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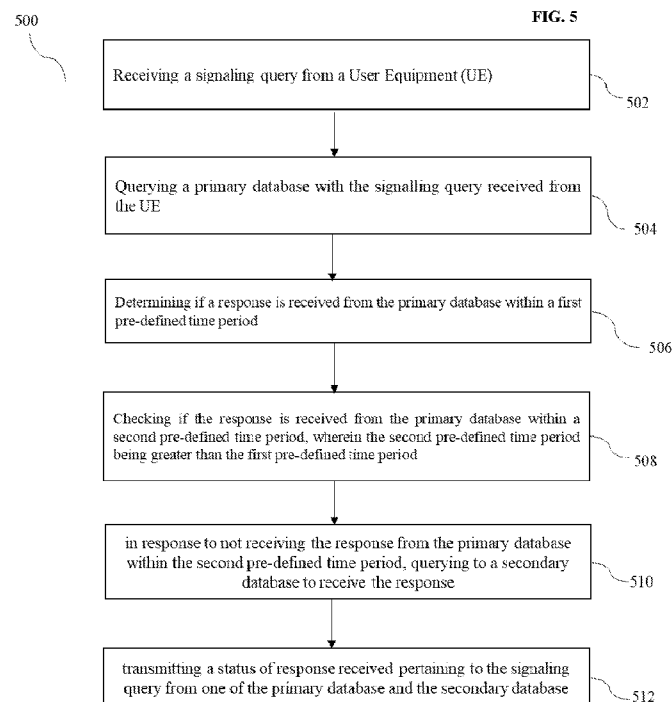
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(54) Title: SYSTEM AND METHOD FOR DATABASE MANAGEMENT



(57) **Abstract:** The present disclosure relates to a system (108) and a method (500) for database management. The system (108) includes a receiving unit (212) to receive a signaling query from a User Equipment (UE) (102). The system (108) includes a querying unit (214) to query a primary database (208). The system (108) includes a determination unit (216) to determine if a response is received from the primary database (208) within a first pre-defined time period. The determination unit (216) further checks if the response is received from the primary database (208) within a second pre-defined time period. The querying unit (214) queries a secondary database (210) to receive the response within the second pre-defined time period. The system (108) includes a transmitting unit (218) to transmit a status of response received pertaining to the signaling query from one of the primary database (208) and the secondary database (210).

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SYSTEM AND METHOD FOR DATABASE MANAGEMENT

FIELD OF THE INVENTION

[0001] The present invention relates to serving data access queries in telecommunication networks, more particularly relates to a system and method for database management.

BACKGROUND OF THE INVENTION

[0002] Modern telecommunications systems have evolved significantly, offering consumers not only telephony capabilities but also access to a wide range of content. The expansion of network capabilities has led to increased interconnectivity and new opportunities for the use of mobile communication devices in various contexts.

[0003] In the telecommunications industry, achieving high service availability is very crucial for customer satisfaction. In one example, each customer, upon subscribing to a particular vendor's services, is provided with subscription data, that may include services included in the subscription, authentication data, service-related data, operation specific data and the like. In another example, subscriber specific dynamic data is also stored in a database by the service provider. Both types of data are stored in a common database. Typically, service providers maintain a local database to store the subscriber related data. So that, when the subscriber makes a data access query, the data is retrieved from the local database and is served to the customer.

[0004] However, the problem arises when the customer makes a query, and the local database is unavailable to cater to the query. There might be an outage due to several reasons, such as flood, earthquake, long power outage, and such, the database might be down and unable to serve the query. Failed transactions due to a primary database failure may result in customer dissatisfaction and inconvenience.

[0005] Therefore, there is a need for a solution that will provide an assured continuity with uninterrupted service provision, irrespective of outage of the local database.

SUMMARY OF THE INVENTION

[0006] One or more embodiments of the present disclosure provide a system and a method for database management.

[0007] In one aspect of the present invention, the system for database management is disclosed. The system includes a receiving unit configured to receive a signaling query from a User Equipment (UE). The system further includes a querying unit configured to query a primary database with the signaling query received from the UE. The system further includes a determination unit configured to determine if a response is received from the primary database within a first pre-defined time period. The determination unit is further configured to check if the response is received from the primary database within a second pre-defined time period. The second pre-defined time period being greater than the first pre-defined time period. The querying unit is further configured to query a secondary database to receive the response in response to not receiving the response from the primary database within the second pre-defined time period. The system further includes a transmitting unit configured to transmit a status of response received pertaining to the signaling query from one of the primary database and the secondary database.

[0008] In an embodiment, the data present in the primary database is mapped onto the secondary database.

[0009] In an embodiment, the signaling query includes one of an attach request, an authentication request, a re-authentication request, and a de-registration request streaming from the UE.

[0010] In an embodiment, the secondary database is a geo-redundant database situated remotely from the primary database.

[0011] In an embodiment, the querying unit is further configured to log a number of the signaling queries transmitted to the primary database without receiving the response from the primary database within the second pre-defined time period. The querying unit is further configured to transmit the subsequent signaling queries to the secondary database in response to the number of the signaling queries transmitted to the primary database crosses a pre-defined threshold count.

[0012] In another aspect of the present invention, the method for database management is disclosed. The method includes the step of receiving a signaling query from a User Equipment (UE). The method further includes the step of querying a primary database with the signaling query received from the UE. The method further includes the step of determining if a response is received from the primary database within a first pre-defined time period. The method further includes the step of checking if the response is received from the primary database within a second pre-defined time period. The second pre-defined time period being greater than the first pre-defined time period. Further, in response to not receiving the response from the primary database within the second pre-defined time period, querying to a secondary database to receive the response. The method further includes the step of transmitting a status of response received pertaining to the signaling query from one of the primary database and the secondary database.

[0013] In another aspect of the invention, a non-transitory computer-readable medium having stored thereon computer-readable instructions is disclosed. The computer-readable instructions are executed by a processor. The processor is configured to receive a signaling query from a User Equipment (UE). The processor is further configured to query a primary database with the signaling query received from the UE. The processor is further configured to determine if a response is received from the primary database within a first pre-defined time period. The processor is

further configured to check if the response is received from the primary database within a second pre-defined time period. The second pre-defined time period being greater than the first pre-defined time period. Further, in response to not receiving the response from the primary database within the second pre-defined time period, query a secondary database to receive the response. The processor is further configured to transmit a status of response received pertaining to the signaling query from one of the primary database and the secondary database.

[0014] In another aspect of invention, a User Equipment is disclosed. The UE includes one or more primary processors communicatively coupled to one or more processors, the one or more primary processors coupled with a memory. The processor is configured to transmit a signaling query to the one or more processor.

[0015] Other features and aspects of this invention will be apparent from the following description and the accompanying drawings. The features and advantages described in this summary and in the following detailed description are not all-inclusive, and particularly, many additional features and advantages will be apparent to one of ordinary skill in the relevant art, in view of the drawings, specification, and claims hereof. Moreover, it should be noted that the language used in the specification has been principally selected for readability and instructional purposes and may not have been selected to delineate or circumscribe the inventive subject matter, resort to the claims being necessary to determine such inventive subject matter.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016] The accompanying drawings, which are incorporated herein, and constitute a part of this disclosure, illustrate exemplary embodiments of the disclosed methods and systems in which like reference numerals refer to the same parts throughout the different drawings. Components in the drawings are not necessarily to scale, emphasis instead being placed upon clearly illustrating the principles of the present disclosure. Some drawings may indicate the components using block diagrams and may not represent the internal circuitry of each component. It will be appreciated by those

skilled in the art that disclosure of such drawings includes disclosure of electrical components, electronic components or circuitry commonly used to implement such components.

[0017] **FIG. 1** is an exemplary block diagram of an environment for database management, according to one or more embodiments of the present invention;

[0018] **FIG. 2** is an exemplary block diagram of a system for database management, according to one or more embodiments of the present invention;

[0019] **FIG. 3** is a schematic representation of a workflow of the system of **FIG. 1**, according to the one or more embodiments of the present invention;

[0020] **FIG. 4** is an exemplary block diagram of an architecture of the system of the **FIG. 2**, according to one or more embodiments of the present invention; and

[0021] **FIG. 5** is a schematic representation of a method for database management, according to one or more embodiments of the present invention.

[0022] The foregoing shall be more apparent from the following detailed description of the invention.

DETAILED DESCRIPTION OF THE INVENTION

[0023] Some embodiments of the present disclosure, illustrating all its features, will now be discussed in detail. It must also be noted that as used herein and in the appended claims, the singular forms "a", "an" and "the" include plural references unless the context clearly dictates otherwise.

[0024] Various modifications to the embodiment will be readily apparent to those skilled in the art and the generic principles herein may be applied to other embodiments. However, one of ordinary skill in the art will readily recognize that the present disclosure including the definitions listed here below are not intended to be

limited to the embodiments illustrated but is to be accorded the widest scope consistent with the principles and features described herein.

[0025] A person of ordinary skill in the art will readily ascertain that the illustrated steps detailed in the figures and here below are set out to explain the exemplary embodiments shown, and it should be anticipated that ongoing technological development will change the manner in which particular functions are performed. These examples are presented herein for purposes of illustration, and not limitation. Further, the boundaries of the functional building blocks have been arbitrarily defined herein for the convenience of the description. Alternative boundaries can be defined so long as the specified functions and relationships thereof are appropriately performed. Alternatives (including equivalents, extensions, variations, deviations, etc., of those described herein) will be apparent to persons skilled in the relevant art(s) based on the teachings contained herein. Such alternatives fall within the scope and spirit of the disclosed embodiments.

[0026] As per various embodiments depicted, the present invention discloses a system and method for database management.

[0027] **FIG. 1** illustrates an exemplary block diagram of an environment **100** for database management, according to one or more embodiments of the present disclosure. In this regard, the environment **100** includes a User Equipment (UE) **102**, a server **104**, a network **106** and a system **108** communicably coupled to each other for database management. The UE **102** aids a user to interact with the system **108** for transmitting a signaling query.

[0028] As per the illustrated embodiment and for the purpose of description and illustration, the UE **102** includes, but not limited to, a first UE **102a**, a second UE **102b**, and a third UE **102c**, and should nowhere be construed as limiting the scope of the present disclosure. In alternate embodiments, the UE **102** may include a plurality of UEs as per the requirement. For ease of reference, each of the first UE **102a**, the

second UE **102b**, and the third UE **102c**, will hereinafter be collectively and individually referred to as the “User Equipment (UE) **102**”.

[0029] In an embodiment, the UE **102** is one of, but not limited to, any electrical, electronic, electro-mechanical or an equipment and a combination of one or more of the above devices such as virtual reality (VR) devices, augmented reality (AR) devices, laptop, a general-purpose computer, desktop, personal digital assistant, tablet computer, mainframe computer, or any other computing device.

[0030] The environment **100** includes the server **104** accessible via the network **106**. The server **104** may include, by way of example but not limitation, one or more of a standalone server, a server blade, a server rack, a bank of servers, a server farm, hardware supporting a part of a cloud service or system, a home server, hardware running a virtualized server, one or more processors executing code to function as a server, one or more machines performing server-side functionality as described herein, at least a portion of any of the above, some combination thereof. In an embodiment, the entity may include, but is not limited to, a vendor, a network operator, a company, an organization, a university, a lab facility, a business enterprise side, a defense facility side, or any other facility that provides service.

[0031] The network **106** includes, by way of example but not limitation, one or more of a wireless network, a wired network, an internet, an intranet, a public network, a private network, a packet-switched network, a circuit-switched network, an ad hoc network, an infrastructure network, a Public-Switched Telephone Network (PSTN), a cable network, a cellular network, a satellite network, a fiber optic network, or some combination thereof. The network **106** may include, but is not limited to, a Third Generation (3G), a Fourth Generation (4G), a Fifth Generation (5G), a Sixth Generation (6G), a New Radio (NR), a Narrow Band Internet of Things (NB-IoT), an Open Radio Access Network (O-RAN), and the like.

[0032] The network **106** may also include, by way of example but not limitation, at least a portion of one or more networks having one or more nodes that transmit, receive, forward, generate, buffer, store, route, switch, process, or a combination thereof, etc. one or more messages, packets, signals, waves, voltage or current levels, some combination thereof, or so forth. The network **106** may also include, by way of example but not limitation, one or more of a wireless network, a wired network, an internet, an intranet, a public network, a private network, a packet-switched network, a circuit-switched network, an ad hoc network, an infrastructure network, a Public-Switched Telephone Network (PSTN), a cable network, a cellular network, a satellite network, a fiber optic network, a VOIP or some combination thereof.

[0033] The environment **100** further includes the system **108** communicably coupled to the server **104** and the UE **102** via the network **106**. The system **108** is configured for database management. As per one or more embodiments, the system **108** is adapted to be embedded within the server **104** or embedded as an individual entity. However, for the purpose of description, the system **108** is illustrated as remotely coupled with the server **104**, without deviating from the scope of the present disclosure.

[0034] Operational and construction features of the system **108** will be explained in detail with respect to the following figures.

[0035] **FIG. 2** is an exemplary block diagram of the system **108** for database management, according to one or more embodiments of the present invention.

[0036] As per the illustrated embodiment, the system **108** includes one or more processors **202**, a memory **204**, a user interface **206**, and a primary database **208**. Further, the system **108** is communicably coupled with a secondary database **210**. For the purpose of description and explanation, the description will be explained with respect to one processor **202** and should nowhere be construed as limiting the scope of the present disclosure. In alternate embodiments, the system **108** may include more

than one processors **202** as per the requirement of the network **106**. The one or more processors **202**, hereinafter referred to as the processor **202** may be implemented as one or more microprocessors, microcomputers, microcontrollers, digital signal processors, central processing units, state machines, logic circuitries, single board computers, and/or any devices that manipulate signals based on operational instructions.

[0037] As per the illustrated embodiment, the processor **202** is configured to fetch and execute computer-readable instructions stored in the memory **204**. The memory **204** may be configured to store one or more computer-readable instructions or routines in a non-transitory computer-readable storage medium, which may be fetched and executed to create or share data packets over a network service. The memory **204** may include any non-transitory storage device including, for example, volatile memory such as RAM, or non-volatile memory such as disk memory, EPROMs, FLASH memory, unalterable memory, and the like.

[0038] In an embodiment, the user interface **206** includes a variety of interfaces, for example, interfaces for a graphical user interface, a web user interface, a Command Line Interface (CLI), and the like. The user interface **206** facilitates communication of the system **108**. In one embodiment, the user interface **206** provides a communication pathway for one or more components of the system **108**. Examples of such components include, but are not limited to, the UE **102** and the primary database **208** and secondary database **210**.

[0039] The primary database **208** and the secondary database **210** are one of, but not limited to, a centralized database, a cloud-based database, a commercial database, an open-source database, a distributed database, an end-user database, a graphical database, a No-Structured Query Language (NoSQL) database, an object-oriented database, a personal database, an in-memory database, a document-based database, a time series database, a wide column database, a key value database, a search database, a cache databases, and so forth. The foregoing examples of primary database **208** and

the secondary database **210** types are non-limiting and may not be mutually exclusive e.g., a database can be both commercial and cloud-based, or both relational and open-source, etc.

[0040] In order for the system **108** to manage the database, the processor **202** includes one or more modules. In one embodiment, the one or more modules includes, but not limited to, a receiving unit **212**, a querying unit **214**, a determination unit **216**, and a transmitting unit **218** communicably coupled to each other for database management.

[0041] The receiving unit **212**, the querying unit **214**, the determination unit **216**, and the transmitting unit **218** in an embodiment, may be implemented as a combination of hardware and programming (for example, programmable instructions) to implement one or more functionalities of the processor **202**. In the examples described herein, such combinations of hardware and programming may be implemented in several different ways. For example, the programming for the processor **202** may be processor-executable instructions stored on a non-transitory machine-readable storage medium and the hardware for the processor may comprise a processing resource (for example, one or more processors), to execute such instructions. In the present examples, the memory **204** may store instructions that, when executed by the processing resource, implement the processor. In such examples, the system **108** may comprise the memory **204** storing the instructions and the processing resource to execute the instructions, or the memory **204** may be separate but accessible to the system **108** and the processing resource. In other examples, the processor **202** may be implemented by electronic circuitry.

[0042] In one embodiment, the receiving unit **212** of the system **108** is configured to receive a signaling query from the UE **102**. The signaling query is a specific type of query or request sent from the UE **102** to the system **108** for the purpose of initiating, maintaining, or managing communication and service states between the UE **102** and the network **106**. The signaling queries are crucial for establishing, maintaining, and

terminating connections, as well as for various administrative and control tasks within the network **106**.

[0043] The signaling query includes one of an attach request, an authentication request, a re-authentication request, and a de-registration request streaming from the UE **102**. The attach request is the signaling query to establish a connection with the network **106** enabling the UE **102** to access network services. The authentication request is the signaling query to ensure that the UE **102** has valid credentials and authorization to access the network **106**. The re-authentication request is the signaling query initiated by the network **106** to re-verify the identity of the UE **102**. The de-registration request is the signaling query sent by the UE **102** to notify the network **106** that the user using the UE **102** is disconnecting or detaching from the network **106**.

[0044] Upon receiving the signaling query from the UE **102**, the querying unit **214** is configured to query the primary database **208** with the signaling query received from the UE **102**. Upon querying the primary database **208**, the determination unit **216** is configured to determine if a response is received from the primary database **208** within a first pre-defined time period. The first pre-defined time period typically refers to a duration within which the querying unit **214** is required to receive the response to the signaling query within a network communication process.

[0045] If the response is not received from the primary database **208** within the first pre-defined time period, the determination unit **216** is further configured to check if the response is received from the primary database **208** within a second pre-defined time period. The second pre-defined time period refers to an additional duration within which the querying unit **214** is required to receive the response to the signaling query, if a response is not received from the primary database **208** within the first pre-defined time period. The second pre-defined time period is defined to be greater than the first pre-defined time period.

[0046] Upon checking whether the response is received from the primary database **208** within the second pre-defined time period, the querying unit **214** is configured to query the secondary database **210**. More specifically, in response to not receiving the response from the primary database **208** within the second pre-defined time period, the querying unit **214** queries the secondary database **210** to receive the response. The secondary database **210** is a geo-redundant database situated remotely from the primary database **208**. The geo-redundant database is a type of database architecture designed to ensure high availability and disaster recovery by replicating data across multiple geographic locations. The recovery by replicating data across multiple geographic locations protects against data loss and downtime due to regional failures, such as natural disasters, power outages, or network issues. The data present in the primary database **208** is mapped onto the secondary database **210**. The data includes, but not limited to, user information, transaction records, product catalog, order processing data, session data, configuration settings, logs and audits, analytics data, multimedia content, IoT sensor data.

[0047] In one embodiment, the querying unit **214** is configured to log a number of the signaling queries transmitted to the primary database **208** without receiving the response from the primary database **208** within the second pre-defined time period. The process of logging the number of the signaling queries refers to the process of systematically recording the number of signaling queries.

[0048] If the number of signaling queries transmitted to the primary database crosses a pre-defined threshold count, the subsequent signaling queries are transmitted to the secondary database **210**. The pre-defined threshold count refers to a specific number that represents the maximum number of signaling queries allowed to be sent to the primary database **208** before subsequent queries are redirected to the secondary database **210**. For instance, if the pre-defined threshold count is set as 100, then the first 100 signaling queries will go to the primary database **208**, and any signaling queries beyond that will be routed to the secondary database **210**.

[0049] Thereafter, the transmitting unit **218** is configured to transmit a status of response received pertaining to the signaling query from one of the primary database **208** and the secondary database **210**. Therefore, the response to the signaling query received from the UE **102** is transmitted without any service disruption. Further, there will be no transaction failure due to the redundancy of the data across the geo-redundant database or the secondary database **210**.

[0050] **FIG. 3** describes a preferred embodiment of the system **108** of **FIG. 2**, according to various embodiments of the present invention. It is to be noted that the embodiment with respect to **FIG. 3** will be explained with respect to the first UE **102a** and the system **108** for the purpose of description and illustration and should nowhere be construed as limited to the scope of the present disclosure.

[0051] As mentioned earlier in **FIG. 1**, each of the first UE **102a**, the second UE **102b**, and the third UE **102c** may include an external storage device, a bus, a main memory, a read-only memory, a mass storage device, communication port(s), and a processor. The exemplary embodiment as illustrated in **FIG. 3** will be explained with respect to the first UE **102a** without deviating from the scope of the present disclosure and the limiting the scope of the present disclosure. The first UE **102a** includes one or more primary processors **302** communicably coupled to the one or more processors **202** of the system **108**.

[0052] The one or more primary processors **302** are coupled with a memory **304** storing instructions which are executed by the one or more primary processors **302**. Execution of the stored instructions by the one or more primary processors **302** enables the first UE **102a** to transmit the signaling query to the one or more processors **202**.

[0053] As mentioned earlier in **FIG. 2**, the one or more processors **202** of the system **108** is configured for database management. As per the illustrated embodiment, the system **108** includes the one or more processors **202**, the memory **204**, the user interface **206**, and the primary database **208**. Further, the system **108** is communicably

coupled with the secondary database **210**. The operations and functions of the one or more processors **202**, the memory **204**, the user interface **206**, the primary database **208** and the secondary database **210** are already explained in **FIG. 2**. For the sake of brevity, a similar description related to the working and operation of the system **108** as illustrated in **FIG. 2** has been omitted to avoid repetition.

[0054] Further, the processor **202** includes the receiving unit **212**, the querying unit **214**, the determination unit **216**, and the transmitting unit **218**. The operations and functions of the receiving unit **212**, the querying unit **214**, the determination unit **216**, and the transmitting unit **218** are already explained in **FIG. 2**. Hence, for the sake of brevity, a similar description related to the working and operation of the system **108** as illustrated in **FIG. 2** has been omitted to avoid repetition. The limited description provided for the system **108** in **FIG. 3**, should be read with the description as provided for the system **108** in the **FIG. 2** above, and should not be construed as limiting the scope of the present disclosure.

[0055] **FIG. 4** is an exemplary block diagram of an architecture **400** of the system **108** for database management, according to one or more embodiments of the present invention.

[0056] The architecture **400** of the system includes a data cluster **402**. The data cluster **402** includes a data engine **404**. The data engine **404** is configured to process and handle multiple signaling queries across multiple servers **104** operational within the data cluster **402**. The data cluster **402** is a cluster formed by multiple data nodes connected to the servers **104**.

[0057] In one embodiment, the data cluster **402** includes the primary database **208** and the secondary database **210**. The primary database **208** is located at some location and will be serving the signaling queries received from that particular location. For example, if the primary database **208** is located at Mumbai, the signaling queries

received from the UE's **102** located at Mumbai, will be facilitated by the primary database **208** located at Mumbai.

[0058] The secondary database **210** is also referred to as geo-redundant database. The secondary database **210** stores the replicated data nodes of the primary database **208**, and is located at a geographical distance from the primary database **208**, relying on the geographical redundancy. For example, if the primary database **208** is located at Mumbai, then the secondary database **210** may be located at Delhi. The geographical distance may vary according to discretion of a service provider.

[0059] The secondary database **210** aids in addressing the problem of geographical calamities resulting in database outage. For example, if the primary database **208** from Mumbai fails to respond due to outage caused by the natural disaster, its corresponding secondary database **210** in Delhi will serve the signaling query, without having to send the failure message to the user using the UE **102**. Due to the creation of the secondary database **210**, the service will be continued without any interruptions and the failure rate of the service will be near to zero. Each of the primary database **208** and the secondary database **210**, includes multiple servers **104**, such as server A and server B, with multiple data nodes such as data node 1 (DN 1), data node 2 (DN 2), data node 3 (DN 3) and data node 4 (DN 4) connected to each of the primary database **208** and the secondary database **210**.

[0060] The data engine **404** further includes a data node replication channel **406**. The data node replication channel **406** is provided to replicate the data nodes connected to each server A and server B. In particular, the data node replication channel **406** creates a replica of the primary database **208** to be stored in the secondary database **210**.

[0061] In an embodiment, the data engine **404** of the data cluster **402** receives the signaling query from the UE **102**. The UE **102** requests the data engine **404** to access the data, such as subscription service-related data. The request received from the UE

102 is facilitated by the primary database **208** corresponding to the UE's **102** geo-location. In case, the primary database **208** is unable to response, or is unavailable for the service, the error response is received from the primary database **208**. Upon receiving the error response from the primary database **208**, the request will be directed to the secondary database **210**.

[0062] In an embodiment, before transmitting the requests to the secondar database, the failure of the primary database **208** is checked. The failure of the primary database **208** includes at least one of face outage, power cut, natural calamities, such as earthquake or flood, and in such scenario, connection is not established between the primary database **208** and the UE **102**. Therefore, the data engine **404** is configured to detect the outage or unavailability of the primary database **208**, based upon either the response (error message received from the primary database **208**), or waiting period completion. A timer can be pre-set with predefined time period. For the predefined time period, the data engine **404** will wait to receive the response from the primary database **208**. If the data engine **404** does not receive any response from the primary database **208**, within the predefined time period, the request will be sent again.

[0063] In one embodiment, the data engine **404** employs a counter, with present number, for indicating how many times the data engine **404** will attempt to reach the primary database **208**. In one example, the counter may be set to zero. As soon as the timer goes off, the data engine **404**.

[0064] In one embodiment, the data engine **404** diverts the signaling query to the secondary database **210** to save service request response time. The number of the counter and timer are reconfigurable. The secondary database **210** serves the signaling query, and the response received from the secondary database **210** is transmitted to the UE **102**.

[0065] **FIG. 5** is a flow diagram of a method **500** for database management, according to one or more embodiments of the present invention. For the purpose of

description, the method **500** is described with the embodiments as illustrated in **FIG. 2** and should nowhere be construed as limiting the scope of the present disclosure.

[0066] At step **502**, the method **500** includes the step of receiving the signaling query from the UE **102** by the receiving unit **212**. The signaling query includes one of the attach request, the authentication request, the re-authentication request, and the de-registration request streaming from the UE **102**.

[0067] At step **504**, the method **500** includes the step of querying the primary database **208** with the signaling query received from the UE **102** by the querying unit **214**.

[0068] At step **506**, the method **500** includes the step of determining if a response is received from the primary database **208** within the first pre-defined time period by the determination unit **216**.

[0069] At step **508**, the method **500** includes the step of checking if the response is received from the primary database **208** within the second pre-defined time period by the determination unit **216**. The second pre-defined time period being greater than the first pre-defined time period.

[0070] At step **510**, the method **500** includes the step of querying the secondary database **210** to receive the response in response to not receiving the response from the primary database **208** within the second pre-defined time period by the querying unit **214**. The secondary database **210** is a geo-redundant database situated remotely from the primary database **208**. Upon querying the secondary database **210**, the querying unit **214** is further configured to log a number of the signaling queries transmitted to the primary database **208** without receiving the response.

[0071] Upon logging the number of signaling queries, the querying unit **214** is further configured to transmit the subsequent signaling queries to the secondary database **210**. The subsequent signaling queries are transmitted to the secondary

database **210** in response to the number of the signaling queries transmitted to the primary database **208** crosses a pre-defined threshold count.

[0072] At step **512**, the method **500** includes the step of transmitting the status of response received pertaining to the signaling query from one of the primary database **208** and the secondary database **210** by the transmitting unit **218**.

[0073] The present invention further discloses a non-transitory computer-readable medium having stored thereon computer-readable instructions. The computer-readable instructions are executed by the processor **202**. The processor **202** is configured to receive the signaling query from the UE **102**. The processor **202** is further configured to query the primary database **208** with the signaling query received from the UE **102**. The processor **202** is further configured to determine if the response is received from the primary database **208** within the first pre-defined time period. The processor **202** is further configured to check if the response is received from the primary database **208** within the second pre-defined time period. The second pre-defined time period being greater than the first pre-defined time period. Further, in response to not receiving the response from the primary database **208** within the second pre-defined time period, query the secondary database **210** to receive the response. The processor **202** is further configured to transmit the status of response received pertaining to the signaling query from one of the primary database **208** and the secondary database **210**.

[0074] A person of ordinary skill in the art will readily ascertain that the illustrated embodiments and steps in description and drawings (FIG.1-5) are set out to explain the exemplary embodiments shown, and it should be anticipated that ongoing technological development will change the manner in which particular functions are performed. These examples are presented herein for purposes of illustration, and not limitation. Further, the boundaries of the functional building blocks have been arbitrarily defined herein for the convenience of the description. Alternative boundaries can be defined so long as the specified functions and relationships thereof

are appropriately performed. Alternatives (including equivalents, extensions, variations, deviations, etc., of those described herein) will be apparent to persons skilled in the relevant art(s) based on the teachings contained herein. Such alternatives fall within the scope and spirit of the disclosed embodiments.

[0075] The present disclosure incorporates technical advancement that the response to the signaling query received from the UE is transmitted without any service disruption. Further, no transaction failure due to the redundancy of the data across the geo-redundant database or the secondary database.

[0076] The present invention offers multiple advantages over the prior art and the above listed are a few examples to emphasize on some of the advantageous features. The listed advantages are to be read in a non-limiting manner.

REFERENCE NUMERALS

- [0077] Environment- 100
- [0078] User Equipment (UE)- 102
- [0079] Server- 104
- [0080] Network- 106
- [0081] System -108
- [0082] Processor- 202
- [0083] Memory- 204
- [0084] User Interface- 206
- [0085] Primary Database- 208
- [0086] Secondary Database- 210
- [0087] Receiving Unit- 212
- [0088] Querying Unit- 214
- [0089] Determining unit- 216
- [0090] Transmitting Unit- 218
- [0091] Primary processor- 302
- [0092] Memory- 304
- [0093] Data Cluster- 402
- [0094] Data Engine- 404
- [0095] Data Replication Channel- 406

We Claim:

1. A method (500) for database management, the method (500) comprising the steps of:
 - receiving, by one or more processor (202), a signalling query from a User Equipment (UE) (102);
 - querying, by the one or more processor (202), a primary database (208) with the signalling query received from the UE (102);
 - determining, by the one or more processor (202), if a response is received from the primary database (208) within a first pre-defined time period;
 - checking, by the one or more processor (202), if the response is received from the primary database (208) within a second pre-defined time period, wherein the second pre-defined time period being greater than the first pre-defined time period;
 - in response to not receiving the response from the primary database (208) within the second pre-defined time period, querying, by the one or more processor (202), to a secondary database (210) to receive the response; and
 - transmitting, by the one or more processor (202), a status of response received pertaining to the signalling query from one of the primary database (208) and the secondary database (210).
2. The method (500) as claimed in claim 1, wherein if the one or more processor (202) fails to receive the response from the primary database (208) within the second pre-defined time period, the method (500) comprising the steps of:
 - logging, by the one or more processors (202), a number of the signalling queries transmitted to the primary database (208) without receiving the response; and
 - transmitting, by the one or more processors (202), the subsequent signalling queries to the secondary database (210), in response to the number

of the signalling queries transmitted to the primary database (208) crosses a pre-defined threshold count.

3. The method (500) as claimed in claim 1, wherein the data present in the primary database (208) is mapped onto the secondary database (210).
4. The method (500) as claimed in claim 1, wherein the signalling query includes one of an attach request, an authentication request, a re-authentication request, and a de-registration request streaming from the UE (102).
5. The method (500) as claimed in claim 1, wherein the secondary database (210) is a geo-redundant database situated remotely from the primary database (208).
6. A system (108) for database management, the system (108) comprising:
 - a receiving unit (212) configured to receive, a signalling query from a User Equipment (UE) (102);
 - a querying unit (214) configured to query, a primary database (208) with the signalling query received from the UE (102);
 - a determination unit (216) configured to:
 - determine, if a response is received from the primary database within a first pre-defined time period; and
 - check, if the response is received from the primary database (208) within a second pre-defined time period, wherein the second pre-defined time period being greater than the first pre-defined time period;
 - the querying unit (214) configured to query, a secondary database (210) to receive the response in response to not receiving the response from the primary database (208) within the second pre-defined time period; and
 - a transmitting unit (218) configured to transmit, a status of response received pertaining to the signalling query from one of the primary database (208) and the secondary database (210).

7. The system (108) as claimed in claim 6, wherein the data present in the primary database (208) is mapped onto the secondary database (210).
8. The system (108) as claimed in claim 6, wherein the signalling query includes one of an attach request, an authentication request, a re-authentication request, and a de-registration request streaming from the UE (102).
9. The system (108) as claimed in claim 6, wherein the secondary database (210) is a geo-redundant database situated remotely from the primary database (208).
10. The system (108) as claimed in claim 6, wherein the querying unit (214) is further configured to:
 - log, a number of the signalling queries transmitted to the primary database (208) without receiving the response from the primary database (208) within the second pre-defined time period; and
 - transmit the subsequent signalling queries to the secondary database (210) in response to the number of the signalling queries transmitted to the primary database (208) crosses a pre-defined threshold count.
11. A User Equipment (UE) (102) comprising of:
 - one or more primary processors (302) communicatively coupled to one or more processors (202) of a system (108), the one or more primary processors (302) coupled with a memory (304), wherein said memory (304) stores instructions which when executed by the one or more primary processors (302) causes the UE (102) to:
 - transmit, a signalling query to the one or more processor (202); and
 - wherein the one or more processor (202) is further configured to perform the steps as claimed in claim 1.

12. A non-transitory computer-readable medium having stored thereon computer-readable instructions that, when executed by a processor (202), causes the processor (202) to:
 - receive, a signalling query from a User Equipment (UE) (102);
 - query, a primary database (208) with the signalling query received from the UE (102);
 - determine, if a response is received from the primary database (208) within a first pre-defined time period;
 - check, if the response is received from the primary database (208) within a second pre-defined time period, wherein the second pre-defined time period being greater than the first pre-defined time period;
 - in response to not receiving the response from the primary database (208) within the second pre-defined time period, query, a secondary database (210) to receive the response; and
 - transmit, a status of response received pertaining to the signalling query from one of the primary database (208) and the secondary database (210).

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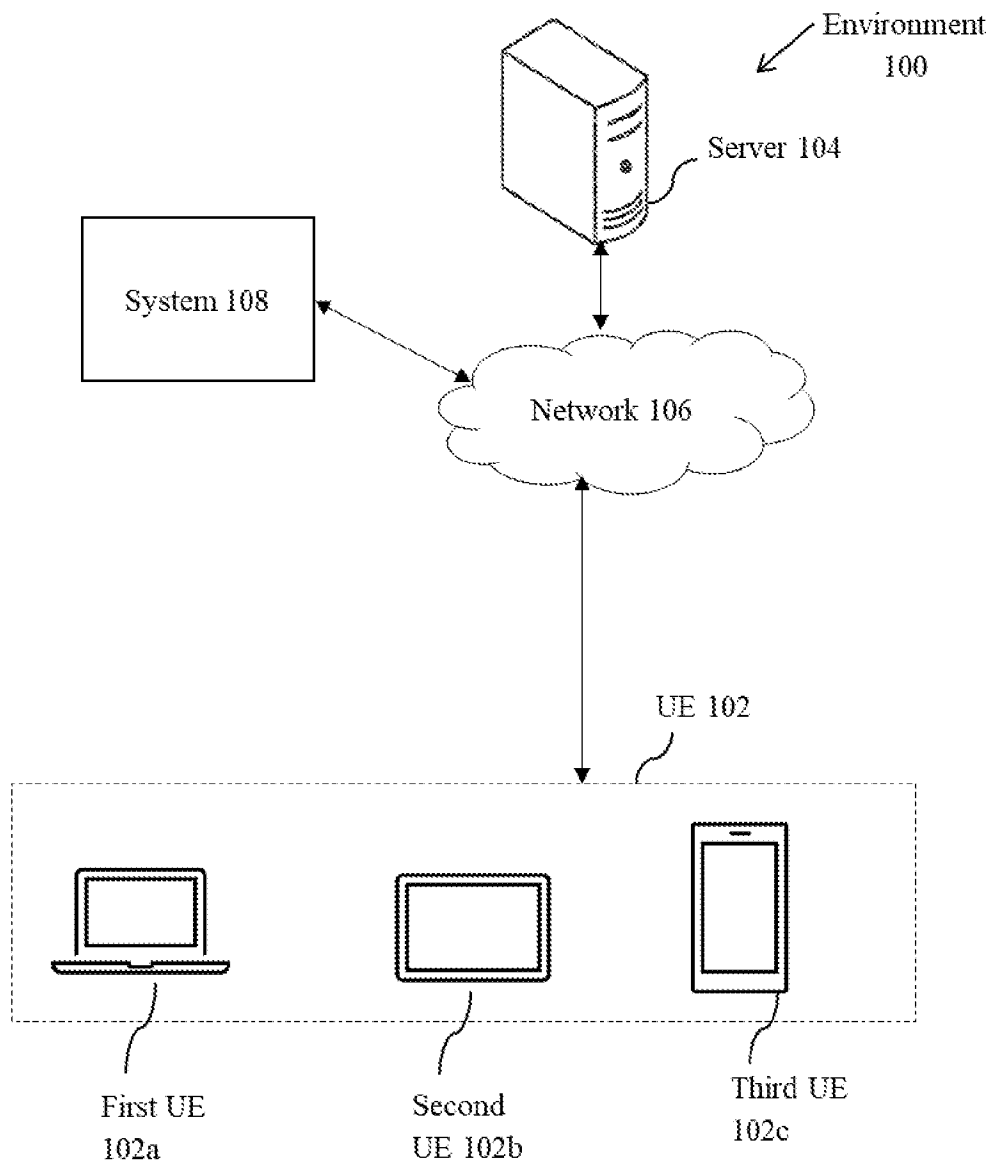


FIG. 1

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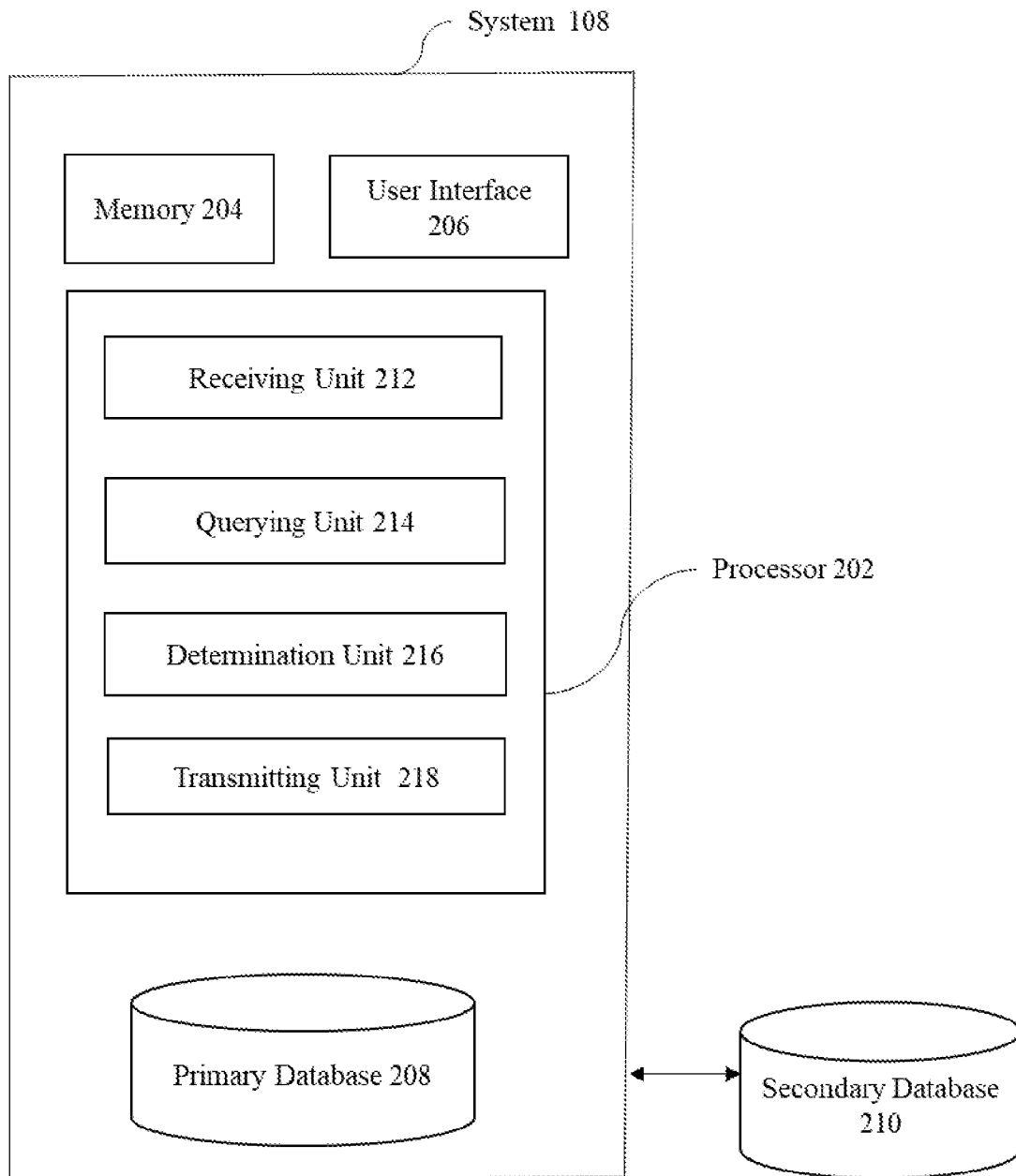


FIG. 2

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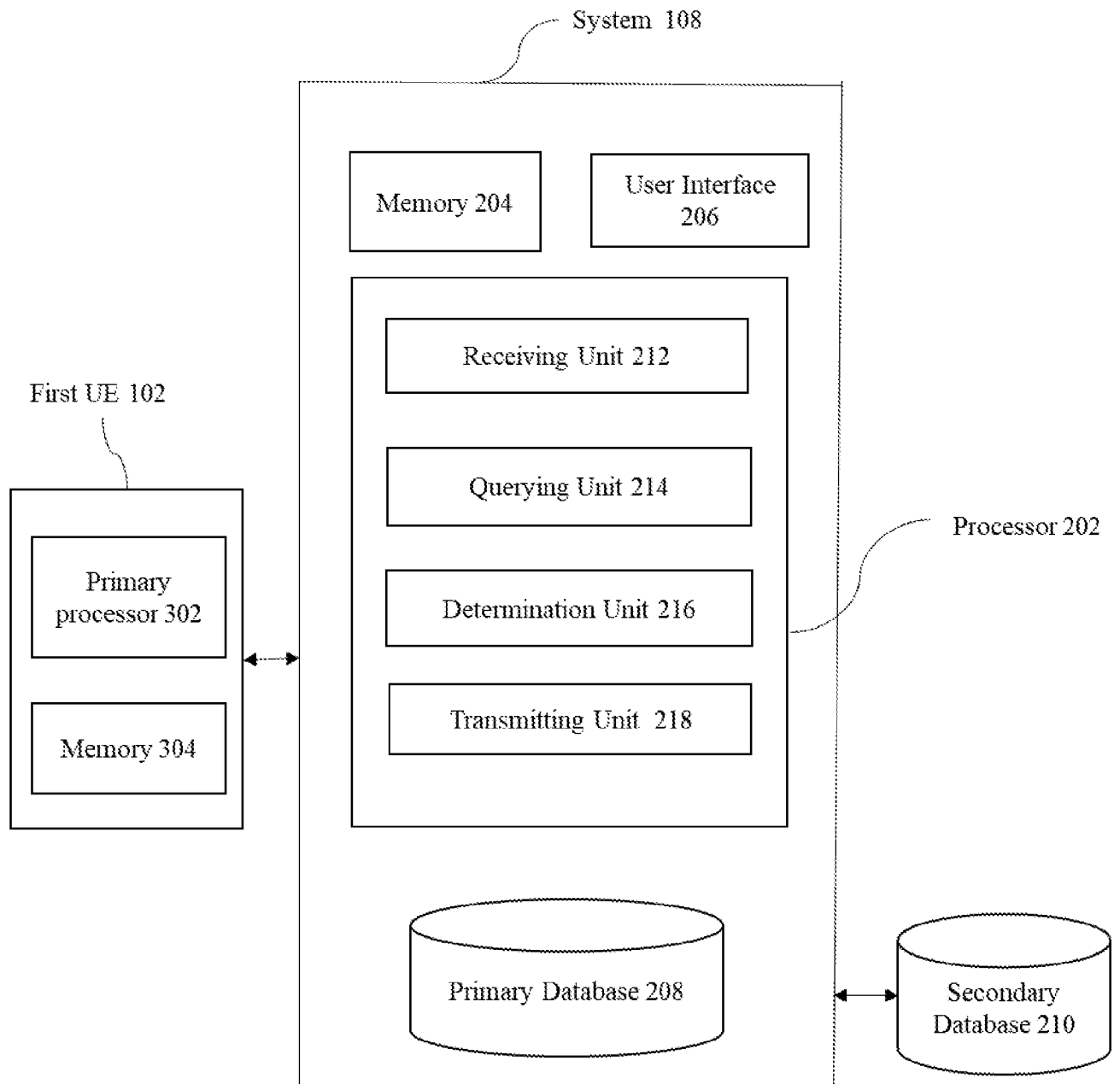


FIG. 3

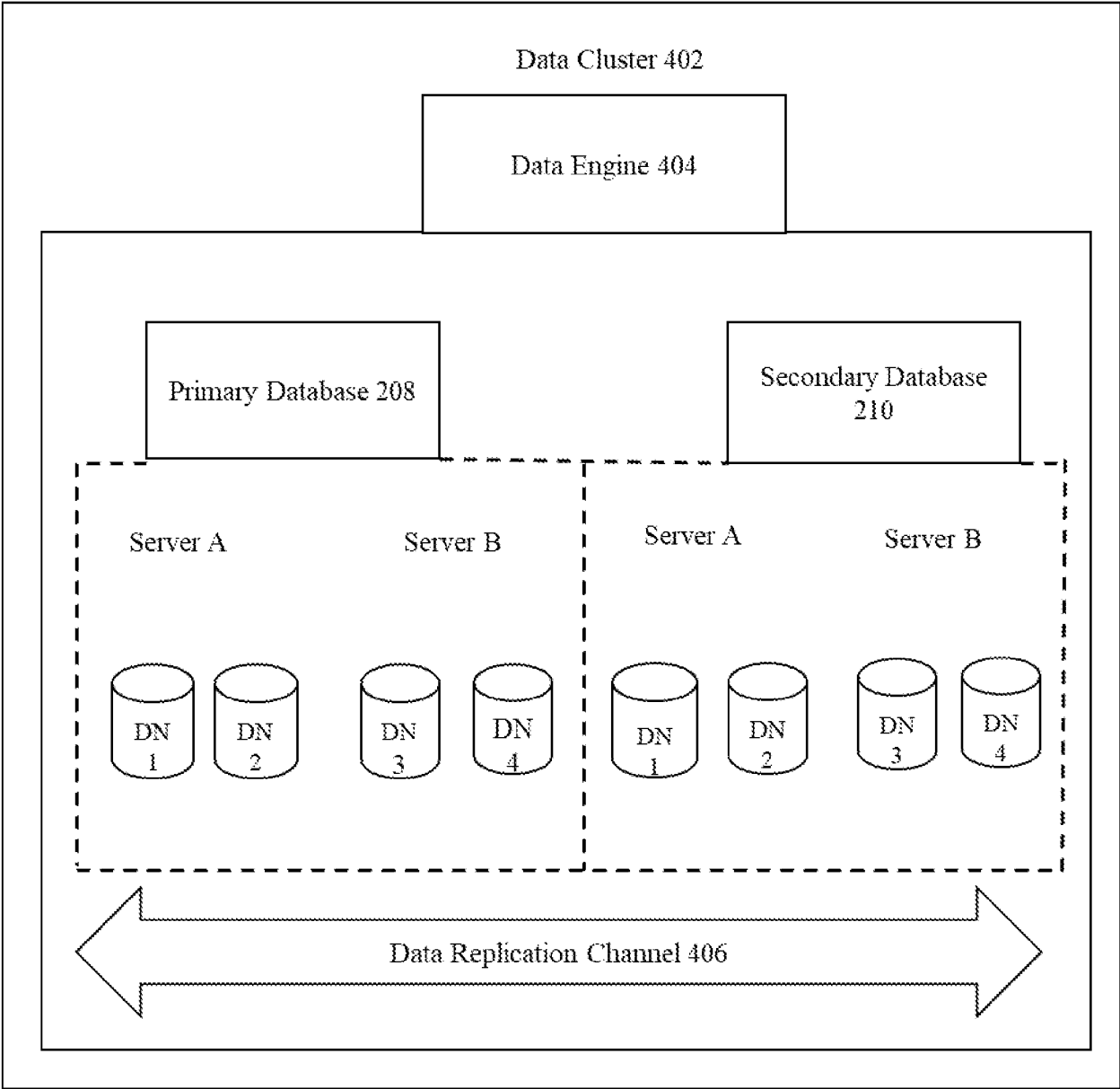


FIG. 4

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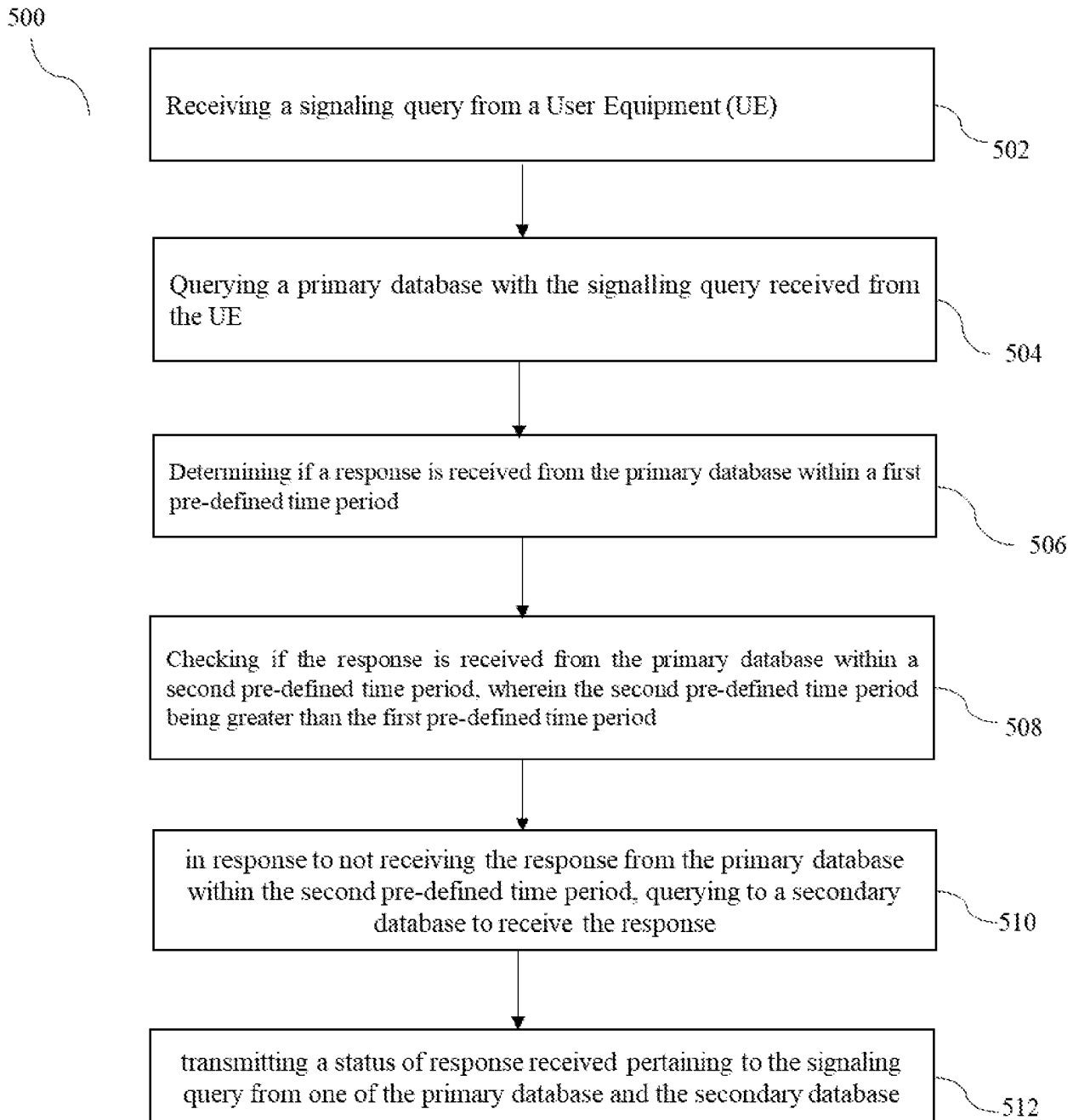


FIG. 5

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IN2024/050945

A. CLASSIFICATION OF SUBJECT MATTER

H04W76/27, H04W48/12, H04W72/23, G06F16/21 Version=2024.01

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

H04W, G06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic database consulted during the international search (name of database and, where practicable, search terms used)

PatSeer, IPO Internal Database

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	CN112765571 A (BEIJING DAJIA INTERNET INFORMATION TECHNOLOGY CO LTD [CN]) 07 May 2021 (07-05-2021) Google translation has been used for citation purpose. "Disclosure of Invention"; Claim 1; Claim 2; -----	1-12
Y	US11048702 B1 (AMAZON TECHNOLOGIES INC [US]) 29 June 2021 (29-06-2021) Column 1, lines 39-47	1-12



Further documents are listed in the continuation of Box C.



See patent family annex.

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"&" document member of the same patent family

Date of the actual completion of the international search

28-10-2024

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