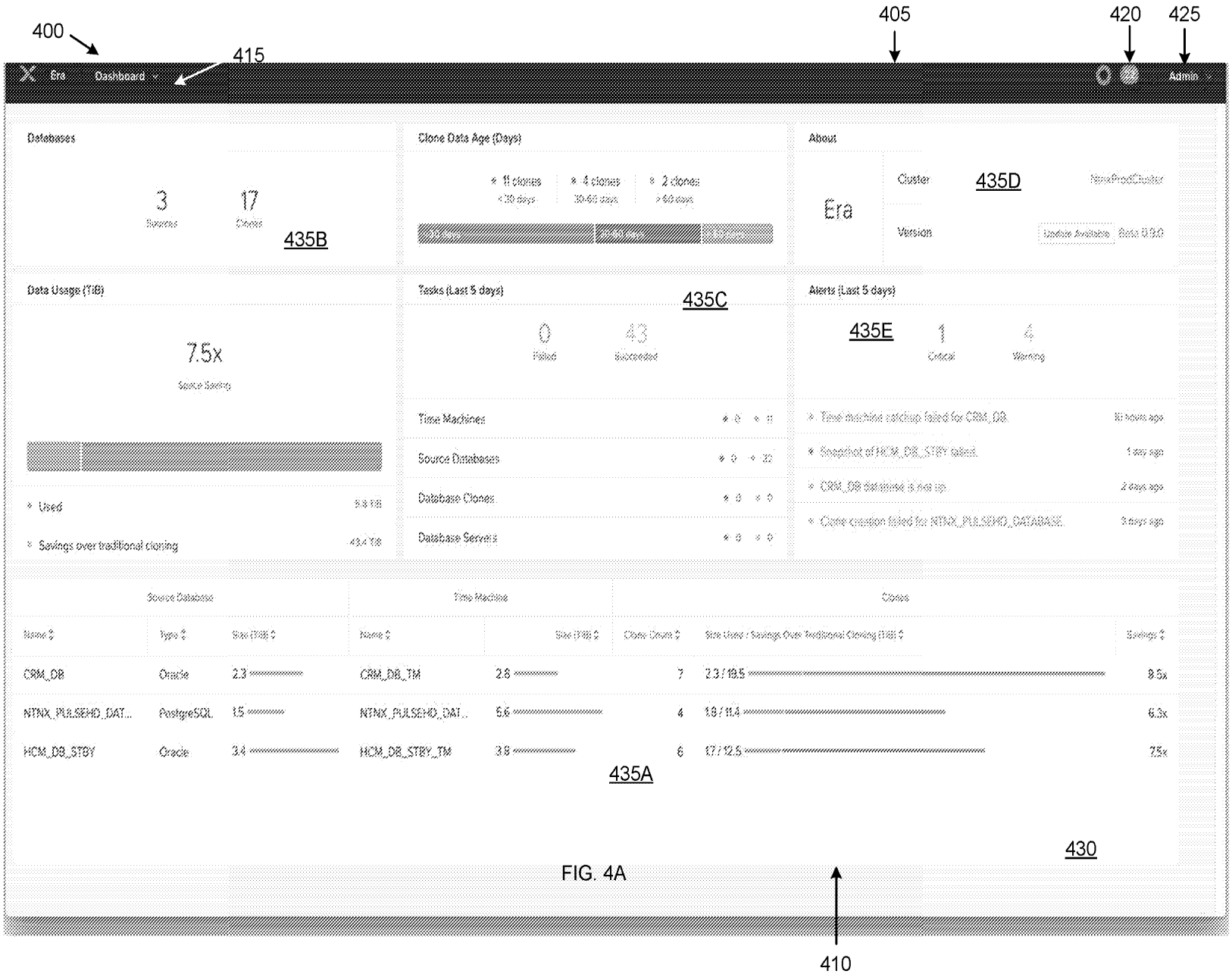

400
415
405
420
425
Era
Dashboard
Admin
Databases
3
Sources
17
Clones
435B
Clone Data Age (Days)
11 clones
< 30 days
4 clones
30-60 days
2 clones
> 60 days
About
Era
Cluster
435D
Version
Data Usage (TiB)
7.5x
Tasks (Last 5 days)
435C
0
Failed
43
Succeeded
Time Machines
Source Databases
Database Clones
Database Servers
Alerts (Last 5 days)
435E
1
Critical
4
Warning
Source Database
Time Machine
Clones
Name
Type
Size (TiB)
Clone Count
CRM_DB
Oracle
2.3
CRM_DB_TM
2.6
7
2.3 / 19.5
9.5x
NTNX_PULSEHD_DAT...
PostgreSQL
1.5
NTNX_PULSEHD_DAT...
5.6
4
1.8 / 11.4
6.3x
HCM_DB_STBY
Oracle
3.4
HCM_DB_STBY_TM
3.9
6
17 / 12.5
7.5x
435A
430
410

FIG. 4A

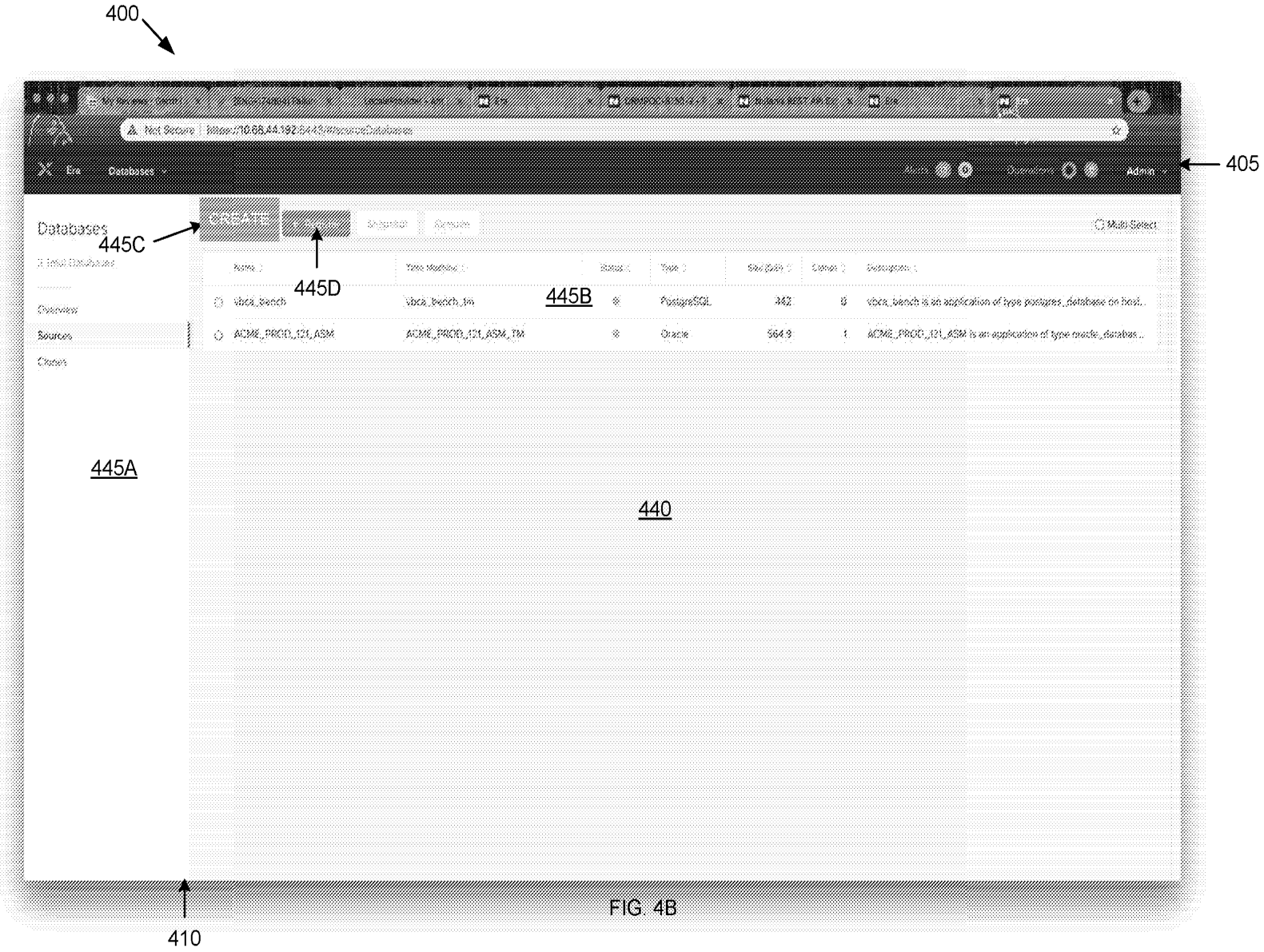


FIG. 4B

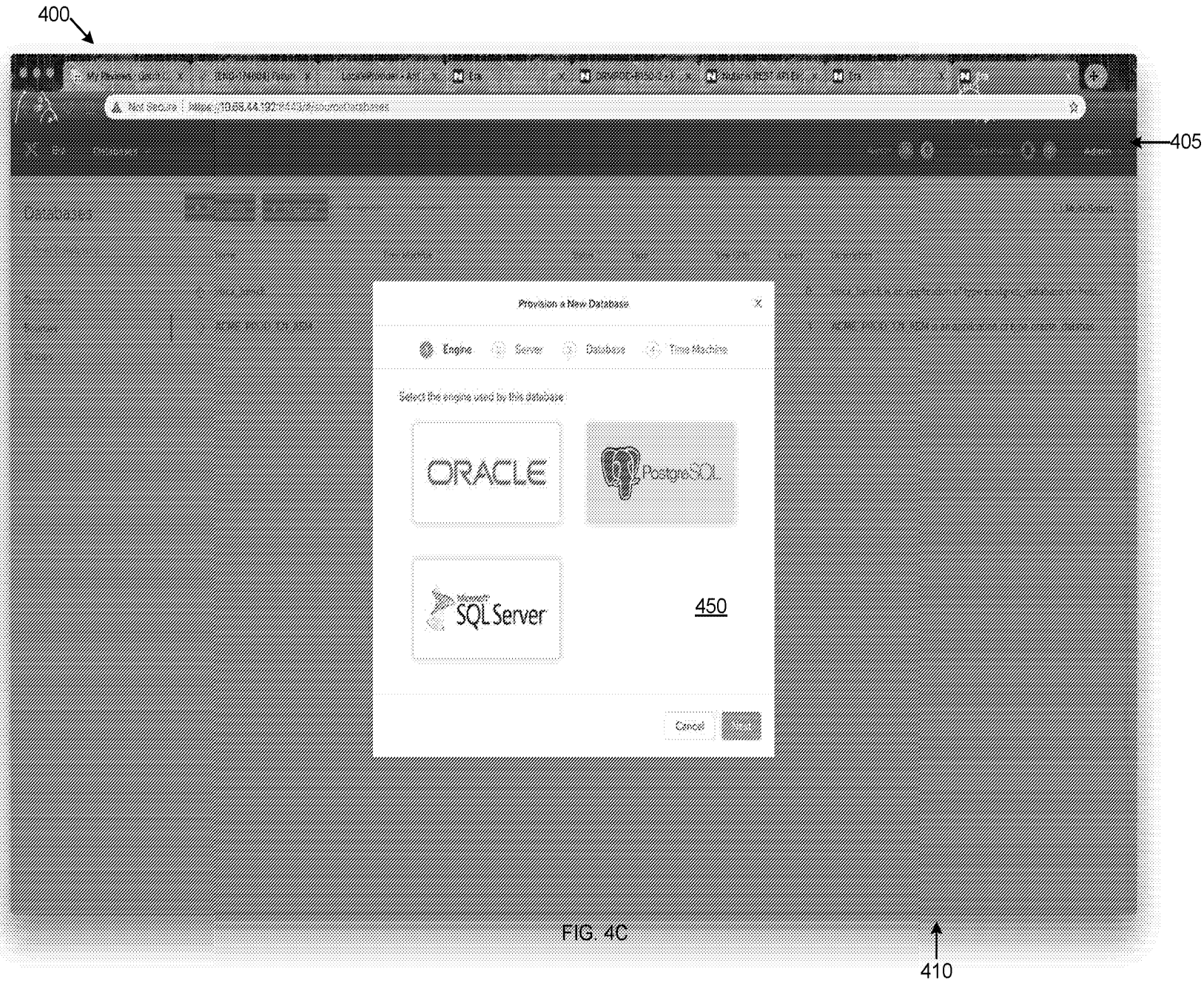

400
405
Provision a New Database
Engine
Server
Database
Time Machine
Select the engine used by this database
ORACLE
PostgreSQL
SQL Server
450
Cancel
Next
410

FIG. 4C

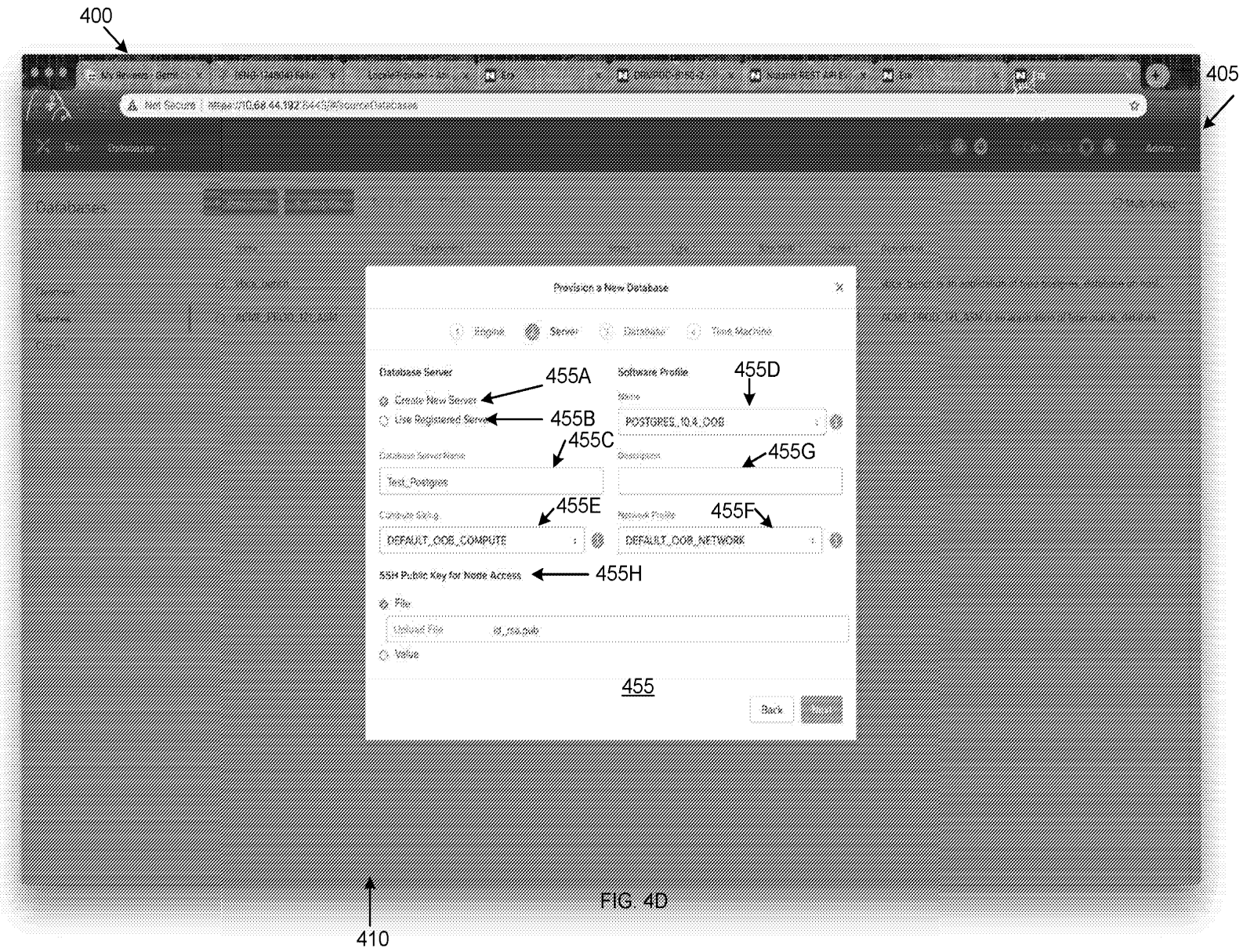

400
405
Provision a New Database
Engine
Server
Database
Virtual Machine
Database Server
455A
Create New Server
455B
Use Registered Server
455C
Test_Postgres
455E
DEFAULT_COB_COMPUTE
Software Profile
455D
POSTGRES_10.4_COB
455G
455F
DEFAULT_COB_NETWORK
SSH Public Key for Node Access
455H
File
Value
455
Back
410

FIG. 4D

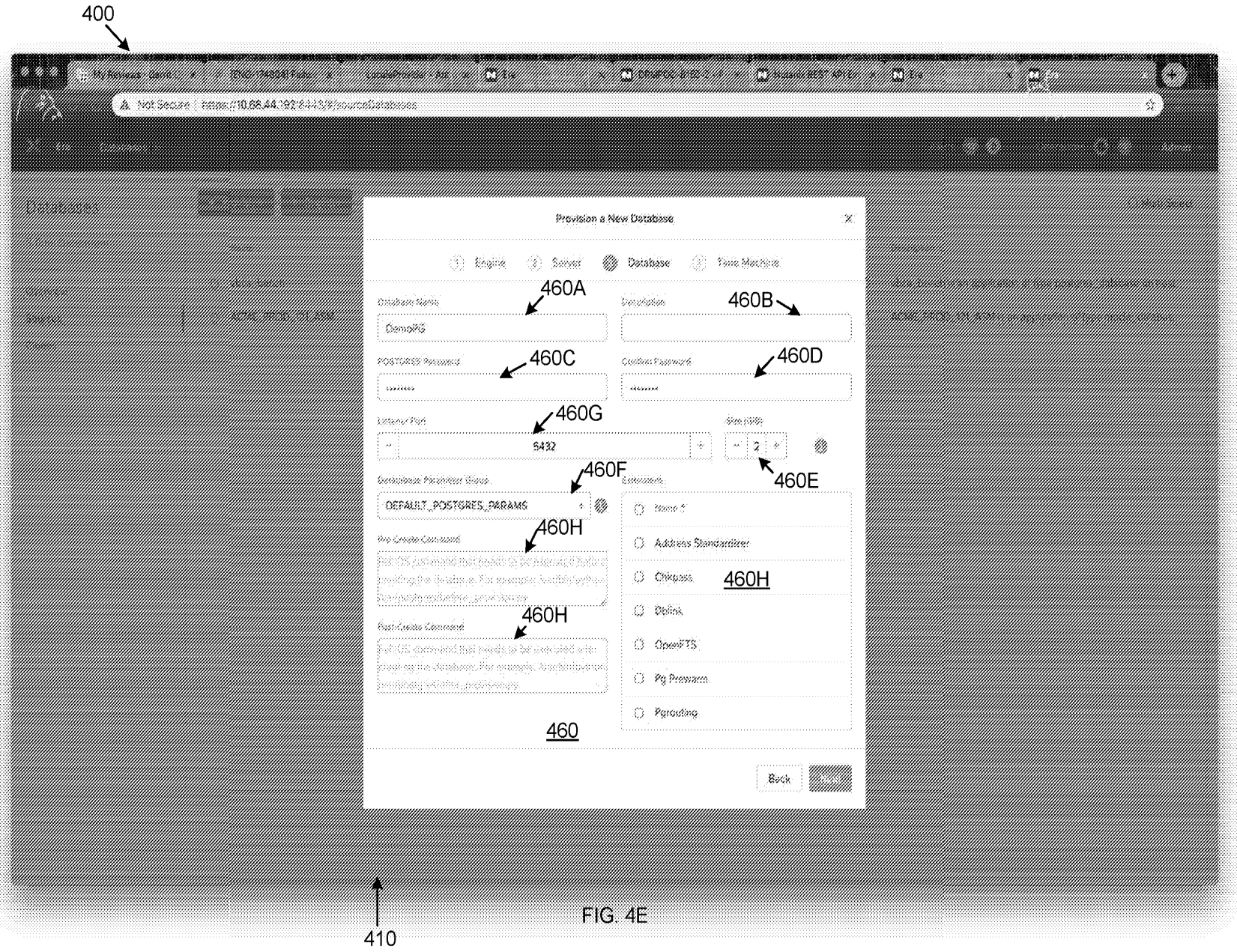

400
Provision a New Database
Engine
Server
Database
Time Machine
460A
460B
DemoPG
460C
460D
460G
5432
2
460E
460F
DEFAULT_POSTGRES_PARAMS
460H
Address Standardizer
Chkpass
460H
Debug
OpenFTS
Pg Prewarm
Pgrouting
460H
460
Back
410

FIG. 4E

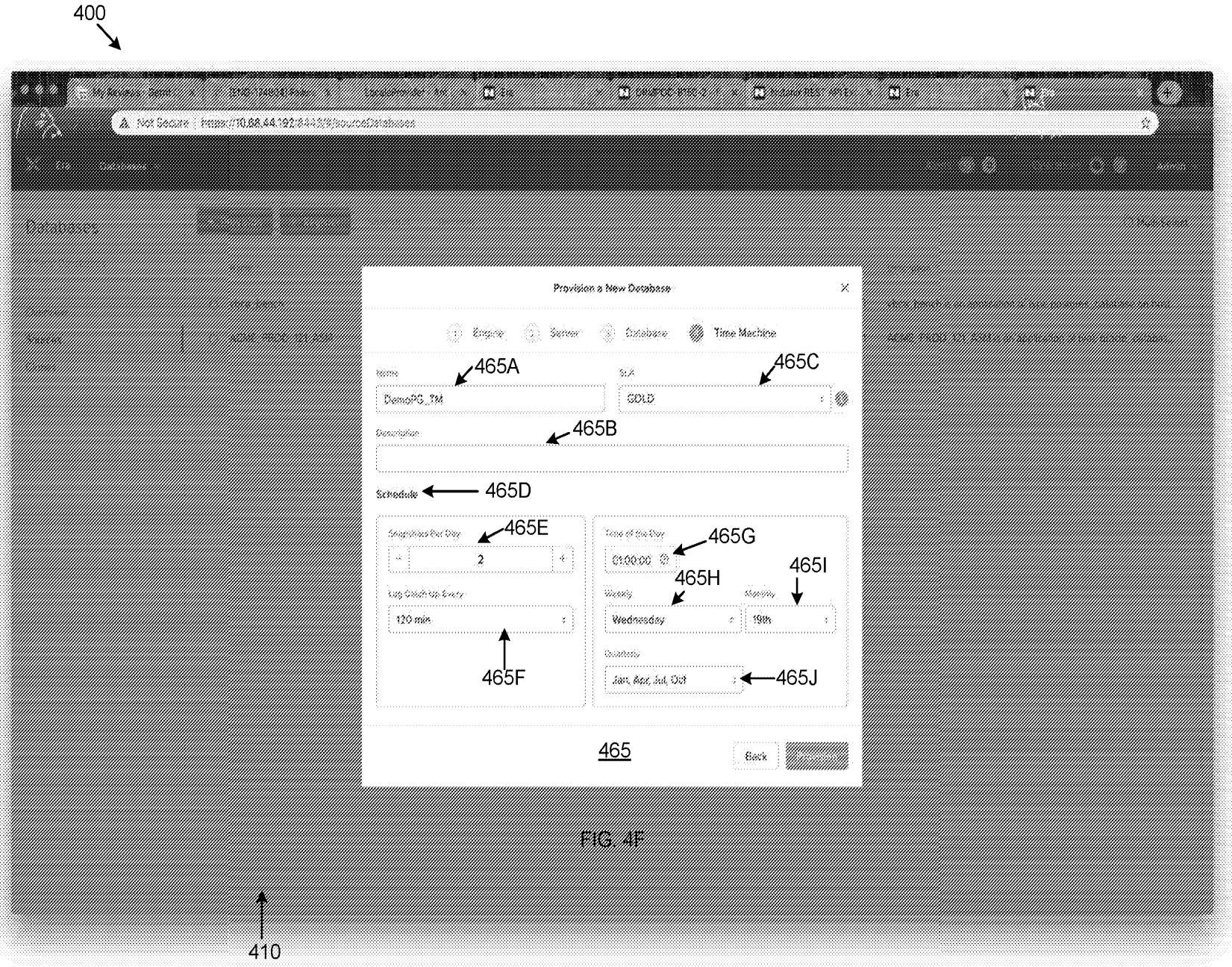

400
Provision a New Database
Engine
Server
Database
Time Machine
465A
465C
DemoPG_TM
SDLD
465B
Schedule
465D
465E
2
465G
6:00:00
465H
465I
Wednesday
19th
465F
Jan, Apr, Jul, Oct
465J
465
Back
410

FIG. 4F

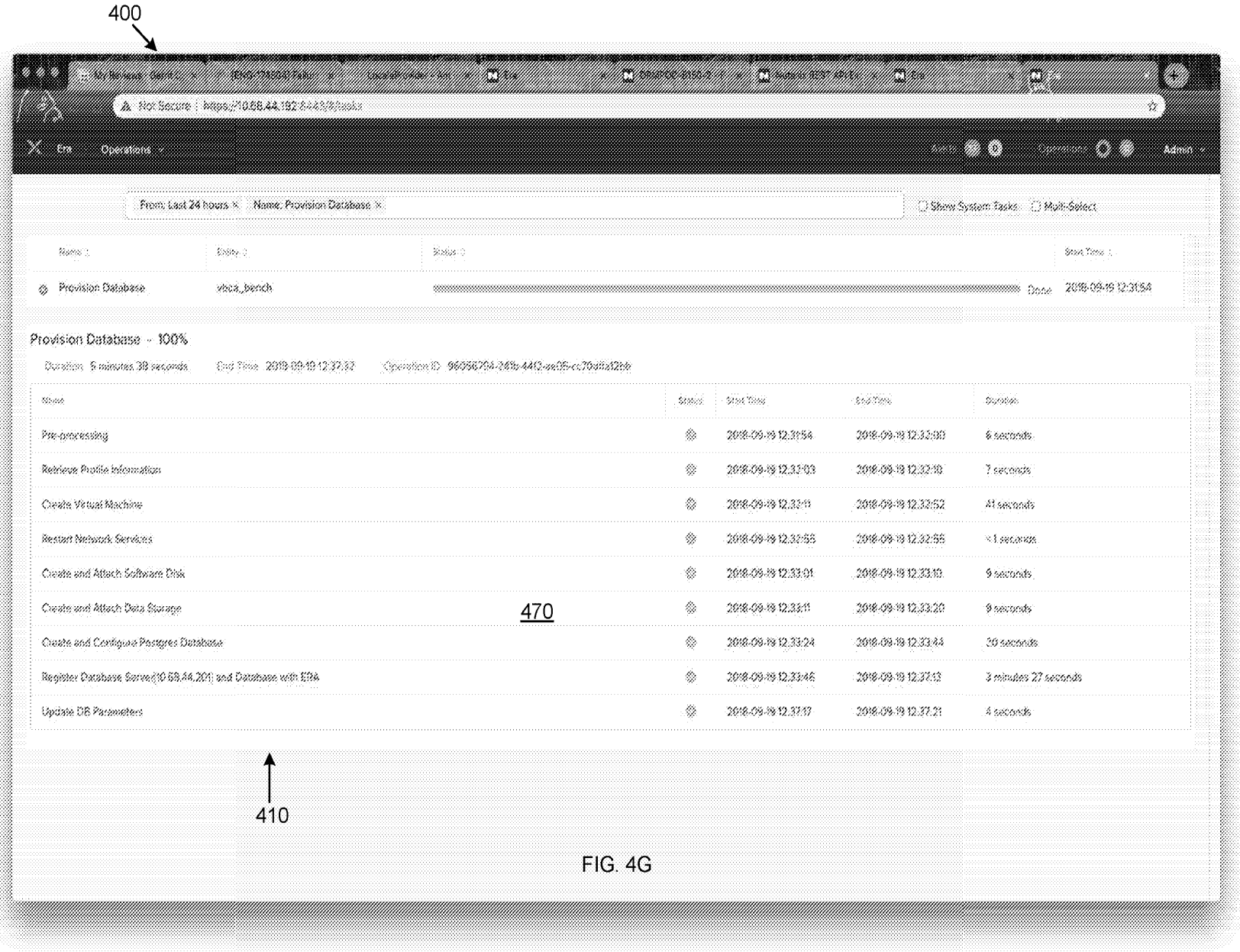

400
Operations
Admin
From: Last 24 hours
Name: Provision Database
Show System Tasks
Multi-Select
Provision Database
vtca_bench
Done
Provision Database - 100%
Pre-processing
Retrieve Profile Information
Create Virtual Machine
Restart Network Services
Create and Attach Software Disk
Create and Attach Data Storage
Create and Configure Postgres Database
Register Database Server(10.68.44.201) and Database with ERA
Update DB Parameters
470
410

FIG. 4G

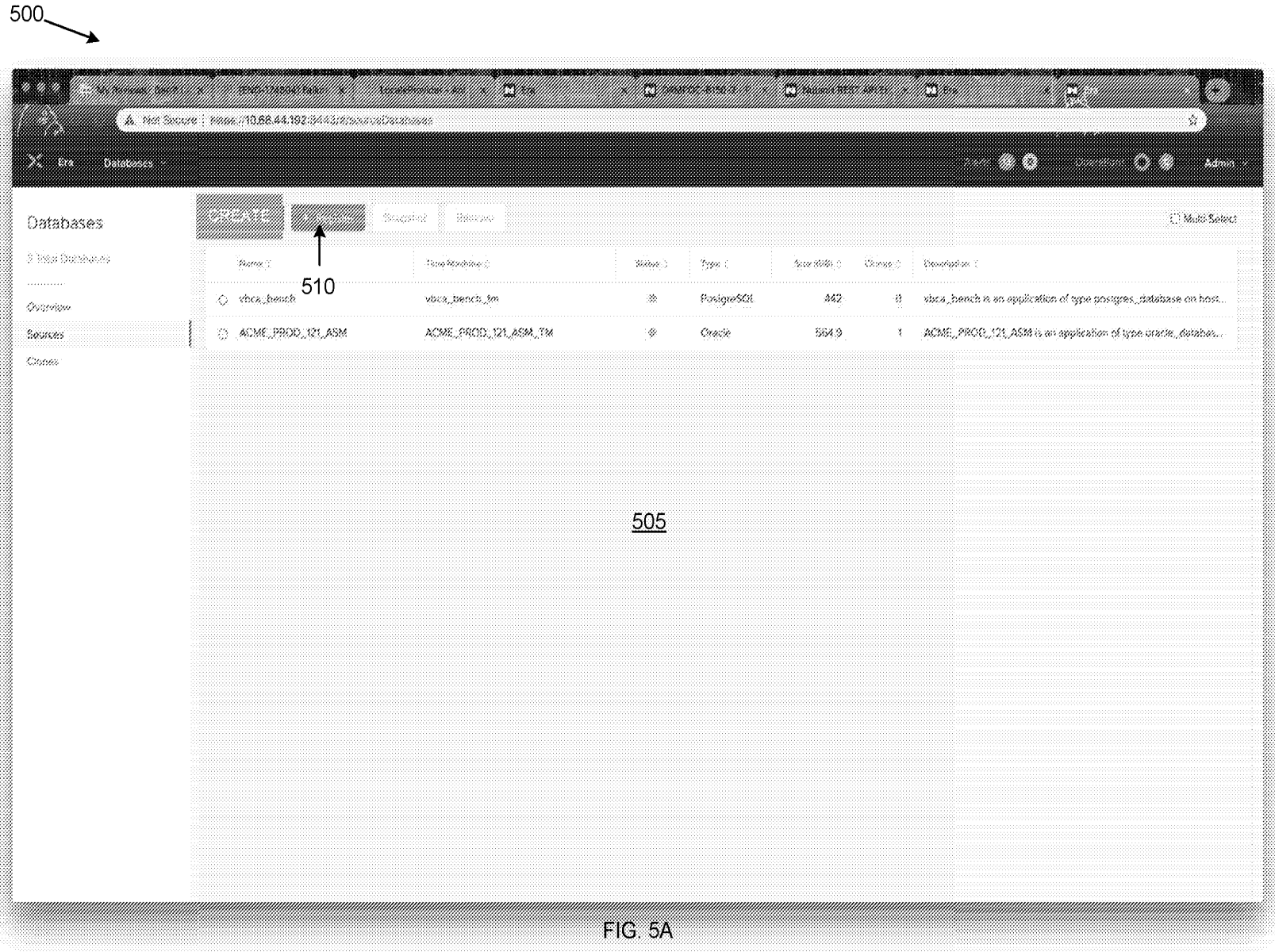


FIG. 5A

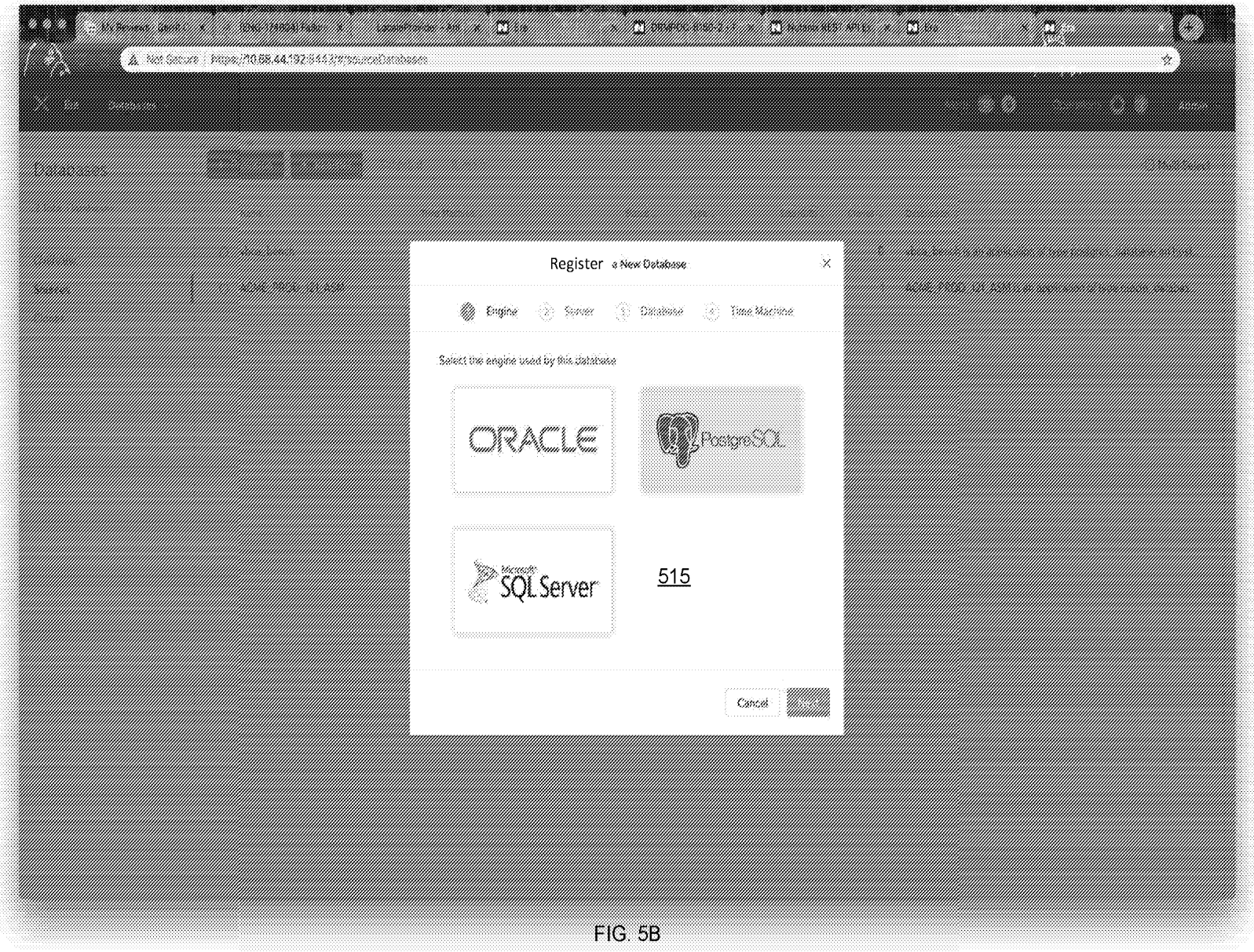

Register a New Database
Engine
Server
Database
Time Machine
Select the engine used by this database
ORACLE
PostgreSQL
SQL Server
515
Cancel

FIG. 5B

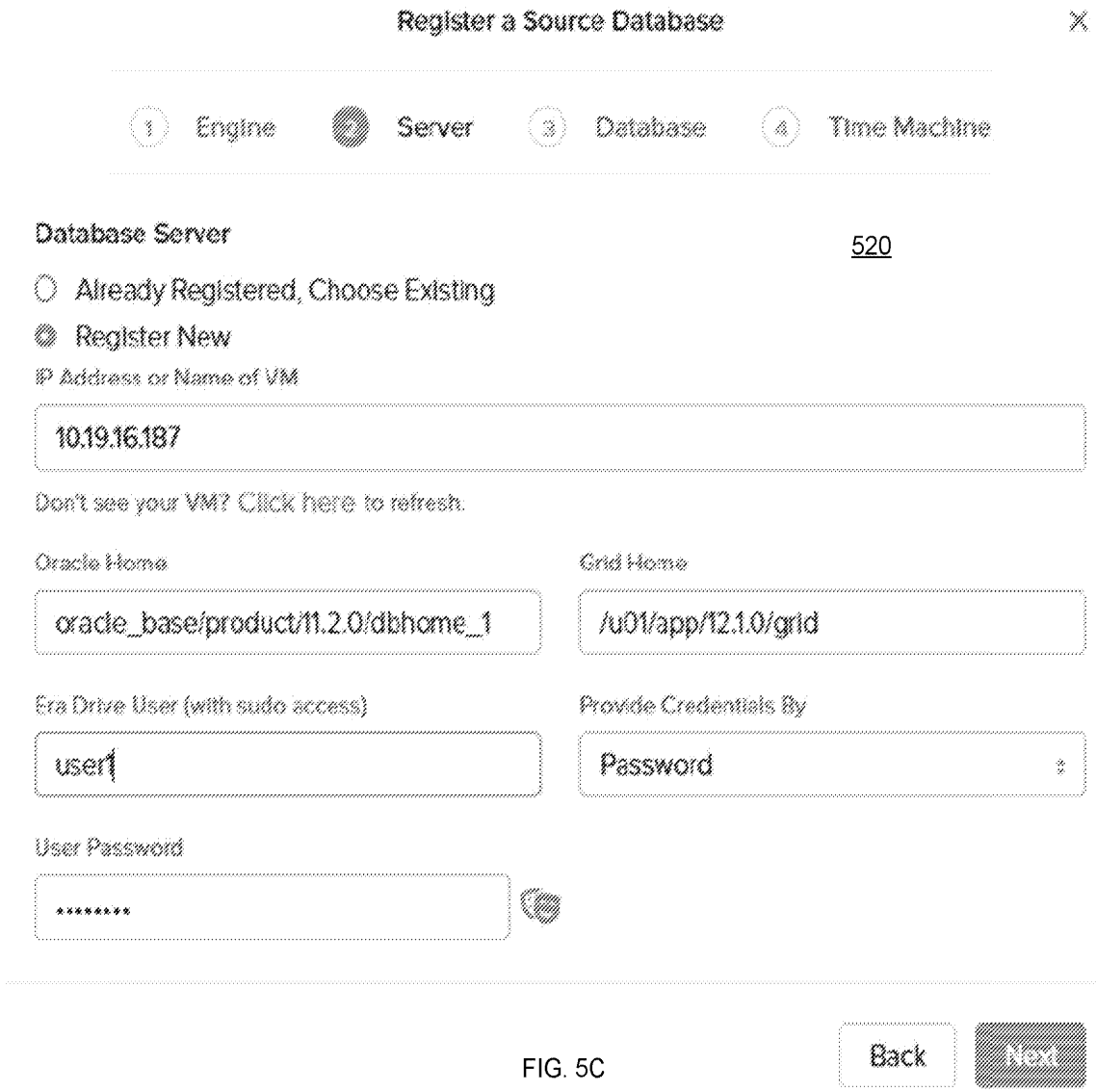

Register a Source Database
1 Engine
2 Server
3 Database
4 Time Machine
Database Server
520
Already Registered, Choose Existing
Register New
IP Address or Name of VM
10.19.16.187
Don't see your VM? Click here to refresh.
Oracle Home
oracle_base/product/11.2.0/dbhome_1
Grid Home
/u01/app/12.1.0/grid
Era Drive User (with sudo access)
user1
Provide Credentials By
Password
User Password
Back
Next

FIG. 5C

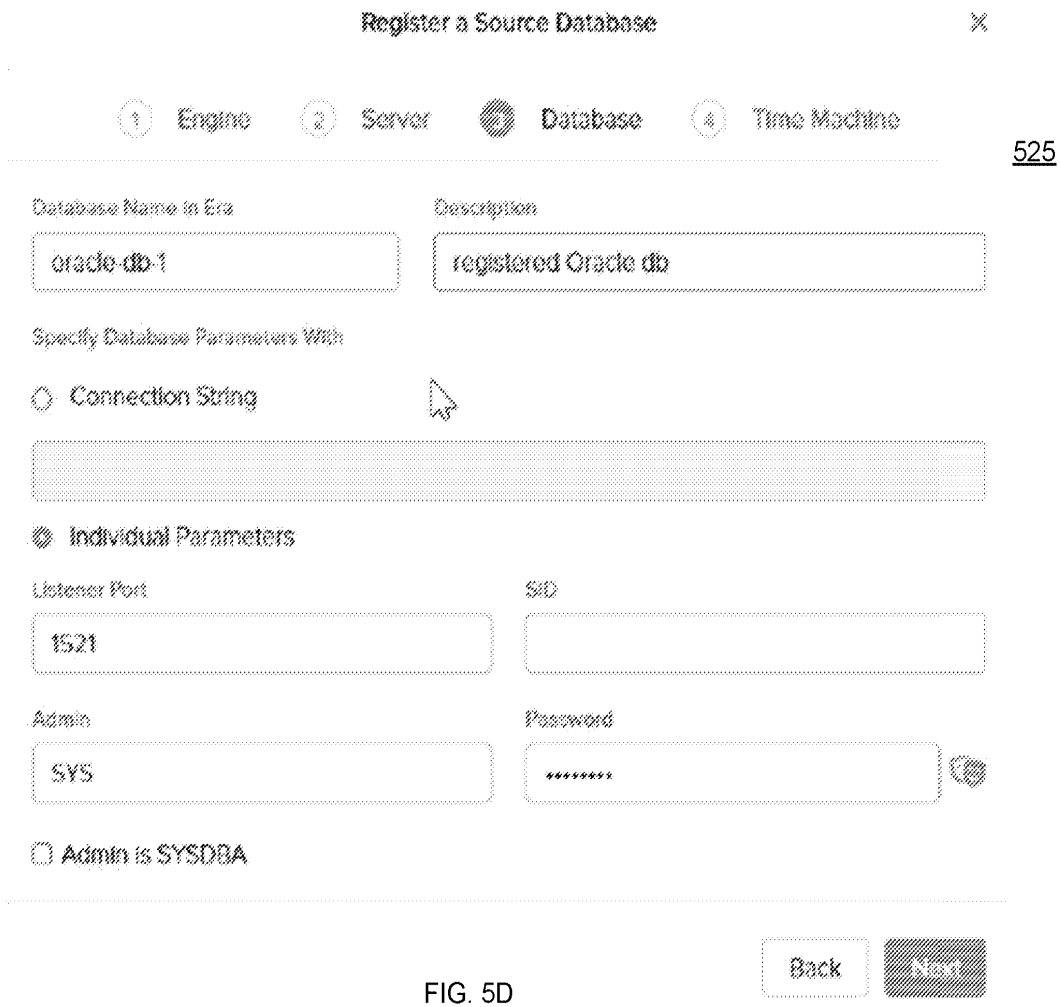


FIG. 5D

EX1002 - Page 34

Provision a New Database
Engine
Server
Database
Time Machine
Name
DemoPG_TM
SLA
SOLD
Description
Schedule
Snapshots Per Day
2
Start by Hour
00:00 UTC
Log Backup Every
120 min
Weekly
Wednesday
Monthly
19th
Quarterly
Jan, Apr, Jul, Oct
Back
Finish
530

FIG. 5E

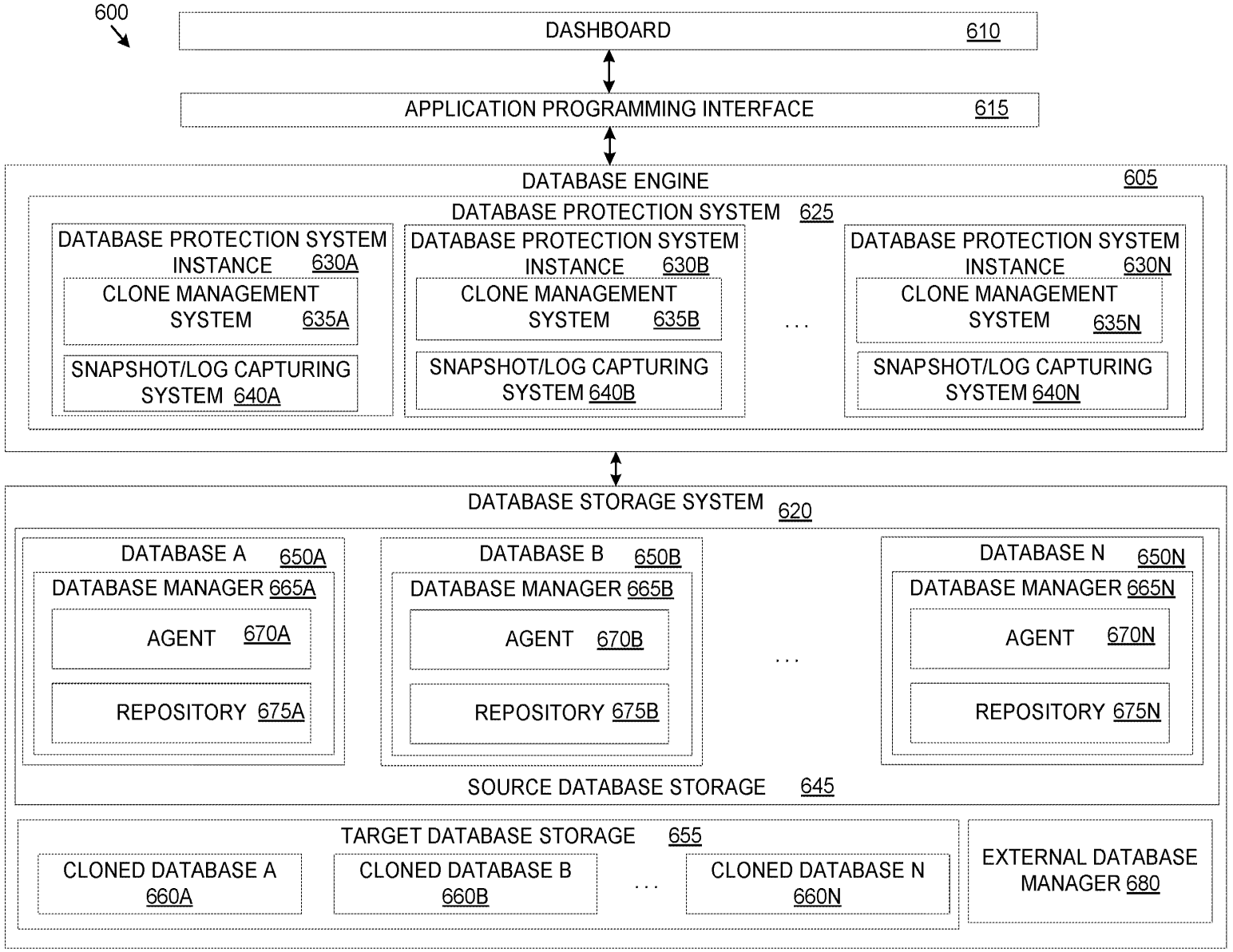

600
DASHBOARD 610
APPLICATION PROGRAMMING INTERFACE 615
DATABASE ENGINE 605
DATABASE PROTECTION SYSTEM 625
DATABASE PROTECTION SYSTEM INSTANCE 630A
CLONE MANAGEMENT SYSTEM 635A
SNAPSHOT/LOG CAPTURING SYSTEM 640A
DATABASE PROTECTION SYSTEM INSTANCE 630B
CLONE MANAGEMENT SYSTEM 635B
SNAPSHOT/LOG CAPTURING SYSTEM 640B
DATABASE PROTECTION SYSTEM INSTANCE 630N
CLONE MANAGEMENT SYSTEM 635N
SNAPSHOT/LOG CAPTURING SYSTEM 640N
DATABASE STORAGE SYSTEM 620
DATABASE A 650A
DATABASE MANAGER 665A
AGENT 670A
REPOSITORY 675A
DATABASE B 650B
DATABASE MANAGER 665B
AGENT 670B
REPOSITORY 675B
DATABASE N 650N
DATABASE MANAGER 665N
AGENT 670N
REPOSITORY 675N
SOURCE DATABASE STORAGE 645
TARGET DATABASE STORAGE 655
CLONED DATABASE A 660A
CLONED DATABASE B 660B
CLONED DATABASE N 660N
EXTERNAL DATABASE MANAGER 680

FIG. 6


700
705
725A
725B
725C
725D
720
715
730
735
710
Log Catch Up
Snapshot
Pause
Update
Time Machines
Admin
CRM_DB_TM
CRM_DB
May 2018 - September 2018
Continuous
Daily
Weekly
Monthly
Quarterly
System Snapshot
Manual
Show Log Catchup

FIG. 7A

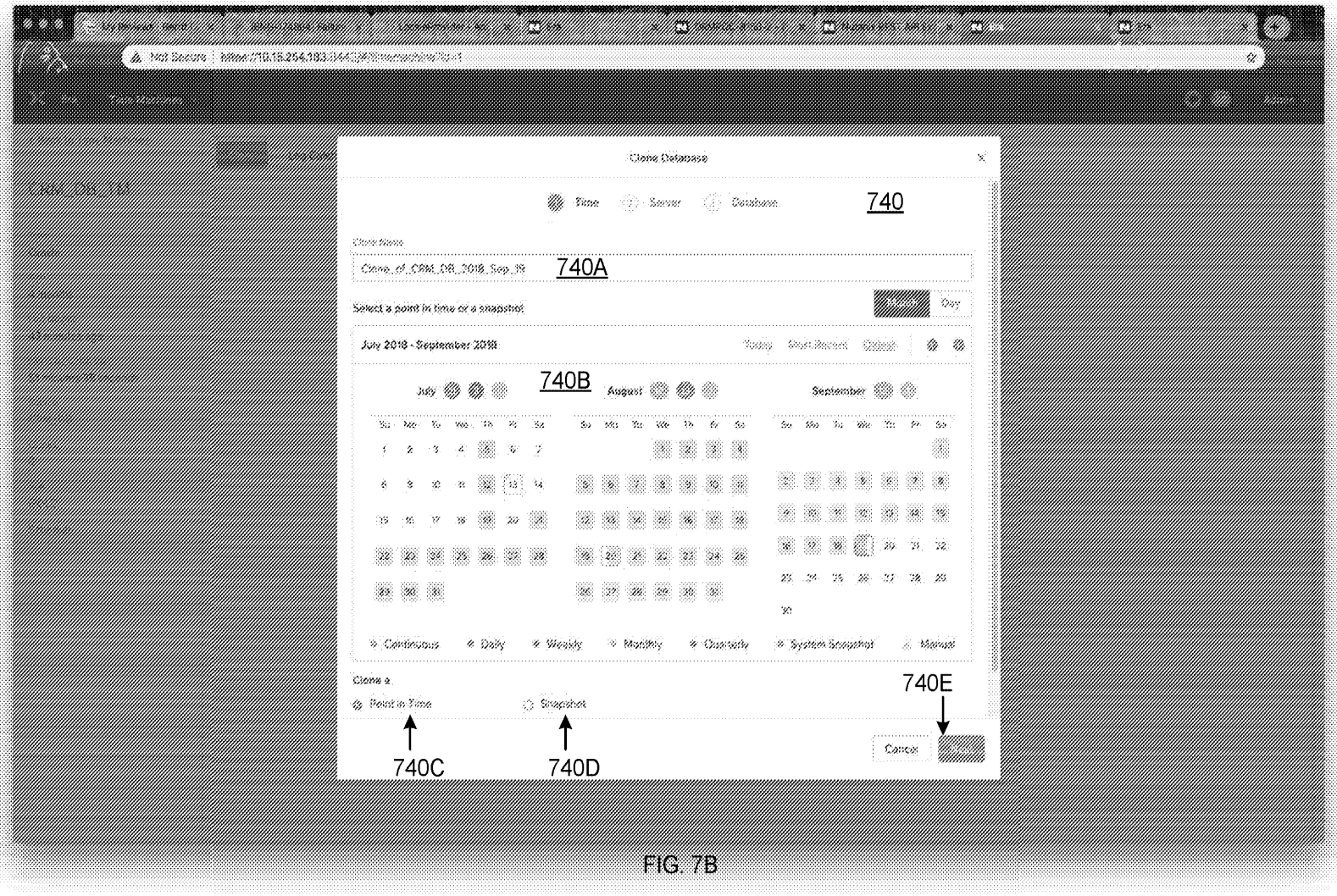

Clone Database
Time
Server
Database
740
Clone Name
Clone_of_CRM_DB_2018_Sep_19
740A
Select a point in time or a snapshot
Week
Day
July 2018 - September 2018
Today
Most Recent
Oldest
July
740B
August
September
Continuous
Daily
Weekly
Monthly
Quarterly
System Snapshot
Manual
Clone a
Point in Time
Snapshot
740E
740C
740D
Cancel
OK

FIG. 7B

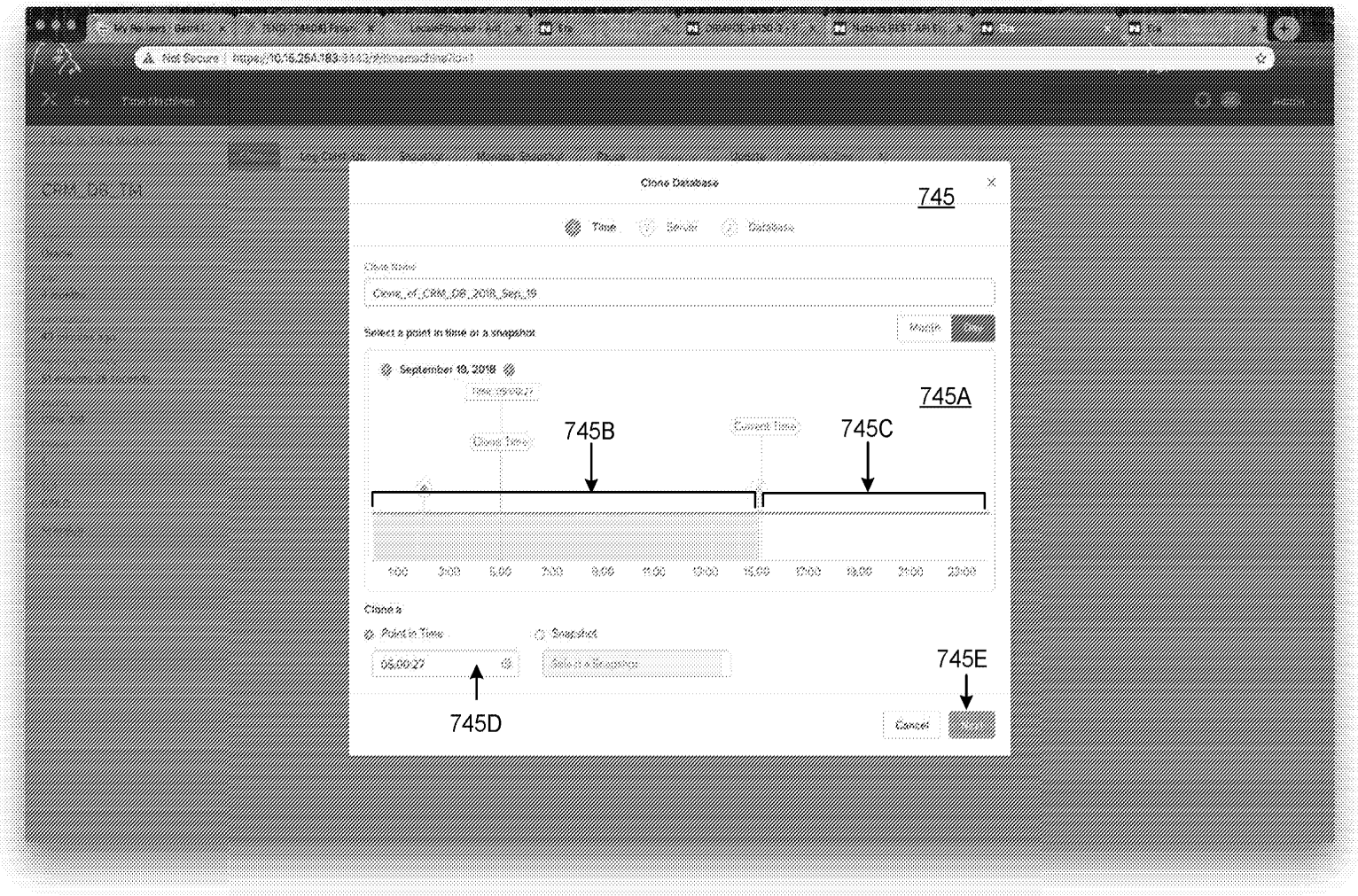

Clone Database
745
Time
Server
Database
Clone Name
Clone_of_CRM_DB_2018_Sep_19
Select a point in time or a snapshot
Month
Day
September 18, 2018
745A
745B
745C
Clone Time
Current Time
Clone a
Point in Time
Snapshot
745D
745E
Cancel

FIG. 7C

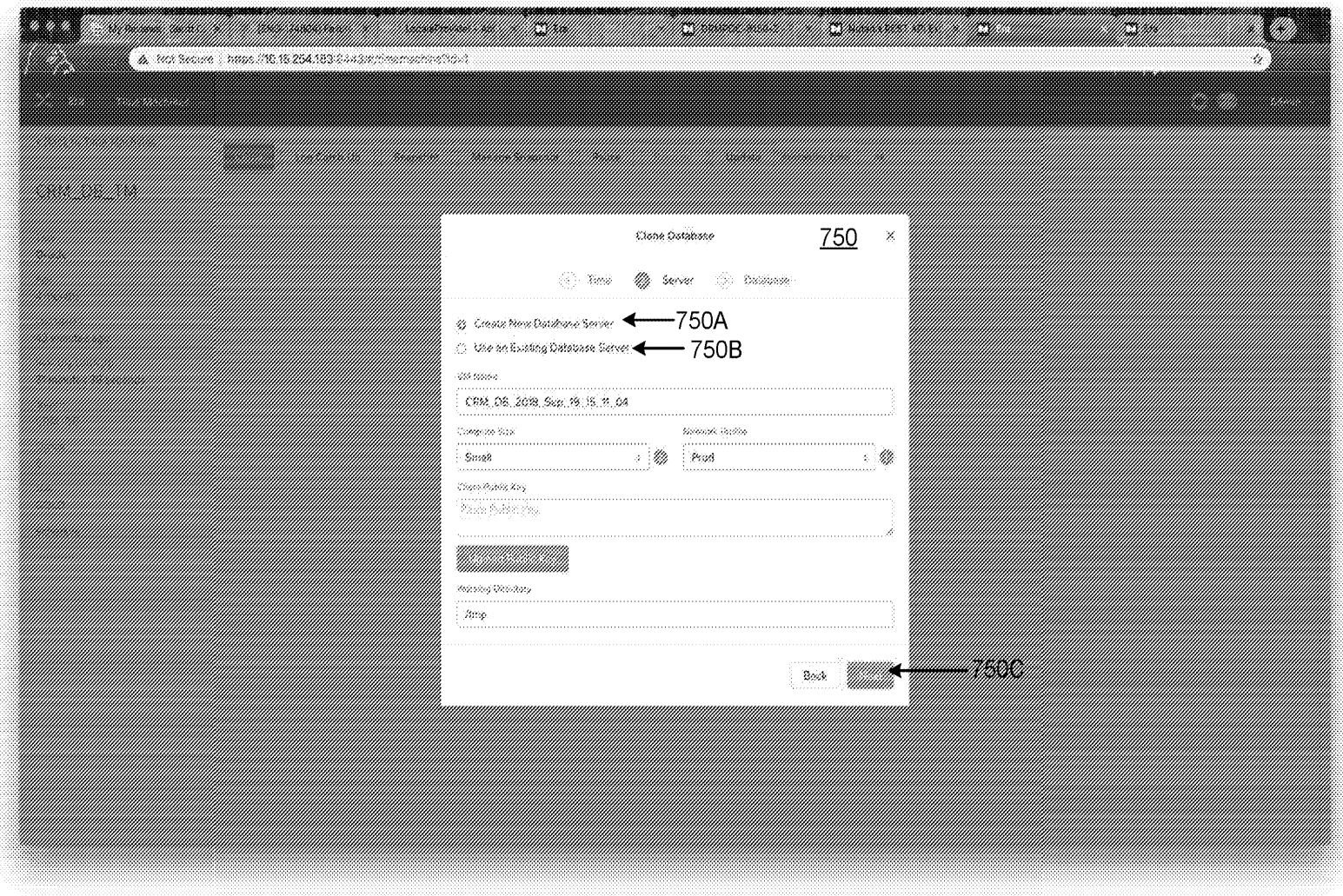

Clone Database
750
Time
Server
Database
Create New Database Server
750A
Use an Existing Database Server
750B
CRM_DB_2019_Sep_19_15_11_04
Small
Prod
Amp
Back
750C

FIG. 7D

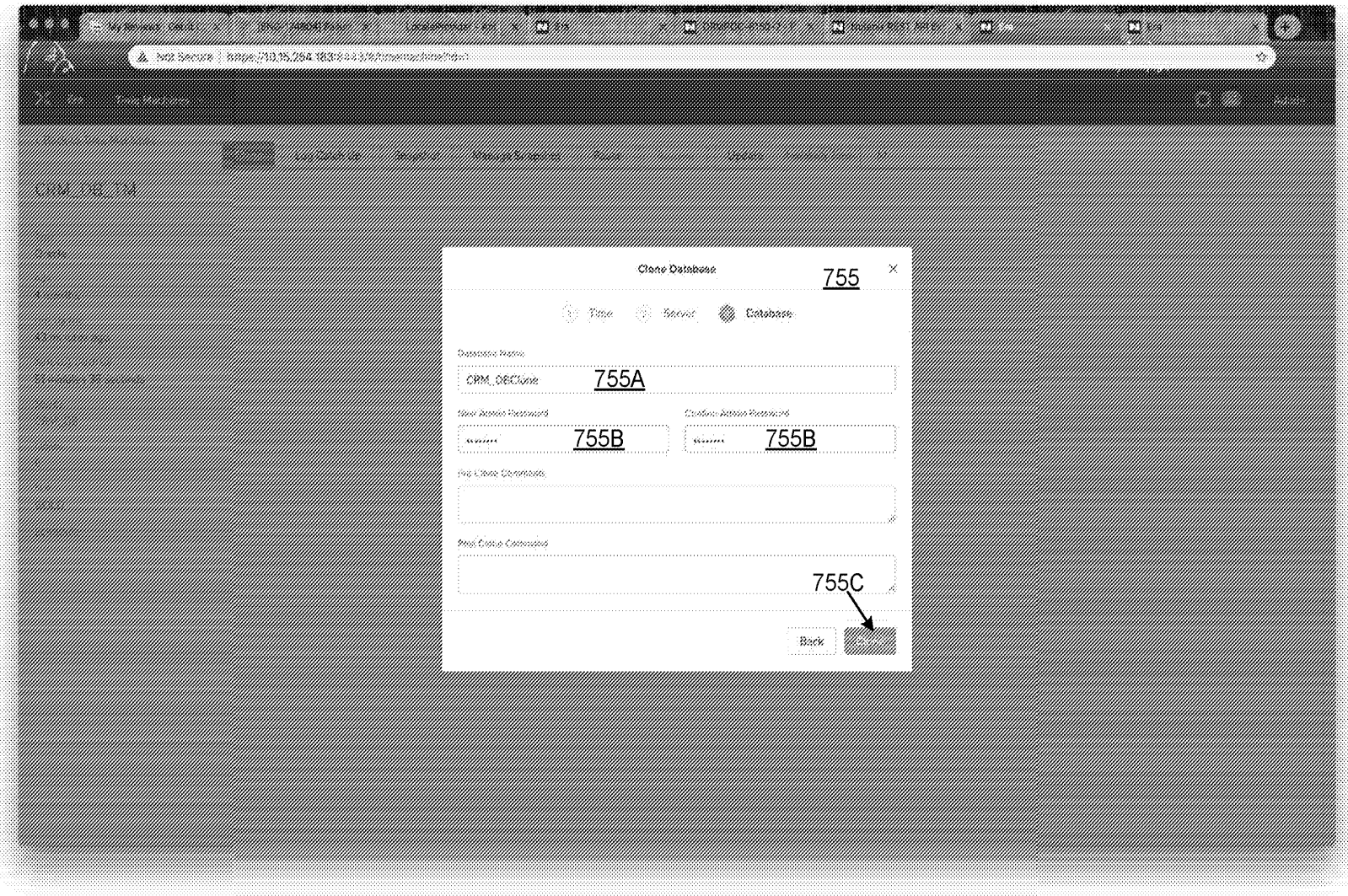

Clone Database
755
Type
Database
CRM_DBClone
755A
755B
755B
755C
Back

FIG. 7E

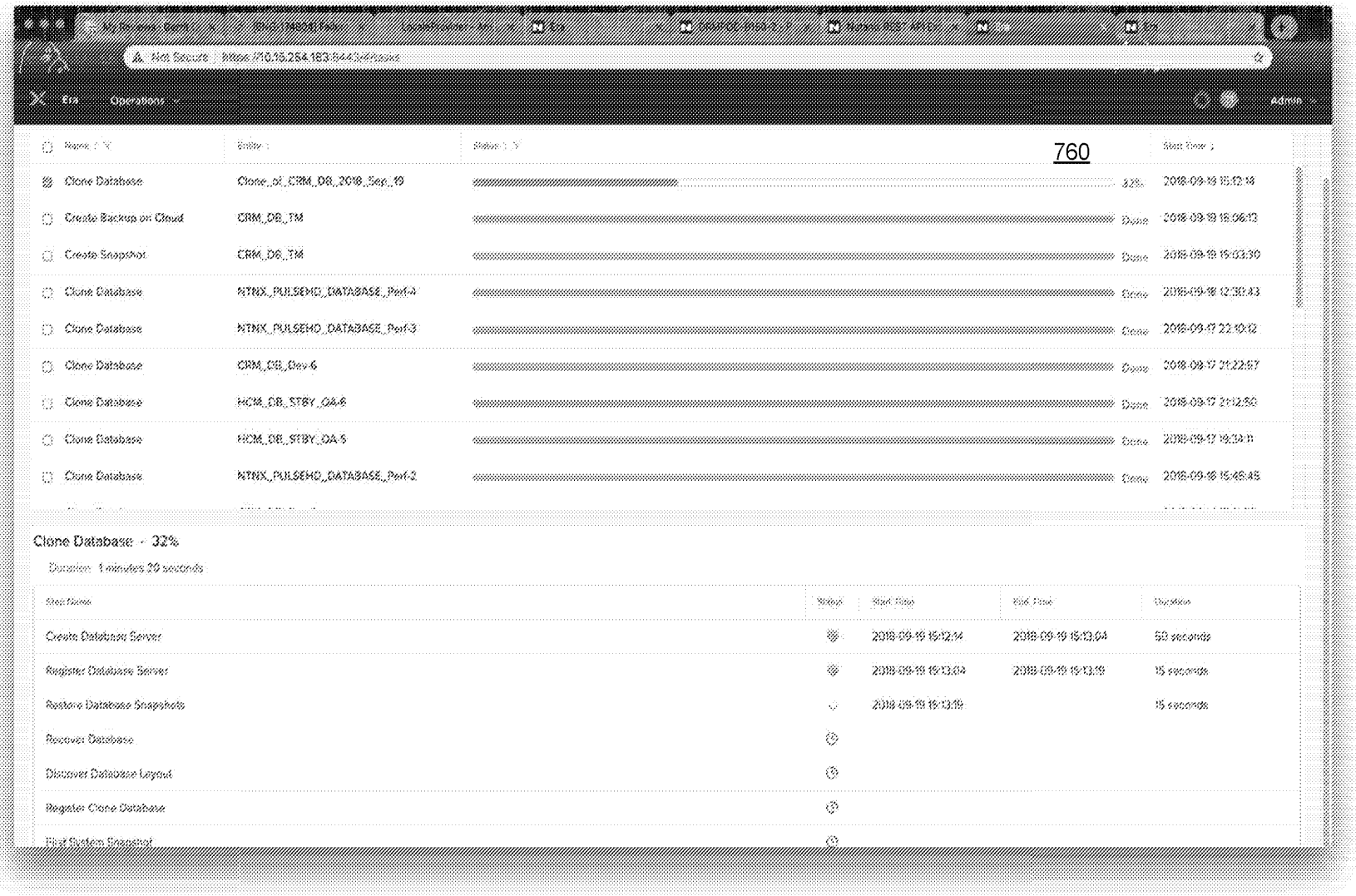

760
Clone Database
Clone_of_CRM_DB_2018_Sep_19
32%
2018-09-19 15:12:14
Create Backup on Cloud
CRM_DB_TM
Done
2018-09-19 15:06:13
Create Snapshot
CRM_DB_TM
Done
2018-09-19 15:03:30
Clone Database
NTNX_PULSEHD_DATABASE_Perf-4
Done
2018-09-18 12:30:43
Clone Database
NTNX_PULSEHD_DATABASE_Perf-3
Done
2018-09-17 22:10:12
Clone Database
CRM_DB_Dev-6
Done
2018-09-17 21:22:57
Clone Database
HCM_DB_STBY_QA-6
Done
2018-09-17 21:12:50
Clone Database
HCM_DB_STBY_QA-5
Done
2018-09-17 19:34:11
Clone Database
NTNX_PULSEHD_DATABASE_Perf-2
Done
2018-09-16 15:48:45
Clone Database - 32%
Duration: 1 minutes 39 seconds
Create Database Server
2018-09-19 15:12:14
2018-09-19 15:13:04
50 seconds
Register Database Server
2018-09-19 15:13:04
2018-09-19 15:13:19
15 seconds
Restore Database Snapshots
2018-09-19 15:13:19
15 seconds
Recover Database
Discover Database Layout
Register Clone Database

FIG. 7F

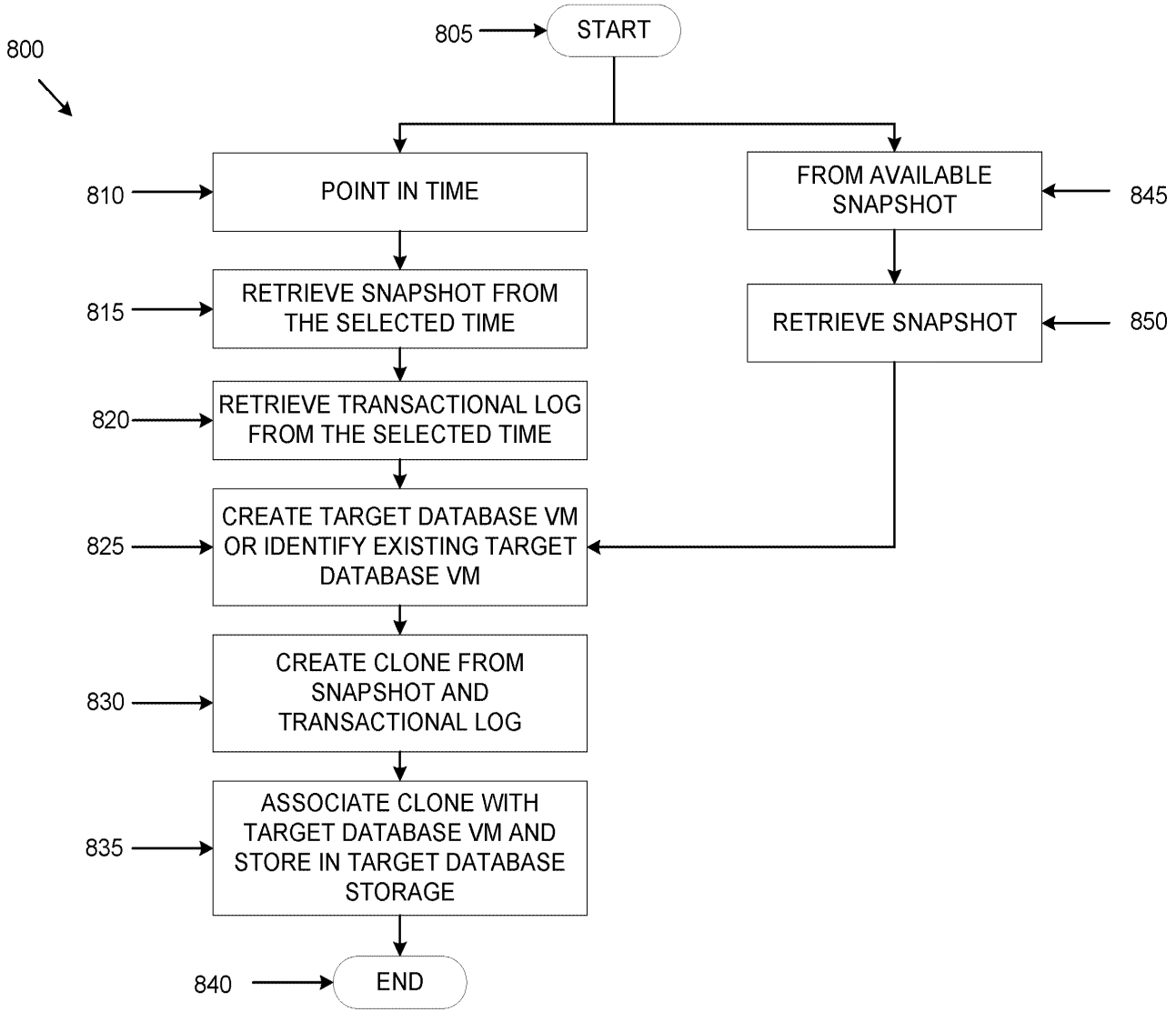

800
805
START
810
POINT IN TIME
815
RETRIEVE SNAPSHOT FROM THE SELECTED TIME
820
RETRIEVE TRANSACTIONAL LOG FROM THE SELECTED TIME
825
CREATE TARGET DATABASE VM OR IDENTIFY EXISTING TARGET DATABASE VM
830
CREATE CLONE FROM SNAPSHOT AND TRANSACTIONAL LOG
835
ASSOCIATE CLONE WITH TARGET DATABASE VM AND STORE IN TARGET DATABASE STORAGE
840
END
845
FROM AVAILABLE SNAPSHOT
850
RETRIEVE SNAPSHOT

FIG. 8

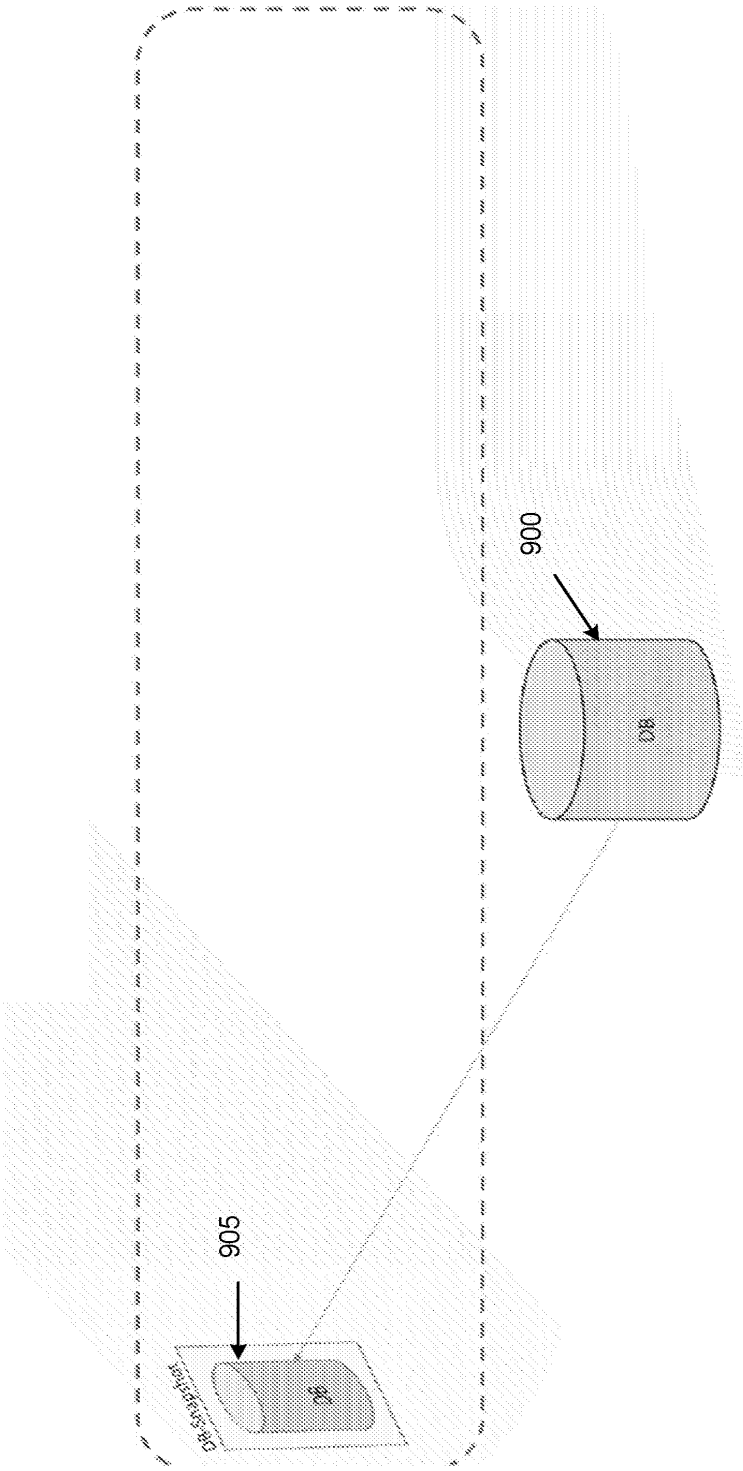


FIG. 9A

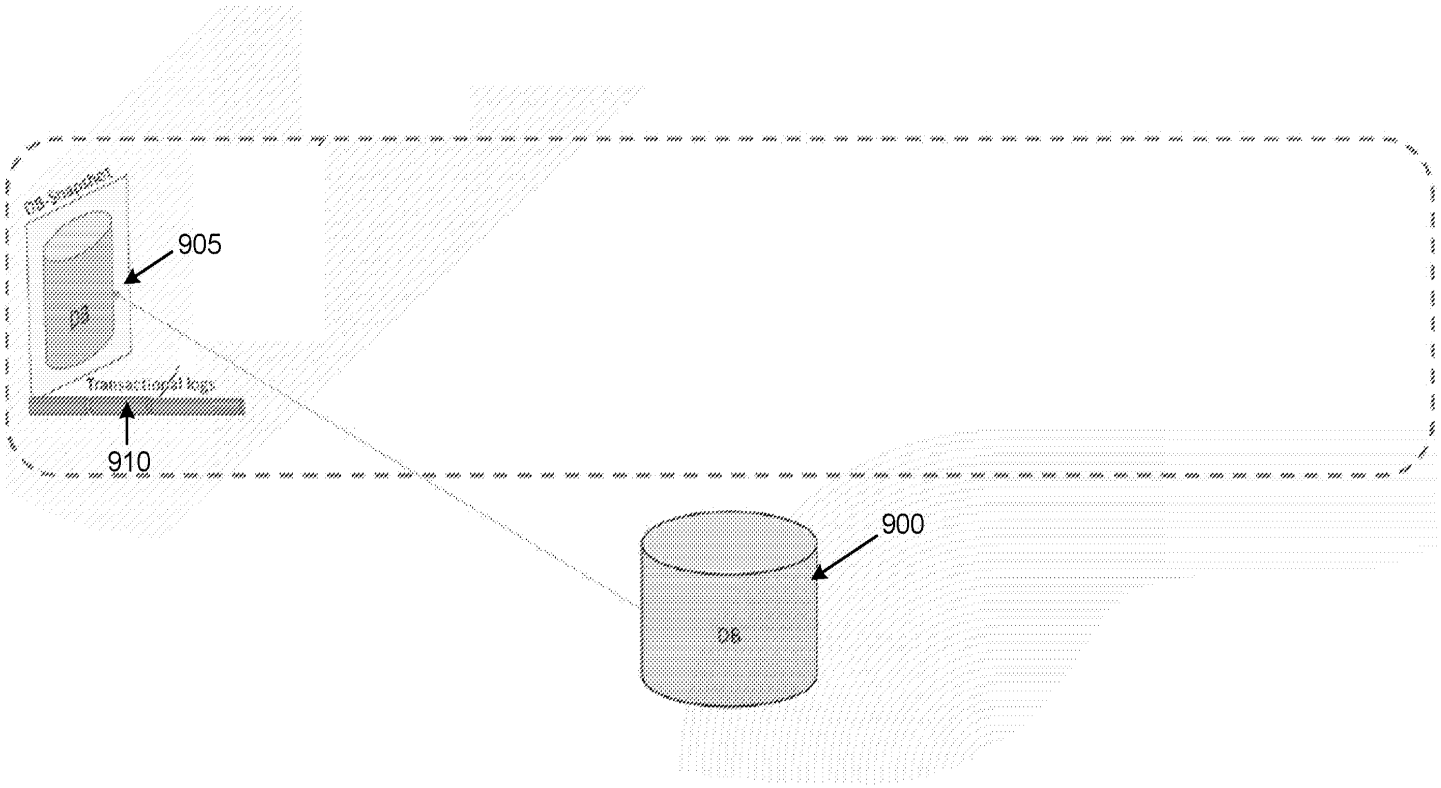


FIG. 9B

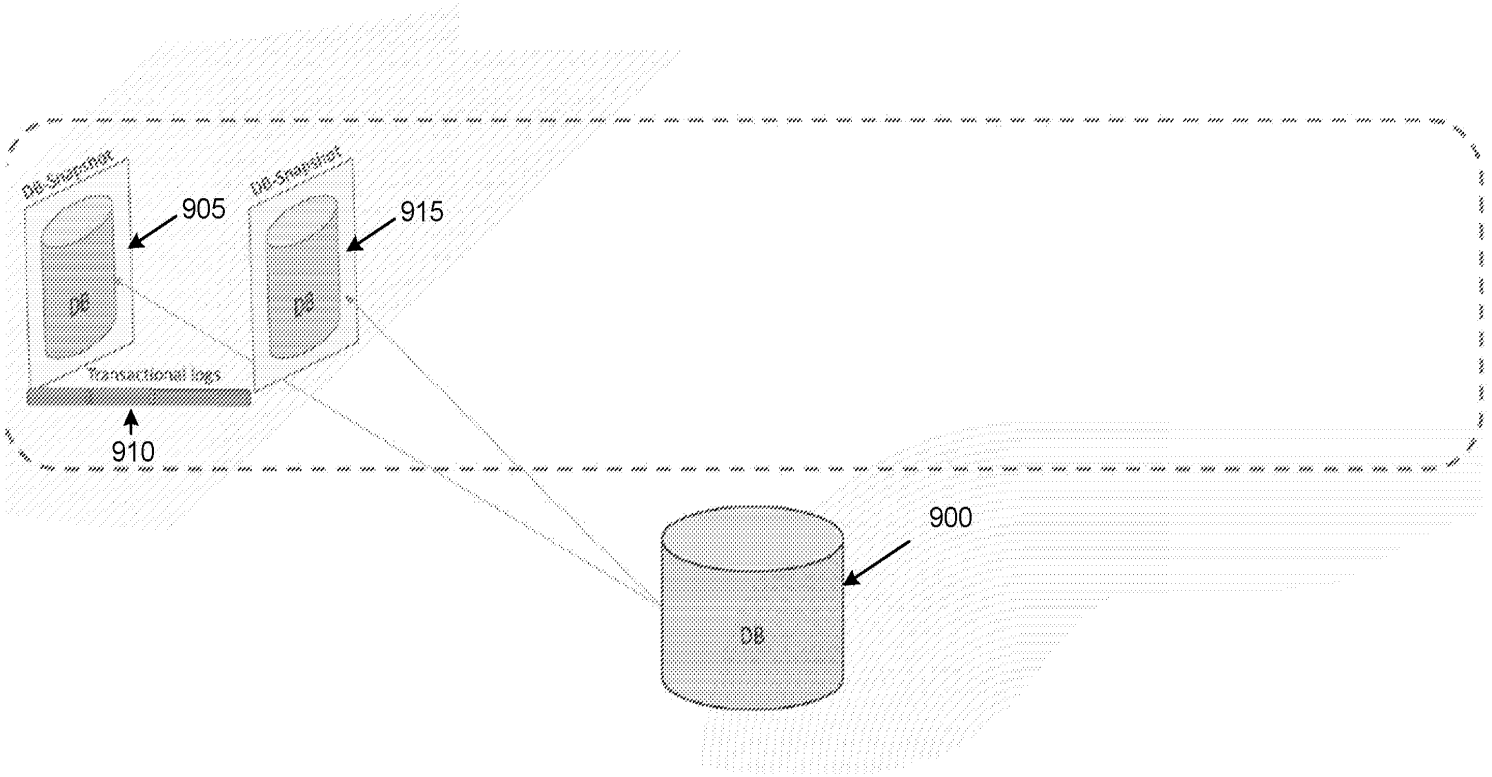


FIG. 9C

905
915
925A
925B
925C
925D
925E
935
910
920
930A
930B
930C
930D
930E
900

FIG. 9D

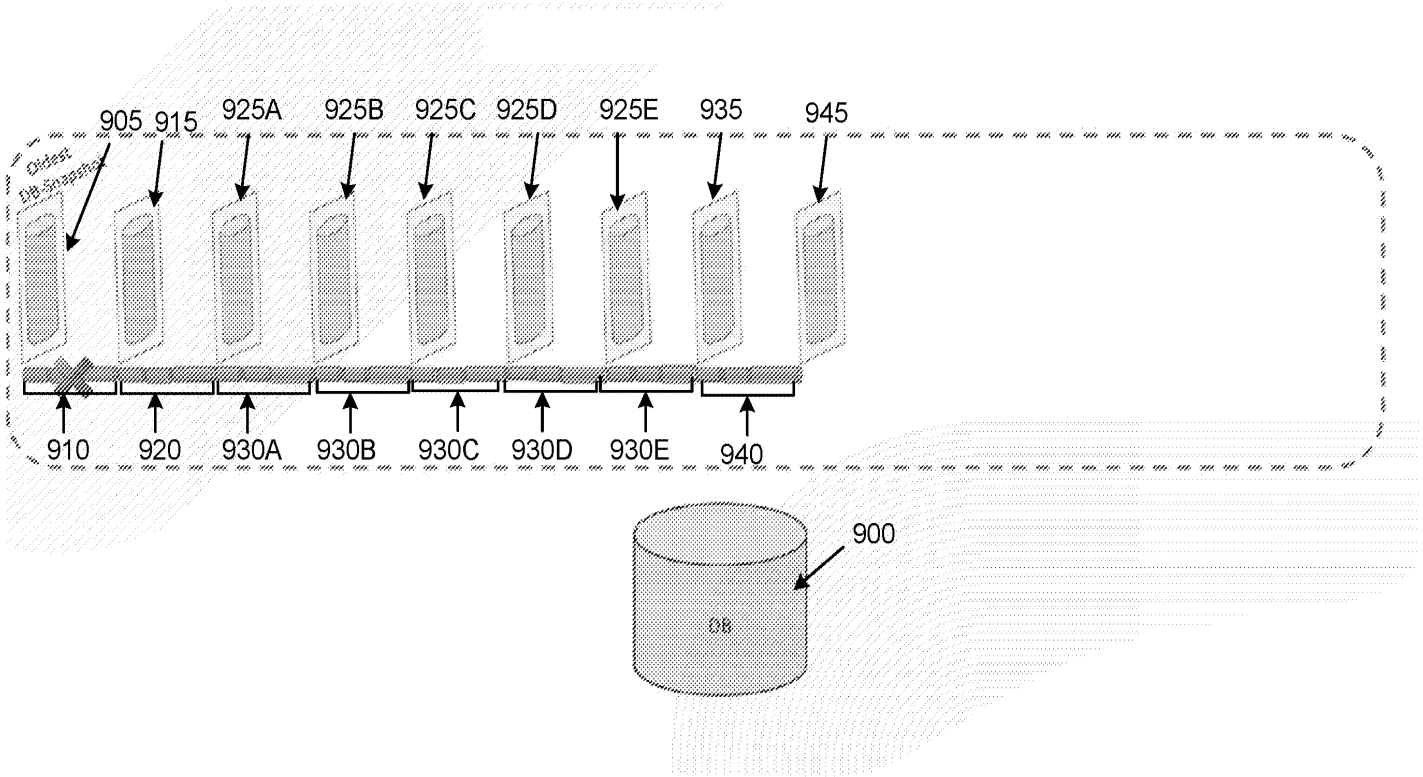

905
915
925A
925B
925C
925D
925E
935
945
Oldest DB Snapshot
910
920
930A
930B
930C
930D
930E
940
900
DB

FIG. 9E

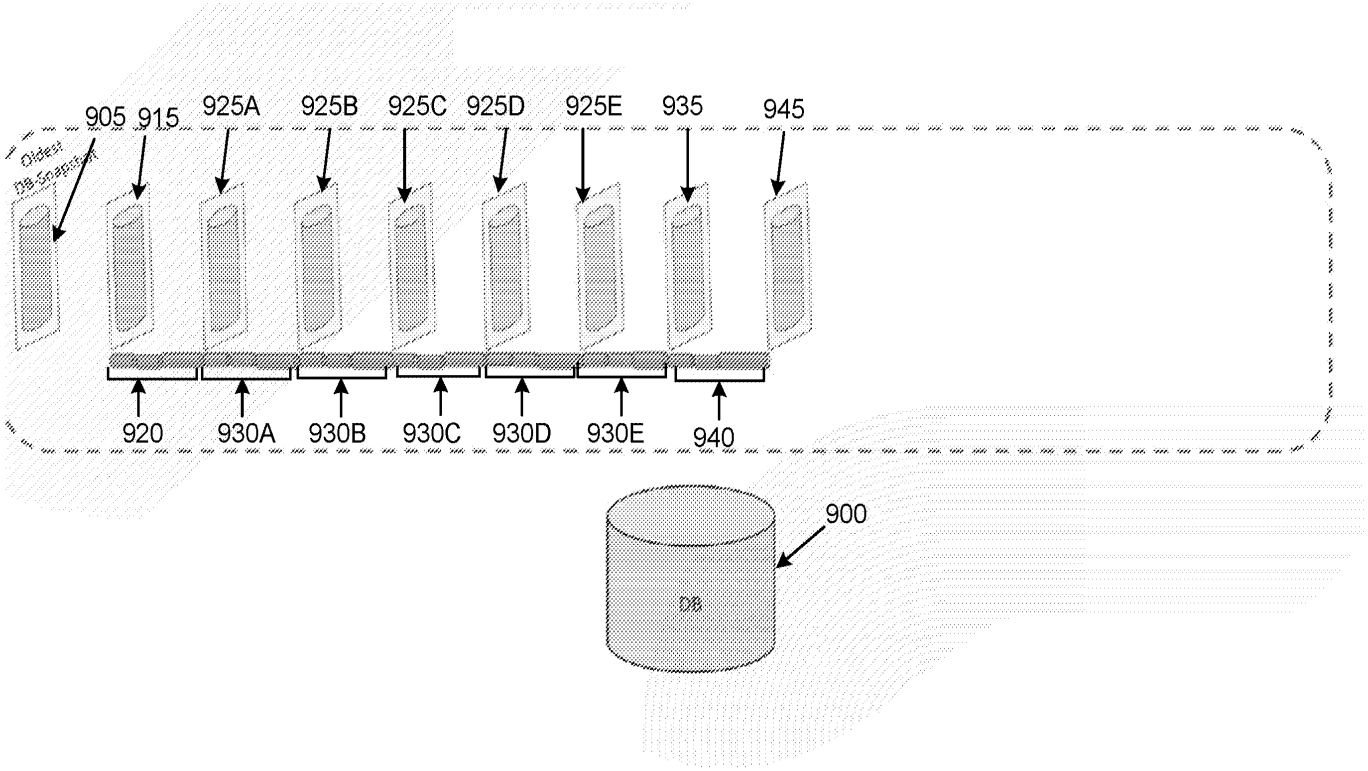

905
915
925A
925B
925C
925D
925E
935
945
920
930A
930B
930C
930D
930E
940
900
DB

FIG. 9F

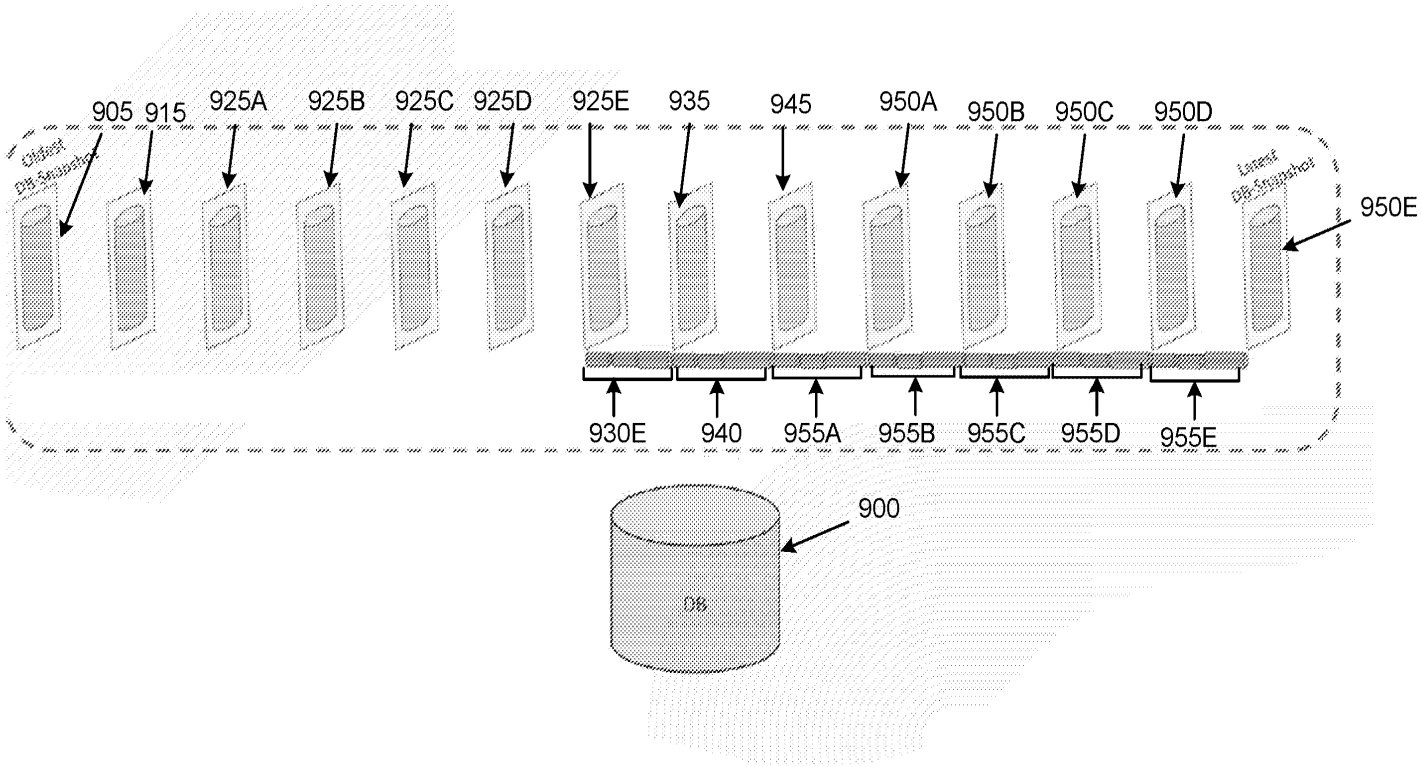

905
915
925A
925B
925C
925D
925E
935
945
950A
950B
950C
950D
950E
930E
940
955A
955B
955C
955D
955E
900
DB

FIG. 9G

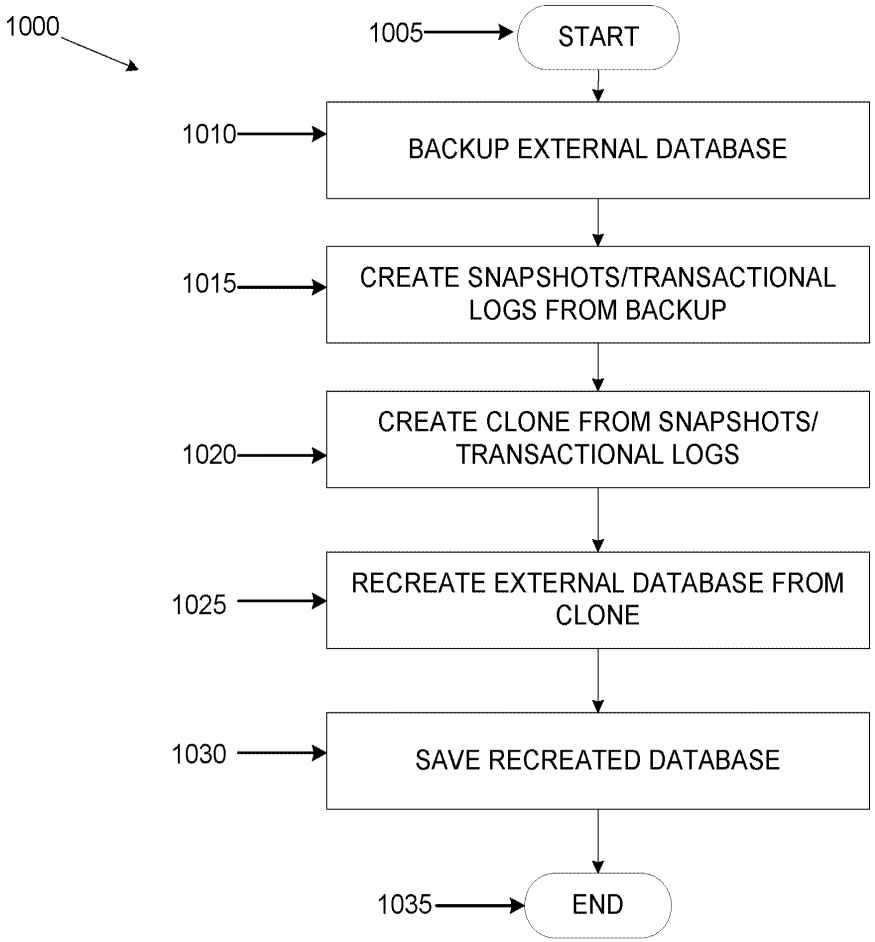

1000
1005
START
1010
BACKUP EXTERNAL DATABASE
1015
CREATE SNAPSHOTS/TRANSACTIONAL LOGS FROM BACKUP
1020
CREATE CLONE FROM SNAPSHOTS/ TRANSACTIONAL LOGS
1025
RECREATE EXTERNAL DATABASE FROM CLONE
1030
SAVE RECREATED DATABASE
1035
END

FIG. 10

SYSTEM AND METHOD FOR PROVISIONING DATABASES IN A HYPERCONVERGED INFRASTRUCTURE SYSTEM

BACKGROUND

[0001] The following description is provided to assist the understanding of the reader. None of the information provided or references cited is admitted to be prior art.

[0002] Virtual computing systems are widely used in a variety of applications. Virtual computing systems include one or more host machines running one or more virtual machines and other entities (e.g., containers) concurrently. Modern virtual computing systems allow several operating systems and several software applications to be safely run at the same time, thereby increasing resource utilization and performance efficiency. However, the present day virtual computing systems have limitations due to their configuration and the way they operate.

SUMMARY

[0003] In accordance with some aspects of the present disclosure, a method is disclosed. The method includes receiving, by a database engine of a database system associated with a virtual computing system, a user request via a dashboard for provisioning a source database with the database system, receiving, by the database engine via the dashboard, selection of a database engine type, and receiving, by the database engine via the dashboard, selection of a Service Level Agreement ("SLA") and a protection schedule. The method also includes provisioning, by the database engine, the source database based upon the database engine type, creating, by the database engine, an instance of a database protection system based upon the SLA and the protection schedule, including associating the instance of the database protection system with the source database, and displaying, by the database engine, the source database within the dashboard.

[0004] In accordance with some other aspects of the present disclosure, a system is disclosed. The system includes a dashboard, a database engine configured to receive input from and provide output to the dashboard, and a database storage system configured to store a source database upon provisioning. The database engine is configured to receive a user request via the dashboard for provisioning the source database, receive selection of a database engine type via the dashboard, receive selection of a Service Level Agreement ("SLA") and a protection schedule via the dashboard, and provision the source database based upon the database engine type and store the source database within the database storage system. The database engine is also configured to create an instance of a database protection system based upon the SLA and the protection schedule, including associating the instance of the database protection system with the source database and display the source database within the dashboard.

[0005] In accordance with yet other aspects of the present disclosure, a non-transitory computer readable media with computer-executable instructions embodied thereon is disclosed. The instructions when executed by a processor of a database engine associated with a database system of a virtual computing system cause the database engine to perform a process. The process includes receiving a user request via a dashboard for provisioning a source database with the database system, receiving, via the dashboard, selection of a database engine type, and receiving, via the dashboard, selection of a Service Level Agreement ("SLA") and a protection schedule. The process also includes provisioning the source database based upon the database engine type, creating an instance of a database protection system based upon the SLA and the protection schedule, including associating the instance of the database protection system with the source database, and displaying the source database within the dashboard.

[0006] The foregoing summary is illustrative only and is not intended to be in any way limiting. In addition to the illustrative aspects, embodiments, and features described above, further aspects, embodiments, and features will become apparent by reference to the following drawings and the detailed description.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] FIG. 1 is an example block diagram of a cluster of a virtual computing system, in accordance with some embodiments of the present disclosure.

[0008] FIG. 2 is an example block diagram of a database system of the virtual computing system of FIG. 1, in accordance with some embodiments of the present disclosure.

[0009] FIG. 3 is an example flowchart outlining operations for provisioning databases by the database system of FIG. 2, in accordance with some embodiments of the present disclosure.

[0010] FIGS. 4A-4G are example screenshots showing the operations of FIG. 3 for creating a new database, in accordance with some embodiments of the present disclosure.

[0011] FIGS. 5A-5E are example screenshots showing the operations of FIG. 3 for registering an existing database, in accordance with some embodiments of the present disclosure.

[0012] FIG. 6 is an example block diagram showing a database protection system of the database system of FIG. 2, in accordance with some embodiments of the present disclosure.

[0013] FIGS. 7A-7F are example screenshots showing creating cloned databases from source databases, in accordance with some embodiments of the present disclosure.

[0014] FIG. 8 is an example flowchart outlining operations for creating cloned databases using the database protection system of FIG. 6, in accordance with some embodiments of the present disclosure.

[0015] FIGS. 9A-9G are example screenshots showing how snapshots and transactional logs are stored within the database system, in accordance with some embodiments of the present disclosure.

[0016] FIG. 10 is an example flowchart outlining operations for protecting an external database, in accordance with some embodiments of the present disclosure.

[0017] The foregoing and other features of the present disclosure will become apparent from the following description and appended claims, taken in conjunction with the accompanying drawings. Understanding that these drawings depict only several embodiments in accordance with the disclosure and are therefore, not to be considered limiting of its scope, the disclosure will be described with additional specificity and detail through use of the accompanying drawings.

DETAILED DESCRIPTION

[0018] In the following detailed description, reference is made to the accompanying drawings, which form a part hereof. In the drawings, similar symbols typically identify similar components, unless context dictates otherwise. The illustrative embodiments described in the detailed description, drawings, and claims are not meant to be limiting. Other embodiments may be utilized, and other changes may be made, without departing from the spirit or scope of the subject matter presented here. It will be readily understood that the aspects of the present disclosure, as generally described herein, and illustrated in the figures, can be arranged, substituted, combined, and designed in a wide variety of different configurations, all of which are explicitly contemplated and made part of this disclosure.

[0019] The present disclosure is generally directed to a virtual computing system having a plurality of clusters, with each of the plurality of clusters having a plurality of nodes. Each of the plurality of nodes includes one or more virtual machines and other entities managed by an instance of a

monitor such as a hypervisor. These and other components may be part of a datacenter, which may be managed by a user (e.g., an administrator or other authorized personnel). A distributed storage system, for providing storage and protection capabilities, is associated with the virtual computing system. The virtual computing system may be configured for providing database management services. For example, at least some of the one or more virtual machines within the virtual computing system may be configured as database virtual machines for storing one or more databases. These databases may be managed by a database system. The database system may provide a plurality of database services. For example, in some embodiments, the database system may provide database provisioning services and copy data management services.

[0020] Database provisioning services involve creating and/or associating databases with the database system for management and use. Creating a new database and associating the database with the database system may be a complex and long drawn process. A user desiring to create a new database with a provider of the database system may make a new database creation request with the database provider. The user request may pass through multiple entities (e.g., people, teams, etc.) of the database provider before a database satisfying the user request may be created. For example, the user may be required to work with a first entity of the database provider to specify the configuration (e.g., database engine type, number of storage disks needed, etc.) of the database that is desired. Upon receiving the database configuration, another entity of the database provider may configure a database virtual machine for hosting the database, while yet another entity may configure the networking settings to facilitate access to the database upon creation. Yet another entity of the database provider may configure database protection services to backup and protect the database. All of these tasks may take a few to several days. Thus, creating the database is a

time intensive process and inconvenient for the user. The user may not have the time or desire to wait for the multiple days to create the database.

[0021] Further, creating the database using the above procedure requires the user to rely on the other entities. If these other entities become unavailable, the user may have no choice but to wait for those entities to become operational again. Additionally, the user may not be fully privy to or even understand the various configurational details of the desired database that the user may be asked to provide to the other entities for creating the database. The present disclosure provides technical solutions to the above problems. Specifically, the database system of the present disclosure greatly simplifies the database provisioning service. The database system of the present disclosure allows the user to quickly and conveniently create a new database and associate the database with the database system without the need for contacting and working with multiple entities. The entire process of creating and associating the database with the database system may be completed by the user within a span of a few minutes instead of the multiple days mentioned above.

[0022] The database system of the present disclosure provides a user friendly, intuitive user interface that solicits information from and conveniently walks the user through the various steps for creating a new database within minutes. The database system may include a catalog of standardized configurations, which the user may select from the user interface for creating the database. The user may modify the standardized configurations or create custom configurations to suit their needs. By virtue of providing standardized configurations, the present disclosure simplifies the database creation process for the user. The user interface also hides the complexity of creating the database from the user. For example, the user need not worry about creating, partitioning, or associating storage space (e.g., storage disk space) with the database that is being

created. The user may simply specify a size of the database that is desired in the user interface and the database system automatically translates that size into storage space. Thus, based upon the needs of the user, the user is able to specifically tailor the database during creation and create the database easily and quickly using the user interface.

[0023] The database system also provides the ability to register an existing database with the database system. Such existing databases may have been created outside of the database system. Users having existing databases may desire to associate their databases with the database system for management. Similar to creating a new database in the database system, registering an existing database with the database system is easy, convenient, and may be completed within a span of a few minutes via the user interface. As with the creation of a new database, the user interface walks the user through the registration process, provides standardized configurations for the user to select from, ability to modify the standardized configurations, and create new configurations. Upon registering the database with the database system, the database may take advantage of other database management services offered by the database system.

[0024] Copy data management services involve protecting a database. Protecting a database means replicating a state of the database for creating a fully functional copy of the database. Replicating the state of the database may involve creating fully functional clones (e.g., back-ups) of the database. Since the clones are fully functional copies of the original or source database, a user may perform operations on the cloned copy that would otherwise be performed on the original database. For example, the user may perform reporting, auditing, testing, data analysis, etc. on the cloned copy of the original database. A cloned database may be created by periodically capturing snapshots of the source database. A snapshot stores the state of the source database at the point in time at which the snapshot is captured. The snapshot is thus a point in time image of the database.

The snapshot may include a complete encapsulation of the virtual machine on which the database is created, including the configuration data of the virtual machine, the data stored within the database, and any metadata associated with the virtual machine. Any of a variety of snapshotting techniques may be used. For example, in some embodiments, copy-on-write, redirect-on-write, near-sync, or other snapshotting methods may be used to capture snapshots. From the snapshot, the source database may be recreated to the state at which the snapshot was captured.

[0025] However, the number of snapshots that are captured in a given day may be limited. Specifically, because capturing a snapshot requires quiescing (e.g., pausing) the source database and entering a safe mode in which user operations are halted, it is desirable to take only a minimum number of snapshots in a day. Thus, choices of state that may recreated from a snapshot may be limited. If a state is desired that falls between the capture of two snapshots, the user is generally out of luck. Thus, the desire to limit the number of snapshots in a day results in a significant technical problem that results in losing changes made to a database since the last snapshot capture or between two snapshot captures. The present disclosure provides technical solutions to this problem.

[0026] Specifically, the present disclosure automatically creates an instance of a database protection system for each database (e.g., source database) that is created within or registered with the database system. The database protection system instance may be configured to protect the source database by automatically capturing snapshots of the source database. Additionally, to avoid losing changes in state between two snapshot captures or since the last snapshot capture, the database system may capture transactional logs. A transactional log may be a text, image, disk, or other type of file that records every transaction or change that occurs on the source database since a last snapshot capture. Thus, by using the snapshots or a combination of snapshots and

transactional logs, any state of the source database down to the last second (or even fractions of seconds or other time granularities) may be recreated. Specifically, states of the source database that fall between the capture of two snapshots may be recreated by using a combination of snapshots and transactional logs.

[0027] The frequency of capturing transactional logs may be higher than the frequency of capturing snapshots in a day. For example, in some embodiments, by default, a transactional log may be captured every 30 minutes. In other embodiments, the user may define the frequency of capturing transactional logs. Further, since the source database is not quiesced (paused) for capturing the transactional log, user operations may continue while the transactional logs are being captured. Further, since the transactional logs only capture the changes in the database since the last snapshot capture, the transactional logs do not consume a lot of space. Thus, clones of the source database can be created to a point in time by using a combination of transactional logs and snapshots (e.g., between two snapshot captures), or based upon available snapshots (e.g., at the point of snapshot capture).

[0028] Further, the frequency with which the snapshots and transactional logs are captured by the database system may depend upon the level of protection desired by the user. The database system may solicit a protection schedule and definition of a Service Level Agreement ("SLA") from the user. For convenience, the database system may include built-in defaults of the protections schedule and SLA levels that the user may select from. The user may modify the defaults or define new parameters for the protection schedule and SLA. Thus, the level of protection accorded to each database associated with the database system may be individually tailored based upon the requirements of the user. The protection schedule may allow the user to define the frequency of

snapshots and transactional logs to be captured each day, and the time-period for capturing daily, weekly, monthly, and/or quarterly snapshots based upon the SLA.

[0029] Thus, the present disclosure provides an easy, convenient, cost effective, and user-friendly mechanism for creating and registering databases, as well as effectively protecting those databases.

[0030] Referring now to FIG. 1, a cluster 100 of a virtual computing system is shown, in accordance with some embodiments of the present disclosure. The cluster 100 includes a plurality of nodes, such as a first node 105, a second node 110, and a third node 115. Each of the first node 105, the second node 110, and the third node 115 may also be referred to as a "host" or "host machine." The first node 105 includes database virtual machines ("database VMs") 120A and 120B (collectively referred to herein as "database VMs 120"), a hypervisor 125 configured to create and run the database VMs, and a controller/service VM 130 configured to manage, route, and otherwise handle workflow requests between the various nodes of the cluster 100. Similarly, the second node 110 includes database VMs 135A and 135B (collectively referred to herein as "database VMs 135"), a hypervisor 140, and a controller/service VM 145, and the third node 115 includes database VMs 150A and 150B (collectively referred to herein as "database VMs 150"), a hypervisor 155, and a controller/service VM 160. The controller/service VM 130, the controller/service VM 145, and the controller/service VM 160 are all connected to a network 165 to facilitate communication between the first node 105, the second node 110, and the third node 115. Although not shown, in some embodiments, the hypervisor 125, the hypervisor 140, and the hypervisor 155 may also be connected to the network 165. Further, although not shown, one or more of the first node 105, the second node 110, and the third node 115 may include one or more containers managed by a monitor (e.g., container engine).

[0031] The cluster 100 also includes and/or is associated with a storage pool 170 (also referred to herein as storage sub-system). The storage pool 170 may include network-attached storage 175 and direct-attached storage 180A, 180B, and 180C. The network-attached storage 175 is accessible via the network 165 and, in some embodiments, may include cloud storage 185, as well as a networked storage 190. In contrast to the network-attached storage 175, which is accessible via the network 165, the direct-attached storage 180A, 180B, and 180C includes storage components that are provided internally within each of the first node 105, the second node 110, and the third node 115, respectively, such that each of the first, second, and third nodes may access its respective direct-attached storage without having to access the network 165.

[0032] It is to be understood that only certain components of the cluster 100 are shown in FIG. 1. Nevertheless, several other components that are needed or desired in the cluster 100 to perform the functions described herein are contemplated and considered within the scope of the present disclosure.

[0033] Although three of the plurality of nodes (e.g., the first node 105, the second node 110, and the third node 115) are shown in the cluster 100, in other embodiments, greater than or fewer than three nodes may be provided within the cluster. Likewise, although only two database VMs (e.g., the database VMs 120, the database VMs 135, the database VMs 150) are shown on each of the first node 105, the second node 110, and the third node 115, in other embodiments, the number of the database VMs on each of the first, second, and third nodes may vary to include other numbers of database VMs. Further, the first node 105, the second node 110, and the third node 115 may have the same number of database VMs (e.g., the database VMs 120, the database VMs 135, the database VMs 150) or different number of database VMs.

[0034] In some embodiments, each of the first node 105, the second node 110, and the third node 115 may be a hardware device, such as a server. For example, in some embodiments, one or more of the first node 105, the second node 110, and the third node 115 may be an NX-1000 server, NX-3000 server, NX-6000 server, NX-8000 server, etc. provided by Nutanix, Inc. or server computers from Dell, Inc., Lenovo Group Ltd. or Lenovo PC International, Cisco Systems, Inc., etc. In other embodiments, one or more of the first node 105, the second node 110, or the third node 115 may be another type of hardware device, such as a personal computer, an input/output or peripheral unit such as a printer, or any type of device that is suitable for use as a node within the cluster 100. In some embodiments, the cluster 100 may be part of a data center. Further, one or more of the first node 105, the second node 110, and the third node 115 may be organized in a variety of network topologies. Each of the first node 105, the second node 110, and the third node 115 may also be configured to communicate and share resources with each other via the network 165. For example, in some embodiments, the first node 105, the second node 110, and the third node 115 may communicate and share resources with each other via the controller/service VM 130, the controller/service VM 145, and the controller/service VM 160, and/or the hypervisor 125, the hypervisor 140, and the hypervisor 155.

[0035] Also, although not shown, one or more of the first node 105, the second node 110, and the third node 115 may include one or more processing units configured to execute instructions. The instructions may be carried out by a special purpose computer, logic circuits, or hardware circuits of the first node 105, the second node 110, and the third node 115. The processing units may be implemented in hardware, firmware, software, or any combination thereof. The term "execution" is, for example, the process of running an application or the carrying out of the operation called for by an instruction. The instructions may be written using one or more programming language,

scripting language, assembly language, etc. The processing units, thus, execute an instruction, meaning that they perform the operations called for by that instruction.

[0036] The processing units may be operably coupled to the storage pool 170, as well as with other elements of the first node 105, the second node 110, and the third node 115 to receive, send, and process information, and to control the operations of the underlying first, second, or third node. The processing units may retrieve a set of instructions from the storage pool 170, such as, from a permanent memory device like a read only memory ("ROM") device and copy the instructions in an executable form to a temporary memory device that is generally some form of random access memory ("RAM"). The ROM and RAM may both be part of the storage pool 170, or in some embodiments, may be separately provisioned from the storage pool. In some embodiments, the processing units may execute instructions without first copying the instructions to the RAM. Further, the processing units may include a single stand-alone processing unit, or a plurality of processing units that use the same or different processing technology.

[0037] With respect to the storage pool 170 and particularly with respect to the direct-attached storage 180A, 180B, and 180C, each of the direct-attached storage may include a variety of types of memory devices that are suitable for a virtual computing system. For example, in some embodiments, one or more of the direct-attached storage 180A, 180B, and 180C may include, but is not limited to, any type of RAM, ROM, flash memory, magnetic storage devices (e.g., hard disk, floppy disk, magnetic strips, etc.), optical disks (e.g., compact disk ("CD"), digital versatile disk ("DVD"), etc.), smart cards, solid state devices, etc. Likewise, the network-attached storage 175 may include any of a variety of network accessible storage (e.g., the cloud storage 185, the networked storage 190, etc.) that is suitable for use within the cluster 100 and accessible via the network 165. The storage pool 170, including the network-attached storage 175 and the direct-

attached storage 180A, 180B, and 180C, together form a distributed storage system configured to be accessed by each of the first node 105, the second node 110, and the third node 115 via the network 165, the controller/service VM 130, the controller/service VM 145, the controller/service VM 160, and/or the hypervisor 125, the hypervisor 140, and the hypervisor 155. In some embodiments, the various storage components in the storage pool 170 may be configured as virtual disks for access by the database VMs 120, the database VMs 135, and the database VMs 150.

[0038] Each of the database VMs 120, the database VMs 135, the database VMs 150 is a software-based implementation of a computing machine. The database VMs 120, the database VMs 135, the database VMs 150 emulate the functionality of a physical computer. Specifically, the hardware resources, such as processing unit, memory, storage, etc., of the underlying computer (e.g., the first node 105, the second node 110, and the third node 115) are virtualized or transformed by the respective hypervisor 125, the hypervisor 140, and the hypervisor 155, into the underlying support for each of the database VMs 120, the database VMs 135, the database VMs 150 that may run its own operating system and applications on the underlying physical resources just like a real computer. By encapsulating an entire machine, including CPU, memory, operating system, storage devices, and network devices, the database VMs 120, the database VMs 135, the database VMs 150 are compatible with most standard operating systems (e.g. Windows, Linux, etc.), applications, and device drivers.

[0039] Thus, each of the hypervisor 125, the hypervisor 140, and the hypervisor 155 is a virtual machine monitor that allows a single physical server computer (e.g., the first node 105, the second node 110, third node 115) to run multiple instances of the database VMs 120, the database VMs 135, and the database VMs 150 with each VM sharing the resources of that one physical server computer, potentially across multiple environments. For example, each of the hypervisor 125, the

hypervisor 140, and the hypervisor 155 may allocate memory and other resources to the underlying VMs (e.g., the database VMs 120, the database VMs 135, the database VM 150A, and the database VM 150B) from the storage pool 170 to perform one or more functions.

[0040] By running the database VMs 120, the database VMs 135, and the database VMs 150 on each of the first node 105, the second node 110, and the third node 115, respectively, multiple workloads and multiple operating systems may be run on a single piece of underlying hardware computer (e.g., the first node, the second node, and the third node) to increase resource utilization and manage workflow. When new database VMs are created (e.g., installed) on the first node 105, the second node 110, and the third node 115, each of the new database VMs may be configured to be associated with certain hardware resources, software resources, storage resources, and other resources within the cluster 100 to allow those virtual VMs to operate as intended.

[0041] The database VMs 120, the database VMs 135, the database VMs 150, and any newly created instances of the database VMs may be controlled and managed by their respective instance of the controller/service VM 130, the controller/service VM 145, and the controller/service VM 160. The controller/service VM 130, the controller/service VM 145, and the controller/service VM 160 are configured to communicate with each other via the network 165 to form a distributed system 195. Each of the controller/service VM 130, the controller/service VM 145, and the controller/service VM 160 may be considered a local management system configured to manage various tasks and operations within the cluster 100. For example, in some embodiments, the local management system may perform various management related tasks on the database VMs 120, the database VMs 135, and the database VMs 150.

[0042] The hypervisor 125, the hypervisor 140, and the hypervisor 155 of the first node 105, the second node 110, and the third node 115, respectively, may be configured to run virtualization

software, such as, ESXi from VMWare, AHV from Nutanix, Inc., XenServer from Citrix Systems, Inc., etc. The virtualization software on the hypervisor 125, the hypervisor 140, and the hypervisor 155 may be configured for running the database VMs 120, the database VMs 135, the database VM 150A, and the database VM 150B, respectively, and for managing the interactions between those VMs and the underlying hardware of the first node 105, the second node 110, and the third node 115. Each of the controller/service VM 130, the controller/service VM 145, the controller/service VM 160, the hypervisor 125, the hypervisor 140, and the hypervisor 155 may be configured as suitable for use within the cluster 100.

[0043] The network 165 may include any of a variety of wired or wireless network channels that may be suitable for use within the cluster 100. For example, in some embodiments, the network 165 may include wired connections, such as an Ethernet connection, one or more twisted pair wires, coaxial cables, fiber optic cables, etc. In other embodiments, the network 165 may include wireless connections, such as microwaves, infrared waves, radio waves, spread spectrum technologies, satellites, etc. The network 165 may also be configured to communicate with another device using cellular networks, local area networks, wide area networks, the Internet, etc. In some embodiments, the network 165 may include a combination of wired and wireless communications. The network 165 may also include or be associated with network interfaces, switches, routers, network cards, and/or other hardware, software, and/or firmware components that may be needed or considered desirable to have in facilitating intercommunication within the cluster 100.

[0044] Referring still to FIG. 1, in some embodiments, one of the first node 105, the second node 110, or the third node 115 may be configured as a leader node. The leader node may be configured to monitor and handle requests from other nodes in the cluster 100. For example, a particular database VM (e.g., the database VMs 120, the database VMs 135, or the database VMs 150) may

direct an input/output request to the controller/service VM (e.g., the controller/service VM 130, the controller/service VM 145, or the controller/service VM 160, respectively) on the underlying node (e.g., the first node 105, the second node 110, or the third node 115, respectively). Upon receiving the input/output request, that controller/service VM may direct the input/output request to the controller/service VM (e.g., one of the controller/service VM 130, the controller/service VM 145, or the controller/service VM 160) of the leader node. In some cases, the controller/service VM that receives the input/output request may itself be on the leader node, in which case, the controller/service VM does not transfer the request, but rather handles the request itself.

[0045] The controller/service VM of the leader node may fulfil the input/output request (and/or request another component within/outside the cluster 100 to fulfil that request). Upon fulfilling the input/output request, the controller/service VM of the leader node may send a response back to the controller/service VM of the node from which the request was received, which in turn may pass the response to the database VM that initiated the request. In a similar manner, the leader node may also be configured to receive and handle requests (e.g., user requests) from outside of the cluster 100. If the leader node fails, another leader node may be designated.

[0046] Additionally, in some embodiments, although not shown, the cluster 100 may be associated with a central management system that is configured to manage and control the operation of multiple clusters in the virtual computing system. In some embodiments, the central management system may be configured to communicate with the local management systems on each of the controller/service VM 130, the controller/service VM 145, the controller/service VM 160 for controlling the various clusters.

[0047] Again, it is to be understood again that only certain components and features of the cluster 100 are shown and described herein. Nevertheless, other components and features that may be

needed or desired to perform the functions described herein are contemplated and considered within the scope of the present disclosure. It is also to be understood that the configuration of the various components of the cluster 100 described above is only an example and is not intended to be limiting in any way. Rather, the configuration of those components may vary to perform the functions described herein.

[0048] Turning now to FIG. 2, an example block diagram of a database system 200 is shown, in accordance with some embodiments of the present disclosure. FIG. 2 is discussed in conjunction with FIG. 1. The database system 200 or portions thereof may be configured as utility software for creating and implementing database management services. The database system 200 is configured to facilitate creation/registration, querying, and/or administration of the databases associated therewith. Thus, the database system 200 includes a database engine 205 that is configured to receive input from and provide output to a user via a dashboard 210. The database engine 205 is also associated with a database storage system 215 that is configured to store one or more databases under management of the database system 200. In association with the dashboard 210 and the database storage system 215, the database engine 205 is configured to implement one or more database management services of the database system 200. For example, the database engine 205 is configured to provide database provisioning services to create new databases and register existing databases with the database system 200 using a database provisioning system 220. The database engine 205 is also configured to protect databases created or registered by the database provisioning system 220 via a database protection system 225. Although the database provisioning system 220. and the database protection system 225 are shown as separate components, in some embodiments, the database provisioning system and the database protection system may be combined and the combined component may perform the operations of the

individual components. The database provisioning system 220 and the database protection system 225 are both discussed in greater detail below.

[0049] The database system 200 may be installed on a database VM (e.g., the database VMs 120, the database VMs 135, the database VMs 150 of FIG. 1). The database system 200 may be installed via the controller/service VM (e.g., the controller/service VM 130, the controller/service VM 145, the controller/service VM 160) of the node (e.g., the first node 105, the second node 110, and the third node 115) on which the database system is to be installed. For example, an administrator desiring to install the database system 200 may download a copy on write image file (e.g., qcow or qcow2 image file) on the controller/service VM to define the content and structure of a disk volume to be associated with the database system 200. In some embodiments, instead of a copy on write image file, another type of disk image file, depending upon the type of underlying hypervisor, may be installed. Further, the administrator may create or one or more new database VMs on which the database system 200 is to reside. As part of creating the database VMs, the administrator may allocate a particular number of virtual central processing units (vCPU) to each of the database VMs, define the number of cores that are desired in each vCPU, designate a specific amount of memory to each of the database VMs, and attach a database storage device (e.g., a virtual disk from the storage pool 170) with each of the database VMs. In some embodiments, at least a portion of the database storage device attached to the database system 200 may form the database storage system 215. The administrator may also create a new network interface (e.g., associate a virtual local area network (VLAN), assign an Internet Protocol ("IP") address to access the database system 200, etc.) with each of the database VMs. The administrator may perform additional and/or other actions to create the database VMs on which the database system 200 resides upon creation and installation of the disk image file.

[0050] In some embodiments, the database VMs on which the database system 200 resides may all be located on a single node (e.g., one of the first node 105, the second node 110, and the third node 115). In other embodiments, the database VMs on which the database system 200 resides may be spread across multiple nodes within a single cluster, or possibly amongst multiple clusters. When spread across multiple clusters, each of the associated multiple clusters may be configured to at least indirectly communicate with one another to facilitate operation of the database system 200. Upon installing the database system 200, a user (e.g., the administrator or other user authorized to access the database system) may access the dashboard 210. The dashboard 210, thus, forms the front end of the database system 200 and the database engine 205 and the database storage system 215 form the backend of the database system.

[0051] The database system 200 may be accessed via a computing device associated with the virtual computing system 100. In other embodiments, instead of or in addition to being accessible via a particular computing device, the database system 200 may be hosted on a cloud service and may be accessed via the cloud. In some embodiments, the database system 200 may additionally or alternatively be configured as a mobile application suitable for access from a mobile computing device (e.g., a mobile phone). In some embodiments, the database system 200 and particularly the dashboard 210 may be accessed via an Application Programming Interface ("API") 230. To access the dashboard 210 via the API 230, a user may use designated devices such as laptops, desktops, tablets, mobile devices, other handheld or portable devices, and/or other types of computing devices that are configured to access the API. These devices may be different from the computing device on which the database system 200 is installed.

[0052] In some embodiments and when the dashboard 210 is configured for access via the API 230, the user may access the dashboard via a web browser and upon entering a uniform resource

locator ("URL") for the API such as the IP address of the database system 200 or other web address. Using the API 230 and the dashboard 210, the users may then send instructions to the database engine 205 and receive information back from the database engine. In some embodiments, the API 230 may be a representational state transfer ("REST") type of API. In other embodiments, the API 230 may be any other type of web or other type of API (e.g., ASP.NET) built using any of a variety of technologies, such as Java, .Net, etc., that is capable of accessing the database engine 205 and facilitating communication between the users and the database engine. In some embodiments, the API 230 may be configured to facilitate communication via a hypertext transfer protocol ("HTTP") or hypertext transfer protocol secure ("HTTPS") type request. The API 230 may receive an HTTP/HTTPS request and send an HTTP/HTTPS response back. In other embodiments, the API 230 may be configured to facilitate communication using other or additional types of communication protocols. In other embodiments, the database system 200 may be configured for access in other ways.

[0053] The dashboard 210 provides a user interface that facilitates human-computer interaction between the users and the database engine 205. The dashboard 210 is configured to receive user inputs from the users via a graphical user interface ("GUI") and transmit those user inputs to the database engine 205. The dashboard 210 is also configured to receive outputs/information from the database engine 205 and present those outputs/information to the users via the GUI of the management system. The GUI may present a variety of graphical icons, windows, visual indicators, menus, visual widgets, and other indicia to facilitate user interaction. In other embodiments, the dashboard 210 may be configured as other types of user interfaces, including for example, text-based user interfaces and other man-machine interfaces. Thus, the dashboard 210 may be configured in a variety of ways.

[0054] Further, the dashboard 210 may be configured to receive user inputs in a variety of ways. For example, the dashboard 210 may be configured to receive the user inputs using input technologies including, but not limited to, a keyboard, a stylus and/or touch screen, a mouse, a track ball, a keypad, a microphone, voice recognition, motion recognition, remote controllers, input ports, one or more buttons, dials, joysticks, etc. that allow an external source, such as the user, to enter information into the database system 200. The dashboard 210 may also be configured to present outputs/information to the users in a variety of ways. For example, the dashboard 210 may be configured to present information to external systems such as users, memory, printers, speakers, etc. Therefore, although not shown, dashboard 210 may be associated with a variety of hardware, software, firmware components, or combinations thereof. Generally speaking, the dashboard 210 may be associated with any type of hardware, software, and/or firmware component that enables the database engine 205 to perform the functions described herein.

[0055] Thus, the dashboard receives a user request (e.g., an input) from the user and transmits that user request to the database engine 205. In some embodiments, the user request may be to request a database management service. For example, in some embodiments, the user request may be to request a database provisioning service. In response to the user request for a database provisioning service, the database engine 205 may activate the database provisioning system 220. The database provisioning system 220 includes a database creation system 235 for creating new databases within the database system 200 and a database registration system 240 for registering databases that were previously created outside of the database system with the database system. Although the database creation system 235 and the database registration system 240 are shown as separate components, in some embodiments, those components may be combined together and the combined component

may perform the functions of the individual components. The database creation system 235 and the database registration system 240 are discussed in greater detail in FIGS. 3-5E below.

[0056] The database protection system 225 is configured to protect databases associated with the database system 200. Thus, the database protection system 225 implements a copy data management service of the database system 200. During creation or registration of a database, the database provisioning system 220 creates an instance of a database protection system 225 for protecting the associated database. Thus, upon the creation or registration of a database, that database may be protected by the associated instance of the database protection system 225 by capturing snapshots, transactional logs, and creating cloned databases. Each instance of the database protection system 225 may receive a variety of user defined constraints in accordance with which the associated database is protected. The database protection system 225 is discussed in greater detail in FIG. 6 below.

[0057] The database engine 205, including the database provisioning system 220 and the database protection system 225 may be configured as, and/or operate in association with, hardware, software, firmware, or a combination thereof. Specifically, the database engine 205 may include a processing unit 245 configured to execute instructions for implementing the database management services of the database system 200. In some embodiments, each of the database provisioning system 220 and the database protection system 225 may have their own separate instance of the processing unit 245. The processing unit 245 may be implemented in hardware, firmware, software, or any combination thereof. "Executing an instruction" means that the processing unit 245 performs the operations called for by that instruction. The processing unit 245 may retrieve a set of instructions from a memory for execution. For example, in some embodiments, the processing unit 245 may retrieve the instructions from a permanent memory

device like a read only memory (ROM) device and copy the instructions in an executable form to a temporary memory device that is generally some form of random access memory (RAM). The ROM and RAM may both be part of the storage pool 170 and/or provisioned separately from the storage pool. In some embodiments, the processing unit 245 may be configured to execute instructions without first copying those instructions to the RAM. The processing unit 245 may be a special purpose computer, and include logic circuits, hardware circuits, etc. to carry out the instructions. The processing unit 245 may include a single stand-alone processing unit, or a plurality of processing units that use the same or different processing technology. The instructions may be written using one or more programming language, scripting language, assembly language, etc.

[0058] The database engine 205 may also include a memory 250. The memory 250 may be provisioned from or be associated with the storage pool 170. In some embodiments, the memory 250 may be separate from the storage pool 170. The memory 250 may be any of a variety of volatile and/or non-volatile memories that may be considered suitable for use with the database engine 205. In some embodiments, the memory 250 may be configured to store the instructions that are used by the processing unit 245. Further, although not shown, in some embodiments, the database provisioning system 220 and the database protection system 225 may each, additionally or alternatively, have their own dedicated memory.

[0059] Further, the database engine 205 may be configured to handle a variety of types of database engines. For example, in some embodiments, the database engine 205 may be configured to manage PostgreSQL, Oracle, Microsoft SQL server, and MySQL database engines. In other embodiments, the database engine 205 may be configured to manage other or additional database engines. Each database that is created within or registered with the database system 200 may be

of a particular "database engine type." The database engine type may identify the type of database management system (e.g., Oracle, PostgreSQL, etc.) of a particular database. By virtue of creating or registering a database with a particular database engine type, that database is managed in accordance with the rules of that database engine type. Thus, the database engine 205 is configured to be operable with and manage databases associated with a variety of database engine types.

[0060] It is to be understood that only some components of the database engine 205 are shown and discussed herein. In other embodiments, the database engine 205 may also include other components that are considered necessary or desirable in implementing the various database management services discussed herein. Similarly, the database provisioning system 220 and the database protection system 225 may have components that are considered necessary or desirable in implementing the various database management services discussed herein.

[0061] Referring still to FIG. 2, the database storage system 215 is configured to store one or more databases that are either created within the database system 200 or registered with the database system. The database storage system 215 may include a source database storage 255 and a target database storage 260. The source database storage 255 is configured to store the original instances of the databases (also referred to herein as source databases) that are created within or registered with the database system 200. The target database storage 260 is configured to store the clones of the source databases (also referred to herein as cloned databases). In some embodiments, the source database storage 255 and the target database storage 260 may be provisioned from the storage pool 170 and may include virtual disk storage that is associated with the database VMs (e.g., the database VMs 120, the database VMs 135, the database VMs 150) on which the database system 200, the source databases, and the cloned databases reside. For example, in some embodiments, the source database storage 255 may be associated with one or more database VMs

(referred to herein as source database VMs) and the source databases stored within the source database storage may be stored within the virtual disks associated with the source database VMs. Similarly, in some embodiments, the target database storage 260 may be associated with one or more database VMs (referred to herein as target database VMs) and the databases stored within the target database storage may be stored within the virtual disks associated with the target database VMs. In some embodiments, each source database VM may be configured to store one or more source databases and each target database VM may be configured to store one or more target databases. In other embodiments, the source database storage 255 and the target database storage 260 may additionally or alternatively be provisioned from other types of storage associated with the database system 200.

[0062] Further, depending upon the size of a particular database and the size of the virtual disk associated with a particular source database VM, a source database may be stored in its entirety on a single source database VM or may span multiple source database VMs. Further, as the size of that source database increases, the source database may be moved to another source database VM, may be stored onto multiple source database VMs, and/or additional storage may be provisioned to the source database VMs to house the increased size of the source database. Similarly, depending upon the size of a cloned database and the size of the virtual disk associated with a particular target database VM, the cloned database may be stored on a single or multiple target database VMs. Further, as the size of the cloned database increases (e.g., by virtue of updating the cloned database to incorporate any changes in the source database), the cloned database may be moved to another target database VM of appropriate size, may be divided amongst multiple target database VMs, and/or additional virtual disk space may be provisioned to the target

database VM. Thus, the database storage system 215 is structured with the flexibility to expand and adapt to accommodate databases of various sizes.

[0063] The database storage system 215 also includes a database manager 265. In some embodiments, each instance of the source database within the source database storage 255 may include an instance of the database manager 265. In other embodiments, a single instance of the database manager 265 may manage multiple or all source databases. The database manager 265 is configured to work with the database protection system 225 to protect the source databases stored within the source database storage 255. The database manager 265 is discussed in greater detail in FIG. 6 below. Although not shown, the database manager 265 may include a processing unit (e.g., similar to the processing unit 245), a memory (e.g., similar to the memory 250), and other hardware, software, and/or firmware components that are necessary or considered desirable for performing the functions described herein. Further, although the cloned databases in the target database storage 260 are shown as having a database manager, in some embodiments, each cloned database may be associated with a database manager for managing the cloned databases.

[0064] Turning now to FIG. 3, an example flow chart outlining operations of a process 300 is shown, in accordance with some embodiments of the present disclosure. The process 300 may include additional, fewer, or different operations, depending on the particular embodiment. The process 300 may be used to implement the database provisioning service. Thus, the process 300 may be used to create a new database or register an existing database. The process 300 is discussed in conjunction with FIGS. 1 and 2 and is implemented by the database provisioning system 220 of the database engine 205 in conjunction with the dashboard 210. Specifically, the database provisioning system 220 receives inputs from the user via the dashboard 210 and performs operations in response to those inputs for creating a new database or registering an existing

database. Thus, the process 300 starts at operation 305 with the database provisioning system 220 receiving a user request via the dashboard 210 for either creating a new database or registering an existing database. Specifically, once the database system 200 is installed and the user is able to access the dashboard 210, the dashboard may present an option to create a new database or register an existing database. If the user desires to create a new database, the user may select the database creation option from the dashboard 210 and activate the database creation system 235 of the database provisioning system 220. If the user desires to register an existing database, the user may select the database registration option and activate the database registration system 240 of the database provisioning system 220.

[0065] Upon activation, the database creation system 235 or the database registration system 240 may present one or more user interfaces to the user for soliciting parameters for creating a new database or registering an existing database, respectively. For example, at operation 310, the activated one of the database creation system 235 or the database registration system 240 presents, via the dashboard 210, a user interface for requesting the database engine type of the database to be created or registered. The dashboard 210 may present a selection of the database engine types that are supported by the database engine 205. The user may select one of the various database engine types presented on the dashboard 210. As noted above, the database engine type defines the database management system of the database being created or registered. For example, if the user desires to create a database with the database engine type Oracle, and if Oracle is presented as an option on the dashboard at the operation 310, the user may select Oracle on the dashboard. As another example, if the user desires to register an existing database that has been configured with the database engine type Oracle, the user may select Oracle from the dashboards at the operation 310.

[0066] The database creation system 235 or the database registration system 240 receives the user's selection of the database engine type at the operation 310. Additionally, the database creation system 235 or the database registration system 240 configures the remaining user interfaces that are presented to the user on the dashboard 210 based on the database engine type selected by the user at the operation 310. For example, if the user selected Oracle as the database engine type at the operation 315, the database creation system 235 or the database registration system 240 may configure the remaining database creation process or the database registration process in accordance with requirements for Oracle. Thus, at operation 315, the database creation system 235 or the database registration system 240 presents one or more user interfaces to the user, via the dashboard 210, for requesting a selection of parameters for defining the configuration for and creating a new source database VM on which the database being created or registered will ultimately reside.

[0067] For example, in some embodiments, the activated one of the database creation system 235 or the database registration system 240 may request parameters for defining a software profile, a network profile, a compute profile, and a database parameter profile to be associated with the new source database VM. In other embodiments, the database provisioning system 220 may request other or additional types of parameters from the user for creating the source database VM based upon the database engine type selected at the operation 310. The user interface may present one or more standardized profiles for one or more of the software profile, network profile, compute profile, and database parameter profile. The user may select from the standardized profiles in some embodiments. In some embodiments, the database creation system 235 or the database registration system 240 may also allow the user to modify a standardized profile and/or create new profiles from scratch based upon the user's preferences. Each of the profiles is based upon the

database engine type selected at the operation 310. Thus, the standardized profiles that are presented to the user are in compliance with the database engine type. Similarly, the database creation system 235 or the database registration system 240 only allow those changes to the standardized profiles or creation of new profiles that comply with the database engine type.

[0068] The software profile defines the software and operating system parameters for the database engine type that is selected at the operation 310. For example, if at the operation 310, the database engine type is selected as PostgreSQL, the software profile may include one or more software and operations system image profiles associated with PostgreSQL. Each software profile may define the rules that are to be applied in managing the database being created or registered. In some embodiments, one or more sample software profiles may be available for the user to select. In other embodiments, the user may create their own custom software profile or modify an existing software profile to suit their needs. When creating their own custom software profile or modifying an existing software profile, in some embodiments, the user may be required to create/modify the software profile before starting the process 300, while in other embodiments, the user may be able to create the custom software profile as part of the operation 315.

[0069] The network profile identifies the network location of the database being created or registered to facilitate access to the database after creation or registration. In some embodiments, the network profile may be the same profile that is created during installation of the database system 200. In other embodiments, a different network profile may be used. Similar to the software profile, the database creation system 235 or the database registration system 240 may make a sample network profile available for the user to select. Alternatively, the user may create a new network profile or modify an existing network profile either before starting the process 300 or during the operation 315. The compute profile defines the size/configuration of the source

database VM. For example, the compute profile may define the number of vCPUs, number of cores per vCPU, and memory capacity to be associated with the source database VM. In other embodiments, the compute profile may define other or additional configurational parameters. At the operation 315, the database creation system 235 or the database registration system 240 may also request the database parameter profile from the user. The database parameter profile defines the custom parameters that are applied to the database being created or registered. Again, the database creation system 235 or the database registration system 240 may make sample compute profiles and/or a sample database parameter profiles available for the user to select in some embodiments. Alternatively, the user may create custom compute and/or database parameter profiles or modify existing compute and/or database parameter profiles, either before starting the process 300 or during the operation 315.

[0070] In some embodiments, the database creation system 235 or the database registration system 240 may pre-select a default option for the user for one or more of the software profile, compute profile, network profile, and the database parameter profile. The database creation system 235 or the database registration system 240 may allow the user to change the default options by selecting another standardized option, modifying a standardized option, or creating a new profile. Thus, at the operation 315, the database creation system 235 or the database registration system 240 receives selection of the various parameters for creating a new source database VM.

[0071] In some embodiments, based upon the parameters received from the user, the database creation system 235 or the database registration system 240 may create a new source database VM at the operation 315. In other embodiments, the database creation system 235 or the database registration system 240 may wait until other remaining parameters are received before creating the source database VM. In some embodiments, instead of creating a new source VM, the database

creation system 235 or the database registration system 240 may allow the user to use a previously created source database VM. Thus, at the operation 315, the database creation system 235 or the database registration system 240 may first request the user to select one option from either creating a new source database VM or using an existing (e.g., previously created) source database VM. Based on the user's selection, the database creation system 235 or the database registration system 240 may request the various profiles discussed above or request the user to identify the existing source database VM to use. In some embodiments, the database creation system 235 or the database registration system 240 may present a list of existing source database VMs created previously for the database engine type selected at the operation 310 and that have space available to receive the database being created or registered. The user may select one source database VM from the list. The database creation system 235 or the database registration system 240 may facilitate the user selection of an existing source database VM in other manners (e.g., by allowing the user to browse to a location, etc.).

[0072] Upon receiving selection of the various profiles for creating a new source database VM or receiving selection of an existing source database VM, at operation 320, the database creation system 235 or the database registration system 240 presents one or more user interfaces, via the dashboard 210, for requesting parameters (e.g., configurational details) for the database being created/registered. For example, the database creation system 235 or the database registration system 240 may request a database name and a description of the database being created or registered to distinguish that database from other databases within the database system 200. The database creation system 235 or the database registration system 240 may also request a database password to restrict access to the database to only authorized users, a database size to determine how much storage space is needed for storing that base, and/or any additional or other parameters

that may be considered necessary or desirable in creating/registering the database. Further, the parameters that are requested may vary based upon whether a database is being created or whether an existing database is being registered. For example, if an existing database is being registered, the database registration system 240 may automatically determine the size of the database. In some embodiments, certain default values may be pre-selected for the user and the user may be allowed to change those values. Thus, at the operation 320, the database creation system 235 or the database registration system 240 receives selection of parameters from the user, via the dashboard 210, for either creating a new database or registering an existing database.

[0073] At operation 325, the database creation system 235 or the database registration system 240 presents one or more user interfaces, via the dashboard 210, to request selection of parameters for creating an instance of a database protection system (e.g., the database protection system 225) for the database being created or registered by the process 300. The instance of the database protection system is configured to protect the database being created or registered by the process 300. To create the instance of the database protection system, the database creation system 235 or the database registration system 240 may request a name and description for the instance of the database protection system 225, a level of a Service Level Agreement ("SLA"), and a protection schedule to define rules based on which the instance of the database protection system 225 operates.

[0074] An SLA is an agreement between a service provider (e.g., the owner of the database system 200) and the user (e.g., the owner of the database) that outlines, among other things, the protection scope of the database. The protection scope defines for how long data from the database being created or registered is retained. Thus, the protection scope defines the database retention policy. In some embodiments, the SLA may define various protection parameters such as continuous,

daily, weekly, monthly, quarterly, or yearly protection parameters for determining the protection scope of the database being created/registered. In other embodiments, the SLA may define other or additional protection parameters.

[0075] Each database for which an instance of the database protection system 225 is created may be protected by capturing snapshots and/or transactional logs. The number of snapshots and transactional logs to be captured on each day may be defined by the user in the protection schedule. As used herein, a "day" may be any 24-hour period (e.g., from midnight to Noon). In some embodiments, the protection schedule may define default values to define the frequency of capturing snapshots and transactional logs, which the user may modify. Thus, based upon the frequency of capturing snapshots and transactional logs defined in the protection schedule, the instance of the database protection system 225 may be configured to capture one or more snapshots and one or more transactional logs each day. Generally speaking, the number of transactional logs that are captured each day may be higher than the number of snapshots that are captured on that day. Since it is impractical and expensive to indefinitely store the captured snapshots and the transactional logs, the protection parameters in the SLA define the duration for how long those snapshots and transactional logs are stored.

[0076] For example, the continuous protection parameter within the SLA defines the duration in days for which all captured snapshots and transactional logs are retained. For example, if the continuous protection parameter is defined as 30 days, the instance of the database protection system 225 is configured to retain all snapshots and transactional logs that are captured within the last 30 days. By retaining all snapshots and the transactional logs, the user may replicate any or substantially any state of the database (down to a second or even a fraction of a second).

[0077] The SLA may also define a daily protection parameter, which defines the duration in days for which a daily snapshot is stored. For example, if the daily protection parameter is 90 days, the instance of the database protection system 225 is configured to store a daily snapshot for 90 days. The protection schedule may define the time of day to identify the snapshot that is designated as the daily snapshot. For example, if the user specifies that the snapshot captured at 11:00 AM every day is the daily snapshot and the SLA defines the daily protection parameter for 90 days, the instance of the database protection system 225 may be configured to store a daily snapshot that was captured at or closest to 11:00 AM and store the daily snapshot for 90 days.

[0078] Similarly, the SLA may define weekly, monthly, and quarterly protection parameters. A weekly protection parameter in the SLA may define the duration in weeks for which a weekly snapshot is stored. The protection schedule may define the day of the week to identify which snapshot is designated as the weekly snapshot. For example, if the user defines in the protection schedule that the snapshot captured on Monday is to be designated as the weekly snapshot, and the weekly protection parameter in the SLA specifies a duration of 8 weeks, the instance of the database protection system 225 may store the snapshot captured every week on Monday for 8 weeks. If multiple snapshots are captured each day, the protection schedule may also define which snapshot captured on the designated day of the week (e.g., Monday) serves as the weekly snapshot. In some embodiments, the time defined in the protection schedule for capturing a daily snapshot may be used. For example, if the protection schedule defines that the snapshot captured at 11:00 AM is the daily snapshot, and the weekly snapshot is to be captured on Monday, the instance of the database protection system 225 may store the snapshot captured at or closest to 11:00 AM every Monday as the weekly snapshot. In other embodiments, another time period may be used.

[0079] Likewise, a monthly protection parameter in the SLA may define a duration in months for which a monthly snapshot is to be stored. The user may specify the date within the protection schedule for identifying which snapshot corresponds to the monthly snapshot. For example, the user may specify storing the snapshot captured on the 20th of every month as the monthly snapshot in the protection schedule, and the monthly protection parameter may specify a duration of 12 months for storing the monthly snapshot. Thus, the instance of the database protection system 225 stores a monthly snapshot captured on the 20th of every month and stores that monthly snapshot for 12 months. A quarterly protection parameter in the SLA may define a duration in quarters for which a quarterly snapshot is to be stored and the user may specify in the protection schedule which months correspond to the various quarters. For example, the user may specify January, April, July, and October as the quarters and the quarterly protection parameter may specify storing the quarterly snapshots for 20 quarters. Thus, the instance of the database protection system 225 may designate a snapshot captured on the first day of January, April, July, and October (e.g., January 1, April 1, July 1, and October 1) as the quarterly snapshot and store the quarterly snapshot for 20 quarters.

[0080] Thus, for each protection parameter that is defined in the SLA, a corresponding value may be requested from the user in the protection schedule to identify which snapshot corresponds to that protection parameter. It is to be understood that the various protection parameters and their respective schedules mentioned above are only examples and may vary from one embodiment to another as desired. Further, when the duration specified by a protection parameter expires, any snapshots or transactional logs that are expired (e.g., past their duration) may be deleted. As an example, if a snapshot is to be stored for 30 days, on the 31st day, that snapshot may be deleted.

Thus, each snapshot and transactional log is managed based on the SLA and protection schedule independent from other snapshots and transactional logs.

[0081] Additionally, to simplify user selection, in some embodiments, various levels of SLA may be pre-defined within the database provisioning system 220. Each level of the SLA may have default values of the various protection parameters. For example, in some embodiments, the various levels of SLA may be GOLD, SILVER, BRONZE and the various protection parameters for these levels may be as follows:

Name	Continuous	Daily	Weekly	Monthly	Quarterly
GOLD	30 Days	90 Days	16 Weeks	12 Months	75 Quarters
SILVER	14 Days	60 Days	12 Weeks	12 Months	0 Quarters
BRONZE	7 Days	30 Days	8 Weeks	6 Months	0 Quarters

[0082] It is to be understood that the nomenclature of the GOLD, SILVER, BRONZE levels of the SLA is only an example and the levels may be given different names in other embodiments. Further, although three levels of the SLA are described herein, in other embodiments, greater or fewer than three SLA levels may be used. Additionally, the values of the protection parameters in each level of the SLA may vary from one embodiment to another. The database creation system 235 or the database registration system 240 may present the various pre-defined SLA levels to the user at the operation 325 to select from. In some embodiments, the database creation system 235 or the database registration system 240 may allow the user to modify the values of one or more protection parameters in the pre-defined SLA levels. For example, if the user desires to select the GOLD level, but would like continuous protection for 45 days instead of the default value of 30

days shown in the table above, the user may modify the continuous protection parameter of the GOLD level. Thus, the pre-defined SLA levels provide the convenience and flexibility of tailoring the various protection parameters to suit the user's needs. Alternatively, the database creation system 235 or the database registration system 240 may allow the user to create a new SLA at the operation 325.

[0083] To create a new SLA, upon receiving input from the user at the operation 325 indicating creation of a new SLA, the database creation system 235 or the database registration system 240 may present one or more user interfaces to the user requesting certain information. For example, the database creation system 235 or the database registration system 240 may request an SLA name, description, and values for the continuous, daily, weekly, monthly, and quarterly protection parameters. The database creation system 235 or the database registration system 240 may request other or additional details as well. Upon receiving the various inputs from the user for creating the new SLA, the database creation system 235 or the database registration system 240 may create the new SLA and allow the user to select that SLA at the operation 325.

[0084] Therefore, at the operation 325, the database creation system 235 or the database registration system 240 receives selection of the SLA and the protection schedule for creating an instance of the database protection system 225 for the database being created/registered. At operation 330, upon receiving the various user selections at the operations 310-325, the database creation system 235 or the database registration system 240 creates a new database or registers the existing database with the database system 200. To create/register the database, the database creation system 235 or the database registration system 240 initiates a series of operations. For example, the database creation system 235 or the database registration system 240 may create a source database VM (or designate an existing source database VM), convert the database size into

a number of virtual disks that are needed to house the database, create a database profile having a database name, description, network information, etc., attach the software and parameters of the database engine type with the database, create an instance of the database protection system, associate the SLA and schedule with the database protection system, designate storage for storing snapshots and transactional logs, etc. Once the database is created/registered, database management services may be applied to the database.

[0085] In some embodiments, the database creation system 235 or the database registration system 240 may request other or additional information for creating/registering the database. For example, the database creation system 235 or the database registration system 240 may request which cluster or clusters the user desires to create/register the database, which node or nodes on a cluster the user desires to create the source database VM, etc. Thus, the database system 200 provides an easy, convenient, and flexible mechanism to create a new database or register an existing database using a user friendly and intuitive user interface. Instead of requiring multiple days to create/register a database, using the user interface of the present disclosure, the database may be created/registered within minutes. Once created/registered, additional database management services may be implemented on those databases.

[0086] Turning now to FIGS. 4A-5E, example user interfaces for creating and registering a database are shown, in accordance with some embodiments of the present disclosure. FIGS. 4A-4G show example user interfaces for creating a database, while FIGS. 5A-5E show example user interfaces for registering a database. FIGS. 4A-5E are discussed in conjunction with FIGS. 1-3. Referring to FIGS. 4A-4G, FIG. 4A shows an example dashboard 400. The dashboard 400 is similar to the dashboard 210. The dashboard 400 becomes accessible to the user upon installing the database system 200 and allows the user to manage and monitor activities across multiple

databases that are created/registered within the database system. In some embodiments, the user may be required to be authenticated before being able to access the dashboard 400.

[0087] The dashboard 400 may include a toolbar 405 and a body 410. The toolbar 405 is configured to switch between various control functions of the database system 200. In some embodiments, the toolbar 410 includes a main menu 415, an alerts menu 420, and a user view menu 425. The main menu 415 may be configured as a drop-down list that enables the user selected within the user view menu 425 to select and activate a control function. For example, when the control function "dashboard" is selected in the main menu 415, the dashboard 400 may be configured to display a "home page" 430 in the body 410 of the dashboard. As the control function selected in the main menu 415 is changed, the page (or at least portions thereof) that is displayed in the body 410 of the dashboard 400 may change to reflect the control function that is activated. The alerts menu 420 allows the user to view and monitor any alerts that are occurring within the database system. An "alert" may be indicative of an error or issue in the database system that needs user attention. In some embodiments, alerts may be color coded to identify the criticality of the alert. The user view menu 425 determines which features are accessible to a particular user. For example, if the user selected in the user view menu 425 is an administrator, certain features that are generally not available to a non-administrator user may be activated. It is to be understood that the toolbar 405 is only an example and may vary from one embodiment to another.

[0088] The homepage 430 displayed within the body 410 provides a summary or a "quick-glance" view of all the databases (e.g., source databases) that are managed by the database system 200. The homepage 430 may be divided into one or more components or cells. For example, the homepage 430 may include a database list cell 435A that lists all of the source databases stored in the source database VMs of the database system 200 and provides a summary of each of those

source databases (e.g., name of the source database, database engine type, size of the database, name of the instance of the database protection system, number of cloned databases created from the source database, etc.). A summary cell 435B lists the total number of source databases created or registered on the source database VMs combined (e.g., the total number of databases listed in the database list cell 435A), the total number of cloned databases created from those total number of source databases, data usage values of the source and/or the cloned databases, etc. A clone cell 435C provides history on the cloning of the databases (e.g., number of clones created in a given time period, whether the cloning was successful or not, etc.). A version cell 435D provides information on the cluster on which the source databases resides and the version of the software implemented by the database system. An alerts cell 435E provides additional details on the various alerts being generated by the databases listed within the database list cell 4335A.

[0089] It is to be understood that the various components or cells of the homepage 430 shown in FIG. 4A are examples and features thereof may vary from one embodiment to another. For example, the number of components or cells that are shown on the homepage 430 may vary from one embodiment to another. Likewise, the details that are displayed within each component or cell may vary from one embodiment to another. The orientation, placement, size, and other design aspects of each component or cell may vary from one embodiment to another. In some embodiments, the configuration of the homepage 430 and/or the configuration of each component/cell may be defined by the user by using a settings menu option of the dashboard 400. By virtue of the dashboard 400, the user may get a quick glance summary of the various source databases that are managed by the database system 200, as well as a quick summary of the configuration and specifics of each source database. Via the dashboard 400, the user may also decide to perform various database management services on the source databases.

[0090] For example, to initiate a database provisioning service, the user authorized to request the database provisioning service may select a "databases" option from the main menu 415 to display a database page 440 (shown in FIG. 4B) in the body 410 of the dashboard. If the user selected in the user view menu 425 is not permitted to request the database provisioning service, the "databases" option may be inactivated or not shown in the main menu 415. The database page 440 may display a database menu 445A from which the user may view additional information and/or perform additional operations. The database page 440 may also include a database detail component 445B to display additional details corresponding to the option selected from the database menu 445A. For example, as shown in FIG. 4B. upon selecting the "Sources" option from the database menu 445, a list of the source databases associated with the database system 200 may be displayed within the database detail component 445B. The user may select any one of the source databases to view additional details of that source database and/or perform permitted operations on that source database.

[0091] The database page 440 may also allow the user to create a new database or register an existing database. For example, the user may select a create button 445C on the database page 440 to send a user request to the database engine 205 to start the process 300 for creating a new database. Likewise, the user may select a register button 445D to initiate a registration process and sending a user request to the database engine 205.

[0092] Upon selecting the create button 445C, the database engine 205, and particularly the database creation system 235 of the database engine may present a user interface 450, shown in FIG. 4C. The user interface 450 identifies the various steps of creating the new database and highlights the current step. For example, the user interface 450 has the "Engine" step highlighted. By virtue of identifying the various steps of creating the new database, the dashboard 400 keeps

the user informed as to which step the database creation process is on and which steps are coming up next. The user interface 450 may also present one or more database engine types that are supported by the database system 200. The user may select one of the database engine types to highlight the selection. For example, the PostgreSQL database engine type is shown selected in the user interface 450. The user may select the "Next" button to send the selected database engine type selection to the database creation system 235, which in response, presents a user interface 455 of FIG. 4D.

[0093] The user interface 455 identifies that the database creation process is at the "Server" step for creating a new source database VM or identifying an existing source database VM. The user interface 455 may, thus, allow a user to select an option 455A to create a new source database VM or an option 455B to use an existing source database VM. In the user interface 455 of FIG. 4D, the option 455A for creating a new source database VM is shown selected. Thus, the user interface 455 requests user selection of one or more profiles for creating a new source database VM. For example, the user interface 455 may request a name 455C for the source database VM, a software profile 455D, a compute profile 455E, a network profile 455F, a description 455G for the source database VM, and security options 455H for the source database VM. The user interface 455 may also request a parameter profile for the source database VM. In other embodiments, the user interface 455 may request additional or other information for creating a new source database VM.

[0094] Although not shown, if the user selects the option 455B for using an existing source database VM, the user interface 455 may display options for allowing the user to identify an existing source database VM. Upon selecting the "Next" button, the various user selections of the user interface 455 are sent to the database creation system 235, which then presents a user interface 460 of FIG. 4E to the user on the dashboard 400.

[0095] The user interface 460 identifies that the database creation process is at the "Database" step at which various parameters for creating a database on the source database VM are received from the user. The user interface 460 also requests the user to provide a name 460A and description 460B for the database being created, a password 460C and 460D to restrict access to the database, a size 460E of the database to be created, a database parameter profile 460F to be applied to the database and the source database VM, a listener port 460G for the database engine type selected in the user interface 450, and any other details (e.g., details 460H) that may be needed or considered desirable to have in creating the database. When the user is satisfied with the selections on the user interface 460, the user may select a "Next" button to send the selections to the database creation system 235. The database creation system 235 may then present a user interface 465 of FIG. 4F.

[0096] The user interface 465 identifies that the database creation process is at the last step of creating the "Time Machine." The user interface 465 is configured to request selection of SLA and protection schedule from the user for creating an instance of the database protection system 225. The user interface 465, thus, requests a name 465A and description for the instance of the database protection system 225, an SLA level 465C, and a protection schedule 465D. Within the protection schedule 465D, the user interface 465 requests the user to provide a number of snapshots 465E desired each day, a number of transactional logs 465F desired each day, and time periods 465G for identifying which snapshot to designate as the daily snapshot, 465H for identifying which snapshot to designate as the weekly snapshot, 465I for identifying which snapshot to designate as the monthly snapshot, and 465J for identifying which snapshot to designate as the quarterly snapshot. Upon providing the various parameters in the user interface 465, the user may select a "Next" button to send the selections to the database creation system 235 and start the database

creation. The database creation system 235 may display a status of the database creation in a user interface 470 of FIG. 4G.

[0097] Upon creating the database, the newly created database may be displayed within the database list cell 435A, within the database page 440, and anywhere else where source databases are listed. The database creation system 235 may also update the various calculations and numbers in the dashboard 400 that provide some statistic of the source databases (e.g., the summary cell 435B). It is to be understood that the configurations of the various user interfaces of FIGS. 4A-4G may vary from one embodiment to another. For example, the various selections may be displayed as drop-lists, as radio buttons, or in other ways. Similarly, some fields may be pre-filled with default values and allowed to be changed by the user if desired. The placement of the various fields, the size, orientation, and other design aspects of those fields may be varied as well. Additionally, some fields may be considered mandatory, while other fields may be designated as mandatory to be filled in by the user. The dashboard 400 thus provides an easy mechanism for creating a new database in a simple, user friendly, and intuitive user interface.

[0098] Turning now to FIGS. 5A-5E, example user interfaces for registering an existing database are shown, in accordance with some embodiments of the present disclosure. Similar to the database creation process, the database registration process is initiated from a dashboard 500. The dashboard 500 is similar to the dashboards 210 and 400. The dashboard 500 includes a database page 505, which is similar to the database page 440. To register an existing database, the user may select a register button 510 and select "Next." Upon selecting "Next," the database registration system 240 may be activated, which starts the database registration process by displaying a user interface 515 of FIG. 5B. From the user interface 515, the user may select the desired database engine type and select "Next." Upon selecting "Next," the user's selection of the database engine

type is sent to the database registration system 240, which then displays a user interface 520 of FIG. 5C.

[0099] By way of the user interface 520, the database registration system 240 requests the user for creating a new source database VM or selecting an existing source database VM. Likewise, by way of user interface 525 of FIG. 5D, the database registration system 240 requests the user for providing various parameters of the existing database, and by way of user interface 530, the database registration system requests the user to define the SLA and protection schedule. Upon receiving all of the parameters from the user, the database registration system 240 registers the database. Similar to the user interface 470, the database registration system may display the registration status in a user interface. Upon registration, the database becomes a source database that resides on a source database VM and on which other database management services may be applied.

[0100] Referring now to FIG. 6, an example block diagram of a database system 600 is shown, in accordance with some embodiments of the present disclosure. The database system 600 is similar to the database system 200. Therefore, the components of the database system 600 that are already discussed with respect to the database system 200 are not discussed again. The database system 600 includes a database engine 605 that is associated with a dashboard 610 via an API 615. The database engine 605 is also associated with a database storage system 620 for storing one or more databases managed by the database system 600. The database engine 605 is similar to the database engine 205, the dashboard 610 is similar to the dashboard 210, the API 615 is similar to the API 230, and the database storage system 620 is similar to the database storage system 215. The database engine 605 includes a database protection system 625 that is configured to protect databases that are associated with the database system 600. The database protection system 625

is similar to the database protection system 225. Although not shown, the database engine 605 also includes a database provisioning system similar to the database provisioning system 220.

[0101] As discussed above, an instance of the database protection system 625 may be created for each source database when that source database is created or registered within the database system 600. Thus, the database protection system 625 may include multiple instances of the database protection system – one for each source database. For example, the database protection system 625 may include database protection system instance 630A-630N (collectively referred to herein as database protection system instances 630). In other embodiments, each instance of the database protection system (e.g., the database protection system instances 630A-630N) may be configured to protect more than one source database. Each of the database protection system instances 630A-6930N may respectively include a clone management system 635A-635N (collectively referred to herein as clone management systems 635) and a snapshot/log capturing system 640A-640N (collectively referred to herein as snapshot/log capturing systems 640).

[0102] Each of the database protection system instances 630 may be associated with a source database stored within a source database storage 645. The source database storage 645 is similar to the source database storage 255. Thus for example, the database protection system instance 630A may be associated with a source database 650A stored within the source database storage 645, the database protection system instance 630B may be associated with a source database 650B of the source database storage, the database protection system instance 630N may be associated with a source database 650N, and so on. Thus, the clone management system 635A and the snapshot/log capturing system 640A of the database protection system instance 630A may be configured to protect the source database 650A, the clone management system 635B and the snapshot/log capturing system 640B may be configured to protect the source database 650B, the

clone management system 635N and the snapshot/log capturing system 640N may be configured to protect the source database 650N, and so on. By virtue of having the database protection system instances 630 for each of the source databases 650A-650N (collectively referred to herein as the source databases 650), the protection of each of those databases may be customized and tailored to suit the user's needs.

[0103] To protect the source databases 650, the database protection system instances 630 may create a clone of those source databases. The clones of the source databases 650 (e.g., cloned databases) may be stored within a target database storage 655. The target database storage 655 is similar to the target database storage 260. For each source database (e.g., the source databases 650) that is stored within the source database storage 645, one or more clones of that source database may be created and stored within the target database storage 655. For example, when a clone of the source database 650A is created, a cloned database 660A is created and stored within the target database storage 655. Similarly, clones of the source databases 650B and 650N may be created as cloned databases 660B and 660N, respectively, and stored within the target database storage 655. The cloned databases 660A-660N are collectively referred to herein as the cloned databases 660. Although each of the source databases 650 in the source database storage 645 has been shown as having a corresponding instance of the cloned databases 660 in the target database storage 655, it is to be understood that in some embodiments, clones of only some of the source databases stored in the source database storage may be made. The source databases 650 that have not been cloned may not have a cloned database within the target database storage 655.

[0104] Further, similar to the source databases 650, which reside on a database VM (e.g., the source database VMs), the cloned databases 660 also reside on a database VM. The database VMs on which the cloned databases 660 reside are referred to herein as target database VM. Each of

the cloned databases 660 may reside entirely on one target database VM or may span across multiple target database VMs. In some embodiments, the source database VMs and the target database VMs may be created on the same node or different nodes of the same cluster or across multiple clusters.

[0105] Thus, the database protection system instances 630, and particularly the clone management systems 635 of the database protection system instances creates the cloned databases 660 from the source databases 650 stored within the source database storage 645, and stores the cloned databases within the target database storage 655. The cloned databases 660 may be of a variety of types. As discussed above, each of the source databases 650 are created or registered on a source database VM. Thus, each of the cloned databases 660 may include a clone of the source database VM only (e.g., to create the target database VM) or may include the clone of the source database VM plus the database that resides on that source database VM. For example, the cloned database 660A of the source database 650A may include a clone of the source database VM on which the source database 650A resides or a clone of that source database VM plus the database 650A. When both the source database VM and the source database 650A are cloned, the cloned database 660A may include a target database VM created on the target database storage 655 with a similar or different configuration as the source database VM and the clone of the source database stored on the target database VM. When only the source database VM is cloned, a target database VM is created for that source database VM and stored on the target database storage 655. The target database VM may be used at a later point to store the clone of the source database that resides on the associated source database VM. Thus, the cloned databases 660 may include the source database VM only, the source database VM plus the source database, or the source database only (which is to be stored on a previously created target database VM).

[0106] The cloned databases 660 may be considered operationally same (or substantially similar) to the source databases 650. Each of the cloned databases 660 may be refreshed/updated to incorporate any changes that may have occurred in the source databases 650 since the cloned databases were created. In some embodiments, the operations that are performed on the source databases 650 may be performed on the cloned databases 660 as well. Thus, in some embodiments, instead of using the source databases 650, the cloned databases 660 may be used for performing operations (e.g., analyzing data). The cloned databases 660 may be created from snapshots and transactional logs captured from the source databases 650. The cloned databases 660 are generally created upon receiving a user request. The user may request to clone a particular one of the source databases 650 to a point in time or to a specific snapshot. For example, the user may request a cloned database of a particular one of the source databases 650 as that source database existed at 11:00AM on a particular date. Alternatively, the user may specifically identify a snapshot and request a cloned database of the source databases 650 based on that snapshot. Creating a cloned database (e.g., the cloned databases 600) involves replicating a state of the source databases 650. The "state" of the source databases 650 may include the configuration of the source database, the user data stored within the source database, metadata stored within the source database, and any other information associated with the source database. In other words, a cloned database may be an exact or substantially exact copy of the source database.

[0107] Thus, upon receiving a user request to create a cloned database (e.g., the cloned database 660A) from a source database (e.g., the source database 650A), the clone management system (e.g., the clone management system 635A) associated with the source database may retrieve snapshots and transactional logs of the source database from a repository where the snapshots and transactional logs are stored. If the user request is to clone the source database to a point in time,

the clone management system (e.g., the clone management system 635A) may retrieve all snapshots and transactional logs captured of the source database at that point in time and create a cloned database (e.g., the cloned database 660A) from those snapshots and transactional logs. The cloned database (e.g., the cloned database 660A) represents the state of the source database at the requested point in time. If the user request is to clone the source database based on a particular available snapshot, the clone management system (e.g., the clone management system 635A) may retrieve that particular snapshot and create a cloned database (e.g., the cloned database 660A) from that particular snapshot. The cloned database (e.g., the cloned database 660A) represents the state of the source database (e.g., the source database 650A) at the time the requested snapshot was captured. Thus, the clone management systems 635 are configured to create the cloned databases 660. The clone management systems 635 are also configured to refresh the cloned databases 660, as well as manage/perform any operations performed on the cloned databases.

[0108] Referring now to FIGS. 7A-7F in conjunction with FIGS. 6 and 4A, example user screenshots illustrating the cloning of a source database are shown, in accordance with some embodiments of the present disclosure. To clone a source database, the user may start from dashboard 700 of FIG. 7A. The dashboard 700 is similar to the dashboard 400. To create a clone of a source database, the user may select the option "time machines" from main menu 705. Upon selecting the option "time machines" from the main menu 705, the user may select a particular source database to be cloned. Alternatively, in some embodiments, the user may first select the source database to be cloned and then select the option "time machines" from the main menu 705. Upon selecting the source database to be cloned, the database protection system instance associated with the source database is activated. Further, the database protection system instance displays, in a body 710 of the dashboard 700, a summary section 715. The summary section 715

may display one or more configurational features of the source database such as the database engine type (e.g., type in FIG. 7A), how long ago was the source database created (e.g., age), the last time the source database was updated (e.g., last update), the next period for capturing a transactional log (e.g., next log catch up), name of the source database (e.g., name), the number of clones previously made of the source database (e.g., clones), the SLA level of the source database (e.g., SLA), and the protection schedule (e.g., schedule). In other embodiments, other or additional details may be provided in the summary section 715.

[0109] The database protection system instance may also display within the body 410 a menu section 720 that provides options of operations that the user may perform on the source database. For example, the user may select a clone option 725A to create a new clone of the source database. The user may elect to manually capture transactional logs or snapshots by interacting with log catch up option 725B and snapshot option 725C, respectively. Similarly, the user may perform other operations by selecting another one of options 725D. Depending upon the options that the user is authorized to make, some of the options 725A-725D may be inactivated. Further, although specific options are shown in FIG. 7A, the number and types of options may vary from one embodiment to another. The database protection system instance may also display a calendar 730 visually representing the SLA associated with the source database. For example, the calendar 730 may include a color coded legend to represent the duration for the continuous, daily, weekly, monthly, and quarterly protection parameters for a selected number of months. For example, the calendar 730 of FIG. 7A shows five months (May-September) with dates highlighted based upon the protection parameter that applies to that date.

[0110] For example, by looking at the calendar 730, the user may quickly determine that August 20-September 19 fall under the continuous protection parameter, July 21-August 19 fall under the

daily protection parameter, and July 5, 12, and 19 are days when the weekly protection parameter applies. The calendar 730 may also show the dates when manual snapshots and/or transactional logs were captured of the source database (e.g., on June 7, July 13, August 19). Further, upon selecting a particular date, the user may view additional details of available snapshots and transactional logs for that date from which a clone may be created. For example, in FIG. 7A, August 21 is shown as selected. Thus, in a display portion 735, a time scale shows the available snapshots/transactional logs. Since August 21 falls under the continuous protection parameter, the user may select any time on the time scale to create a clone of the source database. If for example July 25 is selected by the user, the display portion 735 may highlight the time on the time scale at which the daily snapshot was captured (as identified from the protection schedule) and which the user may be able to select to create a clone from. Thus, the body 710 of the dashboard 700 provides a user friendly, visual, and intuitive interface for easily and quickly determining how the source database is protected and the level of protection that is available to that source database on any given day.

[0111] To clone the source database, the user may select the clone option 725A. Upon selecting the clone option 725A, the database protection system instance and particularly the clone management system of the source database initiates the cloning process. The cloning process may include three distinct operations: a time operation to identify whether the user desires to create the clone based on an available snapshot or to a point in time, a server operation to either create a new target database VM to house the clone of the source database or select a previously created target database VM, and a database operation to create the clone of the source database on the target database VM. Selecting the clone option 725A triggers the time operation by displaying a user interface 740 shown in FIG. 7B.

[0112] The user interface 740 solicits a clone name 740A, a date from a calendar 740B from which the clone is desired, and one of a point in time option 740C or snapshot option 740D. If the user desires to clone the source database to a point in time, the user may select the point in time option 740C and if the user desires to create the clone from an available snapshot, the user may select the snapshot option 740D. Upon providing the information requested in the user interface 740, the user may interact with (e.g., click on) a next button 740E, which opens user interface 745 of FIG. 7C. The dialog box 745 is shown for a point in time selection. Thus, the user interface 745 may solicit the exact time from which the clone is to be created. The user interface 745 may display the times that are available for the user to select for the point in time option. Specifically, the user interface 745 may display a time scale 745A, which may include an activated slot from which the user may pick a time and an inactivated slot that is unavailable to the user. For example, the time scale 745A shows an activated slot 745B and an inactivated slot 745C. The user may pick (e.g., by interacting with the time scale 745A or by entering the time in box 745D) a time from the activated slot 745B for creating the clone. For example, if the user selects 5:00 from the activated slot 745B, the corresponding clone management system is configured to create a clone based on the state of the source database at 5:00.

[0113] It is to be understood that the activated slot 745B corresponds to the protection parameter of the SLA and the protection schedule. For example, if the date that the user selected on the calendar 740B falls under the daily protection parameter and the protection schedule indicates that the daily snapshot is captured at 11:00AM, in some embodiments, the user may be able to only select 11:00AM for the clone. In other embodiments, the user may still be allowed to select times other than 11:00AM as well. However, since only a daily snapshot is available for that date, the clone may be based on the daily snapshot of 11:00AM.

[0114] If the user selects the snapshot option 740D in FIG. 7B, the user interface 745 may look somewhat different and may present options to allow the user to select one or more available snapshots to create a clone from. Upon selecting the point in time or the available snapshot, the user may interact with a next button 745E to display user interface 750 of FIG. 7D. The user interface 750 allows the user to either create a new target database VM 750A on the target database storage (e.g., the target database storage 655) or select an existing target database VM 750B. To create a new target database VM, the database protection system instance may solicit the target database VM name and one or more profiles (e.g., software profile, compute profile, network profile, database parameter profile), and any other desired or required information from the user. In some embodiments, one or more profiles may be same as that of the source database VM, while in other embodiments, the one or more profiles may vary from those of the source database VM. If the user selects the existing target database VM 750B, the user interface 750 may display a list of previously created target database VMs for the source database. In some embodiments, multiple target database VMs may be created for a particular source database. Upon providing the target database VM information, the user may interact with a next button 750C to display a user interface 755 of FIG. 7E.

[0115] In the user interface 755, the user may specify details of the cloned database. For example, the database protection system instance may solicit a name 755A of the cloned database, a password 755B if desired, and any other information that is desired or needed. Upon interacting with a clone button 755C, the database protection system instance creates the clone of the source database based upon the inputs received from the user in FIGS. 7A-7D. Interacting with the clone button 755C may display a user interface 760 of FIG. 7F, which shows the status of the clone. The database protection system instance may retrieve the snapshot(s) and/or the transactional logs and

create the clone therefrom. For the point in time option, the database protection system instance may use both snapshots and transactional logs to create the cloned database, while for the available snapshot option, the database protection system instance may use only the available snapshot. The database protection system instance may also create a new target database VM (if a new target database VM is selected by the user). Once the cloned database is created, the cloned database may be displayed within the dashboard 700. Thus, the dashboard 700 provides an easy and convenient mechanism to clone source databases.

[0116] Turning now to FIG. 8 and referring to FIG. 8 in conjunction with FIGS. 6 and 7A-7F, an example flowchart outlining operations of a process 800 is shown, in accordance with some embodiments of the present disclosure. The process 800 may include additional, other, or different operations depending upon the embodiment. The process 800 may be used to create a cloned database from a source database. The process 800 may be implemented by the clone management systems 635 of the database protection system instances 630. The process 800 starts at operation 805 with the database protection system instances 630 receiving a user request for creating a clone. As discussed in FIG. 7A, the user may request creation of a clone of a source database via the dashboard 700. Upon receiving the user request, the database protection system instances 630 corresponding to the source database being clones is activated. The activated one of the database protection system instances 630 receives selection from the user of creating the clone from either a point in time or from an available snapshot. If the user selects the point in time option, the process 800 proceeds to operation 810. At the operation 810, the activated one of the database protection system instances 630 presents user interface, via the dashboard 700, to the user to receive selection of a specific time at which the clone is to be created. The clone is created based on the state of the source database at that specific time. At operation 815, the activated one of the

database protection system instances 630 retrieves the snapshot corresponding to that specific time or the snapshot that is available closest to that specific time.

[0117] At operation 820, the activated one of the database protection system instances 630 retrieves any transactional logs that may be needed. For example, if the snapshot that is retrieved at the operation 815 is captured at the specific time selected by the user at the operation 810, then the source database may be cloned from the snapshot of the operation 815. However, if the snapshot of the operation 815 is created before or after the specific time selected by the user, then one or more transactional logs may exist between the time the snapshot is captured and the specific time. For example, if the specific time is 11:00 AM and the closest snapshot to 11:00 AM is from 10:00 AM, the database protection system instance 630 may determine if there are transactional logs available between 10:00 AM and 11:00 AM. The database protection system instance 630 may retrieve any transactional logs that may be available. If no transactional logs are available between 10:00 AM and 11:00 AM, the database protection system instance 630 may create the clone from the snapshot of 10:00 AM. Thus, at the operation 820, the activated one of the database protection system instances 630 determines if a transactional log is needed or exists, and retrieves those transactional log(s).

[0118] Additionally, at operation 825, the activated one of the database protection system instance 630 receives selection for a target database VM from the user. As indicated above, the user may either create a new target database VM or use an existing target database VM for storing the cloned database. If the activated one of the database protection system instances 630 receives selection for creating a new target database VM from the user, the database protection system instance may solicit information (e.g., name, profiles, etc.) from the user to create the target database VM. The target database VM may be associated with the target database storage. Alternatively, if the user

desires to use an existing target database VM, the activated one of the database protection system instance 630 may present a list of existing target database VMs created previously for the source database. The user may select one of the existing target database VMs from the list. At operation 830, the activated one of the database protection system instances 630 creates the cloned database from the snapshot of the operation 815 and any transactional logs of the operation 820. The database protection system instances 630 stores the cloned database, at operation 835, on the target database VM, and the process 800 ends at operation 840.

[0119] If at the operation 805, the user selects the option of creating a clone from an available snapshot, the process 800 proceeds to operation 845. At the operation 845, the activated one of the database protection system instances 630 solicits the user to select the snapshot from which the clone is to be created. Upon receiving the user's selection of the available snapshot, at operation 850, the activated one of the database protection system instance 630 retrieves that snapshot. Before, after, or along with retrieving the snapshot, at the operation 825, the database protection system instance 630 may either create a new target database VM or identify an existing target database VM to use. At the operations 830 and 835, the database protection system instance 630 creates the clone of the source database and stores the cloned database on the target database VM. Again, the process 800 ends at the operation 840.

[0120] Returning back to FIG. 6, the cloned databases 660 of the source databases 650 are created from snapshots and transactional logs. Thus, to be able to create the cloned databases 660, snapshots and transactional logs are needed of the source databases 650. The snapshots and transactional logs may be captured via the snapshot/log capturing systems 640. The snapshot/log capturing systems 640 may be configured with the protection schedule and the SLA that are defined by the user when the source databases 650 are created or registered with the database

system 600. The protection schedule defines, among other things, the frequency of capturing snapshots and transactional logs each day. Thus, based upon the protection schedule, the snapshot/log capturing systems 640 may instruct a data manager of the source databases 650 to capture snapshots and transactional logs automatically. As discussed above, an instance of a data manager may be associated with each source database that is created on the source database storage 645. For example, the source database 650A may be associated with a database manager 665A, the source database 650B may be associated with a data manager 665B, and the source database 650N may be associated with a database manager 665N. The database managers 665A-665N are collectively referred to herein as database managers 665. Although not shown, in some embodiments, the cloned databases 660 may each be associate with a database manager as well.

[0121] The database managers 665 are configured to capture the snapshots and the transactional logs upon instruction from the snapshot/log capturing systems 640. The database managers 665 may include an agent that captures the snapshots and the transactional logs based on the protection schedule received from the snapshot/log capturing systems 640. Thus, the database manager 665A may include an agent 670A, the database manager 665B may include an agent 670B, and the database manager 665N may include an agent 670N. The agents 670A-670N are collectively referred to herein as agents 670. Each of the agents 670 is an autonomous software program that is configured for performing one or more specific and approved operations. For example, each of the agents 670 may be configured to capture snapshots and transactional logs based upon the protection schedule, and store the captured snapshots and transactional logs in a repository associated therewith. The clone management systems 635 may retrieve the snapshots and transactional logs from the repositories when creating a clone of the source databases 650. For example, the agent 670A may be configured to store the captured snapshots and transactional logs

in a repository 675A that is configured for the source database 650A, the agent 670B may be configured to store the captured snapshots and transactional logs in a repository 675B that is configured for the source database 650B, and the agent 670N may be configured to store the captured snapshots and transactional logs in a repository 675N that is configured for the source database 650N. The repositories 675A-675N are collectively referred to herein as repositories 675.

[0122] For example, if the protection schedule specifies capturing 2 snapshot every day and capturing a transactional log every 2 hours for the source database 650A, the agent 670A may capture 2 snapshots of the source database 650A and a transactional log every 2 hours such that in a 24-hour period, the agent captures 2 snapshots and 12 transactional logs. Further, if the continuous protection parameter in the SLA specifies a continuous protection of 30 days, the agent 670A may be configured to save all snapshots and transactional logs captured in the previous 30 days (not including the current day). Thereafter, the agent 670A may purge (e.g., delete) some of the snapshots and transactional logs based upon the protection parameters defined in the SLA level. For example, if the SLA level specifies a daily protection parameter of 30 days after the duration of the continuous protection parameter expires, the agent 670A may be configured to delete all but one snapshot that were captured before the previous 30 days, as well as delete all the transaction logs captured before the previous 30 days. The snapshot that is saved as the daily snapshot may be the snapshot that is closest to the daily snapshot time specified in the protection schedule. For example, if the time specified in the protection schedule is 11:00 AM for the daily snapshot, the snapshot that is captured at 11:00AM or closest to 11:00 AM is saved and all other snapshots captured on that day are deleted. Thus, the agent 670A is configured to capture and manage snapshots and transactional logs.

[0123] Referring to FIGS. 9A-9G in conjunction with FIG. 6, an example flow diagram outlining operations of how an agent (e.g., the agents 670) of a database (e.g., the source databases 650) may capture, store, and purge snapshots and transactional logs based upon the protection schedule and protection parameters defined in the SLA level is shown, in accordance with some embodiments of the present disclosure. Simply for purposes of explanation, FIGS. 9A-9G show the flow for an SLA that requires a continuous protection of 7 days and a daily protection thereafter for 7 days. Thus, the SLA defines the continuous protection parameter as 7 days and the daily protection parameter as 7 days. Further, FIGS. 9A-9G are based on a protection schedule that specifies capturing 1 snapshot every day and 3 transactional logs every day. It is to be understood that the SLA definitions and the protection schedule above is only an example and not intended to be limiting in any way.

[0124] FIG. 9A shows the contents of a database 900 on a first day of the continuous 7 days. Since the protection schedule specifies capturing 1 snapshot every day, on the first day, the agent associated with the database 900 captures a snapshot 905. The time of the day at which the snapshot 905 is captured may either be defined in the protection schedule or may be pre-defined within the agent capturing the snapshot. Additionally, as shown in FIG. 9B, on the first day, the agent associated with the database 900 also captures 3 transactional logs (e.g., one transactional log every 8 hours) 910. On the second day, as shown in FIG. 9C, the agent associated with the database 900 captures another snapshot 915 and 3 transactional logs 920 shown in FIG. 9D. The agent associated with the database 900 continues to capture snapshots and transactional logs for 7 days to satisfy the continuous protection parameter and provide continuous protection for 7 days as defined in the SLA level. Thus, as shown in FIG. 9D, by the end of the seventh day, the agent associated with the database 900 has captured the snapshots 900, 915, snapshots 925A-925E, the

transactional logs 910, 920, and 930A-930E. On the eighth and following days, the agent associated with the database 900 continues to capture snapshots (e.g., snapshot 935) and 3 transactional logs 940 shown in FIG. 9E.

[0125] However, since the SLA requires 7 days of continuous protection, after the 7 days, the continuous protection is not required and the agent may purge some of the captured snapshots and transactional logs, again based on the definitions in the SLA. As indicated above, the SLA of FIGS. 9A-9G defines a daily protection parameter of 7 days for daily protection after the expiration of the 7 days of continuous protection. Thus, on the ninth day, the snapshot 905 captured on the first day is greater than 7 days old. Since only one snapshot is captured every day, the agent associated with the database 900 maintains the snapshot as the daily snapshot. If multiple snapshots are captured each day, the agent associated with the database 900 may delete all snapshots except one. Further, since the daily protection parameter provides guarantee of a daily snapshot, the agent may delete all of the transactional logs that were captured that day. Therefore, as shown in FIGS. 9E and 9F, on the ninth day, the snapshot 905 may continue to be stored as the daily snapshot but the transactional logs 910 may be deleted. Further, on the ninth day, the agent associated with the database 900 captures another snapshot 945 to continue to provide a continuous protection for the past 7 days.

[0126] Similarly, on each day, from days 10-14, the agent associated with the database 900 continues to delete the transactional logs that are older than 7 days, and capture a new snapshot and 3 transactional logs (e.g., snapshots 950A-950E and transactional logs 955A-955E shown in FIG. 9G). Thus, the agent associated with the database 900 continues to capture snapshots and transactional logs based upon the SLA level and the protection schedule, and deletes some of the snapshots and transactional logs that are no longer required to satisfy the SLA level.

[0127] Snapshots of a source database may be captured by creating a snapshot of the source database VM and a snapshot of the source database itself. Specifically, a snapshot may be an image/copy of the location of the storage files associated with the virtual disks of the source database and an image/copy of the location of the configuration files associated with the source database VM. The virtual disk(s) on which the source database is stored may be composed of or divided into one or more memory blocks. The snapshot/log capturing systems 640 may capture images or copies of the memory blocks for capturing snapshots. A copy of the memory blocks may be made by identifying the memory pointer (e.g., location) assigned to each memory block and copying the memory pointer to a repository (e.g., the repositories 675). During a first snapshot of the memory blocks, the contents of all the memory blocks may be copied to the repositories 675. After the first snapshot is captured, transactional logs may be captured based upon the protection schedule to record all transactions or changes in the source database after the capture of the first snapshot. Capturing a transactional log may be referred to herein as a log catch up operation.

[0128] For example, say the protection schedule defines capturing 2 snapshots each day and 2 transactional logs between the 2 snapshot captures. If the source database includes 1000 memory blocks, the first snapshot creates copies of all the 1000 memory blocks. Capturing a snapshot involves pausing the source database such that no user operations are performed while the source database is being snapshotted, creating copies of the memory blocks (and other information such as the configuration file of the source database VM, etc.), and unpausing the source database. Since snapshots temporarily halt operation of the source database, taking frequent snapshots of the source database is not practical or desirable. However, to accurately capture the state of the source database in between two snapshot captures and allow creation of cloned databases to satisfy the

SLA (e.g., the continuous protection parameter), transactional logs may be captured between two snapshot captures. The frequency of capturing transactional logs may be higher than the frequency of capturing the snapshots. Thus, for example and continuing the example above, if after capturing the first snapshot, 4 out of the 1000 memory blocks of the source database have changed (e.g., due to data being updated, new data being added, etc.), the agents 670 create a first transactional log based upon the protection schedule. The first transactional log may reflect that the 4 blocks have changed since the last snapshot capture. Specifically, the first transactional log may include memory pointers to the 4 memory blocks that have changed. Thus, instead of copying all of the 1000 memory blocks, the first transactional log only copies the changes since the last snapshot capture, thereby saving space and time. Similarly, based upon the protection schedule, the agents 670 may capture a second transactional log after the first transactional log. The second transactional log may determine which memory blocks have changes since the first snapshot capture.

[0129] For example, if the agents 670 determine that 6 memory blocks have changed since the first snapshot capture, the second transactional log may include memory pointers back to the first snapshot indicating which 6 of the memory blocks have changed. The 6 memory blocks that changed at the time of capturing the second transactional log may or may not include the 4 memory blocks that changed at the time of capturing the first transactional log. Thus, each transactional log that is captured identifies the memory blocks that have changed since the previous snapshot capture and include memory pointers to those changed memory blocks. When the source database is cloned, say to a state when the second transactional log is captured, the associated one of the clone management systems 635 may recreate the source database from the first snapshot and the second transactional log. Specifically, the associated one of the clone management systems 635

may determine (e.g., from the memory pointers in the second transactional log) which particular memory blocks have changed from the first snapshot. In the example above, the second transactional log includes memory pointers of the 6 memory blocks that have changed since the first snapshot capture. Thus, the agents 670 may create the cloned based on the 994 memory blocks from the first snapshot that have not changed plus the 6 memory blocks in the second transactional log that have changed. Thus, the cloned database reflects an accurate state of the source database at the time of the second transactional log capture.

[0130] Further, and continuing with the example above of capturing 2 snapshots and 2 transactional logs each day, the agents 670 may capture a second snapshot based upon the protection schedule. In some embodiments, the second snapshot may be a copy of all the memory blocks (e.g., all 1000 memory blocks in the example above) again and transactional logs that are captured after the second snapshot may identify changes in the memory blocks relative to the second snapshot. Thus, any changes made between the capture of the first snapshot and the capture of the second snapshot are reflected in the second snapshot. In other embodiments, the second snapshot may also be an incremental snapshot that reflects only which memory blocks have changed since the first snapshot capture. Thus, the second snapshot in such cases may take less time to create, as well as less space to store. The subsequent transactional logs may continue to make pointers to the first snapshot to reflect the memory blocks that change.

[0131] Advantageously, the snapshot and transactional log capturing efficiently only copies changes in the memory blocks. Furthermore, all transactions are recorded using transaction logs such that when a clone is created, the source database may be recovered based on both the snapshots and the transaction logs to any desired state. Further, since capturing a transactional log does not require pausing the source database, the transactional logs may be captured in background

while the source database is operating, and the transactional logs may be captured at a greater frequency than the snapshots. To capture a transactional log, the agents 670 maintain a small staging disk. The staging disk may be part of the repositories 675 or may be separately provisioned from those repositories. The staging disk may be dedicated or shared amongst the various source databases 650 and may be used to temporarily store the transactional logs. The agents 670 may sweep (e.g., collects) the transactional logs from the source database to the staging disk based upon the protection schedule. From the staging disk, the agents 670 may start the log catch up operation to move the transactional logs from the staging disk to the repositories 675. Thus, based upon a combination of snapshots and transactional logs, the state of the source database may be effectively and accurately replicated. While the snapshots and transactional logs may be automatically captured based upon the protection schedule, in some embodiments, the database engine 605 may allow the users to manually capture snapshots and transactional logs. Such an operation may be particularly useful if the user desires a state that falls between the capture of two snapshots and transactional logs.

[0132] Referring still to FIG. 6, the database storage system 620 may also include an external database manager 680. The source databases 650 that are created within the database system 600 are already configured to be snapshotted. However, databases that were created outside of the database system 600 and registered with the database system may not have been configured to be snapshotted. Thus, such databases need to be reconfigured to be able be snapshotted and protected by the database system 600. The reconfiguration may be part of the registration process or performed after those databases have been registered. To reconfigure the externally created databases, a process 1000 of FIG. 10 may be used. Referring to FIG. 10 in conjunction with FIG. 6, a flowchart outlining the operations of the process 100 is shown, in accordance with some

embodiments of the present disclosure. The process 1000 may include other, additional, or fewer operations depending upon the particular embodiment. The process 1000 may be implemented by the database engine 605.

[0133] The process 1000 starts at operation 1005 and at operation 1010, a complete back up of the external database is made by the external database manager 680. The complete backup includes a complete copy of the external database. In other words, the actual data of the database is copied when creating a back-up. Knowledge about the structure of the underlying storage (e.g., the virtual disks) of a database is not needed when a back-up is created. In contrast, snapshotting requires knowledge of the underlying storage (e.g., virtual disks) since no actual copy of the data is made. Rather, when a snapshot is captured, a copy of the location of the virtual disk where the data is stored is made. Thus, to configure the external database for capturing snapshots and transactional logs, the external database is backed up to a storage disk (e.g., virtual disk), the structure of which is known to the database engine 605. The back-up copy may be considered the source database for purposes of protection and may be part of the source database storage 645. Further, an instance of a database manager may be associated with the back-up copy to create clones from the back-up copy.

[0134] In some embodiments, the operation 1010 may be performed as part of the registration process when the external database is registered with the database system 600. In other embodiments, the operation 1010 may be performed after the registration process. Since the back-up of the external database is to a known structure of the storage disk, snapshots and transactional logs may be created from the back-up copy. Thus, at operation 1015, snapshots and transactional logs may be captured of the external database from the back-up copy. The process of capturing snapshots and transactional logs from the back-up copy is the same as that of a database created

internally within the database system 600. The snapshots and transactional logs may be stored within the repositories 675 and clones may be created from those snapshots or a combination of snapshots and transactional logs.

[0135] Thus, at operation 1020, upon receiving a user request to create a clone of the external database, the database manager associated with the back-up copy of the external database may create a cloned database from the back-up copy. The clone creation process is same as discussed above. The cloned database may be stored within the target database storage 655. In some embodiments, the user may desire to store the external database outside of the database system 600 or on a system that is not compatible with the database system. Thus, at operation 1025, a user may request storing the cloned database to an external location. The database engine 605 and particularly the external database manager 680 may reconfigure the cloned database to a form that is compatible with the external location and at operation 1030, send the reconfigured database to the external location. The database engine 605 may continue to make snapshots and transactional logs of the back-up copy of the operation 1010 based upon the SLA and protection schedule defined for the external database during the registration process. When the user request of the operation 1020 is received, the database engine 605 may create the clone of the external database, reconfigure the cloned database, and send it to the external location. The process 1000 ends at operation 1035.

[0136] Thus, the database system of the present disclosure is a versatile system for creating and managing databases. A variety of operations may be performed on the databases associated with the database system using a user friendly and intuitive user interface.

[0137] It is to be understood that any examples used herein are simply for purposes of explanation and are not intended to be limiting in any way. It is also to be understood that any examples used

herein are simply for purposes of explanation and are not intended to be limiting in any way. Further, although the present disclosure has been discussed with respect to memory usage, in other embodiments, the teachings of the present disclosure may be applied to adjust other resources, such as power, processing capacity, etc.

[0138] The herein described subject matter sometimes illustrates different components contained within, or connected with, different other components. It is to be understood that such depicted architectures are merely exemplary, and that in fact many other architectures can be implemented which achieve the same functionality. In a conceptual sense, any arrangement of components to achieve the same functionality is effectively "associated" such that the desired functionality is achieved. Hence, any two components herein combined to achieve a particular functionality can be seen as "associated with" each other such that the desired functionality is achieved, irrespective of architectures or intermedial components. Likewise, any two components so associated can also be viewed as being "operably connected," or "operably coupled," to each other to achieve the desired functionality, and any two components capable of being so associated can also be viewed as being "operably couplable," to each other to achieve the desired functionality. Specific examples of operably couplable include but are not limited to physically mateable and/or physically interacting components and/or wirelessly interactable and/or wirelessly interacting components and/or logically interacting and/or logically interactable components.

[0139] With respect to the use of substantially any plural and/or singular terms herein, those having skill in the art can translate from the plural to the singular and/or from the singular to the plural as is appropriate to the context and/or application. The various singular/plural permutations may be expressly set forth herein for sake of clarity.

[0140] It will be understood by those within the art that, in general, terms used herein, and especially in the appended claims (e.g., bodies of the appended claims) are generally intended as "open" terms (e.g., the term "including" should be interpreted as "including but not limited to," the term "having" should be interpreted as "having at least," the term "includes" should be interpreted as "includes but is not limited to," etc.). It will be further understood by those within the art that if a specific number of an introduced claim recitation is intended, such an intent will be explicitly recited in the claim, and in the absence of such recitation no such intent is present. For example, as an aid to understanding, the following appended claims may contain usage of the introductory phrases "at least one" and "one or more" to introduce claim recitations. However, the use of such phrases should not be construed to imply that the introduction of a claim recitation by the indefinite articles "a" or "an" limits any particular claim containing such introduced claim recitation to inventions containing only one such recitation, even when the same claim includes the introductory phrases "one or more" or "at least one" and indefinite articles such as "a" or "an" (e.g., "a" and/or "an" should typically be interpreted to mean "at least one" or "one or more"); the same holds true for the use of definite articles used to introduce claim recitations. In addition, even if a specific number of an introduced claim recitation is explicitly recited, those skilled in the art will recognize that such recitation should typically be interpreted to mean at least the recited number (e.g., the bare recitation of "two recitations," without other modifiers, typically means at least two recitations, or two or more recitations). Furthermore, in those instances where a convention analogous to "at least one of A, B, and C, etc." is used, in general such a construction is intended in the sense one having skill in the art would understand the convention (e.g., "a system having at least one of A, B, and C" would include but not be limited to systems that have A alone, B alone, C alone, A and B together, A and C together, B and C together, and/or A, B, and C together, etc.).

In those instances where a convention analogous to "at least one of A, B, or C, etc." is used, in general such a construction is intended in the sense one having skill in the art would understand the convention (e.g., "a system having at least one of A, B, or C" would include but not be limited to systems that have A alone, B alone, C alone, A and B together, A and C together, B and C together, and/or A, B, and C together, etc.). It will be further understood by those within the art that virtually any disjunctive word and/or phrase presenting two or more alternative terms, whether in the description, claims, or drawings, should be understood to contemplate the possibilities of including one of the terms, either of the terms, or both terms. For example, the phrase "A or B" will be understood to include the possibilities of "A" or "B" or "A and B." Further, unless otherwise noted, the use of the words “approximate,” “about,” “around,” “substantially,” etc., mean plus or minus ten percent.

[0141] The foregoing description of illustrative embodiments has been presented for purposes of illustration and of description. It is not intended to be exhaustive or limiting with respect to the precise form disclosed, and modifications and variations are possible in light of the above teachings or may be acquired from practice of the disclosed embodiments. It is intended that the scope of the invention be defined by the claims appended hereto and their equivalents.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

First Inventor Name:	Balasubrahmanyam Kuchibhotla
Title:	SYSTEM AND METHOD FOR PROVISIONING DATABASES IN A HYPERCONVERGED INFRASTRUCTURE SYSTEM
Application No.:	Unknown
Filing Date:	Herewith
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Art Unit:	Unknown

UTILITY PATENT APPLICATION TRANSMITTAL

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Transmitted herewith for filing under 37 C.F.R. § 1.53(b) is the nonprovisional utility patent application of:

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Enclosed are:

[**X**] Description, Claim(s), and Abstract (78 pages).

[**X**] Drawings (31 sheets, Figures 1-10).

[**X**] Executed Declaration (5 pages).

[**X**] Power of Attorney (1 pages).

[**X**] 3.73(c) statement.

[**X**] Copy of the Executed Assignment.

[**X**] Application Data Sheet (37 CFR 1.76).

The filing fee is calculated below at the large entity rate:

	Number Filed		**Included in Basic Fee**		**Extra**		Rate		Fee Totals
Basic Filing Fee							$300.00	=	$300.00
Search Fee							$660.00		$660.00
Examination Fee							$760.00		$760.00
Sequence Listing fee									$0.00
Size Fee	109 *.75	-	100	=	0	x	$400.00		$0.00
Total Claims:	20	-	20	=	0	x	$100.00	=	$0.00
Independents:	3	-	3	=	0	x	$460.00	=	$0.00
If any Multiple Dependent Claim(s) present:						+	$820.00	=	$0.00
Surcharge under 37 CFR 1.16(f) for late filing of Executed Declaration or late payment of Basic Filing Fee/Search Fee/Examination Fee						+	$160.00	=	$0.00
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TOTAL FEE								=	$1720.00

The above-identified fees of $1720.00 are being paid by credit card via EFS-Web.

The Commissioner is hereby authorized to charge any fees required to secure a filing date and maintain pendency of this application to Deposit Account No. 19-0741.

Respectfully submitted,

Date ___December 27, 2018_____ By ___*/Paul S. Hunter/*_____

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	115539-0217
	Application Number	
Title of Invention	SYSTEM AND METHOD FOR PROVISIONING DATABASES IN A HYPERCONVERGED INFRASTRUCTURE SYSTEM	

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.

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	115539-0217
	Application Number	
Title of Invention	SYSTEM AND METHOD FOR PROVISIONING DATABASES IN A HYPERCONVERGED INFRASTRUCTURE SYSTEM	

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

Customer Number	147491		
Email Address	IPDocketing@foley.com	Add Email	Remove Email

Application Information:

Title of the Invention	SYSTEM AND METHOD FOR PROVISIONING DATABASES IN A HYPERCONVERGED INFRASTRUCTURE SYSTEM		
Attorney Docket Number	115539-0217	**Small Entity Status Claimed**	☐
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	31	**Suggested Figure for Publication (if any)**	

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	147491		

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	115539-0217
	Application Number	
Title of Invention	SYSTEM AND METHOD FOR PROVISIONING DATABASES IN A HYPERCONVERGED INFRASTRUCTURE SYSTEM	

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			Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)

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)

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

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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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	115539-0217
	Application Number	
Title of Invention	SYSTEM AND METHOD FOR PROVISIONING DATABASES IN A HYPERCONVERGED INFRASTRUCTURE SYSTEM	

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	115539-0217
	Application Number	
Title of Invention	SYSTEM AND METHOD FOR PROVISIONING DATABASES IN A HYPERCONVERGED INFRASTRUCTURE SYSTEM	

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	Nutanix, Inc.		
Mailing Address Information For Applicant:			
Address 1	1740 Technology Drive		
Address 2	Suite 150		
City	San Jose	**State/Province**	CA
Country	US	Postal Code	95110
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.

PTO/AIA/14 (11-15)
Approved for use through 04/30/2017. OMB 0651-0032
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	115539-0217
	Application Number	
Title of Invention	SYSTEM AND METHOD FOR PROVISIONING DATABASES IN A HYPERCONVERGED INFRASTRUCTURE SYSTEM	

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. ☒

Organization Name	Nutanix, Inc.

Mailing Address Information For Assignee including Non-Applicant Assignee:

Address 1	1740 Technology Drive		
Address 2	Suite 150		
City	San Jose	**State/Province**	CA
Country i	US	Postal Code	95110
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	/Paul S. Hunter/			Date (YYYY-MM-DD)	2018-12-27
First Name	Paul S.	Last Name	Hunter	Registration Number	44787

Additional Signature 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	115539-0217
	Application Number	
Title of Invention	SYSTEM AND METHOD FOR PROVISIONING DATABASES IN A HYPERCONVERGED INFRASTRUCTURE SYSTEM	

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.

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PTO/AIA/01 (modified)

DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)	115539-0217

Title of Invention	SYSTEM AND METHOD FOR PROVISIONING A DATABASE IN A HYPER CONVERGED INFRASTRUCTURE SYSTEM

As the below named inventor, I hereby declare that:

This declaration is directed to:

☒ 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 (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: BALASUBRAHMANYAM KUCHIBHOTLA Date (Optional): November 30, 2018

Signature: DocuSigned by: BALASUBRAHMANYAM KUCHIBHOTLA 5046EB798D084DB...

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.

DocuSign Envelope ID: D727EBBB-B845-4AEF-9E97-FFE8E0121992

PTO/AIA/01 (modified)

DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)	115539-0217

Title of Invention	SYSTEM AND METHOD FOR PROVISIONING A DATABASE IN A HYPER CONVERGED INFRASTRUCTURE SYSTEM

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☒ The attached application, or

☐ United States application or PCT international application number _____ filed on _____.

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LEGAL NAME OF INVENTOR

Inventor: KAMALDEEP KHANUJA Date (Optional): November 29, 2018

Signature: DocuSigned by: KAMALDEEP KHANUJA E614083C97D04EC...

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.

DocuSign Envelope ID: D727EBBB-B845-4AEF-9E97-FFE8E0121992

PTO/AIA/01 (modified)

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LEGAL NAME OF INVENTOR

Inventor: JEREMY LAUNIER Date (Optional): November 29, 2018

Signature: DocuSigned by: Jeremy Launier 6121A43481C143C...

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.

DocuSign Envelope ID: D727EBBB-B845-4AEF-9E97-FFE8E0121992

PTO/AIA/01 (modified)

DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)	115539-0217

Title of Invention	SYSTEM AND METHOD FOR PROVISIONING A DATABASE IN A HYPER CONVERGED INFRASTRUCTURE SYSTEM

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☒ 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.

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LEGAL NAME OF INVENTOR

Inventor: SUJIT MENON Date (Optional): November 29, 2018

Signature: DocuSigned by: sujit menon DDED94A58492408...

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.

DocuSign Envelope ID: D727EBBB-B845-4AEF-9E97-FFE8E0121992

PTO/AIA/01 (modified)

DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)	115539-0217

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☐ 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.

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LEGAL NAME OF INVENTOR

Inventor: MANEESH RAWAT Date (Optional): November 30, 2018

Signature: DocuSigned by: maneesh rawat 646DB2967AC8451...

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.

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 16/234,553

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			N/A	300
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	660
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	760
TOTAL CLAIMS (37 CFR 1.16(i))	20 minus 20 =	*			OR	x 100 =	0.00
INDEPENDENT CLAIMS (37 CFR 1.16(h))	3 minus 3 =	*				x 460 =	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			TOTAL	1720

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	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
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
16/234,553	12/27/2018		1720	115539-0217	20	3

CONFIRMATION NO. 2275

FILING RECEIPT

147491
FOLEY & LARDNER LLP
3000 K STREET N.W.
SUITE 600
WASHINGTON, DC 20007-5109

OC000000105311195

Date Mailed: 01/25/2019

Receipt is acknowledged of this non-provisional 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 APPLICANT, 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 Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections 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**

Inventor(s)

Balasubrahmanyam Kuchibhotla, San Ramon, CA;
Kamaldeep Khanuja, Dublin, CA;
Jeremy Launier, Sunnyvale, CA;
Sujit Menon, Bangalore, INDIA;
Maneesh Rawat, Bangalore, INDIA;

Applicant(s)

Nutanix, Inc., San Jose, CA;

Assignment For Published Patent Application

Nutanix, Inc., San Jose, CA

Power of Attorney: The patent practitioners associated with Customer Number 147491

Domestic Applications for which benefit is claimed - None.
A proper domestic benefit claim must be provided in an Application Data Sheet in order to constitute a claim for domestic benefit. See 37 CFR 1.76 and 1.78.

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.) - None.
Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

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: 01/24/2019

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 16/234,553**

Projected Publication Date: 07/02/2020

Non-Publication Request: No

Early Publication Request: No
Title

SYSTEM AND METHOD FOR PROVISIONING DATABASES IN A HYPERCONVERGED INFRASTRUCTURE SYSTEM

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

GRANTED

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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).

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technology, manufacture products, deliver services, and grow your business, visit http://www.SelectUSA.gov or call +1-202-482-6800.

Electronic Acknowledgement Receipt	
EFS ID:	36774973
Application Number:	16234553
International Application Number:	
Confirmation Number:	2275
Title of Invention:	SYSTEM AND METHOD FOR PROVISIONING DATABASES IN A HYPERCONVERGED INFRASTRUCTURE SYSTEM
First Named Inventor/Applicant Name:	Balasubrahmanyam Kuchibhotla
Customer Number:	147491
Filer:	Paul S. Hunter/Marilyn Bynum
Filer Authorized By:	Paul S. Hunter
Attorney Docket Number:	115539-0217
Receipt Date:	02-AUG-2019
Filing Date:	27-DEC-2018
Time Stamp:	21:46:05
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	Transmittal Letter	115539-0217_IDS.pdf	161130 a8ab8bd49e9dde49c7a2c5b13c7d9d76cfac883c	no	2

Warnings:

Information:					
2	Information Disclosure Statement (IDS) Form (SB08)	115539-0217_SB08.pdf	139296 61086db1ae5b6f51415e09ecbd8dae78875c3705	no	2
Warnings:					
Information:					
This is not an USPTO supplied IDS fillable form					
3	Non Patent Literature	Jan_2014_The_Nutanix_Bible.pdf	2061651 c1c30b3bafd7276e8243bfa2ba20def48126825c	no	31
Warnings:					
Information:					
4	Non Patent Literature	Jan_2015_The_Nutanix_Bible.pdf	3275926 e15108c75cf72ceb6ed6850fe33674a49dcd584e	no	65
Warnings:					
Information:					
5	Non Patent Literature	Jan_2016_The_Nutanix_Bible.pdf	25325532 eb7bfd41cee755771e2a916adc96bd3554446e59	no	215
Warnings:					
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6	Non Patent Literature	Jan_2017_Part_1_of_2_The_Nutanix_Bible.pdf	13478662 af544c12f658d269c221136708fa5ff09a095850	no	150
Warnings:					
Information:					
7	Non Patent Literature	Jan_2017_Part_2_of_2_The_Nutanix_Bible.pdf	17259766 4d25ca24e2beaa8f1b6aebfb6e7feef22a8eba1e	no	148
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Information:					
8	Non Patent Literature	Jan_2018_Part_1_of_2_The_Nutanix_Bible.pdf	14749684 977d908cbaac5729baf1660158863e1479f104ce	no	158
Warnings:					
Information:					

9	Non Patent Literature	Jan_2018_Part_2_of_2_The_Nutanix_Bible.pdf	17116331 2aed2503584ac6075bada764ef37e5d99bc5b7da	no	158
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Information:					
10	Non Patent Literature	Jun_2014_The_Nutanix_Bible.pdf	3059111 ca432e90dcf3fd05d26e775eaad423cdf066babe	no	53
Warnings:					
Information:					
11	Non Patent Literature	Jun_2015_The_Nutanix_Bible.pdf	3745614 66d3b50e8bdb487ca05f2f11262cd2595491eacf	no	78
Warnings:					
Information:					
12	Non Patent Literature	Jun_2016_Part_1_of_2_The_Nutanix_Bible.pdf	12080910 f5f38995fd88f3742316c3b11c7f230d27af9832	no	131
Warnings:					
Information:					
13	Non Patent Literature	Jun_2016_Part_2_of_2_The_Nutanix_Bible.pdf	16836091 b3fe11c9934516c675437c8b5bbb443509deb736	no	130
Warnings:					
Information:					
14	Non Patent Literature	Jun_2017_Part_1_of_2_The_Nutanix_Bible.pdf	14455340 3aec5032fd8264fca4d12d2c07ad280833770806	no	153
Warnings:					
Information:					
15	Non Patent Literature	Jun_2017_Part_2_of_2_The_Nutanix_Bible.pdf	17270072 9d24867cf7d95d68ded0eb2bea6b732c455cfb55	no	153
Warnings:					
Information:					

16	Non Patent Literature	Jun_2018_Part_1_of_2_The_Nutanix_Bible.pdf	14303838 0865b6da9854a06d975eb0a913ab5047d05efd5d	no	157
Warnings:					
Information:					
17	Non Patent Literature	Jun_2018_Part_2_of_2_The_Nutanix_Bible.pdf	17181597 0379eead5cfb3490aecb51e54bd45fc9d07226b9	no	157
Warnings:					
Information:					
18	Non Patent Literature	Oct_2013_The_Nutanix_Bible.pdf	970301 0d2f50c1925fd9bc6b3dd28a96375b17ce3fd6d8	no	22
Warnings:					
Information:					
19	Non Patent Literature	Sept_2015_The_Nutanix_Bible.pdf	22727324 9f436e8e2518baca113df089699c7aed62a2b1de	no	167
Warnings:					
Information:					
		Total Files Size (in bytes):	216198176		

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

First Inventor Name:	Balasubrahmanyam Kuchibhotla
Title:	SYSTEM AND METHOD FOR PROVISIONING DATABASES IN A HYPERCONVERGED INFRASTRUCTURE SYSTEM
Application No.:	16/234553
Filing Date:	12/27/2018
Examiner:	ABEL JALIL, NEVEEN
Art Unit:	2152
Confirmation No.:	2275

INFORMATION DISCLOSURE STATEMENT UNDER 37 CFR §1.56

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Commissioner:

Applicant submits herewith documents for the Examiner's consideration in accordance with 37 CFR §§1.56, 1.97 and 1.98.

Applicants respectfully request that each listed document be considered by the Examiner and be made of record in the present application and that an initialed copy of Form PTO/SB/08 be returned in accordance with MPEP §609.

The submission of any document herewith is not an admission that such document constitutes prior art against the claims of the present application or that such document is considered material to patentability as defined in 37 CFR §1.56(b). Applicants do not waive any rights to take any action which would be appropriate to antedate or otherwise remove as a competent reference any document submitted herewith.

TIMING OF THE DISCLOSURE

The listed documents are being submitted in compliance with 37 CFR §1.97(b), before the mailing date of the first Office Action on the merits.

Although Applicant believes that no fee is required, the Commissioner is hereby authorized to charge any additional fees which may be due to Deposit Account No. 19-0741.

Respectfully submitted,

Date August 2, 2019

By */Paul S. Hunter/*

FOLEY & LARDNER LLP
Customer Number: 147491
Telephone: (858) 847-6733
Facsimile: (858) 792-6773

Paul S. Hunter
Attorney for Applicant
Registration No. 44,787

Substitute for form 1449/PTO				Complete if Known	
INFORMATION DISCLOSURE STATEMENT BY APPLICANT				**Application Number**	16/234553
				Filing Date	12/27/2018
Date Submitted: August 2, 2019				**First Named Inventor**	Balasubrahmanyam Kuchibhotla
				Art Unit	2152
(use as many sheets as necessary)				Examiner Name	ABEL JALIL, NEVEEN
Sheet	1	of	2	Attorney Docket Number	115539-0217

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2] (*if known*)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	A1	8,549,518-B2	10-01-2013	ARON ET AL.	
	A2	8,601,473-B2	12-03-2013	ARON ET AL.	
	A3	8,850,130-B2	09-30-2014	ARON ET AL.	
	A4	9,772,866-B2	09-26-2017	ARON ET AL.	

UNPUBLISHED U.S. PATENT APPLICATION DOCUMENTS

Examiner Initials*	Cite No.[1]	U.S. Patent Application Document Serial Number-Kind Code[2] (*if known*)	Filing Date of Cited Document MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3]-Number[4]-Kind Code[5] (*if known*)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Documents	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T[6]

NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.[1]	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, page(s), volume-issue number(s), publisher, city and/or country where published.	T[6]
	A5	POITRAS, STEVEN. "The Nutanix Bible" (11 January 2014), from http://stevenpoitras.com/the-nutanix-bible/ (Publication date based on indicated capture date by Archive.org; first publication date unknown)	
	A6	POITRAS, STEVEN. "The Nutanix Bible" (12 January 2016), from https://nutanixbible.com/	
	A7	POITRAS, STEVEN. "The Nutanix Bible" (15 October 2013), from http://stevenpoitras.com/the-nutanix-bible/ (Publication date based on indicated capture date by Archive.org; first publication date unknown)	
	A8	POITRAS, STEVEN. "The Nutanix Bible" (20 June 2014), from http://stevenpoitras.com/the-nutanix-bible/ (Publication date based on indicated capture date by Archive.org; first publication date unknown)	
	A9	POITRAS, STEVEN. "The Nutanix Bible" (25 June 2018), from https://nutanixbible.com/	
	A10	POITRAS, STEVEN. "The Nutanix Bible" (3 January 2017), from https://nutanixbible.com/	
	A11	POITRAS, STEVEN. "The Nutanix Bible" (3 January 2018), from https://nutanixbible.com/	
	A12	POITRAS, STEVEN. "The Nutanix Bible" (4 September 2015), from https://nutanixbible.com/	

Examiner Signature		Date Considered	

4840-7450-8702.1

Substitute for form 1449/PTO				***Complete if Known***	
INFORMATION DISCLOSURE STATEMENT BY APPLICANT				**Application Number**	16/234553
				Filing Date	12/27/2018
Date Submitted: August 2, 2019				**First Named Inventor**	Balasubrahmanyam Kuchibhotla
				Art Unit	2152
(use as many sheets as necessary)				Examiner Name	ABEL JALIL, NEVEEN
Sheet	2	of	2	Attorney Docket Number	115539-0217

NON PATENT LITERATURE DOCUMENTS			
Examiner Initials*	Cite No.[1]	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, page(s), volume-issue number(s), publisher, city and/or country where published.	T[6]
	A13	POITRAS, STEVEN. "The Nutanix Bible" (7 January 2015), from http://stevenpoitras.com/the-nutanix-bible/ (Publication date based on indicated capture date by Archive.org; first publication date unknown)	
	A14	POITRAS, STEVEN. "The Nutanix Bible" (8 June 2017), from https://nutanixbible.com/	
	A15	POITRAS, STEVEN. "The Nutanix Bible" (9 June 2015), from http://stevenpoitras.com/the-nutanix-bible/ (Publication date based on indicated capture date by Archive.org; first publication date unknown)	
	A16	POITRAS, STEVEN. "The Nutanix Bible" (9 June 2016), from https://nutanixbible.com/	

Examiner Signature		Date Considered	

Electronic Acknowledgement Receipt	
EFS ID:	37757231
Application Number:	16234553
International Application Number:	
Confirmation Number:	2275
Title of Invention:	SYSTEM AND METHOD FOR PROVISIONING DATABASES IN A HYPERCONVERGED INFRASTRUCTURE SYSTEM
First Named Inventor/Applicant Name:	Balasubrahmanyam Kuchibhotla
Customer Number:	147491
Filer:	Paul S. Hunter/Maleeha Syeda
Filer Authorized By:	Paul S. Hunter
Attorney Docket Number:	115539-0217
Receipt Date:	14-NOV-2019
Filing Date:	27-DEC-2018
Time Stamp:	17:51:10
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	Transmittal Letter	IDS-Transmittal-115539-0217.pdf	117691 a4c7d8ef0a307e523471fcee38e3f27d4c615ca3	no	2

Warnings:

Information:					
2	Information Disclosure Statement (IDS) Form (SB08)	SB08-Form-115539-0217.pdf	108547 f720bd4050c9e21b9c7c890f36be9045c7762346	no	1
Warnings:					
Information:					
This is not an USPTO supplied IDS fillable form					
3	Non Patent Literature	B1--CANO__IGNACIO__et_al____Curator___Self_M.pdf	1426670 c2f90bd860525cec252b94a285c1973d0e7a35c4	no	16
Warnings:					
Information:					
		Total Files Size (in bytes):	1652908		

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.

<u>New Applications Under 35 U.S.C. 111</u>
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.
<u>National Stage of an International Application under 35 U.S.C. 371</u>
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.
<u>New International Application Filed with the USPTO as a Receiving Office</u>
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.

Substitute for form 1449/PTO				***Complete if Known***	
INFORMATION DISCLOSURE STATEMENT BY APPLICANT				**Application Number**	16/234553
				Filing Date	12/27/2018
Date Submitted: November 14, 2019				**First Named Inventor**	Balasubrahmanyam Kuchibhotla
				Art Unit	2152
(use as many sheets as necessary)				Examiner Name	ABEL JALIL, NEVEEN
Sheet	1	of	1	Attorney Docket Number	115539-0217

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2] (*if known*)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear

UNPUBLISHED U.S. PATENT APPLICATION DOCUMENTS

Examiner Initials*	Cite No.[1]	U.S. Patent Application Document Serial Number-Kind Code[2] (*if known*)	Filing Date of Cited Document MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3]-Number[4]-Kind Code[5] (*if known*)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Documents	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T[6]

NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.[1]	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, page(s), volume-issue number(s), publisher, city and/or country where published.	T[6]
	B1	CANO, IGNACIO, et al. "Curator: Self-Managing Storage for Enterprise Clusters" (27 March 2017), from https://www.usenix.org/conference/nsdi17/	

Examiner Signature		Date Considered	

4834-6694-9036.1

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

First Inventor Name:	Balasubrahmanyam Kuchibhotla
Title:	SYSTEM AND METHOD FOR PROVISIONING DATABASES IN A HYPERCONVERGED INFRASTRUCTURE SYSTEM
Application No.:	16/234553
Filing Date:	12/27/2018
Examiner:	ABEL JALIL, NEVEEN
Art Unit:	2152
Confirmation No.:	2275

INFORMATION DISCLOSURE STATEMENT UNDER 37 CFR §1.56

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Commissioner:

Applicant submits herewith documents for the Examiner's consideration in accordance with 37 CFR §§1.56, 1.97 and 1.98.

Applicants respectfully request that each listed document be considered by the Examiner and be made of record in the present application and that an initialed copy of Form PTO/SB/08 be returned in accordance with MPEP §609.

The submission of any document herewith is not an admission that such document constitutes prior art against the claims of the present application or that such document is considered material to patentability as defined in 37 CFR §1.56(b). Applicants do not waive any rights to take any action which would be appropriate to antedate or otherwise remove as a competent reference any document submitted herewith.

TIMING OF THE DISCLOSURE

The listed document is being submitted in compliance with 37 CFR §1.97(b), before the mailing date of the first Office Action on the merits.

Although Applicant believes that no fee is required, the Commissioner is hereby authorized to charge any additional fees which may be due to Deposit Account No. 19-0741.

Respectfully submitted,

Date ____November 14, 2019_____ By ____*/Paul S. Hunter/*_____

FOLEY & LARDNER LLP
Customer Number: 147491
Telephone: (858) 847-6733
Facsimile: (858) 792-6773

Paul S. Hunter
Attorney for Applicant
Registration No. 44,787

REMARKS

Applicant respectfully requests that the foregoing amendments be made prior to examination of the present application.

Status of Claims

Independent Claims 1, 12, and 19 have been amended. Dependent Claims 2, 4-6, 8-10, 13-18, and 20 have also been amended to reflect the amendments to their respective base independent claims, and to increase clarity. Claims 21-23 are newly added. No new subject matter has been added with any of the amendments to the claims, or with the newly added claims. Support for the amendments can be found in the claims and specification, as originally filed. These amendments are made without prejudice or disclaimer.

After amending the claims as set forth above, Claims 1-23 remain pending in this application. Applicant respectfully requests reconsideration of these claims.

Concluding Remarks

Applicant believes that the application is in condition for allowance. Favorable consideration is respectfully requested. The Examiner is invited to contact the undersigned by telephone if it is felt that a telephone interview would advance prosecution.

The Commissioner is hereby authorized to charge any additional fees which may be required regarding this application, or credit any overpayment, to Deposit Account No. 19-0741.

Respectfully submitted,

Date ___January 3, 2020_____ By ____*/Paul S. Hunter/*_____

FOLEY & LARDNER LLP
Customer Number: 147491
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Paul S. Hunter
Attorney for Applicant
Registration No. 44,787

Electronic Patent Application Fee Transmittal

Application Number:	16234553
Filing Date:	27-Dec-2018
Title of Invention:	SYSTEM AND METHOD FOR PROVISIONING DATABASES IN A HYPERCONVERGED INFRASTRUCTURE SYSTEM
First Named Inventor/Applicant Name:	Balasubrahmanyam Kuchibhotla
Filer:	Paul S. Hunter/Walter Lau
Attorney Docket Number:	115539-0217

Filed as Large Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
CLAIMS IN EXCESS OF 20	1202	3	100	300
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**300**

Amendments to the Claims:

This listing of claims will replace all prior versions and listings of claims in the application:

Listing of Claims:

1. (Currently Amended) A method comprising:

receiving, by a database engine ~~of a database system~~ associated with a hyperconverged infrastructure ~~virtual computing~~ system, a user request ~~via a dashboard~~ for provisioning a source database ~~with the database system~~;

receiving, by the database engine ~~via the dashboard~~, selection of a database engine type;

receiving, by the database engine ~~via the dashboard~~, selection of a Service Level Agreement ("SLA") and a protection schedule;

provisioning, by the database engine, the source database based upon the database engine type; and

creating, by the database engine, an instance of a database protection system based upon the SLA and the protection schedule, including associating the instance of the database protection system with the source database~~; and~~

~~displaying, by the database engine, the source database within the dashboard~~.

2. (Currently Amended) The method of claim 1, further comprising:

receiving, by the database engine ~~via the dashboard~~, selection of a first set of parameters; and

creating, by the database engine, a source database virtual machine based on the first set of parameters, wherein the source database resides on the source database virtual machine.

3. (Original) The method of claim 2, wherein the first set of parameters comprises at least one of a software profile, a compute profile, a network profile, and a database parameters profile.

4. (Currently Amended) The method of claim 1, further comprising:

~~receiving, by the database engine via the dashboard, a size of the source database;~~

converting, by the database engine, [[the]] a size of the source database into a number of virtual disks; and

associating, by the database engine, the virtual disks with the source database.

5. (Currently Amended) The method of claim 1, wherein provisioning the source database comprises creating a new database as the source database ~~within the database system~~.

6. (Currently Amended) The method of claim 1, wherein provisioning the source database comprises registering an existing database as the source database ~~with the database system~~.

7. (Original) The method of claim 1, wherein the protection schedule comprises a frequency of capturing snapshots and a frequency of capturing transactional logs for protecting the source database.

8. (Currently Amended) The method of claim 1, further comprising:

presenting, by the database engine ~~via the dashboard~~, a group of the database engine types that are supported by the hyperconverged infrastructure ~~database~~ system; and

receiving, by the database engine, one of the group of the database engine types as the selection of the database engine type.

9. (Currently Amended) The method of claim 1, further comprising:

~~presenting, by the database engine via the dashboard, a sample set of parameters for creating a source database virtual machine;~~

receiving, by the database engine, selection of at least one of [[the]] a sample set of parameters for creating a source database virtual machine; and

creating, by the database engine, the source database virtual machine based upon the at least one of the sample set of parameters.

10. (Currently Amended) The method of claim 1, further comprising:

presenting, by the database engine ~~via the dashboard~~, a plurality of levels of the SLA; and

receiving, by the database engine ~~via the dashboard~~, selection of one of the plurality of levels of the SLA.

11. (Original) The method of claim 1, wherein the protection schedule comprises a time period for designating at least one of a daily snapshot, a weekly snapshot, a monthly snapshot, and a quarterly snapshot.

12. (Currently Amended) A database management system ~~of a virtual computing system, the database system~~ comprising:

a dashboard;

a database engine of a hyperconverged infrastructure system to receive ~~configured to receive~~ input from and provides ~~provide~~ output to the dashboard; and

a database storage system of the hyperconverged infrastructure system to store ~~configured to store~~ a source database upon provisioning,

wherein the database engine includes programmed instructions that when executed cause the database engine ~~is configured~~ to:

receive a user request via the dashboard for provisioning the source database;

receive selection of a database engine type via the dashboard;

receive selection of a Service Level Agreement ("SLA") and a protection schedule via the dashboard;

provision the source database based upon the database engine type and store the source database within the database storage system;

create an instance of a database protection system based upon the SLA and the protection schedule, including associating the instance of the database protection system with the source database; and

display the source database within the dashboard.

13. (Currently Amended) The database management system of claim 12, wherein the database engine comprises programmed instructions that when executed cause the database engine ~~is configured~~ to communicate with the dashboard via an Application Programing Interface.

14. (Currently Amended) The database management system of claim 12, wherein the database storage system comprises programmed instructions that when executed cause the database engine ~~is configured~~ to store a cloned database created from the source database.

15. (Currently Amended) The database management system of claim 12, wherein the instance of the database protection system captures ~~is configured to capture~~ snapshots and transactional logs from the source database based upon the SLA and the protection schedule.

16. (Currently Amended) The database management system of claim 12, wherein the database engine comprises programmed instructions that when executed cause the database engine receive at least one parameter ~~is further configured to receive parameters~~ for creating a source database virtual machine, and associate ~~associating~~ the source database with the source database virtual machine.

17. (Currently Amended) The database management system of claim 12, wherein the database engine comprises programmed instructions that when executed cause the database engine receive ~~is configured to receive~~ a size of the source database, and ~~wherein the database engine~~ convert ~~is configured to convert~~ the size into a number of virtual disks to be associated with the source database.

18. (Currently Amended) The database management system of claim 12, wherein the database engine comprises programmed instructions that when executed cause the database

engine receive ~~is configured to receive~~ selection of using an existing source database virtual machine, and ~~wherein the database engine~~ create ~~is configured to create~~ the source database on the existing source database virtual machine.

19. (Currently Amended) A non-transitory computer readable media with computer-executable instructions embodied thereon that, when executed by a processor of a database engine associated with a hyperconverged infrastructure ~~database system of a virtual computing~~ system, cause the database engine to perform a process comprising:

receiving a user request ~~via a dashboard~~ for provisioning a source database ~~with the database system~~;

receiving~~, via the dashboard,~~ selection of a database engine type;

receiving~~, via the dashboard,~~ selection of a Service Level Agreement ("SLA") and a protection schedule;

provisioning the source database based upon the database engine type; and

creating an instance of a database protection system based upon the SLA and the protection schedule, including associating the instance of the database protection system with the source database~~; and~~

~~displaying the source database within the dashboard~~.

20. (Currently Amended) The non-transitory computer readable media of claim 19, wherein provisioning the source database comprises receiving a selection~~, by the database engine via the dashboard,~~ for creating a new database or registering an existing database.

21. (New) The non-transitory computer readable media of claim 19, further comprising:

presenting a group of the database engine types that are supported by the hyperconverged infrastructure ~~database~~ system; and

receiving one of the group of the database engine types as the selection of the database engine type.

22. (New) The non-transitory computer readable media of claim 19, further comprising:

receiving selection of at least one of a sample set of parameters for creating a source database virtual machine; and

creating the source database virtual machine based upon the at least one of the sample set of parameters.

23. (New) The non-transitory computer readable media of claim 19, further comprising:

presenting a plurality of levels of the SLA; and

receiving selection of one of the plurality of levels of the SLA.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

First Inventor Name:	Balasubrahmanyam Kuchibhotla
Title:	SYSTEM AND METHOD FOR PROVISIONING DATABASES IN A HYPERCONVERGED INFRASTRUCTURE SYSTEM
Appl. No.:	16/234553
Filing Date:	12/27/2018
Examiner:	ABEL JALIL, NEVEEN
Art Unit:	2152
Confirmation Number:	2275

PRELIMINARY AMENDMENT UNDER 37 C.F.R. 1.115

Mail Stop AMENDMENT
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Commissioner:

Prior to examination of the present Application, Applicant respectfully requests that the application be amended as follows:

Amendments to the Claims are reflected in the listing of claims which begins on page 2 of this document.

Remarks begin on page 8 of this document.

Please amend the application as follows:

Electronic Acknowledgement Receipt	
EFS ID:	38203441
Application Number:	16234553
International Application Number:	
Confirmation Number:	2275
Title of Invention:	SYSTEM AND METHOD FOR PROVISIONING DATABASES IN A HYPERCONVERGED INFRASTRUCTURE SYSTEM
First Named Inventor/Applicant Name:	Balasubrahmanyam Kuchibhotla
Customer Number:	147491
Filer:	Paul S. Hunter/Walter Lau
Filer Authorized By:	Paul S. Hunter
Attorney Docket Number:	115539-0217
Receipt Date:	03-JAN-2020
Filing Date:	27-DEC-2018
Time Stamp:	21:33:36
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$300
RAM confirmation Number	E202013L34191571
Deposit Account	190741
Authorized User	Walter Lau
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: 37 CFR 1.16 (National application filing, search, and examination fees) 37 CFR 1.17 (Patent application and reexamination processing fees)	

37 CFR 1.19 (Document supply fees)

37 CFR 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		115539-0217-Preliminary_Amendment.pdf	145323 c7e249f231511a908047246ec40ad1d6b35d01c8	yes	9

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Preliminary Amendment	1	1
	Claims	2	7
	Applicant Arguments/Remarks Made in an Amendment	8	9

Warnings:

Information:

2	Fee Worksheet (SB06)	fee-info.pdf	30818 9a72713b2531f8bc19e587de1298015881a3529e	no	2

Warnings:

Information:

Total Files Size (in bytes):	176141

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 16/234,553	Filing Date 12/27/2018	☐ 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 $100 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $460 =	
☐ 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	01/03/2020	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 23	Minus	** 20	= 3		x $100 =	300
	Independent (37 CFR 1.16(h))	* 3	Minus	*** 3	= 0		x $460 =	0
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	300

		(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.	Non-Examiner
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".	/RICARDO ANTONIO CAMOU/
*** 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.

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
16/234,553	12/27/2018	Balasubrahmanyam Kuchibhotla	115539-0217

CONFIRMATION NO. 2275

147491
FOLEY & LARDNER LLP
3000 K STREET N.W.
SUITE 600
WASHINGTON, DC 20007-5109

PUBLICATION NOTICE

OC00000018204064

Title:SYSTEM AND METHOD FOR PROVISIONING DATABASES IN A HYPERCONVERGED INFRASTRUCTURE SYSTEM

Publication No.US-2020-0210379-A1
Publication Date:07/02/2020

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

Substitute for form 1449/PTO				**Complete if Known**	
INFORMATION DISCLOSURE STATEMENT BY APPLICANT				**Application Number**	16/234553
				Filing Date	12/27/2018
Date Submitted: July 17, 2020				**First Named Inventor**	Balasubrahmanyam Kuchibhotla
				Art Unit	2166
(use as many sheets as necessary)				Examiner Name	HARPER, ELIYAH STONE
Sheet	1	of	5	Attorney Docket Number	115539-0217

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2] (*if known*)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	A1	6,064,975	05-16-2000	MOON ET AL.	
	A2	7,225,189	05-29-2007	MCCORMACK ET AL.	
	A3	7,725,671	05-25-2010	PRAHLAD ET AL.	
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	A10	8,447,728	05-21-2013	PRAHLAD ET AL.	
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	A12	8,762,335	06-24-2014	PRAHLAD ET AL.	
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	A16	9,116,737	08-25-2015	ASWATHANARAYANA ET AL.	
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	A24	D 763,890-S	08-16-2016	PAN, CHONGGUANG	
	A25	D 779,514-S	02-21-2017	BARIS ET AL.	
	A26	D 803,231-S	11-21-2017	GUINNESS ET AL.	
	A27	D 807,902-S	01-16-2018	CONG ET AL.	
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	A36	10,248,657	04-02-2019	PRAHLAD ET AL.	
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	A43	2007/0100793	05-03-2007	BROWN ET AL.	
	A44	2008/0126945	05-29-2008	MUNKVOLD ET AL.	

Examiner Signature		Date Considered	

Substitute for form 1449/PTO				Complete if Known	
INFORMATION DISCLOSURE STATEMENT BY APPLICANT				**Application Number**	16/234553
				Filing Date	12/27/2018
Date Submitted: July 17, 2020				**First Named Inventor**	Balasubrahmanyam Kuchibhotla
				Art Unit	2166
(use as many sheets as necessary)				Examiner Name	HARPER, ELIYAH STONE
Sheet	2	of	5	Attorney Docket Number	115539-0217

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2] (*if known*)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
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Substitute for form 1449/PTO				Complete if Known	
INFORMATION DISCLOSURE STATEMENT BY APPLICANT				**Application Number**	16/234553
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT				**Application Number**	16/234553
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Electronic Acknowledgement Receipt	
EFS ID:	40039913
Application Number:	16234553
International Application Number:	
Confirmation Number:	2275
Title of Invention:	SYSTEM AND METHOD FOR PROVISIONING DATABASES IN A HYPERCONVERGED INFRASTRUCTURE SYSTEM
First Named Inventor/Applicant Name:	Balasubrahmanyam Kuchibhotla
Customer Number:	147491
Filer:	Paul S. Hunter/Walter Lau
Filer Authorized By:	Paul S. Hunter
Attorney Docket Number:	115539-0217
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Filing Date:	27-DEC-2018
Time Stamp:	21:30:16
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	Transmittal Letter	115539-0217-IDS_Transmittal.pdf	112714 a3825a06dbeb34ca9831c2b08560270aece0ea26	no	2

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3	Foreign Reference	EP1654683B1.pdf	342950 e127927118da9afbc1dfba897e1909f74eb30137	no	21
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4	Foreign Reference	WO2016069029A1.pdf	432625 b2c33aba2bccf09ccf38c64fd97f76c51f3e5959	no	38
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32	Non Patent Literature	VMWARE-Getting_Started_with_Database_Provisioning.pdf	597175 874f61d843fc539feb99583186b2e5391c07bbbd	no	15
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33	Non Patent Literature	Warren-Internet_Archive_Wayback_Machine_Introduces_New_Beta_Version_with_Calendar_View.pdf	153443 585cff2cbeec54349cb787007c02a7a891aee5fd	no	1
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		Total Files Size (in bytes):	20980283		

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New Applications Under 35 U.S.C. 111

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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

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(54) Title: SNAPSHOT CREATION

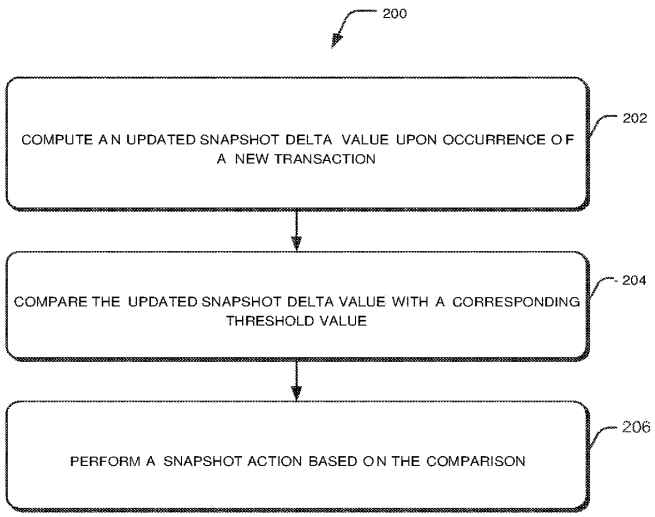


Figure 2

(57) Abstract: In one example an updated snapshot delta value is computed upon occurrence of a new transaction. The new transaction is a data modification operation performed on data blocks of the storage device. Further, the delta value indicates at least one of volume of data modified since creation of a reference snapshot and number of transactions performed since the creation. Subsequently, the updated snapshot delta value is compared with a corresponding threshold value. The threshold value is at least one of a predetermined volume of data modified and a predetermined number of transactions. A snapshot action is subsequently performed based on the comparison.

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SNAPSHOT CREATION

BACKGROUND

[0001] With increase in data generation and data processing capabilities in enterprises, an ever-increasing amount of data are being produced which is stored for short, medium, or long periods. Enterprises implement data management through a file system or a block storage system. Storing the data using a file system involves performing file related actions, at a host level through an application. Examples of the actions include creating a file, adding data in the file, and deleting or archiving the file. Each of these actions results into a file system input or output (I/O). A given I/O to a file system generally includes multiple storage disk I/O requests which are acted upon by the block storage system. The block storage systems further create snapshots, i.e., a point in time image of the data stored in the storage disk. The snapshots can be used for various purposes, such as backup, creating a checkpoint for restoring the state of an application, a source for data mining.

BRIEF DESCRIPTION OF FIGURES

[0002] The detailed description is described with reference to the accompanying figures. In the figures, the left-most digit(s) of a reference number identifies the figure in which the reference number first appears. The same numbers are used throughout the figures to reference like features and components. Systems and/or methods, in accordance with examples of the present subject matter are now described, by way of example, and with reference to the accompanying figures, in which:

[0003] Figure 1(a) illustrates a block diagram of an example computing system for snapshot creation, in accordance with an example of the present subject matter.

[0004] Figure 1(b) illustrates various example components of the example computing system for snapshot creation, in accordance with an example of the present subject matter.

[0005] Figure 2 illustrates an example method for snapshot creation, in accordance with an example of the present subject matter.

[0006] Figure 3 illustrates another example method for snapshot creation, in accordance with an example of the present subject matter.

[0007] Figure 4 illustrates an example network environment implementing a non-transitory computer readable medium for snapshot creation, according to an example of the present subject matter.

DETAILED DESCRIPTION

[0008] Systems and methods for snapshot creation are described herein. The methods can be implemented in various systems, such as computing devices connected through various networks. Typically, data is stored in a storage device and managed through a file system. A file system may be understood as an abstraction for organizing and storing data, as files. The file system may also facilitate in controlling the manner in which the data is stored, modified, and retrieved from the storage device.

[0009] The file systems periodically may create snapshots, i.e., a point in time image of the file system. Such snapshots may be later used for creating a copy of the data stored within the file system. The file system may create the snapshots for various data processing and storage purposes, such as backup, creating a checkpoint for restoring state of an application, data mining, and software debugging and testing. For instance, in case of a system crash or data getting corrupted, the snapshots can be used for restoring the data. Typically, the snapshots are created by copying the data at

each predetermined point in time to form an image of the data within the file system. The snapshot thus obtained, is saved in a snapshot volume on the storage disk. The point in time at which the snapshot is created is typically predetermined and may be based on a variety of conditions, for example, a number of days and time elapsed since a last snapshot creation. For instance, the file system may be set to periodically create snapshots at a predetermined time intervals.

[0010] Creating the snapshots periodically, may result in unpredictable data loss. For instance, in case the system is set to create snapshots every five hours and the system crashes in between two cycles of snapshot creation, say, in the fourth hour, the file system will be able to restore the data based on the last available snapshot created. In case if a large amount of data is modified since the last snapshot creation, if would result in an unpredictable data loss. The extent of data loss in such a case may not be acceptable from a service point of view.

[0011] Alternately, it may also happen that few or no modifications may happen over the data within the periodic interval. In such a case, the snapshot would still be created even though the modifications on the base data are not significant. Later snapshot thus created would more or less be representative of the previously available data. The later snapshot would however have b be stored. Over a period of time, the number of snapshots representing little or no modifications may be maintained in the storage device. This unnecessarily occupies space in the storage device. As a result, when significant modifications do occur, there may not be enough storage space available for accommodating the next snapshot. It should also be noted that creating such snapshots periodically may also utilize processing resources unnecessarily.

[0012] The present subject matter, describes a system and a method for snapshot creation. The present subject matter facilitates in dynamically creating a snapshot based on number and volume of data write operations performed by the system. The subject matter allows managing snapshots stored in a storage device of the system by dynamically performing snapshot actions, such as creating the snapshot, creating a snapshot at a replicated site, creating a backup of the snapshots, and expiring snapshots based on one or more predefined conditions. For instance, each snapshot action is dynamically performed based on either volume of data modified or number of transactions occurred since a last snapshot action was performed.

[0013] In accordance to an example of the present subject matter, the dynamic creation of a snapshot is based on determining the volume of data which has undergone modifications during a transaction being performed by the system. A transaction, also referred to as a system transaction, may be defined as a singular disk write or modification action. For instance, writing data onto data blocks of the storage device of the system may be referred to as a transaction. In the present example, occurrence of a new transaction is determined based on small computer system interface (SCSI) request received from an operating system of the system. Upon occurrence of the transaction, data blocks of the storage device may be analyzed to determine the volume of data written or modified during the transaction.

[0014] In one example, one or more snapshot delta values are used to determine when a snapshot action, such as creating the snapshot has to be performed. The snapshot delta value indicates the volume of data modified or the number of transactions occurred since creation of a reference snapshot. The reference snapshot is a snapshot having image of data in reference to which the volume of data modification is being determined. In operation, file system of the system computes an updated snapshot delta value upon

occurrence of a new transaction. The updated snapshot delta value is subsequently compared with a corresponding threshold value to determine if the snapshot action corresponding to the snapshot delta value has to be performed. In one example, the threshold value is at least one of a predetermined volume of data modified and a predetermined number of transactions.

[0015] In case the updated snapshot delta value is greater than the threshold value, a snapshot action is performed. In one example, the snapshot action corresponding to the snapshot delta value is performed. For instance, if it is determined that a snapshot delta count is greater than the threshold value, a new snapshot is created. The snapshot delta count is subsequently reset to zero. In case the snapshot delta value is less than the threshold value, no action may be taken and the storage system may continue tracking the transactions being performed.

[0016] The present subject matter thus provides systems and methods for minimizing data loss caused due to delay in snapshot creation and optimizing storage space utilization. For example, an acceptable limit may be prescribed for modifications which have been carried out on a volume of data. Only when the modifications are more than the acceptable limit as prescribed by a threshold value, would the snapshot be created. As will be understood based on the above description, the data loss is minimized by dynamically creating a new snapshot based on the snapshot delta count indicating the volume of data modified or number of transactions performed since a previous snapshot was created. Creating the new snapshot based on the snapshot delta count ensures that a substantial amount of data modifications are captured in the new snapshot. This is because whenever the volume of modified data, being tracked using the snapshot delta count, exceeds a preset threshold value, a snapshot is created. Similarly whenever the number

of transactions, being tracked using the snapshot delta count, exceeds a preset threshold value, the new snapshot is created. Further, creating the snapshots based on the snapshot delta count ensures in minimizing storage space wastage caused due to creation of snapshots having same or similar data as the snapshots are now created when a significant volume of data is modified.

[0017] Additionally, using the snapshot delta values, such as a snapshot-replicate value, a snapshot-backup value, and a snapshot-expire value, the reference snapshot stored in the storage device can be easily and dynamically managed. For instance, in case the snapshot-expire value exceeds the corresponding threshold value, the file system may determine that a substantial data of the reference snapshot has been modified and therefore the reference snapshot may be expired.

[0018] The above systems and methods are further described in conjunction with Fig. 1 to Fig. 4. It should be noted that the description and figures merely illustrate the principles of the present subject matter. It will thus be appreciated that various arrangements that embody the principles of the present subject matter, although not explicitly described or shown herein, can be devised from the description and are included within its scope. Furthermore, all examples recited herein are for pedagogical purposes to aid the reader in understanding the principles of the present subject matter. Moreover, all statements herein reciting principles, aspects, and examples of the present subject matter, as well as specific examples thereof, are intended to encompass equivalents thereof.

[0019] Figure 1(a) illustrates a block diagram of an example computing system 102 for snapshot creation, in accordance with an example of the present subject matter. The computing system 102 is hereinafter referred to as system 102. The system 102 may be implemented in, for example,

desktop computers, multiprocessor systems, personal digital assistants (PDAs), laptops, network computers, cloud servers, minicomputers, mainframe computers, hand-held devices, such as tablets, storage-systems. The system 102 may also be hosting a plurality of applications. The system 102 may further be implemented in a networked environment (not shown in the figure).

[0020] The system 102 may include, for example, processor(s) 104, a delta counter 108 communicatively coupled to the processor 104, a snapshot updating module 108 communicatively coupled to the processor 104, and a storage device 110.

[0021] The processor(s) 104 may include microprocessors, microcomputers, microcontrollers, digital signal processors, central processing units, state machines, logic circuitries, and/or any other devices that manipulate signals and data based on computer-readable instructions. Further, functions of the various elements shown in the figures, including any functional blocks labeled as "processors)", may be provided through the use of dedicated hardware as well as hardware capable of executing computer-readable instructions.

[0022] In operation, the delta counter 108 may compute an updated value of a snapshot delta count upon occurrence of a new transaction. The new transaction includes a data modification operation performed on data blocks of the storage device 118. The value of the snapshot delta count indicates at least one of volume of data modified since a last reset of the snapshot delta count and number of transactions performed since the last reset. In one example, the delta counter 106 may compute the updated value of the snapshot delta count based on volume of data modified during the new transaction. The data may be stored in the storage device 110.

[0023] The snapshot updating module 108 may subsequently compare the updated value of the snapshot delta count with a corresponding threshold value. In one example, the threshold value is at least one of a predetermined volume of data modified and a predetermined number of transactions. For instance, in case of a volume based count, the threshold value may be a predetermined percentage, say, 2%, 3%, or 5% of the volume of data stored in the storage device 118. In case of a transaction based count, the threshold value may be a predetermined number, say, 100, 200, or 400.

[0024] On determining the updated value of the snapshot delta count to be greater than the threshold value, the snapshot updating module 108 may create a new snapshot.

[0025] Figure 1(b) illustrates various example components of the system 102, in accordance with an example of the present subject matter. The system 102 includes the processor(s) 104, interface(s) 112, memory 114, modules 118, and data 118. The interfaces 112 may include a variety of commercially available interfaces, for example, interfaces for peripheral device(s), such as data input output devices, referred to as I/O devices, interface cards, storage devices, and network devices.

[0026] The memory 114 may be communicatively coupled to the processor 104 and may include any non-transitory computer-readable medium known in the art including, for example, volatile memory, such as static random access memory (SRAM) and dynamic random access memory (DRAM), and/or non-volatile memory, such as read only memory (ROM), erasable programmable ROM, flash memories, hard disks, optical disks, and magnetic tapes. In one example, the memory 114 may include the storage device 110 and main memory 120. The storage device 110, such as hard disks and magnetic tapes may be used for storing content, such as files in the

system 102. The main memory 120, such as RAM may be used for temporary storage of content for processing by the system 102.

[0027] The modules 116, amongst other things, include routines, programs, objects, components, and data structures, which perform particular tasks or implement particular abstract data types. The modules 116 may also be implemented as, signal processors), state machine(s), logic circuitries, and/or any other device or component that manipulate signals based on operational instructions. Further, the modules 118 can be implemented by hardware, by computer-readable instructions executed by a processing unit, or by a combination thereof.

[0028] The modules 116 may include the delta counter 106, the snapshot updating module 108, a delta reset counter 122, and other module(s) 124. The other modules 124 may include programs or coded instructions that supplement applications and functions, for example, programs in an operating system of the system 102. Further, the data 118 may include snapshot delta count 126, snapshots 128, delta reset count 130, and other data 132.

[0029] The system 102 facilitates dynamically creating a snapshot. The system further facilitates in managing existing snapshots saved in the storage device 110. Dynamically creating the snapshots, such as the snapshots 128 and managing the existing snapshots helps in achieving efficient and smooth working of the system 102. Further, dynamically creating the snapshots minimizes data loss caused due to delay in snapshot creation. In one example, the system 102 may dynamically create the snapshot based upon an updated value of a snapshot delta count indicating at least one of volume of data modified and number of transactions performed since the last reset of the snapshot delta count.

[0030] As previously described, the value of the snapshot delta count is dynamically updated to determine when the corresponding snapshot action has to be performed. In one example, the delta counter 108 computes the updated value of the snapshot delta count upon occurrence of a new transaction. As previously described, a transaction is a singular disk write or modification action performed on data blocks of the storage device 110 of the system 102. In one example, the delta counter 108 may determine the occurrence of the new transaction based on small computer system interface (SCSI) request received from an operating system of the system 102.

[0031] Upon determining the occurrence of the transaction, the delta counter 106 may compute the updated value of the snapshot delta count. In one example, the value of the snapshot delta count may be updated to indicate number of transactions performed since the last reset of the snapshot delta count. In another example, the value of the snapshot delta count may be updated to indicate volume of data modified since the last reset of the snapshot delta count. In yet another example, both, the volume of data modified and the number of transactions may be used to update the value of the snapshot delta count. In such a case, a volume based snapshot delta count and a transaction based snapshot delta count may be simultaneously updated.

[0032] To compute an updated value of the snapshot delta count, the delta counter 108 may obtain a last value of the snapshot delta count from the snapshot delta count 128. The delta counter 106 may then increment the last value of the snapshot delta count by one of the volume of data modified during the new transaction and number of transactions currently occurred, for instance, numeric value one to obtain the updated value of the snapshot delta count. Thus, to compute the snapshot delta count based on the number of transactions, the delta counter 108 may increment the last value of the

snapshot delta count by each the numeric value one each time a transaction occurs. For instance, if the last value of the transaction based snapshot delta count is 10 transactions, then on occurrence of the new transaction the delta counter 106 may increment the transaction based snapshot delta count by one to compute the updated value of the transaction based snapshot delta count as 11 transactions.

[0033] To compute the update value of the snapshot delta count based on the volume of data modified during the new transaction, the delta counter 108 may determine the volume of data modified. In one example, the delta counter 108 may analyze data blocks of the storage device 110 to determine the volume of data written or modified during the new transaction. For instance, the delta counter 106 may identify data blocks in the storage device 110 that are being modified as writes to the storage device 110 are performed during the transaction. Original data that is being written to is copied into a designated storage pool, say, the snapshots 128 in the storage device 110 that is set aside for creating and storing the snapshots before the original data is overwritten. Thus, before a write is allowed to a data block, an original data block is moved to the snapshots 128 based on the copy-on-write technique being used for snapshot creation.

[0034] The delta counter 106 may thus identify the data blocks being modified during the transaction and compute a difference between volume of the identified data blocks before the transaction and volume of the identified data blocks after the transaction. The difference thus computed may be identified as the volume of data modified during the new transaction. The delta counter 106 may then increment the last value of the snapshot delta count by the volume of data modified. For instance, if the last value of the snapshot delta count is 1.8%, say, 100 Megabyte (MB) and the volume of data modified during the new transaction is 30 MB, then the delta counter 106

may add 30 MB to 100 MB to compute the updated value of the snapshot delta count as 130 MB, i.e., 2.3%.

[0035] The updated value of the snapshot delta count is subsequently used by the snapshot updating module 108 to determine if a new snapshot has to be created. In one example, the snapshot updating module 108 may compare the updated value of the snapshot delta count with the corresponding threshold value. As previously described, the threshold value specifies one of the predetermined volume of data modified and the predetermined number of transactions. For instance, the threshold value for creating a new snapshot may be set as 100 transactions or 2% volume of data, i.e., 2% change in volume of data since last snapshot creation.

[0036] The snapshot updating module 108 may compare the updated value of the snapshot delta count with the corresponding threshold value to determine if the new snapshot has to be created. On determining the updated value of the snapshot delta count to be greater than the corresponding threshold value, the snapshot updating module 108 may create the new snapshot. The snapshot updating module 108 may further save the new snapshot in the snapshots 128. Upon creating the new snapshot, the snapshot updating module 108 may reset the corresponding snapshot delta count to zero. In case the snapshot delta count is less than the threshold value, the snapshot updating module 108 may indicate the delta counter 106 to continue tracking the data modifications in the storage device 110.

[0037] Further, the system 102 may use the updated value of the snapshot delta count for managing the existing snapshots 128. In one example, the system 102 may manage the existing snapshots by dynamically performing snapshot actions, such as creating a replicated copy of the snapshots, creating a backup of the snapshots, and expiring the snapshots based on one or more predefined conditions. For instance, each snapshot

action is dynamically performed when a snapshot delta value corresponding to the snapshot action crosses a corresponding threshold value.

[0038] In one example, one or more snapshot delta values are utilized to determine when the corresponding snapshot action has to be performed. The snapshot delta value indicates the volume of data modified or the number of transactions occurred since creation of a reference snapshot. The reference snapshot is a snapshot having image of data in reference to which the volume of data modification is being determined. The snapshot delta values include the snapshot delta count, a snapshot-replicate value, a snapshot-backup value, and a snapshot-expire value. As previously described, the snapshot delta count is used to determine if a new snapshot has to be created. The snapshot-replicate value is used to determine if a replicated volume snapshot of the reference snapshot has to be created. The snapshot-backup value is used to determine if the reference snapshot have to be added to a backup disk, such as a backup partition of a storage device, say, the storage device 110 of the system 102. The snapshot-expire value is used b determine if the reference snapshot has to be deleted.

[0039] In one example, the snapshot updating module 108 may compute the snapshot delta values based on the updated value of the snapshot delta count and a delta reset count. The delta reset count indicates number of times the snapshot delta count has been reset since creation of the reference snapshot. In one example, the delta reset count is computed by the delta reset counter 122. On determining the snapshot delta count to have been reset, the delta reset counter 122 may increment a last value of the delta reset count by a numerical value of one to obtain an updated value of the delta reset count. For instance, since the creation of a snapshot, i.e., the reference snapshot, the snapshot delta count has been reset twice, including the current reset, then the value of the delta reset count will be equal to

numeric value "two". The delta reset counter 122 may save the value of the delta reset count in the delta reset count 130.

[0040] The snapshot updating module 108 may subsequently use the updated value of the snapshot delta count and the delta reset count to compute an updated snapshot delta value. In one example, the updated snapshot delta value may be equal to a value of a cumulative function of the updated value of the snapshot delta count and the delta reset count. For instance, if the value of the delta reset count is two, the updated value of the snapshot delta count is equal to 5%, and the snapshot delta count is reset after every 10% change in volume of data, then the snapshot updating module 108 may determine that updated value of the snapshot delta count is equal to 25%.

[0041] The snapshot updating module 108 may compute the updated value of each of the snapshot delta value, i.e., the snapshot-replicate value, the snapshot-backup value, and the snapshot-expire value upon occurrence of the new transaction. In one example, the snapshot updating module 108 may compute the updated snapshot delta values in a predefined order defined based on a corresponding threshold value and the snapshot action that has to be performed based on the updated snapshot delta value. For instance, once the reference snapshot has been created, the snapshot updating module 108 may initially start computing the snapshot-replicate value upon the occurrence of every new transaction. The snapshot updating module 108 may compute the snapshot-replicate value based on the updated value of the snapshot delta count and the delta reset count. Once the snapshot-replicate value crosses the corresponding threshold value and the replicated volume snapshot of the reference snapshot is created, the snapshot updating module 108 may start computing the snapshot-backup value. The snapshot updating module 108, in such a case may assign the

value of a last snapshot-replicate value as an initial snapshot-backup value. The snapshot updating module 108 may thus update the snapshot delta value upon occurrence of each transaction.

[0042] The updated snapshot delta value is subsequently used by the snapshot updating module 108 to determine if the snapshot action has to be performed. In one example, the snapshot updating module 108 may compare the updated snapshot delta value with the corresponding threshold value. As previously described, the threshold value specifies one of the predetermined volume of data modified and the predetermined number of transactions. Further, a separate threshold value may be predetermined for each of the snapshot action. For instance, the threshold value for creating a replicated volume snapshot of the reference snapshot may be set as 1000 transactions or 20% volume of data, i.e., 20% change in volume of data with respect to the reference snapshot. The threshold value for creating a backup of the reference snapshot may be set as 3000 transactions or 60% volume of data, i.e., 80% change in volume of date with respect to the reference snapshot. The threshold value for expiring the reference snapshot may be set as 5000 transactions or 80% volume of data, i.e., 80% change in volume of data with respect to the reference snapshot. The percentage of delta change is calculated using delta counter 108 and snapshot updating module 108.

[0043] On determining the updated snapshot delta value to be greater than the corresponding threshold value, the snapshot updating module 108 may perform the corresponding snapshot action. For instance, the snapshot updating module 108 may create the replicated volume snapshot of the reference snapshot if the snapshot-replicate value is greater than the corresponding threshold value. In one example, the snapshot updating module 108 may create the replicated volume snapshot of the reference

snapshot in a server (not shown in the figure) remotely connected to the system 100 through a communication network.

[0044] Further, the snapshot updating module 108 may add the reference snapshot to a backup disk (not shown in the figure) connected to the system 102 if the snapshot-backup value is greater than the corresponding threshold value. The snapshot updating module 108 may further expire and delete the reference snapshot if the snapshot-expire value is greater than the corresponding threshold value.

[0045] Further, in one example, the snapshot updating module 108 may create the new snapshot upon occurrence of a snapshot update condition. In one example, the snapshot update condition is at least one of number of errors detected in the storage device 110 being greater than a predetermined error threshold; occurrence of a change in characteristics of existing snapshots saved in the storage device 110; and number of the existing snapshots being less than a minimum snapshot threshold. To determine the occurrence of the snapshot update condition, the snapshot updating module 108 may monitor performance of the storage device 110 and other hardware components connected to the storage device 110.

[0046] In one example, the snapshot updating module 108 may determine occurrence of error in the storage device 110 using SCSI commands received by the storage device 110. A low level of SCSI commands may indicate an error in the storage device 110. In another example, the snapshot updating module 108 may determine occurrence of error using other commands sent to the storage device 110 or array firmware of the system 102 to determine perceived or actual error rates.

[0047] Figures. 2 and 3 illustrate example methods 200 and 300, respectively, for snapshot creation, in accordance with an example of the

present subject matter. The order in which the methods are described is not intended to be construed as a limitation, and any number of the described method blocks may be combined in any order to implement the aforementioned methods, or an alternative method. Furthermore, the methods 200 and 300 may be implemented by processing resource or computing device(s) through any suitable hardware, non-transitory machine readable instructions, or combination thereof.

[0048] It may also be understood that the methods 200 and 300 may be performed by programmed computing devices, such as the system 102 as depicted in Figures. 1(a) and 1(b). Furthermore, the methods 200 and 300 may be executed based on instructions stored in a non-transitory computer readable medium, as will be readily understood. The non-transitory computer readable medium may include, for example, digital memories, magnetic storage media, such as one or more magnetic disks and magnetic tapes, hard drives, or optically readable digital data storage media.

[0049] Further, the methods 200 and 300 are described below with reference to the system 102 as described above, other suitable systems for the execution of these methods can be utilized. Additionally, implementation of these methods is not limited to such examples.

[0050] Referring to Figure 2, at block 202, updated snapshot delta value is computed. In one example, the updated snapshot delta value is computed upon occurrence of a new transaction. The new transaction is a data modification operation performed on data blocks of a storage device, for example, the storage device 110. Further, the snapshot delta value indicates at least one of volume of data modified since creation of a reference snapshot and number of transactions performed since the creation.

[0051] At block 204, the updated snapshot delta value is compared with a corresponding threshold value. The threshold value is at least one of a predetermined volume of data modified and a predetermined number of transactions.

[0052] At block 206, a snapshot action is performed based on the comparison. In one example, upon determining the updated snapshot delta value to be greater than the corresponding threshold value, the system 102 may perform a snapshot action corresponding to the snapshot delta value.

[0053] Referring to Figure 3, at block 302, occurrence of a new transaction is detected. The new transaction is a data modification operation performed on data blocks of a storage device, for example, the storage device 110. In one example, occurrence of the new transaction is determined based on a small computer system interface (SCSI) request received from an operating system of a computing system, for example, the system 102.

[0054] At block 304, an updated value of a snapshot delta count is computed. The value of a snapshot delta count indicates at least one of volume of data modified since a last reset of the snapshot delta count and number of transactions performed since the last reset. in one example, the system 102 may compute the updated value of the snapshot delta count by incrementing a last value of the snapshot delta count by one of the volume of data modified and number of transactions currently occurred to obtain the updated value of the snapshot delta count.

[0055] At block 306, it is determined whether an updated value of the snapshot delta count is greater than a corresponding threshold value. The threshold value is at least one of a predetermined volume of data modified and a predetermined number of transactions. For example, in case the updated value of the snapshot delta count is less than a corresponding

threshold value, ('No' path from block 306), the system computes an updated snapshot delta value based on the updated value of the snapshot delta count and a delta reset count at block 308. The delta reset count indicates number of times the snapshot delta count has been reset since creation of a reference snapshot.

[0056] In case the updated value of the snapshot delta count is more than the corresponding threshold value, ('Yes' path from block 306), the system creates a new snapshot at block 310.

[0057] At block 312, the snapshot delta count is reset. In one example, the snapshot delta count is reset by the snapshot updating module 108 of the system 102.

[0058] At block 314, an updated value of the delta reset count is computed. In one example, a delta reset counter, such as the delta reset counter 122 of the system 102 computes the updated value of the delta reset count. The updated value of the delta reset count is obtained by incrementing a last value of the delta reset count by a numerical value of one.

[0059] At block 318, an updated snapshot delta value is computed based on the updated value of the snapshot delta count and the updated value delta reset count. In one example, the snapshot updating module 108 of the system 102 computes the updated snapshot delta value.

[0060] At block 318, it is determined whether the updated snapshot delta value is greater than another corresponding threshold value. The threshold value is at least one of a predetermined volume of data modified and a predetermined number of transactions. For example, in case the updated snapshot delta value is less than a corresponding threshold value, ('No' path from block 318), the system continues detecting occurrence of new transactions at block 302.

[0061] In case the updated snapshot delta value is greater than a corresponding threshold value, ('Yes' path from block 318), the system performs a snapshot action at block 320. Examples of the snapshot action include, but are not limited to, creating a new snapshot, creating a replicated volume snapshot of the reference snapshot, creating a backup of the reference snapshot, and expiring the reference snapshot.

[0062] Figure 4 illustrates an example network environment 400 for snapshot creation, according to an example of the present disclosure. The system environment 400 may comprise at least a portion of a public networking environment or a private networking environment, or a combination thereof. In one implementation, the system environment 400 includes a processing resource 402 communicatively coupled to a computer readable medium 404 through a communication link 406.

[0063] For example, the processing resource 402 can include one or more processors of a computing device for dynamic snapshot creation and management. The computer readable medium 404 can be, for example, an internal memory device of the computing device or an external memory device. In one implementation, the communication link 406 may be a direct communication link, such as any memory read/write interface. In another implementation, the communication link 406 may be an indirect communication link, such as a network interface. In such a case, the processing resource 402 can access the computer readable medium 404 through a network 408. The network 408 may be a single network or a combination of multiple networks and may use a variety of different communication protocols.

[0064] The processing resource 402 and the computer readable medium 404 may also be coupled to requested data sources 410 through the communication link 406, and/or to communication devices 412 over the

network 408. The coupling with the requested data sources 410 enables in receiving the requested data in an offline environment, and the coupling with the communication devices 412 enables in receiving the requested data in an online environment.

[0065] In one implementation, the computer readable medium 404 includes a set of computer readable instructions, implementing a delta counter 414 and a snapshot updating module 416. The set of computer readable instructions can be accessed by the processing resource 402 through the communication link 406 and subsequently executed to process requested data communicated with the requested data sources 410 in order to facilitate dynamic snapshot creation and management. When executed by processing resource 402, the instructions of delta counter 414 may perform the functionalities described above in relation to the delta counter 106. When executed by processing resource 402, the instructions of the snapshot updating module 416 may perform the functionalities described above in relation b the snapshot updating module 108.

[0066] For example, upon occurrence of a new transaction, the delta counter 414 may compute an updated value of a snapshot delta count. As previously described, the new transaction is a data modification operation performed on data blocks of a storage device of the communication devices 412. In one example, the delta counter 414 may detect the occurrence of the new transaction based on a small computer system interface (SCSI) request received from an operating system of the communication devices 412.

[0067] Further, the value of a snapshot delta count indicates at least one of volume of data modified since a last reset of the snapshot delta count and number of transactions performed since the last reset. In one example, to compute the updated value of the snapshot delta count, the delta counter 414 may increment a last value of the snapshot delta count by either the volume

of data modified or the number of transactions occurred, to obtain the updated value of the snapshot delta count. The last value of the snapshot delta count is the most recent computed value of the snapshot delta count.

[0068] In order to compute a volume based snapshot delta count, the delta counter 414 may initially determine volume of data modified during the new transaction. Based on the volume thus determined, the delta counter 414 may increment the last value of the snapshot delta count by the volume of data modified. In order to compute a transaction based snapshot delta count, the delta counter 414 may increment the last value of the snapshot delta count by the number of transactions currently occurred, for instance, numeric value one.

[0069] The snapshot updating module 416 may subsequently compare the updated value of the snapshot delta count with a corresponding threshold value. As previously described, the threshold value is at least one of a predetermined volume of data modified and a predetermined number of transactions. The snapshot updating module 418 may compare the updated value of the snapshot delta count with the corresponding threshold value to determine whether the snapshot delta count is greater than the corresponding threshold value. For example, on determining the updated value of the snapshot delta count to be greater than the threshold value, the snapshot updating module 416 may create a new snapshot. Further, the snapshot updating module 416 may use the updated value of the snapshot delta count and a delta reset count to compute an updated snapshot delta value. The snapshot delta value indicates at least one of volume of data modified since creation of a reference snapshot and number of transactions performed since creation of the reference snapshot. The delta reset count indicates number of times the snapshot delta count has been reset since creation of the reference snapshot.

[0070] Further, the snapshot updating module 416 may compare the updated snapshot delta value with the corresponding threshold value to determine whether the updated snapshot delta value is greater than the corresponding threshold value. As previously described, the threshold value is at least one of a predetermined volume of data modified and a predetermined number of transactions. On determining the updated value of the snapshot delta count to be greater than the threshold value, the snapshot updating module 416 may perform a snapshot action. The snapshot action is at least one of creating a new snapshot if the snapshot delta value is a snapshot delta count; creating a replicated volume snapshot of the reference snapshot if the snapshot delta count is a snapshot-replicate value; adding the reference snapshot to a backup disk is the snapshot delta count is a snapshot-backup value; and deleting the reference snapshot if the snapshot delta count is a snapshot-expire value.

[0071] Although examples for the present disclosure have been described in language specific to structural features and/or methods, it should be understood that the appended claims are not necessarily limited to the specific features or methods described. Rather, the specific features and methods are disclosed and explained as examples of the present disclosure.

I/We claim:

1. A method comprising:

computing an updated snapshot delta value upon occurrence of a new transaction, wherein the snapshot delta value indicates at least one of volume of data modified since creation of a reference snapshot and number of transactions performed since creation of the reference snapshot, and wherein the new transaction is a data modification operation performed on data blocks of a storage device;

comparing the updated snapshot delta value with a corresponding threshold value, wherein the threshold value is at least one of a predetermined volume of data modified and a predetermined number of transactions; and

performing a snapshot action based on the comparison.

2. The method as claimed in claim 1, wherein the snapshot delta value is one of a snapshot delta count, a snapshot-replicate value, a snapshot-backup value, and a snapshot-expire value.

3. The method of claim 2, wherein the snapshot action is at least one of:

creating a new snapshot if the snapshot delta value is the snapshot delta count;

creating a replicated volume snapshot of the reference snapshot if the snapshot delta value is the snapshot-replicate value;

adding the reference snapshot to a backup disk is the snapshot delta value is the snapshot-backup value; and

deleting the reference snapshot if the snapshot delta value is the snapshot-expire value.

4. The method of claim 1, wherein the computing further comprising:

determining volume of data modified during the new transaction;

incrementing a last value of a snapshot delta count by one of the volume of data modified and number of transactions currently occurred to obtain an updated value of the snapshot delta count, wherein the value of the snapshot delta count indicates at least one of volume of data modified since a last reset of the snapshot delta count and number of transactions performed since the last reset; and

compute the updated snapshot delta value based on the updated value of the snapshot delta count and a delta reset count, wherein the delta reset count indicates number of times the snapshot delta count has been reset since creation of the reference snapshot.

5. The method as claimed in claim 4, wherein the method further comprising:

determining the updated value of the snapshot delta count to be greater than the corresponding threshold:

resetting the snapshot delta count to zero; and

incrementing a last value of the delta reset count by a numerical value of one to obtain an updated value of the delta reset count.

8. A computing system comprising:

a processor;

a delta counter coupled to the processor to:

compute an updated value of a snapshot delta count upon occurrence of a new transaction, wherein the value of the snapshot delta count indicates one of volume of data modified since a last reset of the snapshot delta count and number of transactions performed since the last reset, and wherein the

new transaction includes a data modification operation performed on data blocks of a storage device of the computing system; and

a snapshot updating module coupled to the processor to:

compare the updated value of the snapshot delta count with a corresponding threshold value, wherein the threshold value specifies one of a predetermined volume of data modified and a predetermined number of transactions; and

on determining the updated value of the snapshot delta count to be greater than the threshold value, create a new snapshot.

7. The computing system as claimed in claim 6, wherein the delta counter further is to:

determine volume of data modified during the new transaction; and

increment a last value of the snapshot delta count by one of the volume of data modified and number of transactions currently occurred to obtain the updated value of the snapshot delta count.

8. The computing system as claimed in claim 7, wherein the snapshot updating module further is to:

compute an updated snapshot delta value based on the updated value of the snapshot delta count and a delta reset count to obtain, wherein the snapshot delta value indicates at least one of volume of data modified since creation of a reference snapshot and number of transactions performed since creation of the reference snapshot, and wherein the delta reset count indicates number of times the snapshot delta count has been reset since creation of the reference snapshot; and

compare the updated snapshot delta value with the corresponding threshold value to determine if a snapshot action has to be performed.

9. The computing system as claimed in claim 8, wherein on determining the updated snapshot delta value to be greater than the corresponding threshold value, the snapshot updating module further is to:

create a replicated volume snapshot of the reference snapshot if the snapshot delta value is the snapshot-repiicate value;

add the reference snapshot to a backup disk if the snapshot delta value is the snapshot-backup value; and

delete the reference snapshot if the snapshot delta value is the snapshot-expire value.

10. The computing system as claimed in claim 6 further comprising a delta reset counter coupled to the processor to:

determine the snapshot delta count to have been reset to zero; and

increment a last value of the delta reset count by a numerical value of one to obtain an updated value of the delta reset count, wherein the delta reset count indicates number of times the snapshot delta count has been reset since creation of the reference snapshot.

11. The computing system as claimed in claim 8, wherein the snapshot updating module further is to:

determine occurrence of a snapshot update condition, wherein the snapshot update condition is at least one of:

number of errors detected in the storage device being greater than a predetermined error threshold;

occurrence of a change in characteristics of reference snapshot saved in the storage device; and

number of the reference snapshot being less than a minimum snapshot threshold; and

create the new snapshot occurrence of the snapshot update condition.

12. A non-transitory computer readable medium having a set of computer readable instructions that, when executed, cause a processor to:

compute an updated snapshot delta value upon occurrence of a new transaction, wherein the snapshot delta value indicates at least one of volume of data modified since creation of a reference snapshot and number of transactions performed since creation of the reference snapshot, and wherein the new transaction is a data modification operation performed on data blocks of the storage device;

compare the updated snapshot delta value with a corresponding threshold value, wherein the threshold value is at least one of a predetermined volume of data modified and a predetermined number of transactions; and

on determining the updated snapshot delta value to be greater than the threshold value, perform a snapshot action, wherein the snapshot action is at least one of:

creating a new snapshot if the snapshot delta value is a snapshot delta count;

creating a replicated volume snapshot of the reference snapshot if the snapshot delta value is a snapshot-replicate value;

adding the reference snapshot to a backup disk is the snapshot delta value is a snapshot-backup value; and

deleting the reference snapshot if the snapshot delta value is a snapshot-expire value.

13. The non-transitory computer readable medium of claim 12, wherein the snapshot delta value is one of the snapshot delta count, the snapshot-replicate value, the snapshot-backup value, and the snapshot-expire value.

14. The non-transitory computer readable medium of claim 12, wherein the computer readable instructions, when executed, further cause the processor to:

determine volume of data modified during the new transaction;

increment a last value of a snapshot delta count by one of the volume of data modified and number of transactions currently occurred to obtain an updated value of the snapshot delta count, wherein the value of a snapshot delta count indicates at least one of volume of data modified since a last reset of the snapshot delta count and number of transactions performed since the last reset; and

compute the updated snapshot delta value based on the updated value of the snapshot delta count and a delta reset count, wherein the delta reset count indicates number of times the snapshot delta count has been reset since creation of the reference snapshot.

15. The non-transitory computer readable medium of claim 12, wherein the computer readable instructions, when executed, further cause the processor to:

determine the updated value of the snapshot delta count to be greater than the corresponding threshold;

reset the snapshot delta count to zero; and

increment a last value of the delta reset count by a numerical value of one to obtain an updated value of the delta reset count.

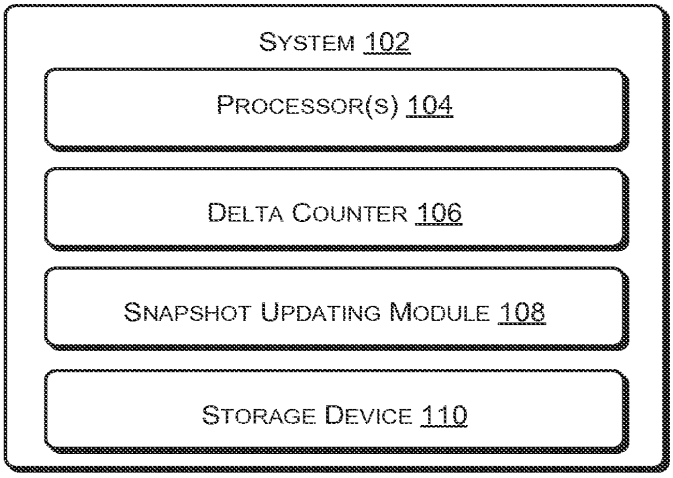

SYSTEM 102
PROCESSOR(S) 104
DELTA COUNTER 106
SNAPSHOT UPDATING MODULE 108
STORAGE DEVICE 110

Figure 1(a)

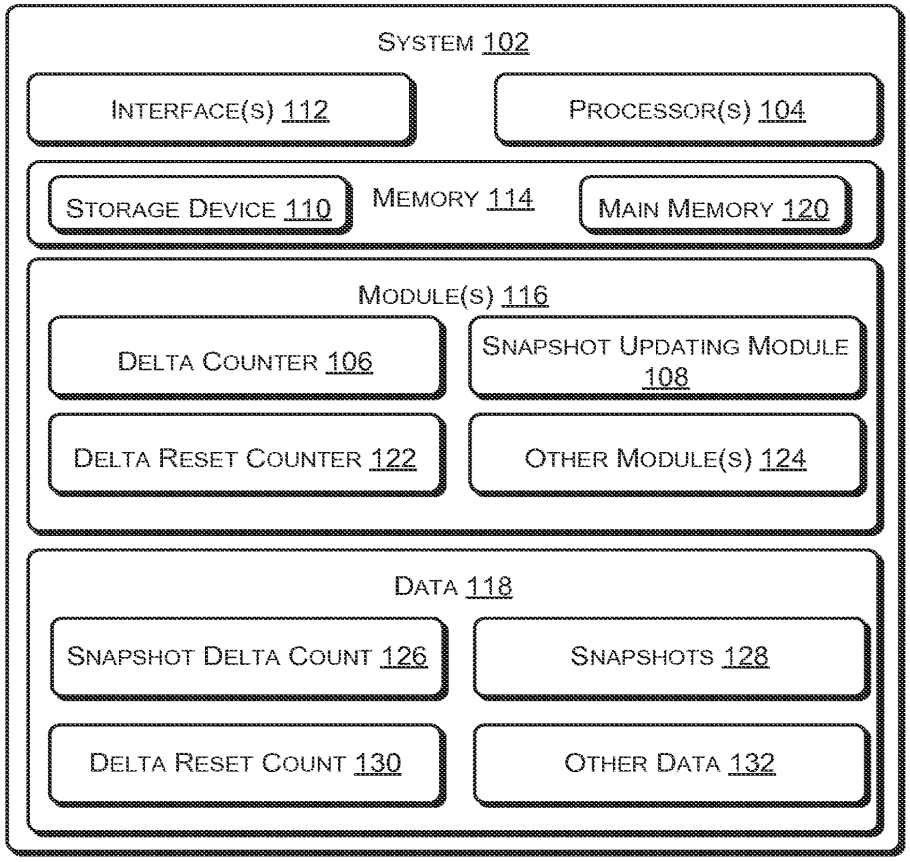

SYSTEM 102
INTERFACE(S) 112
PROCESSOR(S) 104
STORAGE DEVICE 110
MEMORY 114
MAIN MEMORY 120
MODULE(S) 116
DELTA COUNTER 106
SNAPSHOT UPDATING MODULE 108
DELTA RESET COUNTER 122
OTHER MODULE(S) 124
DATA 118
SNAPSHOT DELTA COUNT 126
SNAPSHOTS 128
DELTA RESET COUNT 130
OTHER DATA 132

Figure 1(b)

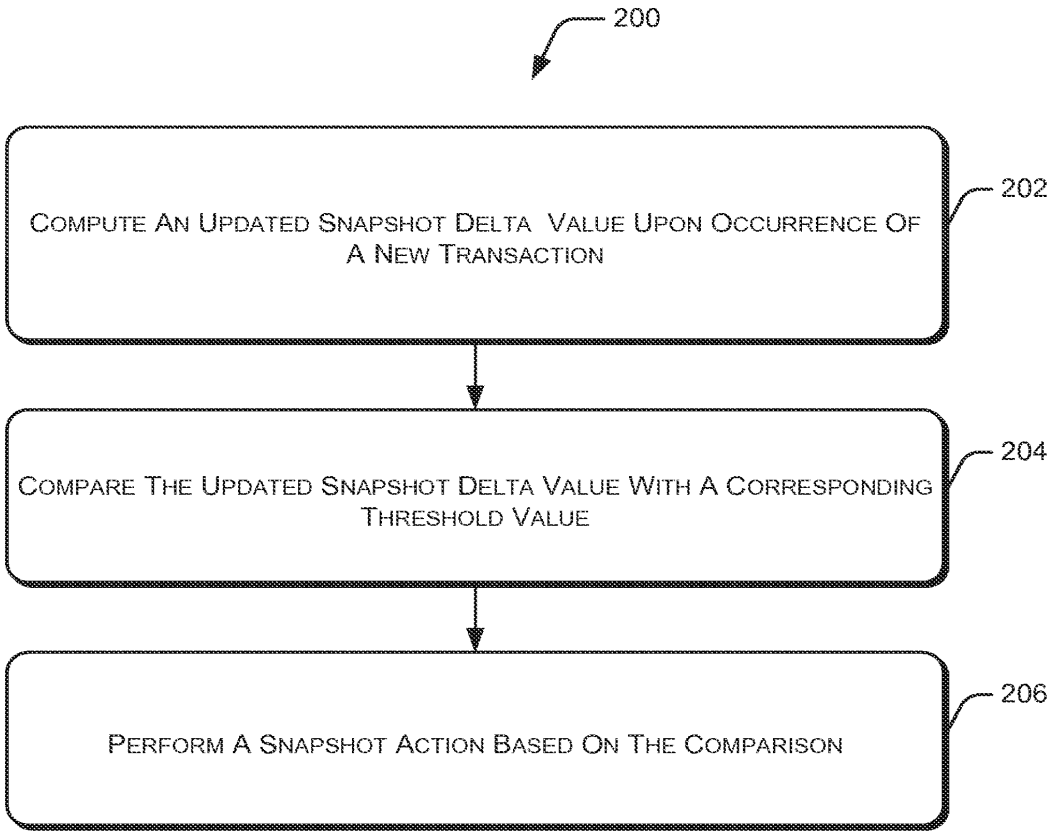

200
COMPUTE AN UPDATED SNAPSHOT DELTA VALUE UPON OCCURRENCE OF A NEW TRANSACTION
202
COMPARE THE UPDATED SNAPSHOT DELTA VALUE WITH A CORRESPONDING THRESHOLD VALUE
204
PERFORM A SNAPSHOT ACTION BASED ON THE COMPARISON
206

Figure 2

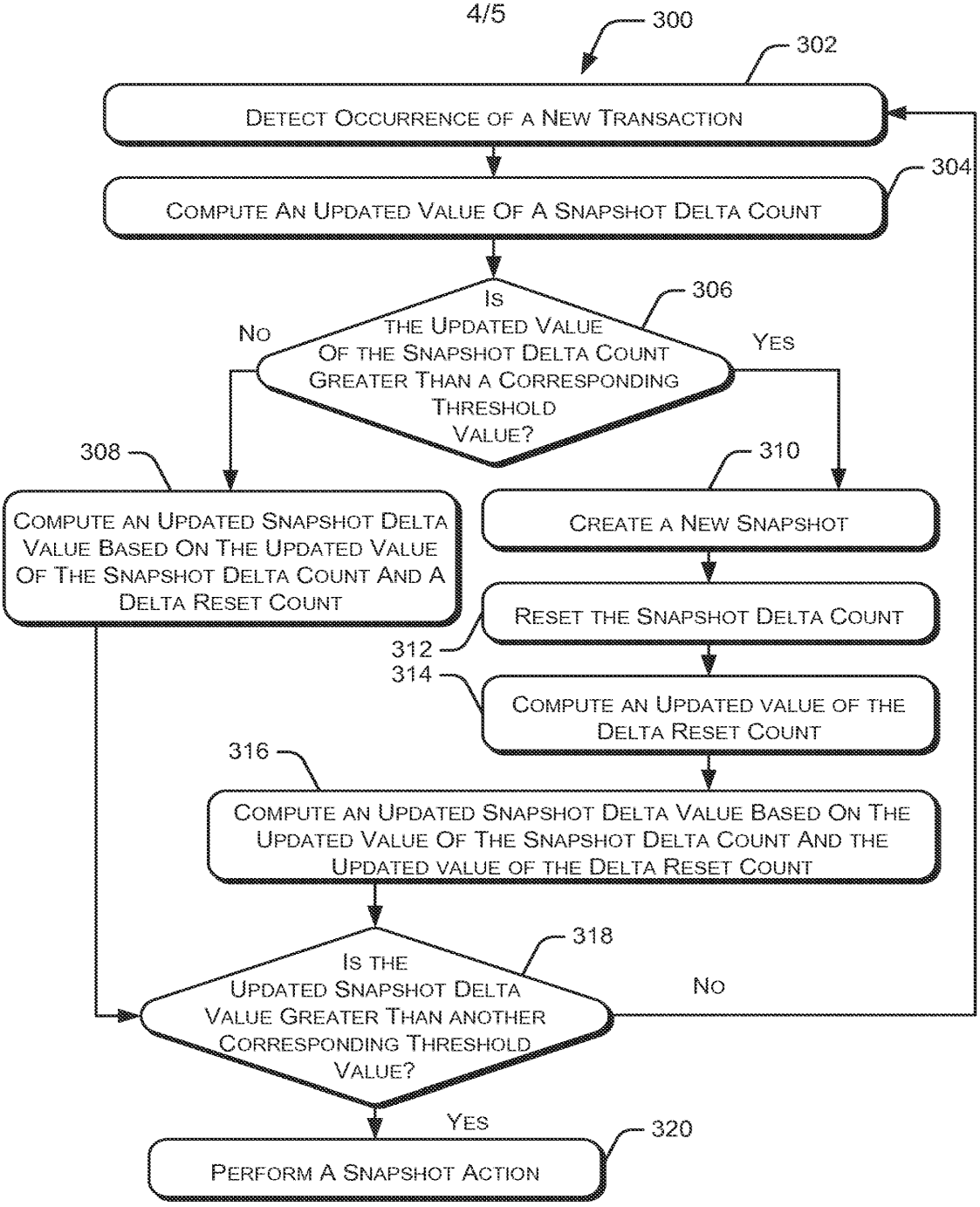

300
302
DETECT OCCURRENCE OF A NEW TRANSACTION
304
COMPUTE AN UPDATED VALUE OF A SNAPSHOT DELTA COUNT
306
IS THE UPDATED VALUE OF THE SNAPSHOT DELTA COUNT GREATER THAN A CORRESPONDING THRESHOLD VALUE?
NO
YES
308
COMPUTE AN UPDATED SNAPSHOT DELTA VALUE BASED ON THE UPDATED VALUE OF THE SNAPSHOT DELTA COUNT AND A DELTA RESET COUNT
310
CREATE A NEW SNAPSHOT
RESET THE SNAPSHOT DELTA COUNT
312
314
COMPUTE AN UPDATED VALUE OF THE DELTA RESET COUNT
316
COMPUTE AN UPDATED SNAPSHOT DELTA VALUE BASED ON THE UPDATED VALUE OF THE SNAPSHOT DELTA COUNT AND THE UPDATED VALUE OF THE DELTA RESET COUNT
318
IS THE UPDATED SNAPSHOT DELTA VALUE GREATER THAN ANOTHER CORRESPONDING THRESHOLD VALUE?
NO
YES
320
PERFORM A SNAPSHOT ACTION

Figure 3

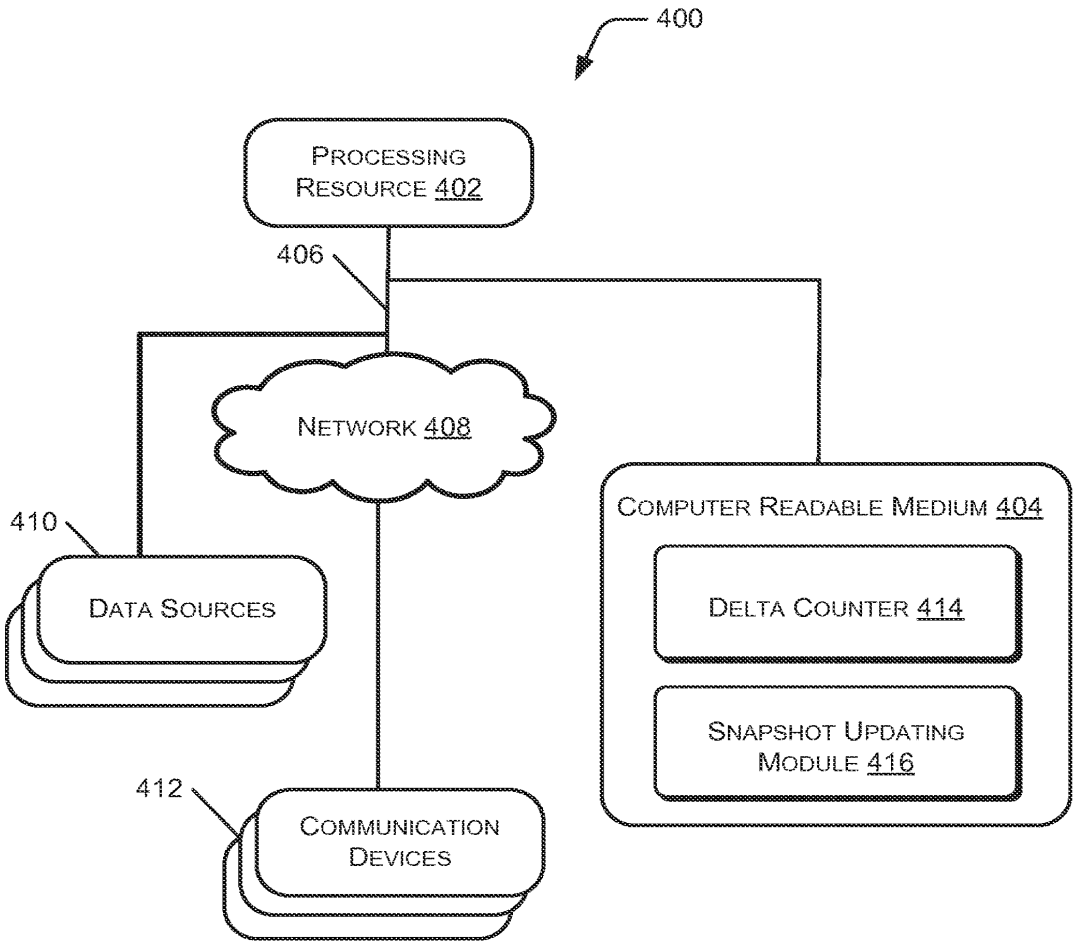

400
PROCESSING RESOURCE 402
406
NETWORK 408
410
DATA SOURCES
412
COMMUNICATION DEVICES
COMPUTER READABLE MEDIUM 404
DELTA COUNTER 414
SNAPSHOT UPDATING MODULE 416

Figure 4

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2014/070403

A. CLASSIFICATION OF SUBJECT MATTER

G06Q 10/06(2012.01)i

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)
G06Q 10/06; G06F 15/16; G06F 9/44; G06F 17/30; G06F 11/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Korean utility models and applications for utility models
Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
eKOMPASS(KIPO internal) & Keywords: compare, updated snapshot delta value, threshold value, snapshot action

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2008-0228879 A1 (RICHARD J. CARDONE et al.) 18 September 2008 See abstract, paragraphs [0049],[0071],[0074] and claims 5,7,17.	1-3,12,13
A		4-11,14,15
Y	US 8103622 B1 (VINEETH KARINTA) 24 January 2012 See abstract and claim 1.	1-3,12,13
A	US 2007-0198605 A1 (NOBUYUKI SAIKA) 23 August 2007 See abstract and claims 1-2.	1-15
A	US 2006-0136771 A1 (HARUAKI WATANABE) 22 June 2006 See abstract, paragraphs [0092],[0093],[0101] and claims 1-2.	1-15
A	US 2014-0122853 A1 (INTERNATIONAL BUSINESS MACHINES CORPORATION) 01 May 2014 See abstract, paragraphs [0055]-[0057] and claim 4.	1-15

☐ 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 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
23 July 2015 (23.07.2015)	**23 July 2015 (23.07.2015)**

Name and mailing address of the ISA/KR	Authorized officer
International Application Division Korean Intellectual Property Office 189 Cheongsa-ro, Seo-gu, Daejeon Metropolitan City, 302-701, Republic of Korea	Jang, Gijeong
Facsimile No. +82-42-472-7140	Telephone No. +82-42-481-8364

Form PCT/ISA/210 (second sheet) (January 2015)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/US2014/070403

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2008-0228879 Al	18/09/2008	US 2006-0036676 Al	16/02/2006
		us 2009-0307373 Al	10/12/2009
		us 7392324 B2	24/06/2008
		us 8005986 B2	23/08/2011
		us 8832310 B2	09/09/2014
us 8103622 Bl	24/01/2012	**us** 7676510 Bl	09/03/2010
us 2007-0198605 Al	23/08/2007	JP 2007-219609 A	30/08/2007
		us 7882067 B2	01/02/2011
us 2006-0136771 Al	22/06/2006	DE 602005000926 Dl	31/05/2007
		DE 602005000926 T2	17/01/2008
		EP 1667023 Al	07/06/2006
		EP 1667023 Bl	18/04/2007
		JP 04583150 B2	17/11/2010
		JP 2006-163729 A	22/06/2006
		US 2009-0216977 Al	27/08/2009
		us 7536592 B2	19/05/2009
		us 8095822 B2	10/01/2012
us 2014-0122853 Al	01/05/2014	CA 2794132 Al	01/05/2014
		US 2014-0122859 Al	01/05/2014

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

First Inventor Name:	Balasubrahmanyam Kuchibhotla
Title:	SYSTEM AND METHOD FOR PROVISIONING DATABASES IN A HYPERCONVERGED INFRASTRUCTURE SYSTEM
Application No.:	16/234,553
Filing Date:	12-27-2018
Examiner:	ABEL JALIL, NEVEEN
Art Unit:	2166
Confirmation No.:	2275

INFORMATION DISCLOSURE STATEMENT UNDER 37 CFR §1.56

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Commissioner:

Applicant submits herewith documents for the Examiner's consideration in accordance with 37 CFR §§1.56, 1.97 and 1.98.

Applicants respectfully request that each listed document be considered by the Examiner and be made of record in the present application and that an initialed copy of Form PTO/SB/08 be returned in accordance with MPEP §609.

The submission of any document herewith is not an admission that such document constitutes prior art against the claims of the present application or that such document is considered material to patentability as defined in 37 CFR §1.56(b). Applicants do not waive any rights to take any action which would be appropriate to antedate or otherwise remove as a competent reference any document submitted herewith.

TIMING OF THE DISCLOSURE

The listed documents are being submitted in compliance with 37 CFR §1.97(b), before the mailing of a first Office Action on the merits.

The Commissioner is hereby authorized to charge any additional fees which may be due to Deposit Account No. 19-0741.

Respectfully submitted,

Date July 17, 2020 By */Paul S. Hunter/*

FOLEY & LARDNER LLP
Customer Number: 147491
Telephone: (858) 847-6733
Facsimile: (858) 792-6773

Paul S. Hunter
Attorney for Applicant
Registration No. 44,787

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 16/234,553	Filing Date 12/27/2018	☐ 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 $100 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $460 =	
☐ 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	12/14/2020	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 23	Minus	** 23	= 0		x $100 =	0
	Independent (37 CFR 1.16(h))	* 3	Minus	*** 3	= 0		x $480 =	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.	SLIE
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".	/JASON ANTHONY JORDAN/
*** 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.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

First Inventor Name:	Balasubrahmanyam Kuchibhotla
Title:	SYSTEM AND METHOD FOR PROVISIONING DATABASES IN A HYPERCONVERGED INFRASTRUCTURE SYSTEM
Appl. No.:	16/234553
Filing Date:	12/27/2018
Examiner:	HARPER, ELIYAH STONE
Art Unit:	2166
Confirmation Number:	2275

PRELIMINARY AMENDMENT UNDER 37 C.F.R. 1.115

Mail Stop AMENDMENT
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Commissioner:

Prior to examination of the present Application, Applicant respectfully requests that the application be amended as follows:

Amendments to the Claims are reflected in the listing of claims which begins on page 2 of this document.

Remarks begin on page 8 of this document.

Please amend the application as follows:

Amendments to the Claims:

This listing of claims will replace all prior versions and listings of claims in the application:

Listing of Claims:

1. (Currently Amended) A method comprising:

receiving, by a ~~database engine~~ processor executing computer-readable instructions stored on a memory ~~associated with a hyperconverged infrastructure system~~, a user request for provisioning a source database in a hyperconverged infrastructure system;

receiving, by the processor ~~database engine~~, selection of a database engine type;

receiving, by the processor ~~database engine~~, selection of a Service Level Agreement ("SLA") and a protection schedule;

provisioning, by the processor ~~database engine~~, the source database based upon the database engine type; and

~~creating, by the database engine, an instance of a database protection system~~ setting up, by the processor, automatic capturing of snapshots and transactional logs based upon the SLA and the protection schedule for protecting the source database~~, including associating the instance of the database protection system with the source database~~.

2. (Currently Amended) The method of claim 1, further comprising:

receiving, by the processor ~~database engine~~, selection of a first set of parameters; and

creating, by the processor ~~database engine~~, a source database virtual machine based on the first set of parameters, wherein the source database resides on the source database virtual machine.

3. (Original) The method of claim 2, wherein the first set of parameters comprises at least one of a software profile, a compute profile, a network profile, and a database parameters profile.

4. (Currently Amended) The method of claim 1, further comprising:

converting, by the processor ~~database engine~~, a size of the source database into a number of virtual disks; and

associating, by the processor ~~database engine~~, the number of virtual disks with the source database.

5. (Previously Presented) The method of claim 1, wherein provisioning the source database comprises creating a new database as the source database.

6. (Previously Presented) The method of claim 1, wherein provisioning the source database comprises registering an existing database as the source database.

7. (Currently Amended) The method of claim 1, wherein the protection schedule comprises a first frequency at which the ~~of capturing~~ snapshots are captured and a second frequency ~~of capturing~~ at which the transactional logs are captured for protecting the source database.

8. (Currently Amended) The method of claim 1, further comprising:

presenting, by the processor ~~database engine~~, a group of [[the]] database engine types that are supported by the hyperconverged infrastructure system; and

receiving, by the database engine, ~~one of~~ the selection of the database engine type from the group of [[the]] database engine types ~~as the selection of the database engine type~~.

9. (Currently Amended) The method of claim 1, further comprising:

receiving, by the processor ~~database engine~~, selection of at least one of a sample set of parameters for creating a source database virtual machine for hosting the source database; and

creating, by the processor ~~database engine~~, the source database virtual machine based upon the at least one of the sample set of parameters.

10. (Currently Amended) The method of claim 1, further comprising:

presenting, by the processor ~~database engine~~, a plurality of levels of the SLA; and

receiving, by the processor ~~database engine~~, selection of one of the plurality of levels of the SLA.

11. (Original) The method of claim 1, wherein the protection schedule comprises a time period for designating at least one of a daily snapshot, a weekly snapshot, a monthly snapshot, and a quarterly snapshot.

12. (Currently Amended) A database management system comprising:

~~a dashboard;~~

~~a database engine of a hyperconverged infrastructure system to receive input from and provides output to the dashboard; and~~

~~a database storage system of the hyperconverged infrastructure system to store a source database upon provisioning;~~

~~wherein the database engine includes programmed instructions that when executed cause the database engine to:~~

a memory comprising computer-readable instructions stored thereon; and

a processor that executes the computer-readable instructions to:

receive a user request ~~via the dashboard~~ for provisioning [[the]] a source database in a hyperconverged infrastructure system;

receive selection of a database engine type ~~via the dashboard~~;

receive selection of a Service Level Agreement ("SLA") and a protection schedule ~~via the dashboard~~;

provision the source database based upon the database engine type ~~and store the source database within the database storage system~~; and

~~create an instance of a database protection system~~ set up automatic capturing of snapshots and transactional logs based upon the SLA and the protection schedule for

protecting the source database~~, including associating the instance of the database protection system with the source database; and~~

~~display the source database within the dashboard~~.

13. (Currently Amended) The database management system of claim 12, wherein the processor further executes the computer-readable ~~database engine comprises programmed~~ instructions ~~that when executed cause the database engine~~ to receive the user request, the selection of the database engine type, and the SLA via a ~~communicate with the~~ dashboard ~~via an Application Programing Interface~~.

14. (Currently Amended) The database management system of claim 12, wherein the processor further executes the computer-readable ~~database storage system comprises programmed~~ instructions ~~that when executed cause the database engine~~ to [[store]] create a cloned database ~~created~~ from the source database based on the snapshots and the transactional logs.

15. (Currently Amended) The database management system of claim 12, wherein the protection schedule comprises a first frequency at which the snapshots are captured and a second frequency at which the transactional logs are captured for protecting the source database ~~the instance of the database protection system captures snapshots and transactional logs from the source database based upon the SLA and the protection schedule~~.

16. (Currently Amended) The database management system of claim 12, wherein the processor further executes the computer-readable ~~database storage system comprises programmed~~ instructions ~~that when executed cause the database engine~~ to receive at least one parameter for creating a source database virtual machine, and associate the source database with the source database virtual machine.

17. (Currently Amended) The database management system of claim 12, wherein the processor further executes the computer-readable ~~database storage system comprises programmed~~ instructions ~~that when executed cause the database engine~~ to receive a size of the source database, and convert the size into a number of virtual disks to be associated with the source database.

18. (Currently Amended) The database management system of claim 12, wherein the processor further executes the computer-readable ~~database storage system comprises programmed~~ instructions ~~that when executed cause the database engine~~ to receive selection of ~~using~~ an existing source database virtual machine, and create the source database on the existing source database virtual machine.

19. (Currently Amended) A non-transitory computer readable media with computer-executable instructions embodied thereon that, when executed by a processor in ~~of a database engine associated with~~ a hyperconverged infrastructure system, cause the processor ~~database engine~~ to perform a process comprising:

receiving a user request for provisioning a source database in the hyperconverged infrastructure system;

receiving selection of a database engine type;

receiving selection of a Service Level Agreement ("SLA") and a protection schedule;

provisioning the source database based upon the database engine type; and

~~creating an instance of a database protection system~~ setting up automatic capturing of snapshots and transactional logs based upon the SLA and the protection schedule for protecting the source database~~, including associating the instance of the database protection system with the source database~~.

20. (Currently Amended) The non-transitory computer readable media of claim 19, wherein provisioning the source database comprises ~~receiving a selection for~~ creating a new source database or registering an existing database as the source database.

21. (Currently Amended) The non-transitory computer readable media of claim 19, wherein the processor further executes the computer-executable instructions for ~~comprising~~:

presenting a group of [[the]] database engine types that are supported by the hyperconverged infrastructure system; and

receiving ~~one of~~ the selection of the database engine type from the group of [[the]] database engine types ~~as the selection of the database engine type~~.

22. (Currently Amended) The non-transitory computer readable media of claim 19, wherein the processor further executes the computer-executable instructions for ~~comprising~~:

receiving selection of at least one of a sample set of parameters for creating a source database virtual machine; and

creating the source database virtual machine based upon the at least one of the sample set of parameters.

23. (Currently Amended) The non-transitory computer readable media of claim 19, wherein the processor further executes the computer-executable instructions for ~~comprising~~:

presenting a plurality of levels of the SLA; and

receiving selection of one of the plurality of levels of the SLA.

Electronic Acknowledgement Receipt	
EFS ID:	41375309
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International Application Number:	
Confirmation Number:	2275
Title of Invention:	SYSTEM AND METHOD FOR PROVISIONING DATABASES IN A HYPERCONVERGED INFRASTRUCTURE SYSTEM
First Named Inventor/Applicant Name:	Balasubrahmanyam Kuchibhotla
Customer Number:	147491
Filer:	Paul S. Hunter/Walter Lau
Filer Authorized By:	Paul S. Hunter
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Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		115539-0217_-_Preliminary_Amendment.pdf	146869 786cc582c3e424ac816920495158a067862 1f33e	yes	9

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Preliminary Amendment	1	1
	Claims	2	7
	Applicant Arguments/Remarks Made in an Amendment	8	9
Warnings:			
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	Total Files Size (in bytes):	146869	

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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.

REMARKS

Applicant respectfully requests that the foregoing amendments be made prior to examination of the present application.

Status of Claims

Independent Claims 1, 12, and 19 have been amended. Dependent Claims 2, 4, 7-10, 13-18, and 20-23 have also been amended to reflect the amendments to their respective base independent claims, and to increase clarity. No new subject matter has been added. Support for the amendments can be found in the specification, as originally filed. These amendments are made without prejudice or disclaimer.

After amending the claims as set forth above, Claims 1-23 remain pending in this application. Applicant respectfully requests consideration of these claims.

Concluding Remarks

Applicant believes that the application is in condition for allowance. Favorable consideration is respectfully requested. The Examiner is invited to contact the undersigned by telephone if it is felt that a telephone interview would advance prosecution.

The Commissioner is hereby authorized to charge any additional fees which may be required for this application to Deposit Account No. 19-0741. If any extensions of time are needed for timely acceptance of papers submitted herewith, applicant hereby petitions for such extensions under 37 CFR § 1.136 and authorizes payment of any such extension fees to Deposit Account No. 19-0741.

Respectfully submitted,

Date ___December 14, 2020_____ By ___*/Paul S. Hunter/*_____

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Maneesh Rawat, Bangalore, INDIA;

**** CONTINUING DATA ***************************

**** FOREIGN APPLICATIONS ***************************

**** IF REQUIRED, FOREIGN FILING LICENSE GRANTED ****

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35 USC 119(a-d) conditions met	❑ Yes ☑ No		CA	31	20	3
Verified and Acknowledged	/ELIYAH STONE HARPER/ Examiner's Signature	Initials				

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TITLE

SYSTEM AND METHOD FOR PROVISIONING DATABASES IN A HYPERCONVERGED INFRASTRUCTURE SYSTEM

FILING FEE RECEIVED	FEES: Authority has been given in Paper	❑ All Fees
2020	No._____ to charge/credit DEPOSIT ACCOUNT	❑ 1.16 Fees (Filing)
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT				**Application Number**	16/234553
				Filing Date	12/27/2018
Date Submitted: July 17, 2020				**First Named Inventor**	Balasubrahmanyam Kuchibhotla
				Art Unit	2166
(use as many sheets as necessary)				Examiner Name	HARPER, ELIYAH STONE
Sheet	1	of	5	Attorney Docket Number	115539-0217

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Examiner Signature	/Eliyah S. Harper/	Date Considered	12/31/2020

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Substitute for form 1449/PTO				Complete if Known	
INFORMATION DISCLOSURE STATEMENT BY APPLICANT				**Application Number**	16/234553
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Date Submitted: July 17, 2020				**First Named Inventor**	Balasubrahmanyam Kuchibhotla
				Art Unit	2166
(use as many sheets as necessary)				Examiner Name	HARPER, ELIYAH STONE
Sheet	2	of	5	Attorney Docket Number	115539-0217

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Substitute for form 1449/PTO				Complete if Known	
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(use as many sheets as necessary)				Examiner Name	HARPER, ELIYAH STONE
Sheet	3	of	5	Attorney Docket Number	115539-0217

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Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3]-Number[4]-Kind Code[5] (*if known*)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Documents	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T[6]
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Examiner Signature	/Eliyah S. Harper/	Date Considered	12/31/2020

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(use as many sheets as necessary)				Examiner Name	HARPER, ELIYAH STONE
Sheet	4	of	5	Attorney Docket Number	115539-0217

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Examiner Signature	/Eliyah S. Harper/	Date Considered	12/31/2020

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /ESH/

Substitute for form 1449/PTO				Complete if Known	
INFORMATION DISCLOSURE STATEMENT BY APPLICANT				**Application Number**	16/234553
				Filing Date	12/27/2018
Date Submitted: July 17, 2020				**First Named Inventor**	Balasubrahmanyam Kuchibhotla
				Art Unit	2166
(use as many sheets as necessary)				Examiner Name	HARPER, ELIYAH STONE
Sheet	5	of	5	Attorney Docket Number	115539-0217

NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.[1]	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, page(s), volume-issue number(s), publisher, city and/or country where published.	T[6]
	A113	Warren, "Internet Archive Wayback Machine Introduces New Beta Version With Calendar View." warren's blog, published January 23, 2011 (Retrieved from the Internet 4/7/2020). Internet URL: <warrenduecker.blogspot.com/2011/01/ internet-archive-wayback-machine.html> (Year: 2011)	

Examiner Signature	/Eliyah S. Harper/	Date Considered	12/31/2020

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /ESH/

Substitute for form 1449/PTO				Complete if Known	
INFORMATION DISCLOSURE STATEMENT BY APPLICANT				**Application Number**	16/234553
				Filing Date	12/27/2018
Date Submitted: August 2, 2019				**First Named Inventor**	Balasubrahmanyam Kuchibhotla
				Art Unit	2152
(use as many sheets as necessary)				Examiner Name	ABEL JALIL, NEVEEN
Sheet	1	of	2	Attorney Docket Number	115539-0217

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2] (*if known*)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	A1	8,549,518-B2	10-01-2013	ARON ET AL.	
	A2	8,601,473-B2	12-03-2013	ARON ET AL.	
	A3	8,850,130-B2	09-30-2014	ARON ET AL.	
	A4	9,772,866-B2	09-26-2017	ARON ET AL.	

UNPUBLISHED U.S. PATENT APPLICATION DOCUMENTS

Examiner Initials*	Cite No.[1]	U.S. Patent Application Document Serial Number-Kind Code[2] (*if known*)	Filing Date of Cited Document MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3]-Number[4]-Kind Code[5] (*if known*)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Documents	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T[6]

NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.[1]	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, page(s), volume-issue number(s), publisher, city and/or country where published.	T[6]
	A5	POITRAS, STEVEN. "The Nutanix Bible" (11 January 2014), from http://stevenpoitras.com/the-nutanix-bible/ (Publication date based on indicated capture date by Archive.org; first publication date unknown)	
	A6	POITRAS, STEVEN. "The Nutanix Bible" (12 January 2016), from https://nutanixbible.com/	
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Examiner Signature	/Eliyah S. Harper/	Date Considered	12/18/2020

4840-7450-8702.1

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /ESH/

Substitute for form 1449/PTO				Complete if Known	
INFORMATION DISCLOSURE STATEMENT BY APPLICANT				**Application Number**	16/234553
				Filing Date	12/27/2018
Date Submitted: August 2, 2019				**First Named Inventor**	Balasubrahmanyam Kuchibhotla
				Art Unit	2152
(use as many sheets as necessary)				Examiner Name	ABEL JALIL, NEVEEN
Sheet	2	of	2	Attorney Docket Number	115539-0217

NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.[1]	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, page(s), volume-issue number(s), publisher, city and/or country where published.	T[6]
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	A15	POITRAS, STEVEN. "The Nutanix Bible" (9 June 2015), from http://stevenpoitras.com/the-nutanix-bible/ (Publication date based on indicated capture date by Archive.org; first publication date unknown)	
	A16	POITRAS, STEVEN. "The Nutanix Bible" (9 June 2016), from https://nutanixbible.com/	

Examiner Signature	/Eliyah S. Harper/	Date Considered	12/18/2020

4840-7450-8702.1

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /ESH/

Substitute for form 1449/PTO				***Complete if Known***	
INFORMATION DISCLOSURE STATEMENT BY APPLICANT				**Application Number**	16/234553
				Filing Date	12/27/2018
Date Submitted: November 14, 2019				**First Named Inventor**	Balasubrahmanyam Kuchibhotla
				Art Unit	2152
(use as many sheets as necessary)				Examiner Name	ABEL JALIL, NEVEEN
Sheet	1	of	1	Attorney Docket Number	115539-0217

U.S. PATENT DOCUMENTS					
Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2] (*if known*)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear

UNPUBLISHED U.S. PATENT APPLICATION DOCUMENTS					
Examiner Initials*	Cite No.[1]	U.S. Patent Application Document Serial Number-Kind Code[2] (*if known*)	Filing Date of Cited Document MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear

FOREIGN PATENT DOCUMENTS						
Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3]-Number[4]-Kind Code[5] (*if known*)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Documents	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T[6]

NON PATENT LITERATURE DOCUMENTS			
Examiner Initials*	Cite No.[1]	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, page(s), volume-issue number(s), publisher, city and/or country where published.	T[6]
	B1	CANO, IGNACIO, et al. "Curator: Self-Managing Storage for Enterprise Clusters" (27 March 2017), from https://www.usenix.org/conference/nsdi17/	

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /ESH/

Examiner Signature	/Eliyah S. Harper/	Date Considered	12/18/2020

4834-6694-9036.1

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /ESH/

Notice of References Cited	Application/Control No. 16/234,553	Applicant(s)/Patent Under Reexamination Kuchibhotla et al.	
	Examiner ELIYAH S HARPER	Art Unit 2166	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-20190324865-A1	10-2019	Weissman; Boris	G06F11/2097	1/1
*	B	US-20160335369-A1	11-2016	Picard; Jean-Charles	G06F16/958	1/1
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FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
	N					
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	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
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	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
	16/234,553	Kuchibhotla et al.
	Examiner	Art Unit
	ELIYAH S HARPER	2166

CPC - Searched*		
Symbol	Date	Examiner
G06F 16/128	12/18/2020	ESH

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	Date	Examiner
inventor search	12/18/2020	ESH

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner

/Eliyah S. Harper/ Primary Examiner, Art Unit 2166	

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S1	5,391	G06F16/$.cpc. and (SLA) and @ad<"20181227"	US-PGPUB; USPAT	OR	OFF	2020/12/18 13:41
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		"20190138631" | "20190155936" | "20190324865" | "7225189" | "7725671" | "7814057" | "7840533" | "7953764" | "8117165" | "8150808" | "8364648" | "8447728" | "8612396" | "8762335" | "8832028" | "8914567" | "8972347" | "9116737" | "9244717" | "9256383" | "9389962" | "9436556" | "9740723" | "D753135" | "D753140" | "D763890" | "D779514" | "D803231" | "D807902" | "D838288" | "D839913" | "D862512" | "D870762" | "D875108" | "D877753" | "0000002" | "8601473" | "8850130" | "9772866").PN.				
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S15	1,902	G06F16/128.cpc. and @ad<"20181227"	US-PGPUB; USPAT	OR	OFF	2020/12/18 21:09
S16	671	(kuchibhotla balasubrahmanyam).in.	US-PGPUB; USPAT	OR	OFF	2020/12/18 21:10
S17	46	(kuchibhotla and balasubrahmanyam).in.	US-PGPUB; USPAT	OR	OFF	2020/12/18 21:10
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EAST Search History (Interference)

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/234,553	12/27/2018	Balasubrahmanyam Kuchibhotla	115539-0217	2275

147491 7590 01/06/2021

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EXAMINER	
HARPER, ELIYAH STONE	

ART UNIT	PAPER NUMBER
2166	

NOTIFICATION DATE	DELIVERY MODE
01/06/2021	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):

ipdocketing@foley.com

PTOL-90A (Rev. 04/07)

Office Action Summary	**Application No.** 16/234,553	**Applicant(s)** Kuchibhotla et al.	
	Examiner ELIYAH S HARPER	**Art Unit** 2166	**AIA (FITF) Status** Yes

-- 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 12/14/2020.

☐ 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) 1-23 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) 1-23 is/are rejected.

8) ☑ Claim(s) 8 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 _____ 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 8/2/2019, 11/14/2019, /17/2020.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date _____.

4) ☐ Other: _____.

DETAILED ACTION

1. This office action is in response to application 16/234,553 filed on 12/27/2018. The preliminary amendment filed on 12/14/2020 has been entered. Accordingly, claims 1, 2, 4, 7-10 and 12-23 have been amended. Accordingly, claims 1-23 are pending in this office action.

Double Patenting

2. 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 conflicting claims 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); *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 nonstatutory double patenting provided the reference application or patent either is shown to be commonly owned with the examined application, or claims an invention made as a result of activities undertaken within the

scope of a joint research agreement. See MPEP § 717.02 for applications subject to examination under the first inventor to file provisions of the AIA as explained in MPEP § 2159. See MPEP § 2146 *et seq.* for applications not subject to examination under the first inventor to file provisions of the AIA. A terminal disclaimer must be signed in compliance with 37 CFR 1.321(b).

The USPTO Internet website contains terminal disclaimer forms which may be used. Please visit www.uspto.gov/patent/patents-forms. The filing date of the application in which the form is filed determines what form (e.g., PTO/SB/25, PTO/SB/26, PTO/AIA/25, or PTO/AIA/26) 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 www.uspto.gov/patents/process/file/efs/guidance/eTD-info-I.jsp.

Claims 1-23 are rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-19 of U.S. Patent No. 10,817,157. Although the claims at issue are not identical, they are not patentably distinct from each other because both sets of claims present a selection of a service level agreement for example the claims at issue recite in part “selection of a Service Level Agreement (“SLA”) and a protection schedule” while the issued claims recite in part “a fourth selection of a Service Level Agreement ("SLA"); and a fifth selection of a frequency of capturing a snapshot.”

Claim Objections

3. Claim 8 is objected to because of the following informalities: the claim recites "receiving by the database engine" however it appears and examiner will assume for the purposes of prosecution that the claim was mean to read "receiving by the processor". Appropriate correction is required.

Claim Rejections - 35 USC § 103

4. In the event the determination of the status of the application as subject to AIA 35 U.S.C. 102 and 103 (or as subject to pre-AIA 35 U.S.C. 102 and 103) is incorrect, any correction of the statutory basis for the rejection will not be considered a new ground of rejection if the prior art relied upon, and the rationale supporting the rejection, would be the same under either status.

The following is a quotation of 35 U.S.C. 103 which forms the basis for all obviousness rejections set forth in this Office action:

> A patent for a claimed invention may not be obtained, notwithstanding that the claimed invention is not identically disclosed as set forth in section 102, if the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which the claimed invention pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-23 is/are rejected under 35 U.S.C. 103 as being unpatentable over US 2019/0324865 (hereinafter Weissman) in view of US 2016/0335369 (hereinafter Picard)

As for claim 1 Weissman discloses: A method comprising: receiving, by a processor executing computer-readable instructions stored on a memory a user request for provisioning a source database in a hyperconverged infrastructure system (See paragraph 0005) : receiving, by the processor selection of a database engine type; receiving, by the processor selection of a

protection schedule (See paragraphs 0016-0017 and 0032); provisioning, by the processor the source database based upon the database engine type (See paragraphs ; and setting up. by the processor, automatic capturing of snapshots and transactional logs based upon the SLA and the protection schedule for protecting the source database (See paragraph 0016-0020 note the system uses a replication schedule to protect the systems and based on the policy will automatically capture snapshots and transactional logs as in paragraphs 0023 and 0060).

Weissman however does not explicitly disclose: receiving, by the processor selection of a Service Level Agreement ("SLA"). Picard however discloses: receiving, by the processor selection of a Service Level Agreement ("SLA") (See paragraphs 0069-0072 and figure 3). It would have been obvious to an artisan of ordinary skill in the pertinent at the time the instantly claimed invention was filed to have incorporated the teaching of Picard into the system of Weissman. The modification would have been obvious because the two references are concerned with the solution to problem of data processing, therefore there is an implicit motivation to combine these references (i.e. motivation from the references themselves). In other words, the ordinary skilled artisan, during his/her quest for a solution to the cited problem, would look to the cited references at the time the invention was made. Consequently, the ordinary skilled artisan would have been motivated to combine the cited references since Picard's teaching would enable users of the Weissman.

As for claim the rejection of claim 2 is incorporated and further Weissman discloses: receiving, by the processor selection of a first set of parameters; and creating, by the processor a source database virtual machine based on the first set of parameters, wherein the source database resides on the source database virtual machine (See paragraphs 0014-0020).

As for claim 3 the rejection of claim 2 is incorporated and further Weissman discloses: wherein the first set of parameters comprises at least one of a software profile, a compute profile, a network profile, and a database parameters profile (See paragraphs 0036-0048 note the criteria can be based on software, network, or the machine capabilities).

As for claim 4 the rejection of claim 1 is incorporated and further Weissman discloses: converting, by the processor a size of the source database into a number of virtual disks; and associating, by the processor the number of virtual disks with the source database (See paragraph 0048)

As for claim 5 the rejection of claim 1 is incorporated and further Weissman discloses: wherein provisioning the source database comprises creating a new database as the source database (See paragraph 0066)

As for claim 6 the rejection of claim 1 is incorporated and further Picard discloses: wherein provisioning the source database comprises registering an existing database as the source database (See paragraph 0114-0116).

As for claim 7 the rejection of claim 1 is incorporated and further Weissman discloses: wherein the protection schedule comprises a first frequency at which the snapshots are captured (See paragraph 0058) and a second frequency at which the transactional logs are captured for protecting the source database (See paragraph 0060)

As for claim 8 the rejection of claim 1 is incorporated and further Weissman discloses: presenting, by the processor a group of database engine types that are supported by the hyperconverged infrastructure system; and receiving, by the processor the selection of the database engine type from the group of database engine types (See paragraphs 0014-0017)

As for claim 9 the rejection of claim 1 is incorporated and further Weissman discloses: receiving, by the processor selection of at least one of a sample set of parameters for creating a source database virtual machine for hosting the source database: and creating, by the processor the source database virtual machine based upon the at least one of the sample set of parameters (See paragraphs 0029-0033 note the policy groups are based on parameters to define the group).

As for claim 10 the rejection of claim 1 is incorporated and further Picard discloses: presenting, by the processor a plurality of levels of the SLA; and receiving, by the processor selection of one of the plurality of levels of the SLA (See figure 3).

As for claim 11 the rejection of claim 1 is incorporated and further Weissman discloses: wherein the protection schedule comprises a time period for designating at least one of a daily snapshot, a weekly snapshot, a monthly snapshot, and a quarterly snapshot (See paragraph 0058).

Claims 12-18 are database management claims substantially corresponding to the method of claims 1-11 and are thus rejected for the same reasons as set forth in the rejection of claims 1-11.

Claims 19-23 are non-transitory claims substantially corresponding to the method of claims 1-11 and are thus rejected for the same reasons as set forth in the rejection of claims 1-11.

Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ELIYAH STONE HARPER whose telephone number is (571)272-0759. The examiner can normally be reached on Monday-Friday 10:00 am - 6:00 pm.

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, Mark Featherstone can be reached on (571)270-3750. 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.

/Eliyah S. Harper/
Primary Examiner, Art Unit 2166
December 18, 2020

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

First Inventor Name:	Balasubrahmanyam Kuchibhotla
Title:	SYSTEM AND METHOD FOR PROVISIONING DATABASES IN A HYPERCONVERGED INFRASTRUCTURE SYSTEM
Application No.:	16/234553
Filing Date:	12/27/2018
Examiner:	HARPER, ELIYAH STONE
Art Unit:	2166
Confirmation No.:	2275

INFORMATION DISCLOSURE STATEMENT UNDER 37 CFR §1.56

Commissioner:

Applicant submits herewith documents for the Examiner's consideration in accordance with 37 CFR §§1.56, 1.97 and 1.98.

Applicant respectfully requests that each listed document be considered by the Examiner and be made of record in the present application and that an initialed copy of Form PTO/SB/08 be returned in accordance with MPEP §609.

The submission of any document herewith is not an admission that such document constitutes prior art against the claims of the present application or that such document is considered material to patentability as defined in 37 CFR §1.56(b). Applicant does not waive any rights to take any action which would be appropriate to antedate or otherwise remove as a competent reference any document submitted herewith.

TIMING OF THE DISCLOSURE

The listed documents are being submitted in compliance with 37 CFR §1.97(c), before the mailing date of any of a final action under 37 CFR §1.113, a notice of allowance under 37 CFR §1.311, or an action that otherwise closes prosecution in the application.

FEE

Fees in the amount of $260.00 to cover the fee associated with an information disclosure statement are being paid by credit card via EFS-Web.

The Commissioner is hereby authorized to charge any additional fees which may be required for this application to Deposit Account Number 19-0741.

Respectfully submitted,

Date January 12, 2021

By */Paul S. Hunter/*

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Paul S. Hunter
Attorney for Applicant
Registration No. 44,787

Electronic Acknowledgement Receipt	
EFS ID:	41625435
Application Number:	16234553
International Application Number:	
Confirmation Number:	2275
Title of Invention:	SYSTEM AND METHOD FOR PROVISIONING DATABASES IN A HYPERCONVERGED INFRASTRUCTURE SYSTEM
First Named Inventor/Applicant Name:	Balasubrahmanyam Kuchibhotla
Customer Number:	147491
Filer:	Paul S. Hunter/Tuan Tran
Filer Authorized By:	Paul S. Hunter
Attorney Docket Number:	115539-0217
Receipt Date:	12-JAN-2021
Filing Date:	27-DEC-2018
Time Stamp:	17:31:14
Application Type:	Utility under 35 USC 111(a)

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RAM confirmation Number	E20211BH32056097
Deposit Account	190741
Authorized User	Tuan Tran
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)	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Transmittal Letter	115539-0217_IDS_D_Transmittal.pdf	435317 e5c6827cd9b834112069d43a05c180258e576ca7	no	2
Warnings:					
Information:					
2	Information Disclosure Statement (IDS) Form (SB08)	115539-0217_IDS_D_SB08.pdf	457766 ad6f29d3641624b50753ba8d3e49af3abd7756dd	no	3
Warnings:					
Information:					
This is not an USPTO supplied IDS fillable form					
3	Foreign Reference	D31--TW_201600970A1.pdf	7679245 a444b7daa76d3425d4b472262df0148dfe600a18	no	160
Warnings:					
Information:					
4	Non Patent Literature	D32--Aluciani___Provisioning_PostgreSQL_to_be.pdf	471043 dcbcc5c7cb09604b3a24ed311c3b9bacddc795a3	no	7
Warnings:					
Information:					
5	Non Patent Literature	D33--AWS___Working_with_Aurora_multi_master_c.pdf	1536533 c78a77f229bdb1c1b110a42f789d3711b11cf30b	no	27
Warnings:					
Information:					
6	Non Patent Literature	D34--Ay__Neslisah___How_to_Set_Up_a_High_Avai.pdf	677024 3fc6f3eba5060b9ad5ba10b6ea47b717d12d4bf7	no	8
Warnings:					

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7	Non Patent Literature	D35-- BRULL__Jim___Oracle_Cloud_ Database_vs_On.pdf	357134 192320f0944072f3ff90a1131a09642f04f4e 62c	no	9
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8	Non Patent Literature	D36-- DREMIO___Multiple_AWS_Clus ters__Dremio__.pdf	1428635 5c06347b6ecfa3be2afcd13a423df0b2e5ee af4f	no	15
Warnings:					
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9	Non Patent Literature	D37-- GEIER__Eric___Using_Static_IP _Addresses_.pdf	196966 c4bfa29876a07bdb81be10a4fd8c68cb227f efe7	no	4
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10	Non Patent Literature	D38-- HAMMERSPACE___Simplify_Da tabase_Deployme.pdf	196022 2be7d9bcaef2fa7dded5b0738b92f4407f1b 5e7b	no	2
Warnings:					
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11	Non Patent Literature	D39-- Hu_et_al___Architecture_of_Hi ghly_Availa.pdf	978471 98ab71196487d8eaa31d262446f10e3c5cc 18708	no	17
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Information:					
12	Non Patent Literature	D40-- KATZ__Jonathan_S___Multi_K ubernetes_Clus.pdf	492794 393b429890857c6917c016af7285e6d5e90 438d7	no	5
Warnings:					
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13	Non Patent Literature	D41-- Kubernetes__Configure_Acces s_to_Multiple.pdf	498236 6ecd49e92ec47620ef0a2c17f15040e797cb 378b	no	7
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14	Non Patent Literature	D42-- KUBERNETES___Configure_Access_to_Multipl.pdf	516104 1966aa2768089616163dbe629a77b0efe9e0305f	no	7
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15	Non Patent Literature	D43-- Kumar__Madan___Managing_High_Availabilit.pdf	546784 efb19a0a666ad2959f0aa576ba8362ad4f58cfb8	no	11
Warnings:					
Information:					
16	Non Patent Literature	D44-- M__A__METAWAI_et_al___Load_balancing_in_.pdf	1772463 54e698cae12c43c554f551e01a79273273b32508	no	13
Warnings:					
Information:					
17	Non Patent Literature	D45-- MICROSOFT_DOCS___Always_On_availability_.pdf	451623 476eb12c2ebc984f3d8bde06d044b5c36f8ade86	no	7
Warnings:					
Information:					
18	Non Patent Literature	D46-- MICROSOFT_DOCS___What_is_an_Always_On_av.pdf	862152 2826301e7fbb8de4b12e2441721e3c55d71b1871	no	11
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19	Non Patent Literature	D47-- NET_APP_SUPPORT___Data_replication_from_.pdf	67663 49ef652278e1b692d42c1d45a3ca408cdb905a9c	no	2
Warnings:					
Information:					
20	Non Patent Literature	D48-- Nizhegolenko__Alexey___High_Availability.pdf	734400 8f6a5572acf0d21d8c8461f7966d10502825cdb7	no	16
Warnings:					
Information:					

21	Non Patent Literature	D49-- NUTANIX___Nutanix_Hybrid_Cloud_Infrastru.pdf	706625 0b6e731528f17244c987aacafe999fcc4a2c28e8	no	8
Warnings:					
Information:					
22	Non Patent Literature	D50-- OPSTER___High_Availability_in_Elasticsea.pdf	830195 7b8c3797e1040d27d8d4b24f00c33c8cb80d8ea1	no	8
Warnings:					
Information:					
23	Non Patent Literature	D51-- OPSTER___Multi_Cluster_Load_Balancer_An_.pdf	300204 1194d8bad11e5265bbf2000d9e1e6e7f00f51b22	no	4
Warnings:					
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24	Non Patent Literature	D52-- RED_HAT__Chapter_4__Configuring_The_Hapr.pdf	441524 b6b358a9637c35d5d0fe66423f1b2ccf2988dca7	no	8
Warnings:					
Information:					
25	Non Patent Literature	D53-- Sharif__Ashraf___Making_Your_Database_Co.pdf	483209 c0c0675a11b1537d41fc821c0e2ef0c61e74b6cf	no	8
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26	Non Patent Literature	D54-- Stack_Exchange_Users___PostgreSQL_High_A.pdf	232594 12e59453ffcaa31b78b1114ab18aba77dcef84ef	no	5
Warnings:					
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27	Non Patent Literature	D55-- STEPAN___How_to_Set_Up_Multi_Cluster_Loa.pdf	1318506 ce4fbe74ee1fe7bc51e6db073edafeaad39c6f25	no	15
Warnings:					
Information:					

28	Fee Worksheet (SB06)	fee-info.pdf	30831 0899c39954822498423 49f95913a8c1550489924	no	2
Warnings:					
Information:					
			Total Files Size (in bytes):	24700063	

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.

Electronic Patent Application Fee Transmittal

Application Number:	16234553
Filing Date:	27-Dec-2018
Title of Invention:	SYSTEM AND METHOD FOR PROVISIONING DATABASES IN A HYPERCONVERGED INFRASTRUCTURE SYSTEM
First Named Inventor/Applicant Name:	Balasubrahmanyam Kuchibhotla
Filer:	Paul S. Hunter/Tuan Tran
Attorney Docket Number:	115539-0217

Filed as Large 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($)
Miscellaneous:				
SUBMISSION- INFORMATION DISCLOSURE STMT	1806	1	260	260
		Total in USD ($)		**260**

Substitute for form 1449/PTO				Complete if Known	
INFORMATION DISCLOSURE STATEMENT BY APPLICANT				**Application Number**	16/234553
Date Submitted: January 12, 2021				**Filing Date**	12/27/2018
				First Named Inventor	Balasubrahmanyam Kuchibhotla
(use as many sheets as necessary)				Art Unit	2166
				Examiner Name	HARPER, ELIYAH STONE
Sheet	1	of	3	Attorney Docket Number	115539-0217

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2] (*if known*)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	D1	8,429,630-B2	04-23-2013	NICKOLOV ET AL.	
	D2	8,635,421-B2	01-21-2014	GUPTA ET AL.	
	D3	8,863,124-B1	10-14-2014	ARON, MOHIT	
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UNPUBLISHED U.S. PATENT APPLICATION DOCUMENTS

Examiner Initials*	Cite No.[1]	U.S. Patent Application Document Serial Number-Kind Code[2] (*if known*)	Filing Date of Cited Document MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear

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Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3]-Number[4]-Kind Code[5] (*if known*)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Documents	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T[6]
	D31	TW-201600970-A1	01-01-2016	DAN C. KANG		

Examiner Signature		Date Considered	

4848-3092-6294.1

Substitute for form 1449/PTO				Complete if Known	
INFORMATION DISCLOSURE STATEMENT BY APPLICANT				**Application Number**	16/234553
				Filing Date	12/27/2018
Date Submitted: January 12, 2021				**First Named Inventor**	Balasubrahmanyam Kuchibhotla
				Art Unit	2166
(use as many sheets as necessary)				Examiner Name	HARPER, ELIYAH STONE
Sheet	2	of	3	Attorney Docket Number	115539-0217

NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.[1]	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, page(s), volume-issue number(s), publisher, city and/or country where published.	T[6]
	D32	Aluciani. "Provisioning PostgreSQL to be Highly Available and Resilient on Nutanix" Nutanix Community Blog. 2019. Retrieved from https://next.nutanix.com/community-blog-154/provisioning-postgresql-to-be-highly-available-and-resilient-on-nutanix-33726 (Year: 2019).	
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	D41	Kubernetes "Configure Access to Multiple Clusters" Kubernetes Documentation. October 22, 2020. Retrieved from https://kubernetes.io/docs/tasks/access-application-cluster/configure-access-multiple-clusters/ (Year: 2020).	
	D42	KUBERNETES, "Configure Access to Multiple Clusters" Kubernetes Documentation. October 22, 2020. Received from https://kubernetes.io/docs/tasks/access-application-cluster/configure-access-multiple-clusters/ (Year: 2020)	
	D43	Kumar, Madan. "Managing High Availability in PostgreSQL – Part III: Patroni" ScaleGrid. August 22, 2019. Retrieved from https://scalegrid.io/blog/managing-high-availability-in-postgresql-part-3/ (Year: 2019)	
	D44	M. A. METAWAI et al. "Load balancing in distributed multi-agent computing systems" Ain Shams Engineering Journal. ASEJ. May 23, 2012. P. 237-249. (Year: 2012)	
	D45	MICROSOFT DOCS, "Always On availability groups: a high-availability and disaster-recovery solution" Microsoft SQL Docs, April 23, 2019 (2019), https://docs.microsoft.com/en-us/sql/database-engine/availability-groups/windows/always-on-availability-groups-sql-server?view=sql-server-ver15	
	D46	MICROSOFT DOCS, "What is an Always On availability group?" Microsoft SQL Docs, April 29, 2020 (2020) https://docs.microsoft.com/en-us/sql/database-engine/availability-groups/windows/overview-of-always-on-availability-groups-sql-server?view=sql-server-ver15	
	D47	NET APP SUPPORT, "Data replication from one destination to another in a series (cascading)" Net App. 2015. Received from https://library.netapp.com/ecmdocs/ECMP1635994/html/GUID-25C143ED-C369-4129-B055-C532FDB8AB79.html (Year: 2015)	
	D48	Nizhegolenko, Alexey. "High-Availability MySQL cluster with load balancing using HAProxy and Heartbeat." Towards Data Science. Dec. 3, 2018. Retrieved from https://towardsdatascience.com/high-availability-mysql-cluster-with-load-balancing-using-haproxy-and-heartbeat-40a16e134691 (Year: 2018).	

Examiner Signature		Date Considered	

4848-3092-6294.1

Substitute for form 1449/PTO				Complete if Known	
INFORMATION DISCLOSURE STATEMENT BY APPLICANT				**Application Number**	16/234553
				Filing Date	12/27/2018
Date Submitted: January 12, 2021				**First Named Inventor**	Balasubrahmanyam Kuchibhotla
				Art Unit	2166
(use as many sheets as necessary)				Examiner Name	HARPER, ELIYAH STONE
Sheet	3	of	3	Attorney Docket Number	115539-0217

NON PATENT LITERATURE DOCUMENTS			
Examiner Initials*	Cite No.[1]	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, page(s), volume-issue number(s), publisher, city and/or country where published.	T[6]
	D49	NUTANIX, "Nutanix Hybrid Cloud Infrastructure Now Available on Amazon Web Services" Nutanix Press Release. August 11, 2020. Received from https://www.nutanix.com/press-releases/2020/nutanix-clusters-on-aws?icid=111AJW0ZPW22N (Year: 2020)	
	D50	OPSTER, "High Availability in Elasticsearch – Cross Cluster Replication and Alternatives" Opster. 2020. Received from https://opster.com/blogs/elasticsearch-cross-cluster-replication-overview/ (Year: 2020)	
	D51	OPSTER, "Multi-Cluster Load Balancer-An Alternative to Cross Cluster Replication" Opster. 2020. Received from https://opster.com/elasticsearch-multi-cluster-load-balancer/ (Year: 2020).	
	D52	RED HAT "Chapter 4. Configuring The Haproxy Load Balancer" Red Hat Customer Portal. 2020. Retrieved on 12/22/2020 from https://access.redhat.com/documentation/en-us/red_hat_cloudforms/4.6/html/high_availability_guide/configuring_haproxy (Year: 2020).	
	D53	Sharif, Ashraf. "Making Your Database Components Highly Available (HA) via Load Balancers". Several Nines. March, 20, 2018. Retrieved from https://severalnines.com/blog/become-clustercontrol-dba-making-your-db-components-ha-load-balancers (Year: 2018).	
	D54	Stack Exchange Users. "PostgreSQL High Availability/Scalability using HAProxy and PGBouncer" Stack Exchange. November 2020. Retrieved from https://dba.stackexchange.com/questions/56559/postgresql-high-availability-scalability-using-haproxy-and-pgbouncer (Year: 2020).	
	D55	STEPAN, "How to Set Up Multi-Cluster Load Balancing with GKE", DoiT International. August 17, 2020. Received from https://blog.doit-intl.com/how-to-setup-multi-cluster-load-balancing-with-gke-4b407e1f3dff (Year: 2020).	

Examiner Signature		Date Considered	

4848-3092-6294.1

From: PHunter@foley.com
To: Harper, Elivah
Subject: Examiner Interview - US 16/234,553 - THURS Jan. 14 at 1 pm ET - Foley ref. no. 115539-0217
Date: Tuesday, January 12, 2021 4:37:37 PM

Examiner Harper,

Thank you for taking the time to discuss U.S. 16/234,553 on Thursday, January 14 at 1 pm Eastern Time. Below is an agenda. Please confirm receipt.

1. **Discuss Weissman Reference**

Weissman teaches "virtual machine snapshots." The Office Action contended that Weissman discloses the claim feature "setting up, by the processor, automatic capturing of snapshots and transactional logs based upon the SLA and the protection schedule for protecting the source database." However, Applicant respectfully submits that Weismann does not show setting up automatic capturing of transactional logs.

2. **Discuss Proposed Amendment to Claim 1**

Applicant proposes clarifying the distinction with Weissman by the following amendment:

> 1. A method comprising:
> receiving, by a processor executing computer-readable instructions stored on a memory, a user request for provisioning a source database in a hyperconverged infrastructure system;
> receiving, by the processor, selection of a database engine type;
> receiving, by the processor, selection of a Service Level Agreement ("SLA") and a protection schedule;
> provisioning, by the processor, the source database based upon the database engine type; and
> setting up, by the processor, automatic capturing of snapshots and transactional logs based upon the SLA and the protection schedule for protecting the source database, wherein the transactional logs record transactions occurring on the source database since a most recent snapshot.

3. **Discuss Claim 7**

Regarding Claim 7, the Office Action argued on page 7 that Weissman paragraphs 0058 and 0060 discloses the claimed "protection schedule comprises a first frequency at which the snapshots are captured and a second frequency at which the transactional logs are captured for protecting the source database."

Paragraph [0060] describes a "replication scheduler" that sends snapshot requests and a "point-in-

time" which is a "specific point" for "desired snapshots." There is no teaching of **frequencies** for capturing snapshots and transaction logs. There are especially no teachings of "a **first** frequency at which the snapshots are captured and a **second** frequency at which the transactional logs are captured."

4. **Examiner suggestions**

Does the Examiner have any suggestions for advancing prosecution?

Thank you,
Paul

If you want to schedule a meeting with me, click here.

Paul S. Hunter
Partner, Chair Electronics Group, Office Managing Partner

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/234,553	12/27/2018	Balasubrahmanyam Kuchibhotla	115539-0217	2275

147491 7590 01/21/2021

FOLEY & LARDNER LLP
3000 K STREET N.W.
SUITE 600
WASHINGTON, DC 20007-5109

EXAMINER	
HARPER, ELIYAH STONE	

ART UNIT	PAPER NUMBER
2166	

NOTIFICATION DATE	DELIVERY MODE
01/21/2021	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):

ipdocketing@foley.com

PTOL-90A (Rev. 04/07)

Applicant-Initiated Interview Summary	**Application No.** 16/234,553	**Applicant(s)** Kuchibhotla et al.		
	Examiner ELIYAH S HARPER	**Art Unit** 2166	**AIA (First Inventor to File) Status** Yes	**Page** 1 of 1

All Participants (applicant, applicants representative, PTO personnel)	**Title**	**Type**
ELIYAH S HARPER	Primary Examiner	Telephonic
Paul Hunter	Attorney of Record	

Date of Interview: 14 January 2021

Issues Discussed:

35 U.S.C. 103

Applicant's representative and examiner discussed the claimed invention the and cited prior art rejection. The proposed amendments were discussed with examiner agreeing that the proposed amendments including incorporating claim 7 into claim 1 would overcome the cited prior art rejection

☑ Attachment

/Eliyah S. Harper/ Primary Examiner, Art Unit 2166	

Applicant is reminded that a complete written statement as to the substance of the interview must be made of record in the application file. It is the applicants responsibility to provide the written statement, unless the interview was initiated by the Examiner and the Examiner has indicated that a written summary will be provided. See MPEP 713.04
Please further see:
MPEP 713.04
Title 37 Code of Federal Regulations (CFR) § 1.133 Interviews, paragraph (b)
37 CFR § 1.2 Business to be transacted in writing

Applicant recordation instructions: The formal written reply to the last Office action must include the substance of the interview. (See MPEP section 713.04). If a reply to the last Office action has already been filed, applicant is given a non-extendable period of the longer of one month or thirty days from this interview date, or the mailing date of this interview summary form, whichever is later, to file a statement of the substance of the interview.

Examiner recordation instructions: Examiners must summarize the substance of any interview of record. A complete and proper recordation of the substance of an interview should include the items listed in MPEP 713.04 for complete and proper recordation including the identification of the general thrust of each argument or issue discussed, a general indication of any other pertinent matters discussed regarding patentability and the general results or outcome of the interview, to include an indication as to whether or not agreement was reached on the issues raised.

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 16/234,553	Filing Date 12/27/2018	☐ To be Mailed

ENTITY: ☑ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED - PART I

	(Column 1)	(Column 2)			
FOR	NUMBER FILED	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 $100 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $460 =	
☐ 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	03/15/2021	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 23	Minus	** 23	= 0		x $100 =	0
	Independent (37 CFR 1.16(h))	* 3	Minus	*** 3	= 0		x $480 =	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".	/VENESSA JONES/
*** 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.

Electronic Acknowledgement Receipt	
EFS ID:	42179989
Application Number:	16234553
International Application Number:	
Confirmation Number:	2275
Title of Invention:	SYSTEM AND METHOD FOR PROVISIONING DATABASES IN A HYPERCONVERGED INFRASTRUCTURE SYSTEM
First Named Inventor/Applicant Name:	Balasubrahmanyam Kuchibhotla
Customer Number:	147491
Filer:	Paul S. Hunter/Vicki Andrews
Filer Authorized By:	Paul S. Hunter
Attorney Docket Number:	115539-0217
Receipt Date:	15-MAR-2021
Filing Date:	27-DEC-2018
Time Stamp:	14:01:39
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		115539-0217-Response_NFOA_dtd_1_6_2021.pdf	154911 84064b07ebad3727020c010d1fc9863745abe081	yes	10

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Amendment/Req. Reconsideration-After Non-Final Reject	1	1
	Claims	2	6
	Applicant Arguments/Remarks Made in an Amendment	7	10
Warnings:			
Information:			
	Total Files Size (in bytes):	154911	

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<u>New Applications Under 35 U.S.C. 111</u>
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.
<u>National Stage of an International Application under 35 U.S.C. 371</u>
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.
<u>New International Application Filed with the USPTO as a Receiving Office</u>
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.

REMARKS

Applicant respectfully requests reconsideration of the present application in view of the foregoing amendments and the reasons that follow. Claims 1, 7, 8, 12, 15, and 19 are amended. No new subject matter has been added with the amendments to the claims.

After the amendments as set forth above, Claims 1 – 23 will be pending in the present application.

I. Examiner Interview Summary

Applicant thanks the Examiner for the courtesy extended during the interview conducted on January 14, 2021 with Applicant's representative to discuss the Office Action mailed January 6, 2021. During the interview, Applicant's representative and the Examiner discussed the current rejections and the cited art. The Examiner agreed that proposed amendments would overcome the rejections.

II. Double Patenting Rejection

On page 3, the Office Action rejected Claims 1-23 on the ground of non-statutory double patenting as allegedly being unpatentable over Claims 1-19 of U.S. Patent No. 10,817,157 ("'157"). Applicant herewith submits a terminal disclaimer to overcome the rejection. Applicant requests the rejection be withdrawn.

III. Claim Objections

On page 4, the Office Action objected to Claim 8 because of the following informalities:

The claim recited "receiving by the database engine" and examiner will assume for the purposes of prosecution that the claim was meant to be read as "receiving by the processor."

Applicant amends Claim 8 to correct the informality.

IV. Claim Rejections under 35 U.S.C. § 103

On page 4, the Office Action rejected Claims 1-23 under 35 U.S.C. § 103 as allegedly being unpatentable over U.S. Patent Application Publication No. 2019/0324865 to Weissman *et al.* ("Weissman") in view of U.S. Patent Application Publication No. 2016/0335369 to Picard *et al.* ("Picard"). Applicant respectfully traverses the rejection.

The Office Action contended that Weissman discloses the claim feature "setting up, by the processor, automatic capturing of snapshots and transactional logs based upon the SLA and the protection schedule for protecting the source database." Applicant disagrees. Weisman does not describe, suggest, or teach setting up automatic capturing of transactional logs.

The Office Action cited to Weissman, paragraphs 0023 and 0060, but these paragraphs merely refer to "virtual machine snapshots." To further clarify distinctions, Applicant amends the claims consistent with paragraphs [0026] and [0027] from the published application.

Regarding Claim 7, the Office Action argued on page 7 that Weissman paragraphs 0058 and 0060 discloses the claimed "protection schedule comprises a **first frequency** at which the snapshots are captured and a **second frequency** at which the transactional logs are captured for protecting the source database." Paragraph [0060] of Weissman is reproduced below with emphasis added. This paragraph describes a "replication scheduler" that sends snapshot requests and a "point-in-time" which is a "specific point" for "desired snapshots." There is no teaching of **frequencies** for capturing snapshots and transaction logs. There are especially no teachings of "a first frequency at which the snapshots are captured and a second frequency at which the transactional logs are captured."

> [0060] Block 222, within block 220, depicts the step of the replication scheduler process sending a snapshot request for the first policy group. In an embodiment, the request for a snapshot from **the replication scheduler process includes a particular point-in-time** that each of the compute nodes 122-126 are to generate a point-in-time bookmark for the desired snapshot. As described, the point-in-time bookmark is used to mark a **specific point** within the data logs to identify the

particular time window **for the desired snapshots**. By using the point-in-time bookmark the replication scheduler process may ensure that each of the snapshots of the first set of virtual machines are atomic based upon the particular point-in-time desired.

To advance prosecution, Applicant incorporates Claim 7 (and similar Claim 15) into the independent claims. During the Examiner interview, the Examiner confirmed that these amendments would advance prosecution. For example, Claim 1 is amended as shown below:

1. A method comprising:
receiving, by a processor executing computer-readable instructions stored on a memory, a user request for provisioning a source database in a hyperconverged infrastructure system;
receiving, by the processor, selection of a database engine type;
receiving, by the processor, selection of a Service Level Agreement ("SLA") and a protection schedule;
provisioning, by the processor, the source database based upon the database engine type; and
setting up, by the processor, automatic capturing of snapshots and transactional logs based upon the SLA and the protection schedule for protecting the source database, wherein the transactional logs record transactions occurring on the source database since a most recent snapshot, and wherein the protection schedule comprises a first frequency at which the snapshots are captured and a second frequency at which the transactional logs are captured for protecting the source database.

Applicant respectfully requests withdrawal of the rejections and allowance of the pending claims.

V. Concluding Remarks

It is submitted that each outstanding rejection to the application has been overcome, and that the Application is in condition of allowance. Applicant respectfully requests reconsideration and allowance of all pending claims. The Examiner is invited to contact the undersigned by telephone if it is felt that a telephone interview would advance prosecution.

It should also be noted that although arguments have been presented with respect to certain claims herein, the recited subject matter as well as various other subject matter and/or

combinations of subject matter may be patentable for other reasons. Further, the failure to address any statement by the Examiner herein should not be interpreted as acquiescence or agreement with such statement. Applicant expressly reserves the right to set forth additional and/or alternative reasons for patentability and/or allowance with the present Application or in any other future proceeding, and to rebut any statement presented by the Examiner in this or other papers during prosecution of the present Application.

The Commissioner is hereby authorized to charge any additional fees which may be required regarding this application, or credit any overpayment, to Deposit Account No. 19-0741. If any extensions of time are needed for timely acceptance of papers submitted herewith, Applicant hereby petitions for such extension under 37 C.F.R. §1.136 and authorizes payment of any such extensions fees to Deposit Account No. 19-0741.

Respectfully submitted,

Date March 15, 2021

By */Paul S. Hunter/*

FOLEY & LARDNER LLP
Customer Number: 147491
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Facsimile: (858) 792-6773

Paul S. Hunter
Attorney for Applicant
Registration No. 44,787

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

First Inventor Name:	Balasubrahmanyam Kuchibhotla
Title:	SYSTEM AND METHOD FOR PROVISIONING DATABASES IN A HYPERCONVERGED INFRASTRUCTURE SYSTEM
Appl. No.:	16/234553
Filing Date:	12/27/2018
Examiner:	HARPER, ELIYAH STONE
Art Unit:	2166
Confirmation Number:	2275

AMENDMENT AND REPLY UNDER 37 C.F.R. 1.111

Mail Stop AMENDMENT
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Commissioner:

This communication is responsive to the non-final Office Action mailed January 6, 2021, concerning the above-referenced patent application.

Amendments to the Claims are reflected in the listing of claims which begins on page 2 of this document.

Remarks begin on page 7 of this document.

Please amend the application as follows:

Amendments to the Claims:

This listing of claims will replace all prior versions and listings of claims in the application:

Listing of Claims:

1. (Currently Amended) A method comprising:

receiving, by a processor executing computer-readable instructions stored on a memory, a user request for provisioning a source database in a hyperconverged infrastructure system;

receiving, by the processor, selection of a database engine type;

receiving, by the processor, selection of a Service Level Agreement ("SLA") and a protection schedule;

provisioning, by the processor, the source database based upon the database engine type; and

setting up, by the processor, automatic capturing of snapshots and transactional logs based upon the SLA and the protection schedule for protecting the source database, wherein the transactional logs record transactions occurring on the source database since a most recent snapshot, and wherein the protection schedule comprises a first frequency at which the snapshots are captured and a second frequency at which the transactional logs are captured for protecting the source database.

2. (Previously Presented) The method of claim 1, further comprising:

receiving, by the processor, selection of a first set of parameters; and

creating, by the processor, a source database virtual machine based on the first set of parameters, wherein the source database resides on the source database virtual machine.

3. (Original) The method of claim 2, wherein the first set of parameters comprises at least one of a software profile, a compute profile, a network profile, and a database parameters profile.

4. (Previously Presented) The method of claim 1, further comprising:

converting, by the processor, a size of the source database into a number of virtual disks; and

associating, by the processor, the number of virtual disks with the source database.

5. (Previously Presented) The method of claim 1, wherein provisioning the source database comprises creating a new database as the source database.

6. (Previously Presented) The method of claim 1, wherein provisioning the source database comprises registering an existing database as the source database.

7. (Currently Amended) The method of claim 1, wherein the ~~protection schedule comprises a~~ first frequency ~~at which the snapshots are captured~~ and [[a]] the second frequency are the same ~~at which the transactional logs are captured for protecting the source database~~.

8. (Currently Amended) The method of claim 1, further comprising:

presenting, by the processor, a group of database engine types that are supported by the hyperconverged infrastructure system; and

receiving, by the processor ~~database engine~~, the selection of the database engine type from the group of database engine types.

9. (Previously Presented) The method of claim 1, further comprising:

receiving, by the processor, selection of at least one of a sample set of parameters for creating a source database virtual machine for hosting the source database; and

creating, by the processor, the source database virtual machine based upon the at least one of the sample set of parameters.

10. (Previously Presented) The method of claim 1, further comprising:

presenting, by the processor, a plurality of levels of the SLA; and

receiving, by the processor, selection of one of the plurality of levels of the SLA.

11. (Original) The method of claim 1, wherein the protection schedule comprises a time period for designating at least one of a daily snapshot, a weekly snapshot, a monthly snapshot, and a quarterly snapshot.

12. (Currently Amended) A database management system comprising:

a memory comprising computer-readable instructions stored thereon; and

a processor that executes the computer-readable instructions to:

receive a user request for provisioning a source database in a hyperconverged infrastructure system;

receive selection of a database engine type;

receive selection of a Service Level Agreement ("SLA") and a protection schedule;

provision the source database based upon the database engine type; and

set up automatic capturing of snapshots and transactional logs based upon the SLA and the protection schedule for protecting the source database, wherein the transactional logs record transactions occurring on the source database since a most recent snapshot, and wherein the protection schedule comprises a first frequency at which the snapshots are captured and a second frequency at which the transactional logs are captured for protecting the source database.

13. (Previously Presented) The database management system of claim 12, wherein the processor further executes the computer-readable instructions to receive the user request, the selection of the database engine type, and the SLA via a dashboard.

14. (Previously Presented) The database management system of claim 12, wherein the processor further executes the computer-readable instructions to create a cloned database from the source database based on the snapshots and the transactional logs.

15. (Currently Amended) The database management system of claim 12, wherein the ~~protection schedule comprises a~~ first frequency ~~at which the snapshots are captured~~ and [[a]] the second frequency are different ~~at which the transactional logs are captured for protecting the source database~~.

16. (Previously Presented) The database management system of claim 12, wherein the processor further executes the computer-readable instructions to receive at least one parameter for creating a source database virtual machine, and associate the source database with the source database virtual machine.

17. (Previously Presented) The database management system of claim 12, wherein the processor further executes the computer-readable instructions to receive a size of the source database, and convert the size into a number of virtual disks to be associated with the source database.

18. (Previously Presented) The database management system of claim 12, wherein the processor further executes the computer-readable instructions to receive selection of an existing source database virtual machine, and create the source database on the existing source database virtual machine.

19. (Currently Amended) A non-transitory computer readable media with computer-executable instructions embodied thereon that, when executed by a processor in a hyperconverged infrastructure system, cause the processor to perform a process comprising:

receiving a user request for provisioning a source database in the hyperconverged infrastructure system;

receiving selection of a database engine type;

receiving selection of a Service Level Agreement ("SLA") and a protection schedule;

provisioning the source database based upon the database engine type; and

setting up automatic capturing of snapshots and transactional logs based upon the SLA and the protection schedule for protecting the source database, wherein the transactional logs record transactions occurring on the source database since a most recent snapshot, and wherein the protection schedule comprises a first frequency at which the snapshots are captured and a second frequency at which the transactional logs are captured for protecting the source database.

20. (Previously Presented) The non-transitory computer readable media of claim 19, wherein provisioning the source database comprises creating a new source database or registering an existing database as the source database.

21. (Previously Presented) The non-transitory computer readable media of claim 19, wherein the processor further executes the computer-executable instructions for:

presenting a group of database engine types that are supported by the hyperconverged infrastructure system; and

receiving the selection of the database engine type from the group of database engine types.

22. (Previously Presented) The non-transitory computer readable media of claim 19, wherein the processor further executes the computer-executable instructions for:

receiving selection of at least one of a sample set of parameters for creating a source database virtual machine; and

creating the source database virtual machine based upon the at least one of the sample set of parameters.

23. (Previously Presented) The non-transitory computer readable media of claim 19, wherein the processor further executes the computer-executable instructions for:

presenting a plurality of levels of the SLA; and

receiving selection of one of the plurality of levels of the SLA.

Electronic Acknowledgement Receipt	
EFS ID:	42219043
Application Number:	16234553
International Application Number:	
Confirmation Number:	2275
Title of Invention:	SYSTEM AND METHOD FOR PROVISIONING DATABASES IN A HYPERCONVERGED INFRASTRUCTURE SYSTEM
First Named Inventor/Applicant Name:	Balasubrahmanyam Kuchibhotla
Customer Number:	147491
Filer:	Paul S. Hunter/Maria Lopes-Carvalho
Filer Authorized By:	Paul S. Hunter
Attorney Docket Number:	115539-0217
Receipt Date:	18-MAR-2021
Filing Date:	27-DEC-2018
Time Stamp:	15:06:14
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$170
RAM confirmation Number	E20213HF06092429
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	33498 8ee0062e09f575c0713bb79eb3b1421c6f105b12	no	2
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	30849 d6e4d6fc0b2b3ec30fee1b8af29dbf2b2517a9de	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	64347		

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.

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	16234553
Filing Date	27-Dec-2018
First Named Inventor	Balasubrahmanyam Kuchibhotla
Attorney Docket Number	115539-0217
Title of Invention	SYSTEM AND METHOD FOR PROVISIONING DATABASES IN A HYPERCONVERGED INFRASTRUCTURE SYSTEM

☒ 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
Nutanix, Inc.	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)

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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 44787 ○ 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	/Paul S. Hunter/
Name	Paul S. Hunter

*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:	16234553
Filing Date:	27-Dec-2018
Title of Invention:	SYSTEM AND METHOD FOR PROVISIONING DATABASES IN A HYPERCONVERGED INFRASTRUCTURE SYSTEM
First Named Inventor/Applicant Name:	Balasubrahmanyam Kuchibhotla
Filer:	Paul S. Hunter/Maria Lopes-Carvalho
Attorney Docket Number:	115539-0217

Filed as Large 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	1814	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.: 16234553

Filing Date: 27-Dec-2018

Applicant/Patent under Reexamination: Kuchibhotla

Electronic Terminal Disclaimer filed on March 18, 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

Substitute for form 1449/PTO				Complete if Known	
INFORMATION DISCLOSURE STATEMENT BY APPLICANT				**Application Number**	16/234553
				Filing Date	12/27/2018
Date Submitted: January 12, 2021				**First Named Inventor**	Balasubrahmanyam Kuchibhotla
				Art Unit	2166
(use as many sheets as necessary)				Examiner Name	HARPER, ELIYAH STONE
Sheet	1	of	3	Attorney Docket Number	115539-0217

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Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2] (*if known*)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
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	D5	9,069,708-B2	06-30-2015	GILL ET AL.	
	D6	9,336,060-B2	05-10-2016	NORI ET AL.	
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	D15	10,700,991-B2	06-30-2020	KHINVASARA ET AL.	
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	D17	10,785,029-B2	09-22-2020	GUPTA ET AL.	
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Examiner Initials*	Cite No.[1]	U.S. Patent Application Document Serial Number-Kind Code[2] (*if known*)	Filing Date of Cited Document MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear

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Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3]-Number[4]-Kind Code[5] (*if known*)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Documents	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T[6]
	D31	TW-201600970-A1	01-01-2016	DAN C. KANG		

Examiner Signature	/Eliyah S. Harper/	Date Considered	03/23/2021

4848-3092-6294.1

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /ESH/

Substitute for form 1449/PTO				Complete if Known	
INFORMATION DISCLOSURE STATEMENT BY APPLICANT				**Application Number**	16/234553
				Filing Date	12/27/2018
Date Submitted: January 12, 2021				**First Named Inventor**	Balasubrahmanyam Kuchibhotla
				Art Unit	2166
(use as many sheets as necessary)				Examiner Name	HARPER, ELIYAH STONE
Sheet	2	of	3	Attorney Docket Number	115539-0217

NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.[1]	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, page(s), volume-issue number(s), publisher, city and/or country where published.	T[6]
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Examiner Signature	/Eliyah S. Harper/	Date Considered	03/23/2021

4848-3092-6294.1

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /ESH/

Substitute for form 1449/PTO				Complete if Known	
INFORMATION DISCLOSURE STATEMENT BY APPLICANT				**Application Number**	16/234553
				Filing Date	12/27/2018
Date Submitted: January 12, 2021				**First Named Inventor**	Balasubrahmanyam Kuchibhotla
				Art Unit	2166
(use as many sheets as necessary)				Examiner Name	HARPER, ELIYAH STONE
Sheet	3	of	3	Attorney Docket Number	115539-0217

NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.[1]	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, page(s), volume-issue number(s), publisher, city and/or country where published.	T[6]
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Examiner Signature	/Eliyah S. Harper/	Date Considered	03/23/2021

4848-3092-6294.1

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /ESH/

Notice of References Cited	Application/Control No. 16/234,553	Applicant(s)/Patent Under Reexamination Kuchibhotla et al.	
	Examiner ELIYAH S HARPER	Art Unit 2166	Page 1 of 1

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*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
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*	B	US-20200201526-A1	06-2020	Kuchibhotla; Balasubrahmanyam	G06F16/27	1/1
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	L					
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*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		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.

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S19	589	G06F16/$.cpc. and (SLA) and (service near level near agreement) and (snapshot$1) and select$3 and @ad<"20181227"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2021/03/18 08:18
S20	692	(kuchibhotla balasubrahmanyam).in.	US-PGPUB; USPAT	OR	OFF	2021/03/18 08:18
S21	46	(kuchibhotla and balasubrahmanyam).in.	US-PGPUB; USPAT	OR	OFF	2021/03/18 08:38
S22	1	(kuchibhotla and balasubrahmanyam).in. and (menon same sujit).in.	US-PGPUB; USPAT	OR	OFF	2021/03/18 08:38
S23	473	(nutanix).as.	US-PGPUB; USPAT	OR	OFF	2021/03/18 08:39
S24	883	(nutanix).as.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2021/03/18 08:39
S25	1	(kuchibhotla and balasubrahmanyam).in. and (menon same sujit).in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/03/18 08:39
S26	83	G06F16/128.cpc. and (SLA) and @ad<"20181227"	US-PGPUB; USPAT	OR	OFF	2021/03/18 08:39
S27	257	G06F16/$.cpc. and (SLA) and (service near level near agreement) and (transaction$1 near log$1) and @ad<"20181227"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2021/03/18 08:41
S28	3	G06F16/$.cpc. and (SLA) and (service near level near agreement) and ((transaction$1 near log$1) same frequenc$3) and @ad<"20181227"	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2021/03/18 08:42

			JPO; DERWENT; IBM_TDB			
S29	3	G06F16/$.cpc. and (SLA) and (service near level near agreement) and ((transaction$1 same log$1) same frequenc$3) and @ad<"20181227"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2021/03/18 08:55
S30	28	("0000009" | "0002012" | "0002016" | "0002019" | "10447806" | "10599423" | "10700991" | "10728255" | "10785029" | "20160274981" | "20190235904" | "20190339870" | "20190340091" | "20200034245" | "20200050522" | "20200106737" | "20200137157" | "20200193388" | "8635421" | "8863124" | "9009106" | "9336060" | "9336132" | "9413810" | "9529551" | "9652265" | "9747287" | "D000001").PN.	US-PGPUB; USPAT	OR	OFF	2021/03/18 08:57
S31	0	S30 and snapshot and (transaction near log$1)	US-PGPUB; USPAT	OR	OFF	2021/03/18 09:15
S32	0	S30 and (transaction near log$1)	US-PGPUB; USPAT	OR	OFF	2021/03/18 09:32
S33	0	S30 and (transaction near log$1)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2021/03/18 09:33
S34	5,040	G06F16/$.cpc. and (SLA) and (service near level near agreement) and @ad<"20181227"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2021/03/22 11:01
S35	46	(kuchibhotla and balasubrahmanyam).in.	US-PGPUB; USPAT	OR	OFF	2021/03/22 11:01
S36	50	(kuchibhotla and balasubrahmanyam).in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2021/03/22 11:02

S37	149	G06F16/$.cpc. and (SLA same select$3) and (service near level near agreement) and (snapshot$1) and @ad<"20181227"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2021/03/22 11:06
S39	5	(SLA) and (service near level near agreement) and ((transaction$1 near log$1) same frequenc$3) and @ad<"20181227"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2021/03/22 16:54
S40	886	(nutanix).as.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2021/03/22 17:50
S42	5,285	G06F16/$.cpc. and (SLA) and (service near level) and @ad<"20181227"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2021/03/23 08:54
S43	1,938	G06F16/128.cpc. and @ad<"20181227"	US-PGPUB; USPAT	OR	OFF	2021/03/23 10:12
S44	3,417	G06F16/128.cpc. and @ad<"20181227"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2021/03/23 10:12
S45	4,211	G06F11/1461.cpc. and @ad<"20181227"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2021/03/23 10:18
S46	9	G06F16/$.cpc. and (SLA same select$3) and (service near level near agreement).ab. and (snapshot$1) and @ad<"20181227"	US-PGPUB; USPAT	OR	OFF	2021/03/23 10:25

S47	10	G06F16/$.cpc. and (SLA same select$3) and (service near level near agreement).ab. and (snapshot$1) and @ad<"20181227"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2021/03/23 10:25
S48	91	G06F16/$.cpc. and (SLA same select$3) and (service near level near agreement) and transaction$1 and (snapshot$1) and @ad<"20181227"	US-PGPUB; USPAT	OR	OFF	2021/03/23 10:27
S49	91	G06F16/$.cpc. and (SLA same select$3) and (service near level near agreement) and transaction$1 and (snapshot$1) and @ad<"20181227"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2021/03/23 10:28
S50	17	(SLA) and (service near level near agreement) and ((transaction$1 same log$1) same frequenc$3) and @ad<"20181227"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2021/03/23 11:05

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S38	161	G06F16/$.cpc. and (SLA same select$3) and (service near level near agreement) and (snapshot$1)	US-PGPUB; USPAT	OR	OFF	2021/03/22 11:19
S41	8	(SLA) and (service near level near agreement) and ((transaction$1 near log$1) same frequenc$3)	US-PGPUB; USPAT	OR	OFF	2021/03/22 17:42
S51	1,938	G06F16/128.cpc. and @ad<"20181227"	US-PGPUB; USPAT	OR	OFF	2021/03/23 10:13
S52	2,016	G06F11/1461.cpc. and @ad<"20181227"	US-PGPUB; USPAT	OR	OFF	2021/03/23 10:16
S53	90	(SLA same select$3) and (service near level near agreement) and transaction$1 and (snapshot$1)	USPAT	OR	OFF	2021/03/23 10:28
S54	174	(SLA same select$3) and (service near level near agreement) and transaction$1 and (snapshot$1)	US-PGPUB; USPAT	OR	OFF	2021/03/23 10:28

S55	17	(SLA) and (service near level near agreement) and ((transaction$1 same log$1) same frequenc$3) and @ad<"20181227"	US-PGPUB; USPAT	OR	OFF	2021/03/23 11:05

3/23/2021 11:06:47 AM
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Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/234,553	Kuchibhotla et al.
	Examiner	Art Unit
	ELIYAH S HARPER	2166

CPC - Searched*		
Symbol	**Date**	**Examiner**
G06F 16/128	12/18/2020	ESH
G06F 16/128	03/23/2021	ESH
G06F 11/1461	03/23/2021	ESH

CPC Combination Sets - Searched*		
Symbol	**Date**	**Examiner**

US Classification - Searched*			
Class	**Subclass**	**Date**	**Examiner**
707	639	03/23/2021	ESH

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	**Date**	**Examiner**
inventor search	12/18/2020	ESH
updated search including assignee and inventor	03/22/2021	ESH

Interference Search			
US Class/CPC Symbol	**US Subclass/CPC Group**	**Date**	**Examiner**
G06F	16/128	03/23/2021	ESH
G06F	11/1461	03/23/2021	ESH

/Eliyah S. Harper/ Primary Examiner, Art Unit 2166	

Substitute for form 1449/PTO				Complete if Known	
INFORMATION DISCLOSURE STATEMENT BY APPLICANT				**Application Number**	16/234553
				Filing Date	12/27/2018
Date Submitted: August 2, 2019				**First Named Inventor**	Balasubrahmanyam Kuchibhotla
				Art Unit	2152
(use as many sheets as necessary)				Examiner Name	ABEL JALIL, NEVEEN
Sheet	1	of	2	Attorney Docket Number	115539-0217

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2] (*if known*)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	A1	8,549,518-B2	10-01-2013	ARON ET AL.	
	A2	8,601,473-B2	12-03-2013	ARON ET AL.	
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Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3]-Number[4]-Kind Code[5] (*if known*)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Documents	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T[6]

NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.[1]	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, page(s), volume-issue number(s), publisher, city and/or country where published.	T[6]
	A5	POITRAS, STEVEN. "The Nutanix Bible" (11 January 2014), from http://stevenpoitras.com/the-nutanix-bible/ (Publication date based on indicated capture date by Archive.org; first publication date unknown)	
	A6	POITRAS, STEVEN. "The Nutanix Bible" (12 January 2016), from https://nutanixbible.com/	
	A7	POITRAS, STEVEN. "The Nutanix Bible" (15 October 2013), from http://stevenpoitras.com/the-nutanix-bible/ (Publication date based on indicated capture date by Archive.org; first publication date unknown)	
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	A9	POITRAS, STEVEN. "The Nutanix Bible" (25 June 2018), from https://nutanixbible.com/	
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Examiner Signature	/Eliyah S. Harper/	Date Considered	03/23/2021

4840-7450-8702.1

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /ESH/

Substitute for form 1449/PTO				Complete if Known	
INFORMATION DISCLOSURE STATEMENT BY APPLICANT				**Application Number**	16/234553
				Filing Date	12/27/2018
Date Submitted: August 2, 2019				**First Named Inventor**	Balasubrahmanyam Kuchibhotla
				Art Unit	2152
(use as many sheets as necessary)				Examiner Name	ABEL JALIL, NEVEEN
Sheet	2	of	2	Attorney Docket Number	115539-0217

NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.[1]	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, page(s), volume-issue number(s), publisher, city and/or country where published.	T[6]
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	A14	POITRAS, STEVEN. "The Nutanix Bible" (8 June 2017), from https://nutanixbible.com/	
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Examiner Signature	/Eliyah S. Harper/	Date Considered	03/23/2021

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ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /ESH/

Substitute for form 1449/PTO				***Complete if Known***	
INFORMATION DISCLOSURE STATEMENT BY APPLICANT				**Application Number**	16/234553
				Filing Date	12/27/2018
Date Submitted: November 14, 2019				**First Named Inventor**	Balasubrahmanyam Kuchibhotla
				Art Unit	2152
(use as many sheets as necessary)				Examiner Name	ABEL JALIL, NEVEEN
Sheet	1	of	1	Attorney Docket Number	115539-0217

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2] (*if known*)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear

UNPUBLISHED U.S. PATENT APPLICATION DOCUMENTS

Examiner Initials*	Cite No.[1]	U.S. Patent Application Document Serial Number-Kind Code[2] (*if known*)	Filing Date of Cited Document MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear

FOREIGN PATENT DOCUMENTS

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NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.[1]	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, page(s), volume-issue number(s), publisher, city and/or country where published.	T[6]
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Examiner Signature	/Eliyah S. Harper/	Date Considered	03/23/2021

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ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /ESH/

Substitute for form 1449/PTO				Complete if Known	
INFORMATION DISCLOSURE STATEMENT BY APPLICANT				**Application Number**	16/234553
				Filing Date	12/27/2018
Date Submitted: July 17, 2020				**First Named Inventor**	Balasubrahmanyam Kuchibhotla
				Art Unit	2166
(use as many sheets as necessary)				Examiner Name	HARPER, ELIYAH STONE
Sheet	1	of	5	Attorney Docket Number	115539-0217

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2] (*if known*)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
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Examiner Signature	/Eliyah S. Harper/	Date Considered	03/23/2021

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Substitute for form 1449/PTO				Complete if Known	
INFORMATION DISCLOSURE STATEMENT BY APPLICANT				**Application Number**	16/234553
				Filing Date	12/27/2018
Date Submitted: July 17, 2020				**First Named Inventor**	Balasubrahmanyam Kuchibhotla
				Art Unit	2166
(use as many sheets as necessary)				Examiner Name	HARPER, ELIYAH STONE
Sheet	2	of	5	Attorney Docket Number	115539-0217

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Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2] (*if known*)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
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Examiner Initials*	Cite No.[1]	U.S. Patent Application Document Serial Number-Kind Code[2] (*if known*)	Filing Date of Cited Document MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear

Examiner Signature	/Eliyah S. Harper/	Date Considered	03/23/2021

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /ESH/

Substitute for form 1449/PTO				Complete if Known	
INFORMATION DISCLOSURE STATEMENT BY APPLICANT				**Application Number**	16/234553
				Filing Date	12/27/2018
Date Submitted: July 17, 2020				**First Named Inventor**	Balasubrahmanyam Kuchibhotla
				Art Unit	2166
(use as many sheets as necessary)				Examiner Name	HARPER, ELIYAH STONE
Sheet	3	of	5	Attorney Docket Number	115539-0217

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Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3]-Number[4]-Kind Code[5] (*if known*)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Documents	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T[6]
	A83	EP-1 654 683	05-10-2006	ORACLE INT CORP		
	A84	WO-2016/069029	05-06-2016	HEWLETT PACKARD ENTPR DEV LP		

NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.[1]	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, page(s), volume-issue number(s), publisher, city and/or country where published.	T[6]
	A85	CISCO PUBLIC "Hyperconvergence for Databases" (2019) from https://www.cisco.com/c/dam/en/us/products/collateral/hyperconverged-infrastructure/hyperflex-hx-series/le-60303-hxsql-aag.pdf (accessed 12/18/2019).	
	A86	CISCO PUBLIC, "Cisco HyperFlex All-Flash Systems for Oracle Database Deployments" (June 2017) from https://www.cisco.com/c/en/us/products/collateral/hyperconverged-infrastructure/hyperflex-hx-series/whitepaper_c11-739237.pdf (accessed 12/18/2019).	
	A87	CISCO PUBLIC, "Cisco HyperFlex All-NVMe Systems for Oracle Database: Reference Architecture" (2019) from https://www.cisco.com/c/en/us/products/collateral/hyperconverged-infrastructure/hyperflex-hx-series/hx-oracle-wp.html (accessed 12/18/2019)	
	A88	CISCO PUBLIC, "Cisco HyperFlex HX Data Platform" (2018) from https://www.cisco.com/c/dam/en/us/products/collateral/hyperconverged-infrastructure/hyperflex-hx-series/white-paper-c11-736814.pdf (accessed 12/18/2019).	
	A89	DELPHIX "Backup and Recovery Strategies for the Delphix Engine" (published 2017) Delphix Corp., from https://docs.delphix.com/docs/data-backup-and-recovery-solutions/backup-and-recovery-strategies-for-the-delphix-engine (accessed 12/19/2019).	
	A90	DELPHIX "Database Provisioning Overview" (published 2017) Delphix Corp., from https://docs.delphix.com/docs/introduction/database-virtualization-with-delphix/database-provisioning-overview (accessed 12/19/2019).	
	A91	DELPHIX "Quick Start Guides" (published 2017) Delphix Corp., from https://docs.delphix.com/docs52/quick-start-guides (accessed 12/19/2019).	
	A92	DELPHIX "Replication" (Published 2017) Delphix Corp., from https://docs.delphix.com/docs52/data-backup-and-recovery-solutions/replication (accessed 12/19/2019).	
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	A94	Friedman, Vitaly, "Designing the Perfect Date and Time Picker." Smashing Magazine, published July 2017 (Retrieved from the Internet 4/7/2020). Internet URL: <https://www .smashingmagazine.com/2017 /07 /designing-perfect-date-time-picker/> (Year: 2017)	
	A95	Kolasa, Konrad, "Date Picker." Dribbble, published February 28, 2017 (Retrieved from the Internet 4/7/2020). Internet URL: <https:// dribbble.com/shots/3326020-Date-Picker> (Year: 2017)	
	A96	MELLOR, CHRIS "Beam, Flow and Era: Not a yoga class, silly, Nutanix's move into copy data management" (published 5/10/2019) The Register, from https://www.theregister.co.uk/2018/05/10/nutanix_beam_flow_era/ (accessed 12/18/2019).	
	A97	MELLOR, CHRIS "Delphix sends database virtualization sailing up the Amazon" (published 12/1/2017) The Register, from https://www.theregister.co.uk/2017/12/01/delphix_database_virtualization_comes_to_aws/ (accessed 12/18/2019).	

Examiner Signature	/Eliyah S. Harper/	Date Considered	03/23/2021

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /ESH/

Substitute for form 1449/PTO				Complete if Known	
INFORMATION DISCLOSURE STATEMENT BY APPLICANT				**Application Number**	16/234553
				Filing Date	12/27/2018
Date Submitted: July 17, 2020				**First Named Inventor**	Balasubrahmanyam Kuchibhotla
				Art Unit	2166
(use as many sheets as necessary)				Examiner Name	HARPER, ELIYAH STONE
Sheet	4	of	5	Attorney Docket Number	115539-0217

NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.[1]	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, page(s), volume-issue number(s), publisher, city and/or country where published.	T[6]
	A98	NETAPP SUPPORT, "Cloning databases using SnapManager" (August 2013) from, https://library.netapp.com/ecmdocs/ECMP1217281/html/GUID-EAA4950A-C186-423D-9574-6EA12A92E53D.html (accessed 12/17/2019).	
	A99	NETAPP SUPPORT, "Types of SnapManager restore operations" (August 2013) from, https://library.netapp.com/ecmdocs/ECMP1217281/html/GUID-599DF5AE-C49F-4BF0-A96C-E6E71FAFF102.html (accessed 12/17/2019).	
	A100	NUTANIX "Nutanix announces Flow, Era and Beam and .NEXT 2018" (published 5/9/2018) Nutanix Youtube, from https://www.youtube.com/watch?v=w40asaGtrkU (accessed 12/19/2019)	
	A101	ORACLE COMMUNICATIONS, "Provisioning Database Interface User's Guide, Release 16.0" (September 2014) Oracle, p. 1-174.	
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	A103	Palmer, Brent, "Date Range." Dribbble, published October 21, 2015 (Retrieved from the Internet 4/7/2020). Internet URL: <https://dribbble.com/shots/2306949-Date-Range> (Year: 2015)	
	A104	PATIL, MANOJ E. et al. "Design and Implementation of Graphical User Interface for Relational Database Management System" (2012), International Jounral of Computer Science and Information Technologies (IJCSIT), Volume 3 (3), p. 3871-3874.	
	A105	REED, KATE "Nutanix Introduces Database Services with Era" (published 5/9/2018) Business Wire, from https://www.businesswire.com/news/home/20180509005397/en/ (accessed 12/18/2019).	
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	A108	SANGLAJI, MARYAM et al. "Nutanix Era: Databases Made Simple" (published 2018) Nutanix, from https://www.nutanix.com/blog/nutanix-era-databases-made-simple (accessed 12/18/2019).	
	A109	SANGLAJI, MARYAM et al. "Nutanix Era: One-click Database Management (London)" (published 2018) .NEXT Conference 2018, from https://next.nutanix.com/next-conference-2018-54/nutanix-era-one-click-database-manag (accessed 12/18/2019).	
	A110	SANGLAJI, MARYAM et al. "Nutanix Era: One-click Database Management" (published 2018) .NEXT Conference 2018, from https://www.dropbox.com/s/tfhw1nb0rcvexg3/NEXTEURO2018%20-%20Nutanix%20Era-One%20click%20Database%20Management.pdf?dl=0 (accessed 12/18/2019).	
	A111	VMWARE "VMware vFabric Data Director Administrator and User Guide: Clone a Database" (2012) from https://pubs.vmware.com/datadirector/index.jsp?topic=%2Fcom.vmware.datadirector.admin.doc%2FGUID-426EEA1E-BF44-462F-B400-E2421F53144D.html (accessed 12/17/2019)	
	A112	VMWARE, "VMware vFabric Data Director 2.0: Getting Started with Database Provisioning" (2012) from https://www.vmware.com/pdf/vfabric-data-director-20-database-provision-guide.pdf (accessed 12/18/2019).	

Examiner Signature	/Eliyah S. Harper/	Date Considered	03/23/2021

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /ESH/

Substitute for form 1449/PTO				Complete if Known	
INFORMATION DISCLOSURE STATEMENT BY APPLICANT				**Application Number**	16/234553
				Filing Date	12/27/2018
Date Submitted: July 17, 2020				**First Named Inventor**	Balasubrahmanyam Kuchibhotla
				Art Unit	2166
(use as many sheets as necessary)				Examiner Name	HARPER, ELIYAH STONE
Sheet	5	of	5	Attorney Docket Number	115539-0217

NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.[1]	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, page(s), volume-issue number(s), publisher, city and/or country where published.	T[6]
	A113	Warren, "Internet Archive Wayback Machine Introduces New Beta Version With Calendar View." warren's blog, published January 23, 2011 (Retrieved from the Internet 4/7/2020). Internet URL: <warrenduecker.blogspot.com/2011/01/ internet-archive-wayback-machine.html> (Year: 2011)	

Examiner Signature	/Eliyah S. Harper/	Date Considered	03/23/2021

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /ESH/

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/234,553	Kuchibhotla et al.
	Examiner	Art Unit
	ELIYAH S HARPER	2166

CPC						
Symbol					Type	Version
G06F	/	16	/	128	F	2019-01-01
G06F	/	11	/	1461	I	2013-01-01
G06F	/	9	/	45558	I	2013-01-01
G06F	/	2009	/	45562	A	2013-01-01

CPC Combination Sets							
Symbol					Type	Set	Ranking	Version
	/		/					

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	23	
/Eliyah S. Harper/ Primary Examiner, Art Unit 2166	23 March 2021	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	6

U.S. Patent and Trademark Office — Part of Paper No.: 20210321

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/234,553	Kuchibhotla et al.
	Examiner	Art Unit
	ELIYAH S HARPER	2166

INTERNATIONAL CLASSIFICATION				
CLAIMED				
G06F	/	11	/	14

NON-CLAIMED				
	/		/	

US ORIGINAL CLASSIFICATION	
CLASS	SUBCLASS
707	639

CROSS REFERENCES(S)						
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)					

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	23	
/Eliyah S. Harper/ Primary Examiner, Art Unit 2166	23 March 2021	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	6

U.S. Patent and Trademark Office — Part of Paper No.: 20210321

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/234,553	Kuchibhotla et al.
	Examiner	Art Unit
	ELIYAH S HARPER	2166

☑ Claims renumbered in the same order as presented by applicant ☐ CPA ☑ T.D. ☐ R.1.47

CLAIMS

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original

NONE (Assistant Examiner)	(Date)	Total Claims Allowed: 23	
/Eliyah S. Harper/ Primary Examiner, Art Unit 2166 (Primary Examiner)	23 March 2021 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 6

U.S. Patent and Trademark Office Part of Paper No.: 20210321

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
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Alexandria, Virginia 22313-1450
www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

147491 7590 03/30/2021

FOLEY & LARDNER LLP
3000 K STREET N.W.
SUITE 600
WASHINGTON, DC 20007-5109

EXAMINER
HARPER, ELIYAH STONE

ART UNIT	PAPER NUMBER
2166	

DATE MAILED: 03/30/2021

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/234,553	12/27/2018	Balasubrahmanyam Kuchibhotla	115539-0217	2275

TITLE OF INVENTION: SYSTEM AND METHOD FOR PROVISIONING DATABASES IN A HYPERCONVERGED INFRASTRUCTURE SYSTEM

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$1200	$0.00	$0.00	$1200	06/30/2021

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Maintenance fees are due in utility patents issuing on applications filed on or after Dec. 12, 1980. It is patentee's responsibility to ensure timely payment of maintenance fees when due. More information is available at www.uspto.gov/PatentMaintenanceFees.

PTOL-85 (Rev. 02/11)

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), by mail or fax, or via EFS-Web.

By mail, send to: Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

By fax, send to: (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

147491 7590 03/30/2021
FOLEY & LARDNER LLP
3000 K STREET N.W.
SUITE 600
WASHINGTON, DC 20007-5109

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being transmitted to the USPTO via EFS-Web or by facsimile to (571) 273-2885, on the date below.

(Typed or printed name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/234,553	12/27/2018	Balasubrahmanyam Kuchibhotla	115539-0217	2275

TITLE OF INVENTION: SYSTEM AND METHOD FOR PROVISIONING DATABASES IN A HYPERCONVERGED INFRASTRUCTURE SYSTEM

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$1200	$0.00	$0.00	$1200	06/30/2021

EXAMINER	ART UNIT	CLASS-SUBCLASS
HARPER, ELIYAH STONE	2166	707-639000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

❑ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.

❑ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-09 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1_____
2_____
3_____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ❑ Corporation or other private group entity ❑ Government

4a. Fees submitted: ❑Issue Fee ❑Publication Fee (if required) ❑Advance Order - # of Copies _____

4b. Method of Payment: *(Please first reapply any previously paid fee shown above)*

❑ Electronic Payment via EFS-Web ❑ Enclosed check ❑ Non-electronic payment by credit card (Attach form PTO-2038)

❑ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. _____

5. **Change in Entity Status** (from status indicated above)

❑ Applicant certifying micro entity status. See 37 CFR 1.29

❑ Applicant asserting small entity status. See 37 CFR 1.27

❑ Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/234,553	12/27/2018	Balasubrahmanyam Kuchibhotla	115539-0217	2275

147491 7590 03/30/2021

FOLEY & LARDNER LLP
3000 K STREET N.W.
SUITE 600
WASHINGTON, DC 20007-5109

EXAMINER	
HARPER, ELIYAH STONE	
ART UNIT	**PAPER NUMBER**
2166	

DATE MAILED: 03/30/2021

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

PTOL-85 (Rev. 02/11)

OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. 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 30 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, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. 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.

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.

Notice of Allowability	Application No. 16/234,553	Applicant(s) Kuchibhotla et al.	
	Examiner ELIYAH S HARPER	Art Unit 2166	AIA (FITF) Status Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☑ This communication is responsive to 3/15/2021.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2. ☐ 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.

3. ☑ The allowed claim(s) is/are 1-23 . As a result of the allowed claim(s), 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.**

4. ☐ 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)).

   * Certified copies not received: _____ .

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____ .

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☑ Notice of References Cited (PTO-892)
2. ☑ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date 8/2/2019, 11/14/2019, /1/2020, 1/12/2021.
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material _____.
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date. _____.
5. ☐ Examiner's Amendment/Comment
6. ☑ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

/Eliyah S. Harper/
Primary Examiner, Art Unit 2166

DETAILED ACTION

1. This communication is in response to the amendment filed on 3/15/2021. After a thorough search and examination of the present application and in light of the prior art made of record, claims 1-23 are allowed.

Reasons for allowance

2. The prior art does not teach or fairly suggest a user request for provisioning a source database in a hyperconverged infrastructure system; receive(ing) selection of a database engine type; receive(ing) selection of a Service Level Agreement ("SLA") and a protection schedule; provisioning the source database based upon the database engine type; and setting up automatic capturing of snapshots and transactional logs based upon the SLA and the protection schedule for protecting the source database, wherein the transactional logs record transactions occurring on the source database since a most recent snapshot, and wherein the protection schedule comprises a first frequency at which the snapshots are captured and a second frequency at which the transactional logs are captured for protecting the source database.

Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ELIYAH STONE HARPER whose telephone number is (571)272-0759. The examiner can normally be reached on Monday-Friday 10:00 am - 6:00 pm.

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, Mark Featherstone can be reached on (571)270-3750. 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.

/Eliyah S. Harper/
Primary Examiner, Art Unit 2166
March 23, 2021

Electronic Acknowledgement Receipt	
EFS ID:	42331314
Application Number:	16234553
International Application Number:	
Confirmation Number:	2275
Title of Invention:	SYSTEM AND METHOD FOR PROVISIONING DATABASES IN A HYPERCONVERGED INFRASTRUCTURE SYSTEM
First Named Inventor/Applicant Name:	Balasubrahmanyam Kuchibhotla
Customer Number:	147491
Filer:	Paul S. Hunter/Vicki Andrews
Filer Authorized By:	Paul S. Hunter
Attorney Docket Number:	115539-0217
Receipt Date:	31-MAR-2021
Filing Date:	27-DEC-2018
Time Stamp:	13:25:08
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$1200
RAM confirmation Number	E20213UD26271132
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	Issue Fee Payment (PTO-85B)	115539-0217-Issue_Fee_Transmittal.pdf	196630 390f12adf0cf6973a5da958d247f1abb07637dca	no	1
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	30870 035bd3b1518d6a1ae75324c9f7df798d810121cf	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	227500		

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.

Electronic Patent Application Fee Transmittal

Application Number:	16234553
Filing Date:	27-Dec-2018
Title of Invention:	SYSTEM AND METHOD FOR PROVISIONING DATABASES IN A HYPERCONVERGED INFRASTRUCTURE SYSTEM
First Named Inventor/Applicant Name:	Balasubrahmanyam Kuchibhotla
Filer:	Paul S. Hunter/Vicki Andrews
Attorney Docket Number:	115539-0217

Filed as Large 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:				
UTILITY APPL ISSUE FEE	1501	1	1200	1200

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**1200**

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), by mail or fax, or via EFS-Web.

By mail, send to: Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

By fax, send to: (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

147491 7590 03/30/2021
FOLEY & LARDNER LLP
3000 K STREET N.W.
SUITE 600
WASHINGTON, DC 20007-5109

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being transmitted to the USPTO via EFS-Web or by facsimile to (571) 273-2885, on the date below.

Vicki L. Andrews	(Typed or printed name)
/Vicki L. Andrews/	(Signature)
March 31, 2021	(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/234,553	12/27/2018	Balasubrahmanyam Kuchibhotla	115539-0217	2275

TITLE OF INVENTION: SYSTEM AND METHOD FOR PROVISIONING DATABASES IN A HYPERCONVERGED INFRASTRUCTURE SYSTEM

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$1200	$0.00	$0.00	$1200	06/30/2021

EXAMINER	ART UNIT	CLASS-SUBCLASS
HARPER, ELIYAH STONE	2166	707-639000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.

☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-09 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 FOLEY & LARDNER LLP
2
3

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE: Nutanix, Inc.

(B) RESIDENCE: (CITY and STATE OR COUNTRY): San Jose, California

Please check the appropriate assignee category or categories (will not be printed on the patent) : ☐ Individual ☒ Corporation or other private group entity ☐ Government

4a. Fees submitted: ☒ Issue Fee ☐ Publication Fee (if required) ☐ Advance Order - # of Copies _____

4b. Method of Payment: *(Please first reapply any previously paid fee shown above)*

☒ Electronic Payment via EFS-Web ☐ Enclosed check ☐ Non-electronic payment by credit card (Attach form PTO-2038)

☒ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. 19-0741

5. **Change in Entity Status** (from status indicated above)

☐ Applicant certifying micro entity status. See 37 CFR 1.29

☐ Applicant asserting small entity status. See 37 CFR 1.27

☐ Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature /Paul S. Hunter/ Date March 31, 2021

Typed or printed name Paul S. Hunter Registration No. 44,787

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 NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/234,553	12/27/2018	Balasubrahmanyam Kuchibhotla	115539-0217	2275

147491 7590 04/07/2021

FOLEY & LARDNER LLP
3000 K STREET N.W.
SUITE 600
WASHINGTON, DC 20007-5109

EXAMINER	
HARPER, ELIYAH STONE	

ART UNIT	PAPER NUMBER
2166	

NOTIFICATION DATE	DELIVERY MODE
04/07/2021	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):

ipdocketing@foley.com

UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450
www.uspto.gov

Application No. : 16234553
Applicant : Kuchibhotla
Filing Date : 12/27/2018
Date Mailed : 04/07/2021

NOTICE TO FILE CORRECTED APPLICATION PAPERS

Notice of Allowance Mailed

This application has been accorded an Allowance Date and is being prepared for issuance. The application, however, is incomplete for the reasons below.

Applicant is given two (2) months from the mail date of this Notice within which to respond. This time period for reply is extendable under 37 CFR 1.136(a) for only TWO additional MONTHS.

The informalities requiring correction are indicated in the attachment(s). If the informality pertains to the abstract, specification (including claims) or drawings, the informality must be corrected with an amendment in compliance with 37 CFR 1.121 (or, if the application is a reissue application, 37 CFR 1.173). Such an amendment may be filed after payment of the issue fee if limited to correction of informalities noted herein. See Waiver of 37 CFR 1.312 for Documents Required by the Office of Patent Publication, 1280 Off. Gaz. Patent Office 918 (March 23, 2004). In addition, if the informality is not corrected until after payment of the issue fee, for purposes of 35 U.S.C. 154(b)(1)(iv), "all outstanding requirements" will be considered to have been satisfied when the informality has been corrected. A failure to respond within the above-identified time period will result in the application being ABANDONED.

See attachment(s).

A copy of this notice MUST be returned with the reply. Please address response to "Mail Stop Issue Fee, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450".

/Midel Geronimo/
Publication Branch
Office of Data Management
(571) 272-4200

Application No. 16234553 **Drawings filed: 12/27/2018**

IDENTIFICATION OF DRAWING DEFICIENCIES

- [ ] There is a hole or the image thereof within the illustration. FIG(s)
- [ ] The illustration is penetrated or traversed by a solid or broken line that is not intended to be part of the drawing, such as a dark line caused by a flaw in the copying process. FIG(s)
- [ ] An ink stamp or the image thereof obscures part of the illustration. FIG(s)
- [ ] The drawing is marred by black smudges, obliterations, or fax/copier marks (for example, speckles or dots in a substantial portion of the drawing). FIG(s)
- [ ] Figure numbers are duplicated or missing. FIG(s)
- [ ] Drawing sheet or figure is missing. FIG(s)
- [ ] Numbers, letters, or reference characters in the drawing have been crossed out or are illegibly handwritten. FIG(s)
- [ ] The character of the lines, numbers, and letters is poor. FIG(s)
- [X] The drawing's background shows that the original drawing was made on graph paper or other paper with a pattern or decoration. FIG(s) 9A-9G
- [ ] The FIG. number label is placed in a location that causes the drawing to be read upside down. FIG(s)
- [X] Data, a reference number, or part of the drawing is truncated or missing, or a lead line has no reference number. FIG(s) 9B
- [ ] The drawing and/or the FIG. label contain(s) foreign language. FIG(s)
- [ ] This utility application contains a photograph of a view that is capable of being illustrated as a line drawing. FIG(s)
- [ ] A petition under 37 CFR 1.84(a)(2) to accept color drawings has been granted, but the brief description of the drawings in the specification does not contain (or has not been amended to contain) the paragraph required by 37 CFR 1.84(a)(2)(iii).
- [ ] This reissue application contains added and/or amended drawings that are not labeled as “New” or “Amended” or “Canceled” as required by 37 CFR 1.173(b)(3). FIG(s)
- [ ] This Design reissue application contains a drawing that is labeled as “Canceled” but is not surrounded by brackets, or a drawing that is surrounded by brackets but is not labeled as “Canceled.” See 37 CFR 1.173(b)(3). FIG(s)
- [ ] OTHER:
- [ ] COMMENTS:

Electronic Acknowledgement Receipt	
EFS ID:	42496968
Application Number:	16234553
International Application Number:	
Confirmation Number:	2275
Title of Invention:	SYSTEM AND METHOD FOR PROVISIONING DATABASES IN A HYPERCONVERGED INFRASTRUCTURE SYSTEM
First Named Inventor/Applicant Name:	Balasubrahmanyam Kuchibhotla
Customer Number:	147491
Filer:	Paul S. Hunter/Vicki Andrews
Filer Authorized By:	Paul S. Hunter
Attorney Docket Number:	115539-0217
Receipt Date:	20-APR-2021
Filing Date:	27-DEC-2018
Time Stamp:	11:20:32
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	Post Allowance Communication - Incoming	115539-0217-Response_to_Notice_to_File_Corrected_Application_Papers-Drawings.pdf	394855 3f083611cbad8837e5dbc55aa1e188b59dd2fc14	no	5
Warnings:					

Information:					
2	Drawings-only black and white line drawings	115539-0217-Replacement_Drawings_9A-9G.pdf	1436237 91c3a8eec55eb807b9e9edcbecb58cffc2b192a8	no	7
Warnings:					
Information:					
			Total Files Size (in bytes):	1831092	

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.

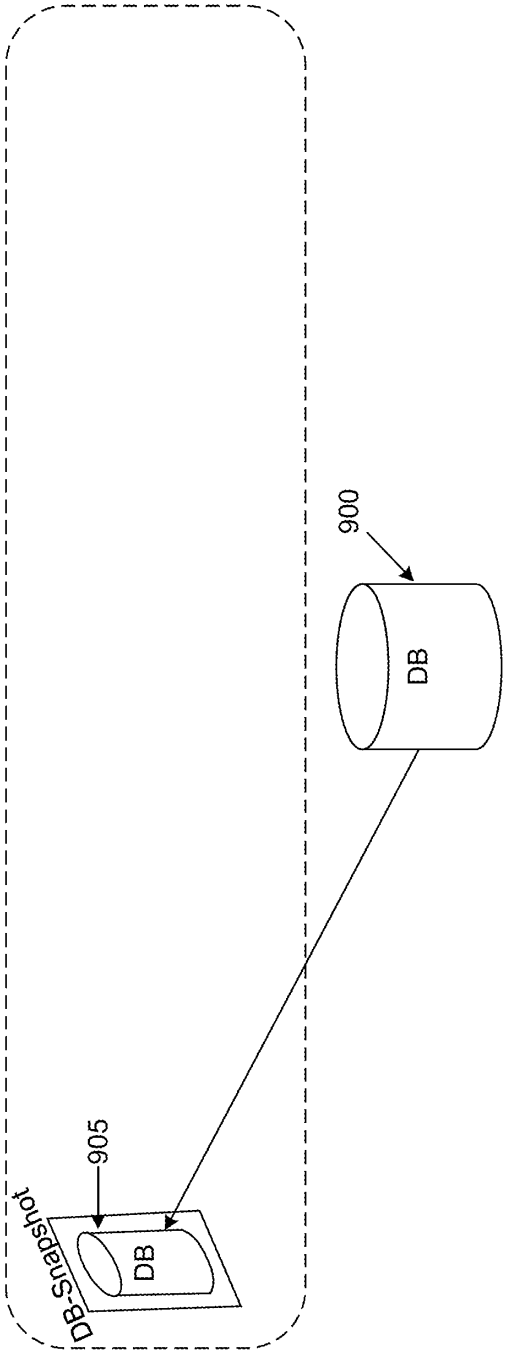


FIG. 9A

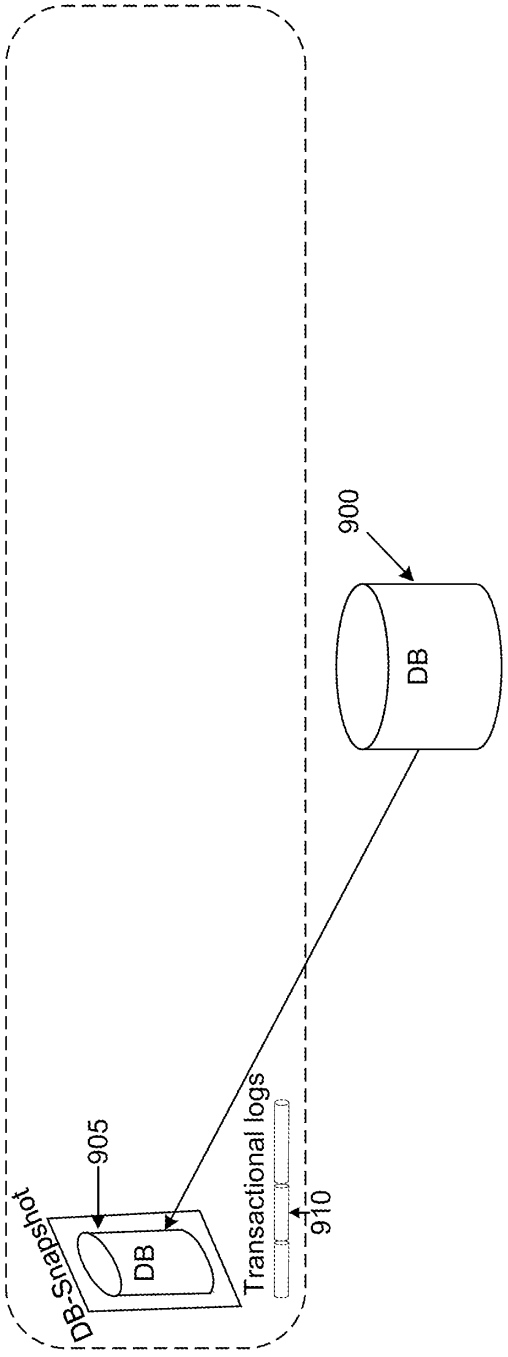


FIG. 9B

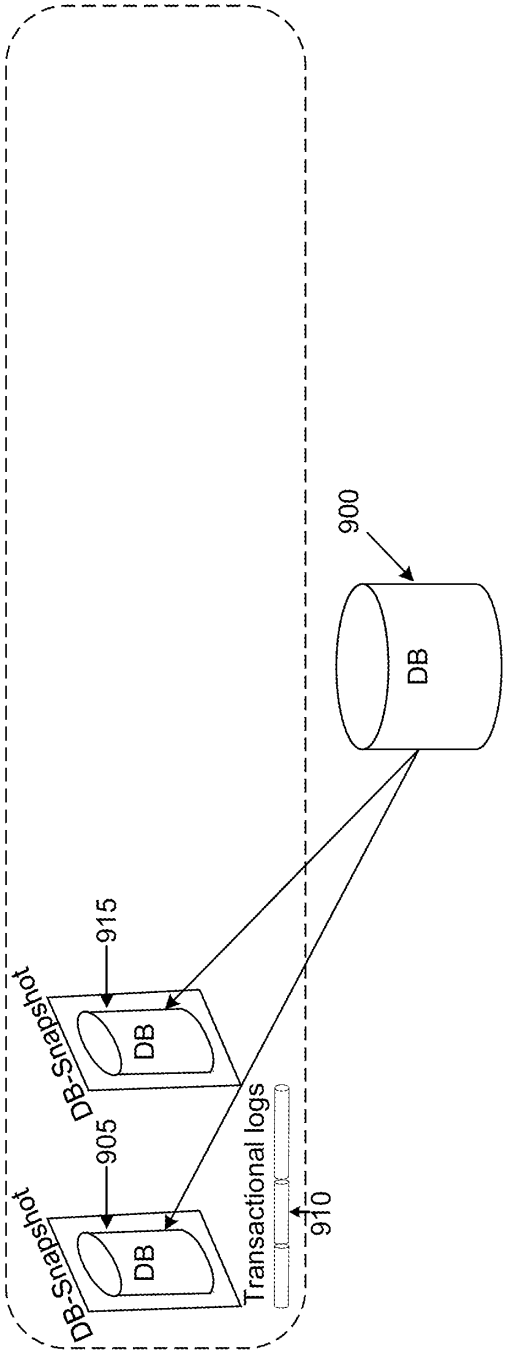

900
DB
915
DB-Snapshot
DB
905
DB-Snapshot
DB
Transactional logs
910

FIG. 9C

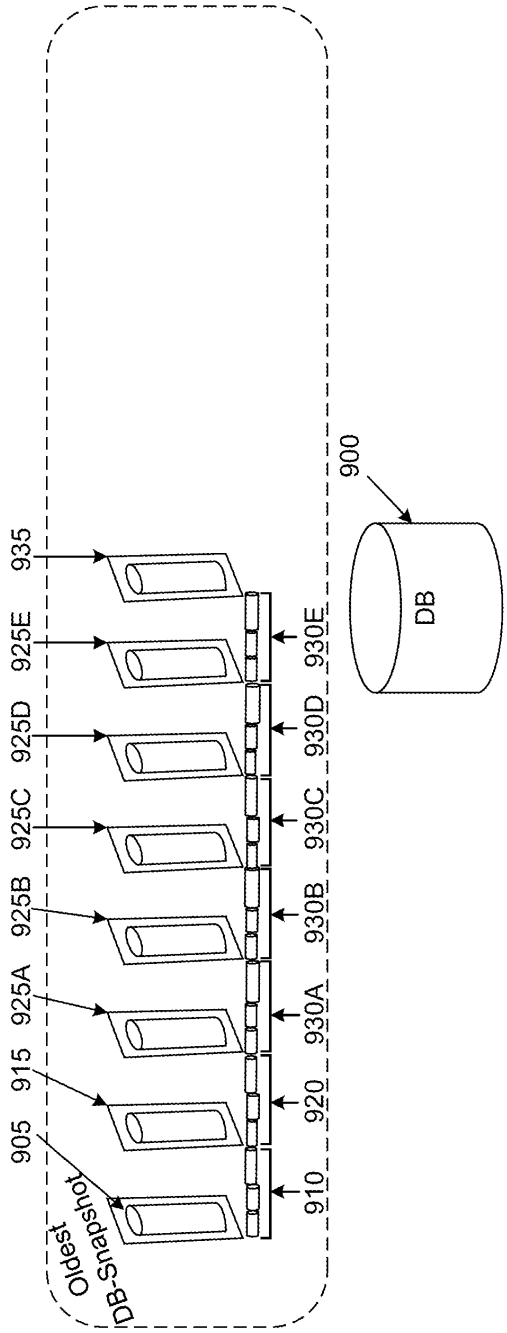

900
DB
935
925E
925D
925C
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915
905
Oldest
DB-Snapshot
930E
930D
930C
930B
930A
920
910

FIG. 9D

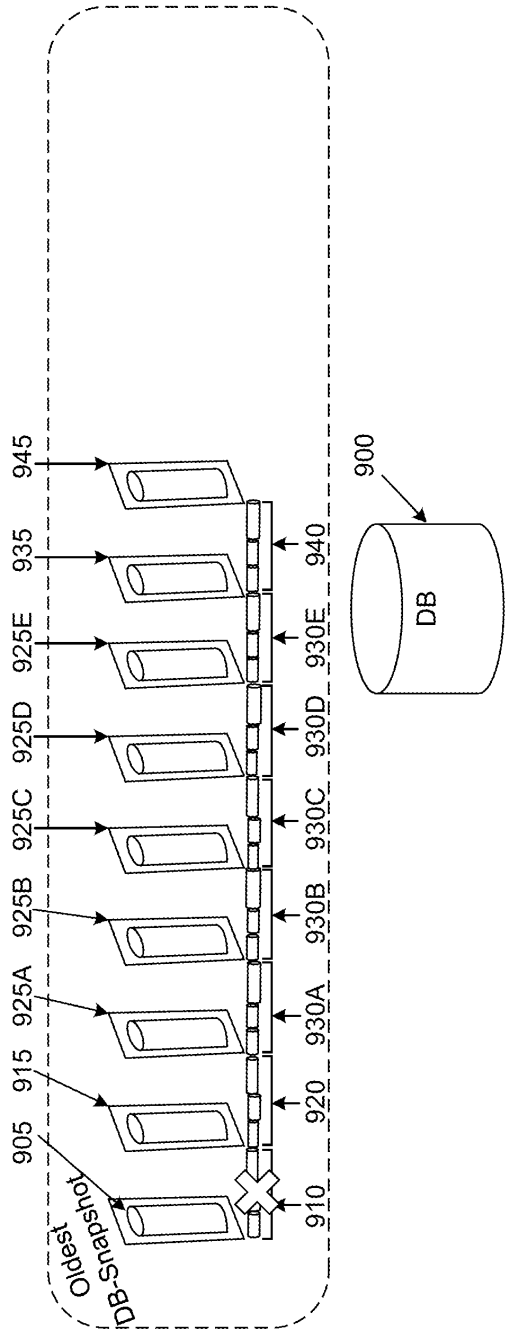

945
935
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925D
925C
925B
925A
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905
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930B
930C
930D
930E
940
900
DB

FIG. 9E

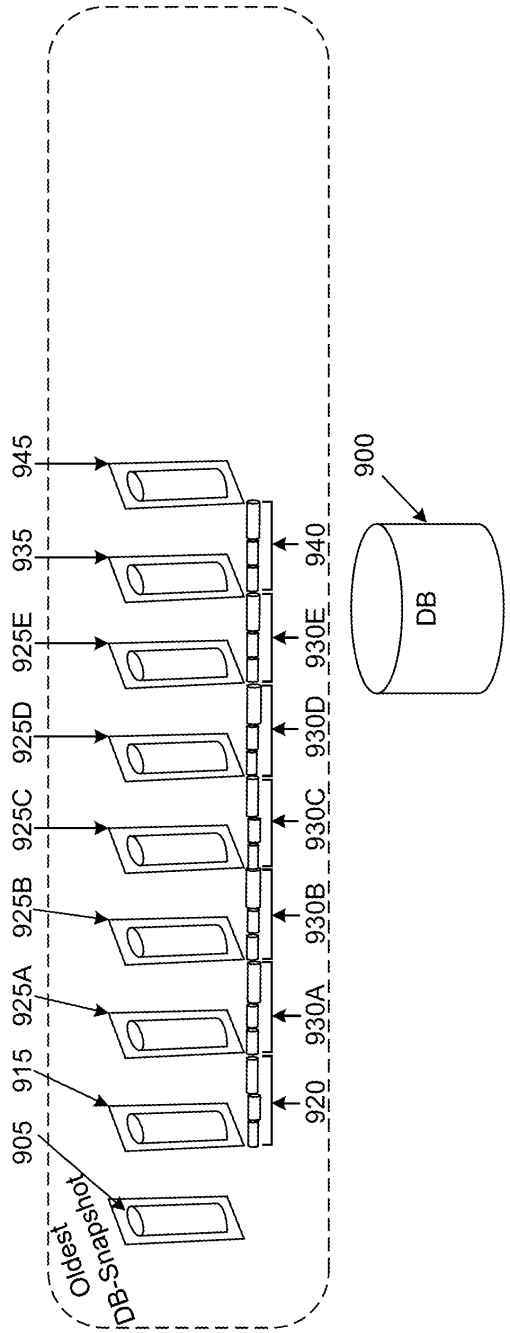

945
935
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925D
925C
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940
930E
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930C
930B
930A
920
900
DB

FIG. 9F

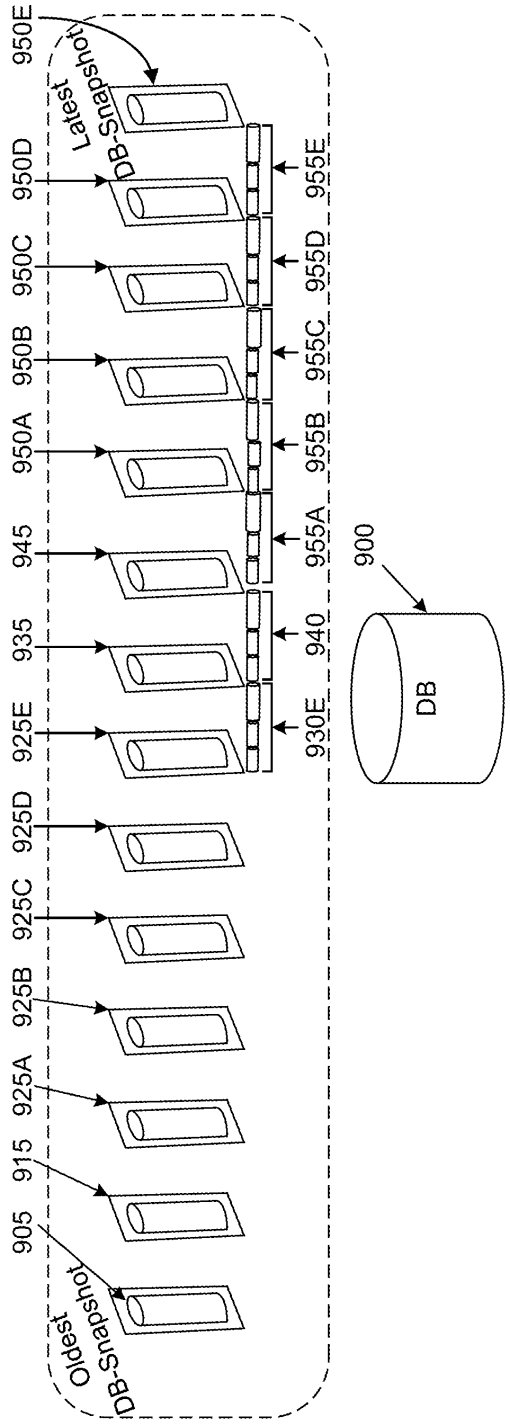

950E
Latest DB-Snapshot
950D
950C
950B
950A
945
935
925E
925D
925C
925B
925A
915
905
Oldest DB-Snapshot
955E
955D
955C
955B
955A
940
930E
900
DB

FIG. 9G

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
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Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/234,553	12/27/2018	Balasubrahmanyam Kuchibhotla	115539-0217	2275

147491 7590 04/07/2021

FOLEY & LARDNER LLP
3000 K STREET N.W.
SUITE 600
WASHINGTON, DC 20007-5109

EXAMINER	
HARPER, ELIYAH STONE	

ART UNIT	PAPER NUMBER
2166	

NOTIFICATION DATE	DELIVERY MODE
04/07/2021	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):

ipdocketing@foley.com

UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450
www.uspto.gov

Application No. : 16234553
Applicant : Kuchibhotla
Filing Date : 12/27/2018
Date Mailed : 04/07/2021

NOTICE TO FILE CORRECTED APPLICATION PAPERS

Notice of Allowance Mailed

This application has been accorded an Allowance Date and is being prepared for issuance. The application, however, is incomplete for the reasons below.

Applicant is given two (2) months from the mail date of this Notice within which to respond. This time period for reply is extendable under 37 CFR 1.136(a) for only TWO additional MONTHS.

The informalities requiring correction are indicated in the attachment(s). If the informality pertains to the abstract, specification (including claims) or drawings, the informality must be corrected with an amendment in compliance with 37 CFR 1.121 (or, if the application is a reissue application, 37 CFR 1.173). Such an amendment may be filed after payment of the issue fee if limited to correction of informalities noted herein. See Waiver of 37 CFR 1.312 for Documents Required by the Office of Patent Publication, 1280 Off. Gaz. Patent Office 918 (March 23, 2004). In addition, if the informality is not corrected until after payment of the issue fee, for purposes of 35 U.S.C. 154(b)(1)(iv), "all outstanding requirements" will be considered to have been satisfied when the informality has been corrected. A failure to respond within the above-identified time period will result in the application being ABANDONED.

See attachment(s).

A copy of this notice MUST be returned with the reply. Please address response to "Mail Stop Issue Fee, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450".

/Midel Geronimo/
Publication Branch
Office of Data Management
(571) 272-4200

Application No. 16234553 **Drawings filed: 12/27/2018**

IDENTIFICATION OF DRAWING DEFICIENCIES

- [ ] There is a hole or the image thereof within the illustration. FIG(s)
- [ ] The illustration is penetrated or traversed by a solid or broken line that is not intended to be part of the drawing, such as a dark line caused by a flaw in the copying process. FIG(s)
- [ ] An ink stamp or the image thereof obscures part of the illustration. FIG(s)
- [ ] The drawing is marred by black smudges, obliterations, or fax/copier marks (for example, speckles or dots in a substantial portion of the drawing). FIG(s)
- [ ] Figure numbers are duplicated or missing. FIG(s)
- [ ] Drawing sheet or figure is missing. FIG(s)
- [ ] Numbers, letters, or reference characters in the drawing have been crossed out or are illegibly handwritten. FIG(s)
- [ ] The character of the lines, numbers, and letters is poor. FIG(s)
- [X] The drawing's background shows that the original drawing was made on graph paper or other paper with a pattern or decoration. FIG(s) 9A-9G
- [ ] The FIG. number label is placed in a location that causes the drawing to be read upside down. FIG(s)
- [X] Data, a reference number, or part of the drawing is truncated or missing, or a lead line has no reference number. FIG(s) 9B
- [ ] The drawing and/or the FIG. label contain(s) foreign language. FIG(s)
- [ ] This utility application contains a photograph of a view that is capable of being illustrated as a line drawing. FIG(s)
- [ ] A petition under 37 CFR 1.84(a)(2) to accept color drawings has been granted, but the brief description of the drawings in the specification does not contain (or has not been amended to contain) the paragraph required by 37 CFR 1.84(a)(2)(iii).
- [ ] This reissue application contains added and/or amended drawings that are not labeled as “New” or “Amended” or “Canceled” as required by 37 CFR 1.173(b)(3). FIG(s)
- [ ] This Design reissue application contains a drawing that is labeled as “Canceled” but is not surrounded by brackets, or a drawing that is surrounded by brackets but is not labeled as “Canceled.” See 37 CFR 1.173(b)(3). FIG(s)
- [ ] OTHER:
- [ ] COMMENTS:

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

First Inventor Name:	Balasubrahmanyam Kuchibhotla
Title:	SYSTEM AND METHOD FOR PROVISIONING DATABASES IN A HYPERCONVERGED INFRASTRUCTURE SYSTEM
Application No.:	16/234,553
Filing Date:	12/27/2018
Examiner:	Harper, Eliyah Stone
Art Unit:	2166
Confirmation No.:	2275

RESPONSE TO NOTICE TO FILE CORRECTED APPLICATION PAPERS

Mail Stop Missing Parts
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Commissioner:

This paper is responsive to the Notice to File Corrected Application Papers mailed April 7, 2021, in the above-identified patent application due June 7, 2021.

Transmitted herewith is replacement figures 9A, 9B, 9C, 9D, 9E, 9F, 9G. One sheet of each replacement figure is submitted herewith.

Enclosed are:

[X] Return Copy of Notice to File Corrected Application Papers

[X] Replacement Drawing Sheets of Figures 9A, 9B, 9C, 9D, 9E, 9F, 9G (7 pages)

The Commissioner is hereby authorized to charge any additional fees which may be required for this application to Deposit Account No. 19-0741. If any extensions of time are needed for timely acceptance of papers submitted herewith, applicant hereby petitions for such

extension under 37 C.F.R. §1.136 and authorizes payment of any such extensions fees to Deposit Account No. 19-0741.

Respectfully submitted,

Date: April 20, 2021

By: */Paul S. Hunter/*

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Substitute for form 1449/PTO				Complete if Known	
INFORMATION DISCLOSURE STATEMENT BY APPLICANT				**Application Number**	16/234553
Date Submitted: July 17, 2020				**Filing Date**	12/27/2018
				First Named Inventor	Balasubrahmanyam Kuchibhotla
(use as many sheets as necessary)				Art Unit	2166
				Examiner Name	HARPER, ELIYAH STONE
Sheet	1	of	5	Attorney Docket Number	115539-0217

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2] (*if known*)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	A1	6,064,975	05-16-2000	MOON ET AL.	
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4/2/2021

Examiner Signature	/Eliyah S. Harper/	Date Considered	03/23/2021

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /ESH/

UNITED STATES PATENT AND TRADEMARK OFFICE

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APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/234,553	05/18/2021	11010336	115539-0217	2275

147491 7590 04/28/2021

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ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(application filed on or after May 29, 2000)

The Patent Term Adjustment is 282 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Data Management (ODM) at (571)-272-4200.

APPLICANT(s) (Please see PAIR WEB site http://pair.uspto.gov for additional applicants):

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IR103 (Rev. 10/09)