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(54) **METHOD FOR LADDER RANKING IN A GAME**

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See application file for complete search history.

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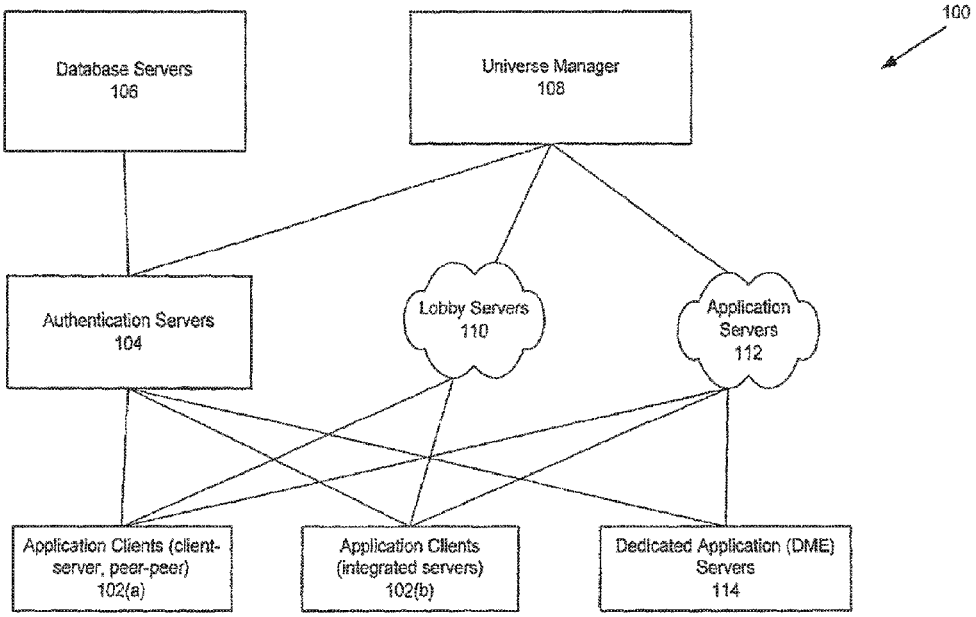
(57) **ABSTRACT**

Methods for creating an interactive gaming environment are provided. In various embodiments, methods of the present invention may include initializing an interactive game application at a game server which is then characterized as having an active status, notifying a lobby server concerning the active status of the game server, registering the application with a universe management server via the lobby server, and allowing users to join the interactive gaming environment. The users joining the interactive gaming environment. may be identified by a server key obtained from the game server.

23 Claims, 7 Drawing Sheets



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U.S. Appl. No. 13/918,809 Office Action dated Apr. 3, 2020.
U.S. Appl. No. 15/688,610 Office Action dated Jan. 30, 2020.
U.S. Appl. No. 15/688,592 Final Office Action dated Jun. 26, 2020.
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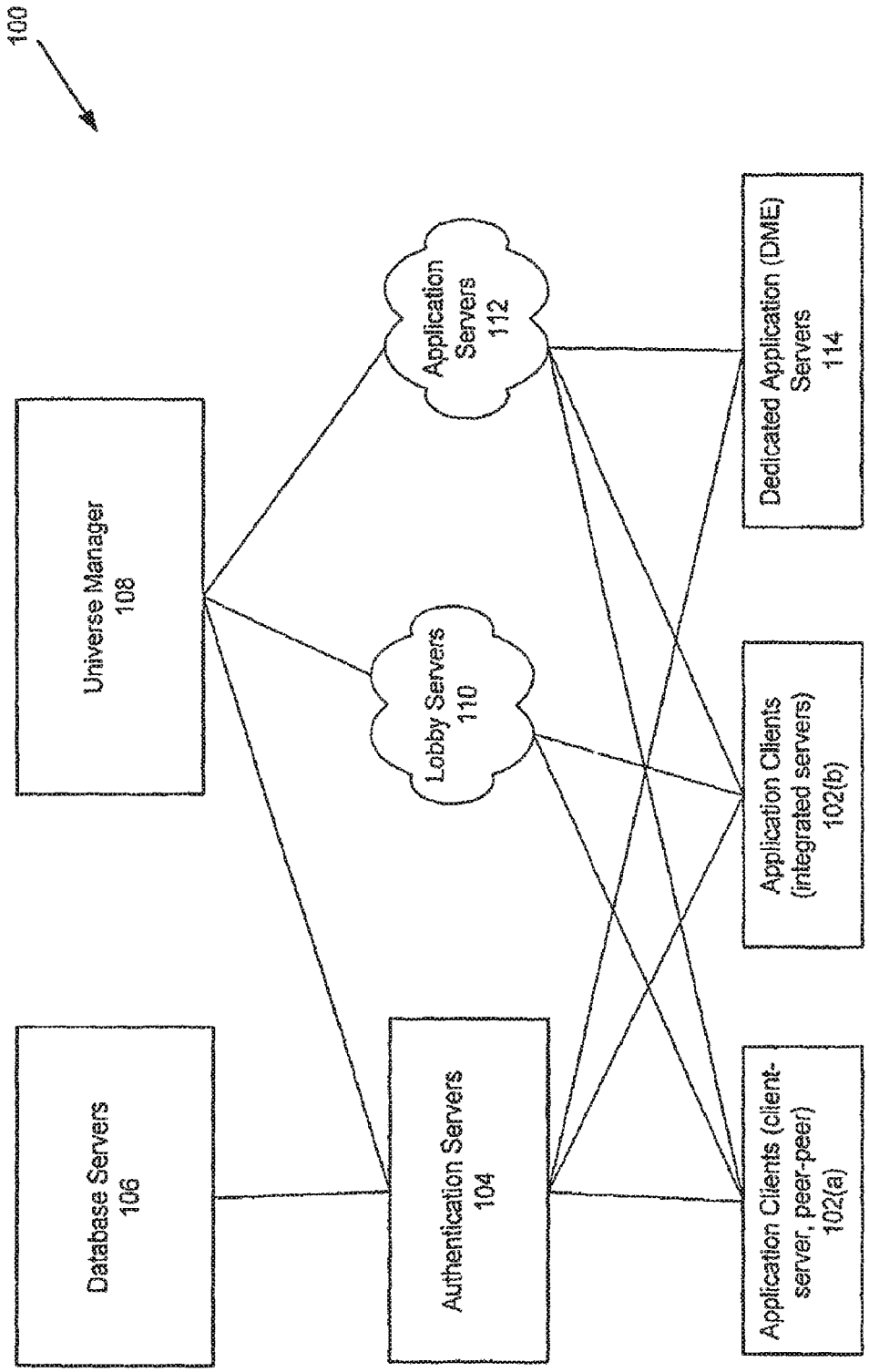

100
Universe Manager
108
Application
Servers
112
Dedicated Application (DME)
Servers
114
Lobby Servers
110
Application Clients
(integrated servers)
102(b)
Database Servers
106
Authentication Servers
104
Application Clients (client-
server, peer-peer)
102(a)

Figure 1

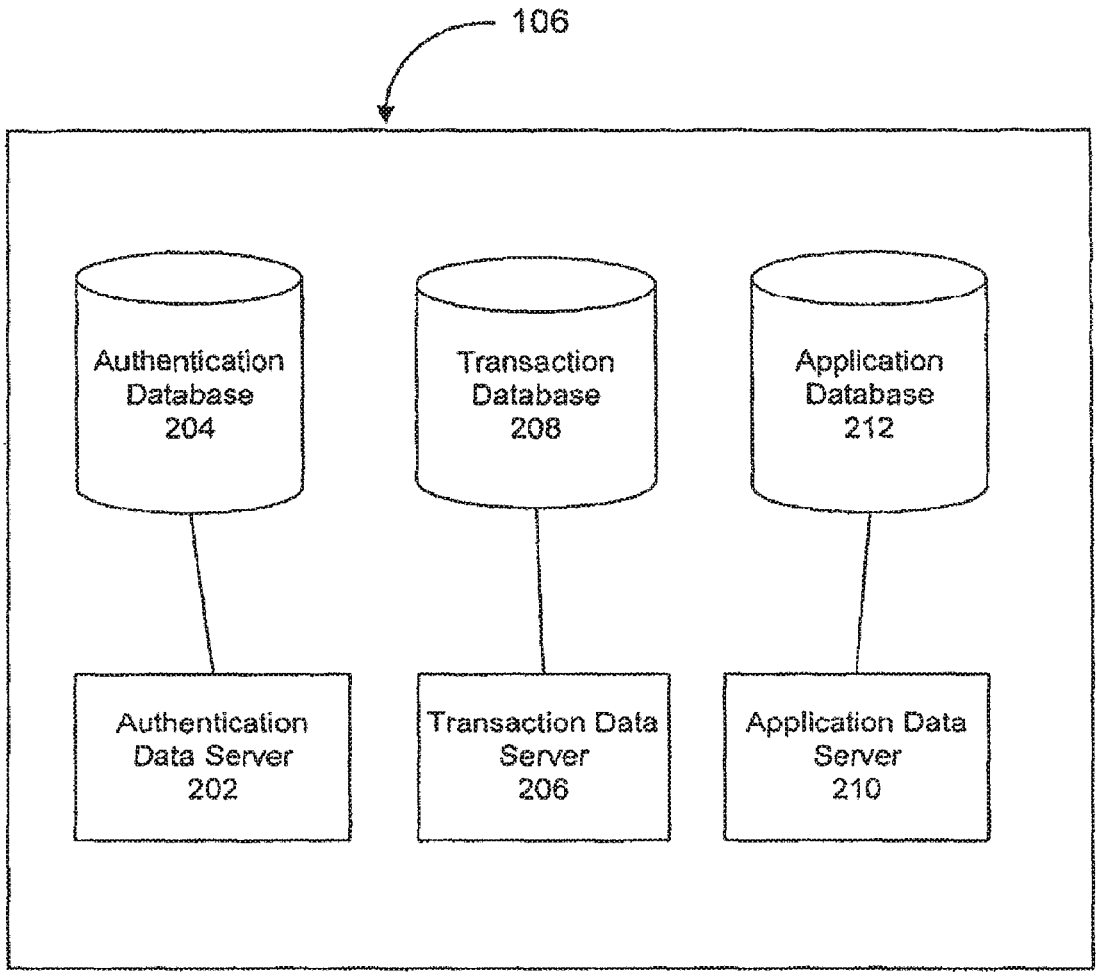

106
Authentication Database 204
Transaction Database 208
Application Database 212
Authentication Data Server 202
Transaction Data Server 206
Application Data Server 210

Figure 2

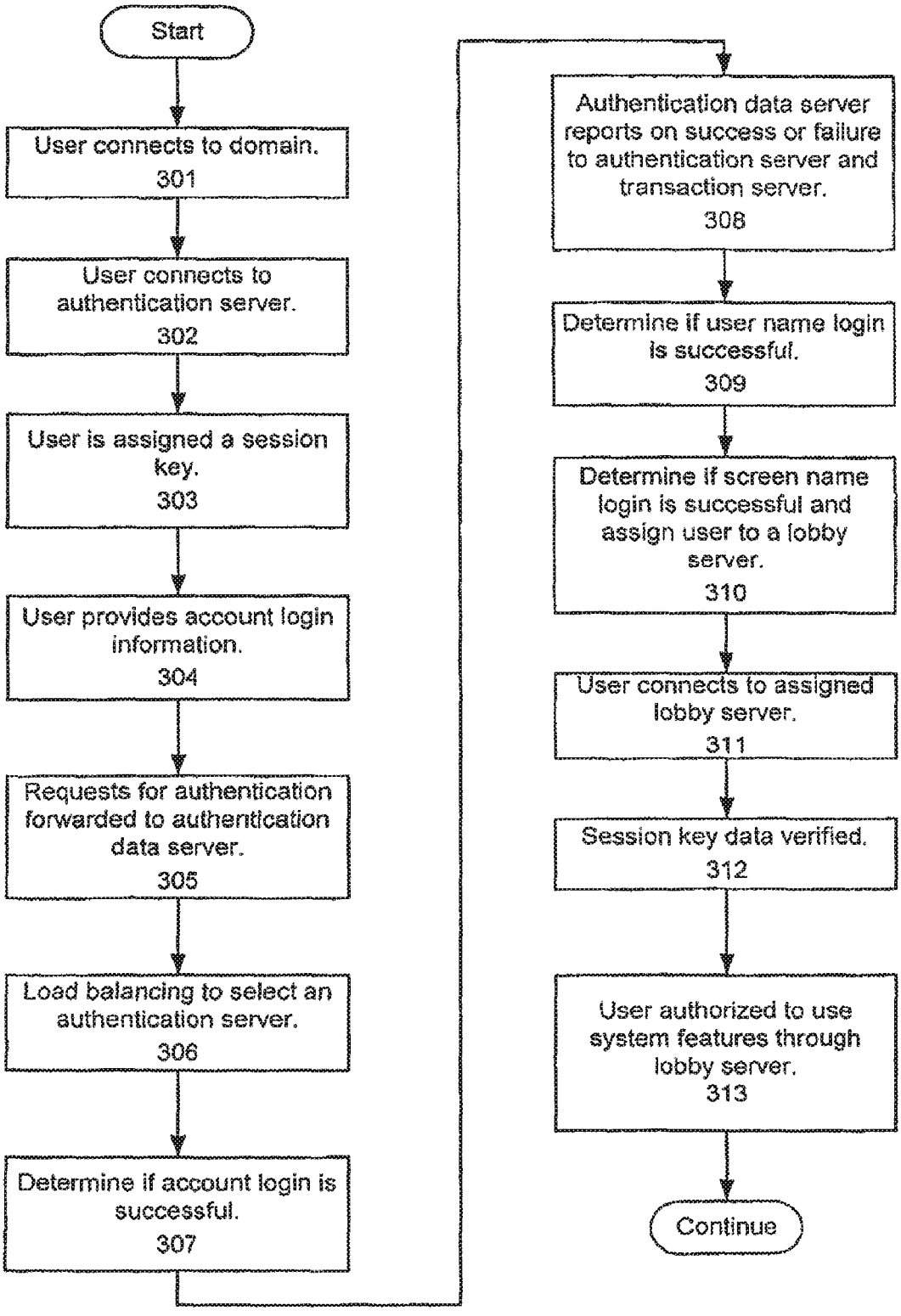

Start
User connects to domain.
301
User connects to authentication server.
302
User is assigned a session key.
303
User provides account login information.
304
Requests for authentication forwarded to authentication data server.
305
Load balancing to select an authentication server.
306
Determine if account login is successful.
307
Authentication data server reports on success or failure to authentication server and transaction server.
308
Determine if user name login is successful.
309
Determine if screen name login is successful and assign user to a lobby server.
310
User connects to assigned lobby server.
311
Session key data verified.
312
User authorized to use system features through lobby server.
313
Continue

Figure 3

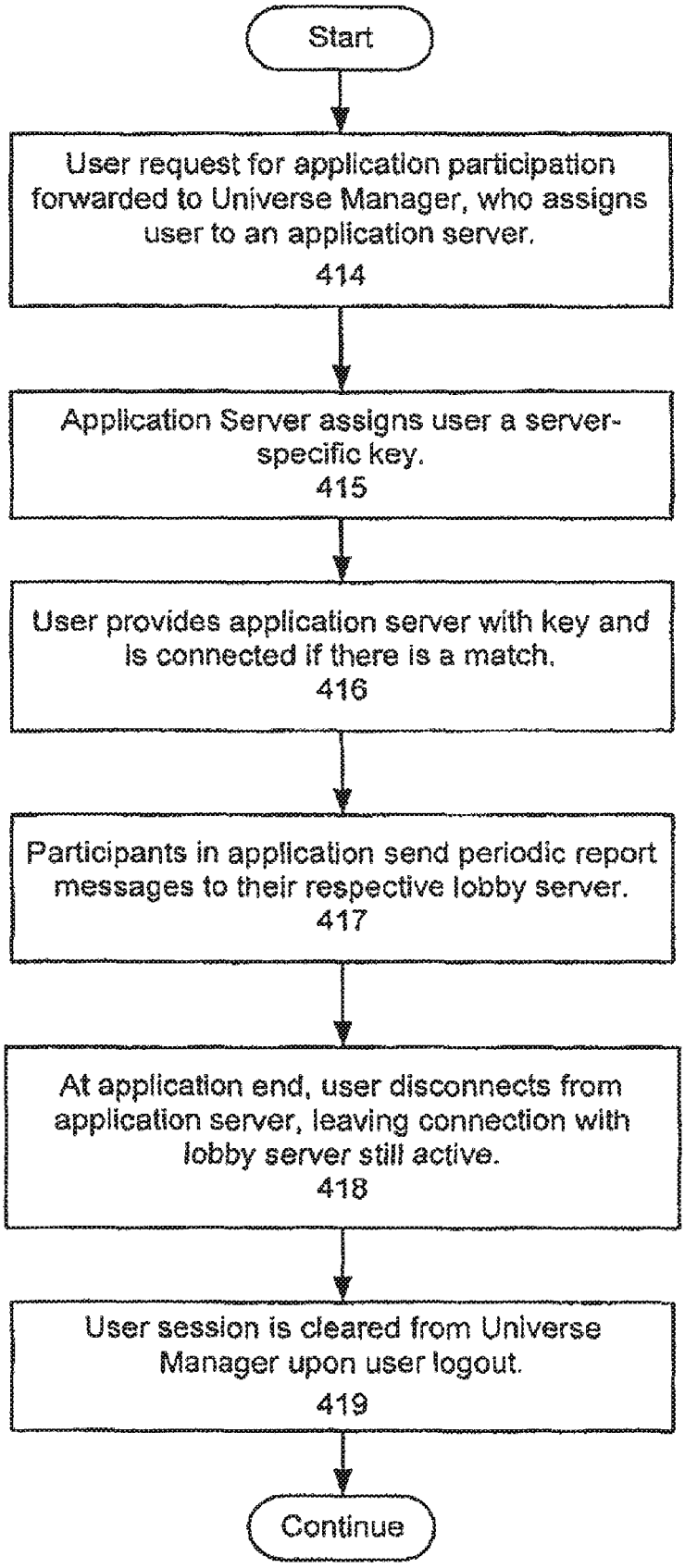

Start
User request for application participation forwarded to Universe Manager, who assigns user to an application server.
414
Application Server assigns user a server-specific key.
415
User provides application server with key and is connected if there is a match.
416
Participants in application send periodic report messages to their respective lobby server.
417
At application end, user disconnects from application server, leaving connection with lobby server still active.
418
User session is cleared from Universe Manager upon user logout.
419
Continue

Figure 4

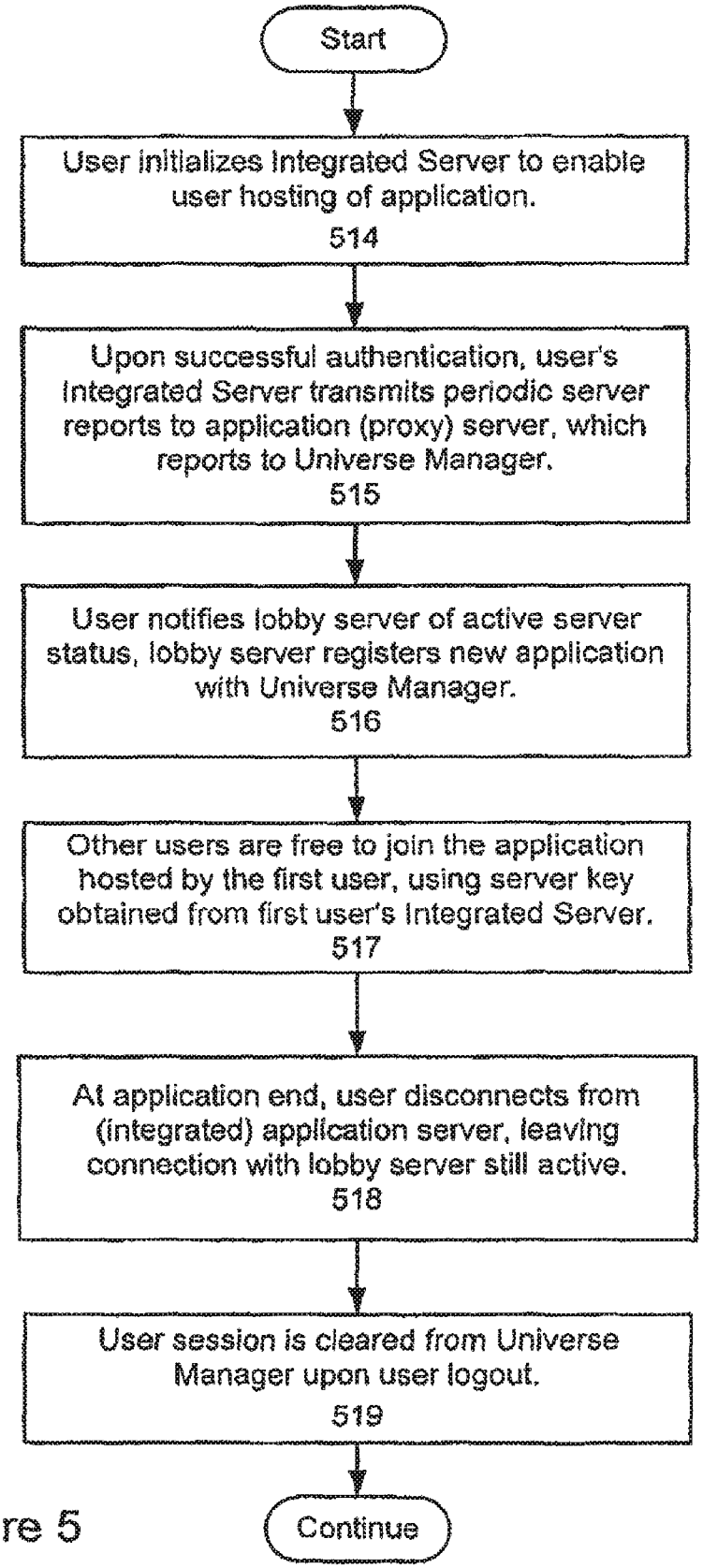
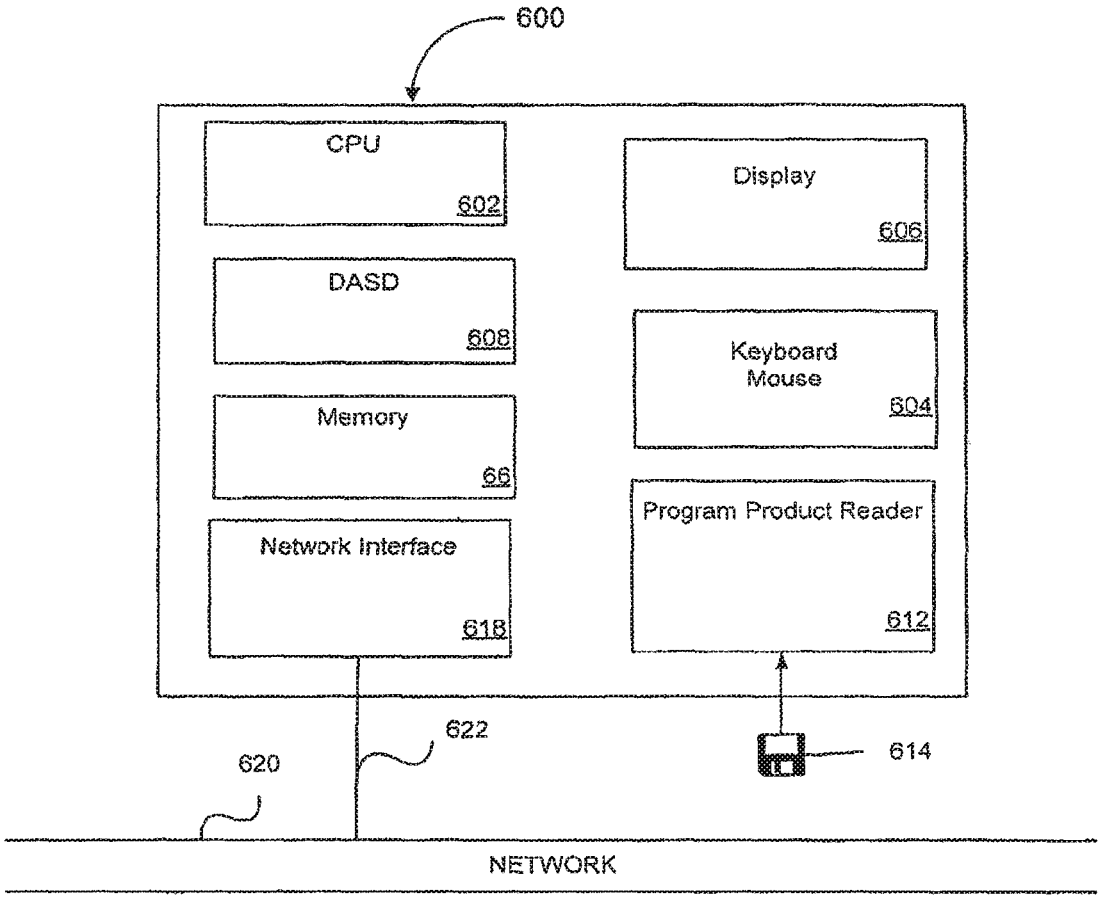

Start
User initializes Integrated Server to enable user hosting of application.
514
Upon successful authentication, user's Integrated Server transmits periodic server reports to application (proxy) server, which reports to Universe Manager.
515
User notifies lobby server of active server status, lobby server registers new application with Universe Manager.
516
Other users are free to join the application hosted by the first user, using server key obtained from first user's Integrated Server.
517
At application end, user disconnects from (integrated) application server, leaving connection with lobby server still active.
518
User session is cleared from Universe Manager upon user logout.
519
Continue

Figure 5


600
CPU
602
Display
606
DASD
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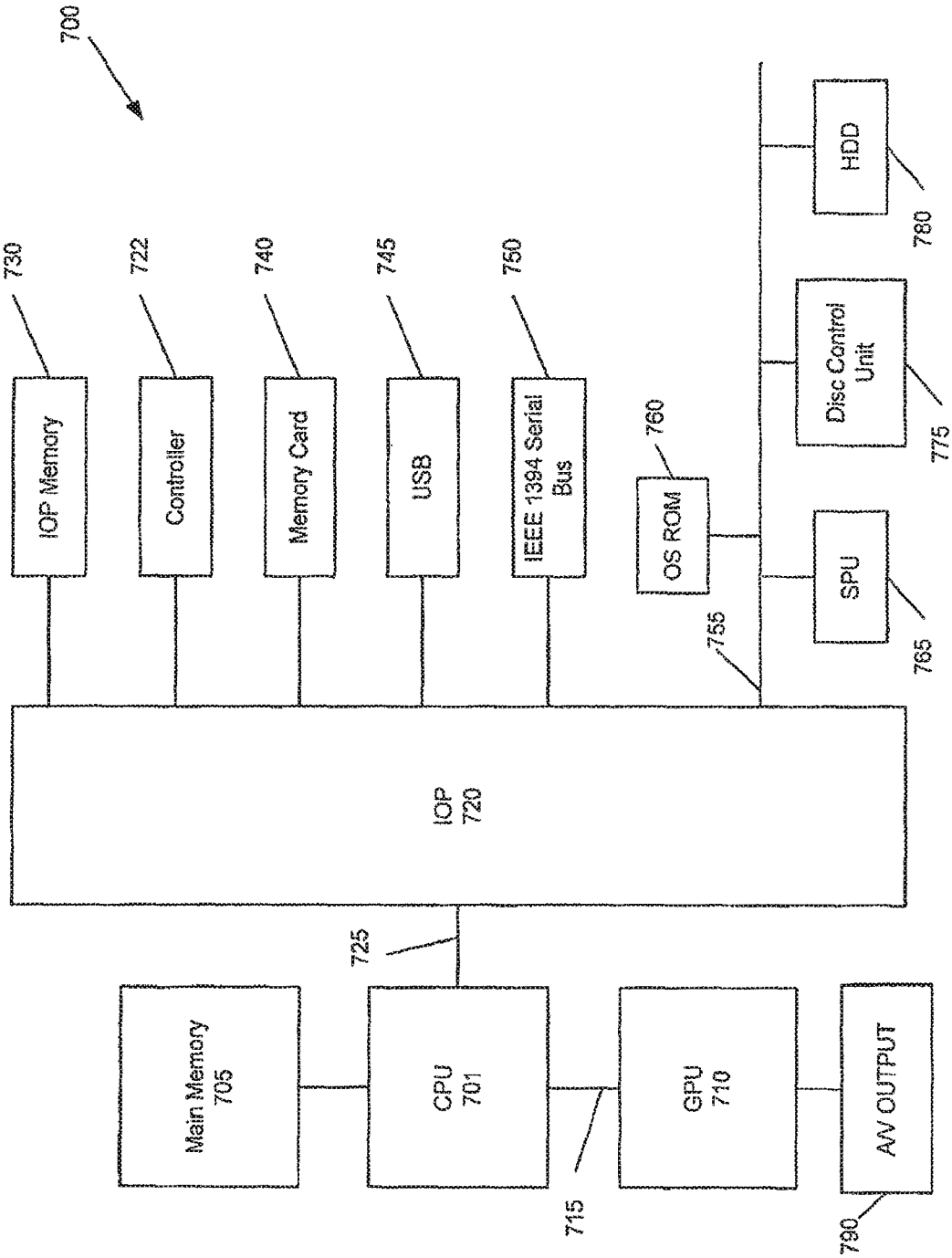
Keyboard
Mouse
604
Memory
66
Program Product Reader
612
Network Interface
618
622
620
614
NETWORK

Figure 6


700
730
IOP Memory
722
Controller
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Memory Card
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USB
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IEEE 1394 Serial Bus
760
OS ROM
755
HDD
780
Disc Control Unit
775
SPU
765
IOP 720
725
Main Memory 705
CPU 701
715
GPU 710
A/V OUTPUT
790

Figure 7

METHOD FOR LADDER RANKING IN A GAME

Matter enclosed in heavy brackets [ ] appears in the original patent but forms no part of this reissue specification; matter printed in italics indicates the additions made by reissue; a claim printed with strikethrough indicates that the claim was canceled, disclaimed, or held invalid by a prior post-patent action or proceeding.

CROSS-REFERENCE TO RELATED APPLICATIONS

[This application is a continuation and claims the priority benefit of U.S. patent application Ser. No. 12/218,581, filed Jul. 15, 2008, now U.S. Pat. No. 7,822,809 and entitled "Creating and Interactive Gaming Environment," which is a divisional and claims the priority benefit of U.S. patent application Ser. No. 10/359,359, filed Feb. 4, 2003, now U.S. Pat. No. 7,711,847 and entitled "Managing Users in a Multi-User Network Game Environment." U.S. patent application Ser. No. 10/359,359 claims the priority benefit of U.S. provisional patent application Ser. No. 60/376,115, filed Apr. 26, 2002 and entitled "Multi-User Application Program Interface." The disclosure of each of the aforementioned applications is incorporated by reference.]

More than one reissue application has been filed for the reissue of U.S. Pat. No. 7,962,549. The reissue applications include application Ser. Nos. 13/918,809 (the parent reissue) and concurrently-filed continuation reissues Ser. No. 15/688,656 (the present continuation reissue), Ser. Nos. 15/688,592 (reissuing as RE48700), and 15/688,610, all of which are reissues of U.S. Pat. No. 7,962,549;

The present application is a continuation reissue of U.S. patent application Ser. No. 13/918,809 filed Jun. 14, 2013, which is an application for reissue of U.S. Pat. No. 7,962,549 filed Jul. 19, 2010 as U.S. patent application Ser. No. 12/839,311 and issued on Jun. 14, 2011; the '549 patent is a continuation of U.S. patent application Ser. No. 12/218,581 filed Jul. 15, 2008, which is a divisional of U.S. patent application Ser. No. 10/359,359 filed Feb. 4, 2003, which claims the priority benefit of U.S. provisional patent application No. 60/376,115 filed on Apr. 26, 2002, the disclosures of which are incorporated by reference herein.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates generally to computer networks and, more particularly, to creating an interactive gaming environment over a computer network.

2. Description of the Related Art

Computer networks, such as local area networks and the Internet, are increasingly being used as the backbone for various transactions and interactions between parties. From online banking, where bank customers can initiate financial transactions over a computer network, to online gaming, where garners can participate in real-time gaming over the Internet, service providers are increasingly supporting a variety of services over computer networks. There are currently a variety of different computer network configurations that facilitate the transactions and interactions that take place.

Many of the online applications involve multi-user applications, which are computer programs that are executed on a computer system and which allow multiple geographically separated participants to interact with the computer program and other participating users in an application environment. For example, gaming is a popular multi-user application that is increasing in popularity. An aircraft simulation game can enable multiple participants to pilot their respective virtual aircraft within an airspace, and can enable the participants to interact with other participants in their aircraft in the same airspace. Thus, the online gaming application provides a single application environment or universe in which multiple participants maneuver.

To support multi-user applications, such as online gaming, with geographically dispersed application users, such as game participants, and to support real-time interaction among the users in the application environment, it has been necessary to share information about every participant in the environment. For example, in an aircraft simulation application, it becomes necessary to share information about the airplanes for each of the participants, including aircraft size, speed, altitude in three-dimensional space, appearance details, virtual environment details (such as buildings and terrain), and the like. Such information permits the computer at each participant to properly keep track of game developments and determine the actions being performed by each of the participants. This permits each participant to obtain properly rendered visual images on the participant's viewing display.

The amount of information that must be shared among all of the participants can become daunting and can result in bandwidth difficulties. The amount of information that must be shared among participants is so great that it has inhibited the development of online gaming and other online multi-user applications. A technique for distributing the management of online applications is described in U.S. Pat. No. 5,841,980 to R. Waters et al. entitled Distributed System for Communication Networks in Multi-User Applications.

The '980 patent describes a system configuration in which the functionality of a monolithic server is distributed across multiple servers, each of which services a number of local users. Thus, whereas a single server previously served as the source of all application information, such as game state, the '980 patent describes a situation in which the game server functionality is distributed across multiple computers. Users (on-line participants) are free to login to their most convenient server. In this way, there is no single "choke point" that might inhibit game play, and the bandwidth requirements for the online game community are reduced. Even with the reduction in overall bandwidth demands, the sheer volume of data that must be transmitted between users to support the online environment can result in local pockets of strained bandwidth capacity.

Other multi-user applications provide a somewhat cumbersome user interface and can be inefficient for operation of the application server. For example, some online gaming portals provide links to game sites of interest. The server that provides the gaming portal Web site only provides links to game pages or game Web sites. Thus, the gaming portal will redirect a user to the appropriate game server or host for information about ongoing games. This places additional operational burdens on the game servers.

Unfortunately, current multi-user applications are not configured for maximum efficiency of operation and cannot support a number of application users to make online gaming a viable opportunity. Thus, there is a need for an improved, more efficient online multi-user application environment. The present invention satisfies this need.

SUMMARY OF THE INVENTION

The present invention provides for creating an interactive gaming environment. In various embodiments, methods of

the present invention may include initializing an interactive game application at a game server which is then characterized as having an active status, notifying a lobby server concerning the active status of the game server, registering the application with a universe management server via the lobby server, and allowing users to join the interactive gaming environment. The users joining the interactive gaming environment may be identified by a server key obtained from the game server.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is an illustration of a computer network system on which is run a multi-user application configured in accordance with the present invention.

FIG. **2** is a detail block of the system shown in FIG. **1**.

FIG. **3** is a flow diagram of the operations performed by the system of FIG. **1**.

FIG. **4** is a flow diagram that shows further system operations in addition to those shown in FIG. **3**.

FIG. **5** is a flow diagram that shows further system operations in addition to those shown in FIG. **3**.

FIG. **6** is a block diagram of a computer in the network illustrated in FIG. **4**, illustrating the hardware components.

FIG. **7** is a block diagram of a computer entertainment system in the network illustrated in FIG. **1**, illustrating the hardware components.

DETAILED DESCRIPTION

System Construction

FIG. **1** is a block diagram of a computer network system **100** comprised of one or more network devices including one or more client computers **102** who communicate with an authorization server **104** to gain access to the system, including participation with multi-user online applications. As described further below, the client computers can comprise computers **102**(a) configured in a classic client-server configuration, or in a peer-to-peer configuration, or can comprise computers **102**(b) configured in an integrated server configuration that combine the functionality of other computers with the client computer functions. References to client computers **102** will be understood to be a collective reference to either configuration, or references to one configuration subgroup **102**(a), **102**(b) or the other will be to the specific subgroup specified. An authentication server determines whether authorization is warranted by consulting a database server **106** for user records. The authentication server also communicates with a universe manager computer **108** that maintains records about online users and helps manage the online application environment, or universe.

After an authentication server **104** authorizes a user **102** to continue, the user can participate in an online multi-user application by first communicating with lobby servers **110** to obtain application-level information. The application-level information can include information about an application and its participating users. In the context of an online game application, for example, the lobby server **110** can provide information about the game and about currently participating users. After selection of an online multi-user application, the user is redirected to an appropriate application server **112**, from which the user receives information sufficient to permit the user to join the online environment of the multi-user application. Thus, application level information is maintained at a lobby server **110**, rather than at each individual application server or host machine **112**. Users can therefore learn about and select a desired application, such as an aircraft online game, through communication with the lobby server, leaving the application servers free to host their particular applications.

In FIG. **1**, the lobby servers **108** and application servers **112** are depicted as cloud shapes to indicate that the functionality of these servers can be distributed across multiple computers who collectively provide the functionality or can be provided by one or more independent network computers. For example, the application servers **112** can comprise dedicated application server computers **114** that function as a distributed memory engine (DME). As an alternative, as described further below, the application servers can comprise a combination of integrated servers **102**(b) and application servers **112** acting in a proxy capacity to provide an interface to the universe manager **108**. Similarly, the function of the lobby servers **110** can be provided by dedicated lobby servers that communicate directly with the clients **102**, or the lobby server functions can be provided by other computers that communicate with the clients, such as the authentication server or universe manager **108**.

Thus, the functionality of the game server is split between the lobby server and the application server. The lobby server can therefore reduce the bandwidth requirements and other operating demands on the application server. The application can comprise, for example, a multi-user interactive gaming application. This improves efficiency of operation.

In accordance with the invention, cross-user communications as well as cross-application communications in real-time are facilitated through the lobby server concept. A user who is participating with one application can communicate with a user who is participating with a different application. Thus, a first user can be logged in to lobby server and can be participating in an aircraft online game environment through an application server, while a second user can be logged in to the same lobby server, but can be participating with a different application in a different programming environment, such as a financial package or a different online game. The first user and the second user can communicate with each other, if they wish, or they can choose to participate in their respective environments, isolated from each other in terms of communications.

The universe manager **108** acts in an overall supervisory role, maintaining information about the users (clients) **102** who are registered with the system and logged on, communicating with the users via the authorization servers **104**, lobby servers **110**, and application servers **112**. The lobby servers **110** provide application level information to the users, thereby acting as an application portal and source of application information to the clients **102**. For example, unlike typical game portal servers that merely provide links to game sites, the lobby servers provide information about games in progress and can provide game-level information, such as information about the players who are actively participating in a game. The application servers **112** provide the actual application environment. For example, in the situation where the online application is a game, the application servers provide the actual game play environment comprising player participants, audio and graphics information, and other data necessary for a client **102** to fully participate in the online gaming experience for the game administered by the particular application server **112**. In this way, many tasks that must be performed to support system operation can be performed according to the most appropriate machine to perform the task.

As noted above, the authentication servers **104** communicate with database servers **106** for authentication, appli-

cation information, and the like. FIG. **2** illustrates details of the database servers and shows that the database servers can comprise multiple servers and associated database storage. For example, FIG. **2** shows a database server **106** that includes an authentication data server **202** and an associated authentication database **204**, a transaction data server **206** and associated transaction database **208**, and an application data server **210** and associated application database **212**. The operation and configuration of these components will be better understood with reference to the following description.

System Operation

FIGS. **3**, **4**, and **5** are flow diagrams that illustrate the functioning of the system constructed in accordance with the invention to provide improved operation of online multi-user applications.

In the first operation, represented by the flow diagram block **301**, a user connects to a network domain name, such as a game portal or other Internet site to attempt access and login to a multi-user application, such as an online game. In the next operation, the user is redirected to one of the authentication servers. This operation (represented by block **302**) can include operation through a load balancer or similar configuration for server workload management. At the next block **303**, the user is assigned a session key by an authentication server. The session key will remain active during the current online session by the user and will be associated with a privilege level, thereby providing a means for the various system components (illustrated in FIG. **1**) to determine the level of access to be granted to the user. The user then supplies account login information to the authentication server, at block **304**, and then the authentication server forwards an authentication request to the authentication data server (of the database servers), as indicated at the block **305**. The account login involves a user's registered account number or other identifier against which a user's right to access can be determined. At the next operation (block **306**), the authentication request is processed with appropriate load balancing and is directed to a particular one of the authentication servers.

At the next block **307**, the authentication data server communicates directly with the authentication database to determine whether the user's login should be accepted. This operation can involve, for example, checking the user's account history to ensure all appropriate fees have been paid and to ensure the user has all authorizations or qualifications to proceed. To maintain the user's history, this operation **307** also involves sending the transaction record (login attempt) to the transaction data server for non-volatile storage. This recording operation also can involve a load balancing operation.

The success or failure of the login attempt is reported back to the authentication server, at the next block **308**. The login result is forwarded back to the user and also to the transaction data server. At the next block **309**, similar processing operations are repeated for the user name login procedure. Yet another similar login sequence occurs for the user's screen name, along with an application identification, as indicated at the block **310**. If the screen name login is successful, then the authentication server will assign the user to a lobby server and will also promote the session privilege level to the Universe Manager, so that the user will be granted all appropriate access during the session. It should be noted that the authentication server is aware of the lobby servers that are available corresponding to the application ID provided by the user, by requesting an appropriate application server from the Universe Manager. The Universe Manager keeps track of the available lobby servers via "heartbeat" reports that are sent by lobby servers to the Universe Manager continuously while the lobby servers are operational. This processing is represented by the next block **310**.

Next, at the block **311**, the user disconnects from the authentication server and establishes communication with the assigned lobby server. At the block **312**, the user verifies the session key that was obtained from the authentication server at block **303** and also verifies the application ID with the assigned lobby server. The lobby server verifies the data, as well as the privilege level, with the Universe Manager. The user's privilege is upgraded upon successful verification.

In the next phase of system operation, at block **313**, the user has successfully completed login with a lobby server and therefore is entitled to participate in system-wide functions. These functions can include, for example, chat, group or community management, player-matching activities such as team or clan tasks, and outcome or competitive standings and ladder progress. Any requests from the user for information regarding available chat channels, available games, location of other users, messaging functions, and the like, the request is forwarded from the lobby server to the Universe Manager. If a request for information involves the non-volatile storage, then the request is forwarded to the appropriate database server (FIG. **2**).

One of the system-wide functions that a user might want to participate in following successful connection with a lobby server can comprise using an application. In the context of an online gaming environment, that application is a game. Those skilled in the art will appreciate that other online multi-user applications can be involved. As noted above, the clients can participate in online gaming as either part of a client-server configuration or peer-to-peer configuration, or as part of an integrated application server and client configuration. FIG. **4** relates to users who are operating in a client-server or peer-to-peer configuration, and FIG. **5** relates to users who are operating in an integrated application server configuration.

In FIG. **4**, the first operation (which occurs upon the user wanting to join a game after completion of the last block in FIG. **3**), is for the lobby server to forward the user's application (game) request to the Universe Manager. In the FIG. **4** processing, the client is configured as a classic client-server configuration or as a peer-to-peer configuration. The Universe Manager assigns the user to a game server that is appropriate for the requested game. The game servers keep the Universe Manager apprised of their status via continuous, periodic heartbeat reports, in a fashion similar to that of the lobby servers. In this way, the Universe Manager is aware of system status and can manage and respond to requests from the lobby servers and application servers. After the first processing operation shown in FIG. **4** (block **414**), the assigned application server assigns a server specific key to the user (block **415**). The key provides an extra measure of security to prevent unauthorized access. The authentication server asks either the Universe Manager or the assigned application server for the key, and forwards the key to the user through the Universe Manager and to the lobby server.

In the next block **416**, the user is connected with the assigned application server, providing it with the server-specific key it received from block **415**. The user will be disconnected from the application server if the server-specific key does not match the records at the application server. If there is a match, the user is allowed to remain connected with the application server. It should be noted that

the user remains connected to a lobby server throughout use of the application, such as during a game playing session. At block **417**, periodic user reports are sent from an application-participating user back to the user's lobby server. In addition, the application server who is hosting the application for all participants (such as the game host) sends periodic reports on the status of the application to the application host. The lobby server and application server do not directly communicate, thereby better managing the processing load on the lobby server.

At the conclusion of the application session (block **418**), the user disconnects from the application server and returns to normal activities, including all available lobby functions through the lobby server. As noted, these functions can include chat, group or community management, messaging, and the like. It should be noted that these functions are available to the user at all times when the user is connected to the lobby server, including during application use (e.g., during game play).

If the user performs a logout procedure, or if the user is timed out from an active connection because of inactivity, the user's session is cleared from the active records of the Universe Manager. This is indicated at the next block, **419**. If the user wishes to participate in another application, the user must go through the authentication process once again, including the login process.

Rather than operate in a network configuration in which applications are provided by dedicated application servers, the network can also operate in a configuration in which the multi-user application is provided by integrated servers. An integrated server refers to a user (client) machine that has been configured with an integrated server application that provides the user machine with application server functionality. A system that implements this method of operation is described in co-pending U.S. patent application Ser. No. 09/704,514 by C. Guy, G. Van Datta, and J. Fernandes entitled "Application Development Interface for Multi-User Applications Executable Over Communication Networks" filed Nov. 1, 2000. The disclosure of this application is hereby incorporated by reference. As noted above, when a user wants to join a game, the system operation moves from the description of FIG. **3** to the description of either FIG. **4** (dedicated application server) or FIG. **5** (integrated server).

Turning now to FIG. **5**, the first operation under the integrated server configuration is for a user who wants to host an application (such as an online game) to initialize an integrated server application that has been installed on the user's computer. The integrated server application makes a connection to an appropriate domain name, such as a game portal Web site. The integrated server then executes an authentication process with an authentication server, in a process similar to the initial login process described in conjunction with FIG. **3**. These operations are represented by the first block **514** of FIG. **5**.

Upon successful authentication with the authentication server, the hosting user's integrated server application causes periodic server reports to be transmitted to a proxy application server. As noted above, the proxy application server is included within the application server cloud **112** of FIG. **1**. The proxy application server can comprise an application in addition to or integrated with the integrated server application at the hosting user, or the proxy application server can comprise a separate server that is another node of the FIG. **1** network and that communicates with the hosting user's computer. In any case, the user's integrated server application provides periodic, regular "heartbeat" reports to the proxy application server to confirm the operation of the hosted application and to provide status information to the proxy application server. The proxy application server communicates with the Universe Manager, providing the Universe Manager with the application status information received from the hosting user machine. The Universe Manager includes these reports in its data collection, just as it would with similar reports from dedicated application servers and from any other integrated servers. These reporting operations are represented by the second block **515** of FIG. **5**.

In the next operation, block **516**, the user notifies its assigned lobby server of its status as an active application server. This new executing application will now be available over the network. The lobby server then registers this new application with the Universe Manager, which adds the appropriate application information to its data collection. This operation is performed by the Universe Manager in a manner similar to what it would perform in response to any other server becoming available with a network application.

After the new application has been registered with the Universe Manager, the network nodes will become aware of the application through respective lobby servers. Therefore, the application becomes available for network users, who can join the program environment established by the integrated server. For example, if the application is a multi-user game, then other network users can join the on-going game, as managed by the hosting user's integrated server. The process of joining a game in progress involves the same operations as described above in conjunction with blocks **414**, **415**, **416**, and **417** of FIG. **4**. These operations involve communicating with an appropriate application server, receiving a server-specific key, providing the server with that key, becoming authorized and providing regular "heartbeat" reports to the lobby server. These integrated server operations are represented by the "join" block **517** of FIG. **5**.

At the conclusion of the application session (block **518**), a participating user can disconnect from the integrated server and return to normal activities, including all available lobby functions through the lobby server. As noted, these functions can include chat, group or community management, messaging, and the like. As noted above, these functions are available to the user at all times when the user is connected to the lobby server, including during application use (e.g., during game play). If a hosting user (the integrated server) wishes to withdraw from hosting the application, the network system (FIG. **1**) can implement procedures as desired to ensure an orderly shut down of the application or an orderly transition to a different integrated server that continues on with the program environment of the hosted application.

If the user performs a logout procedure, or if the user is timed out from an active connection because of inactivity, the user's session is cleared from the active records of the Universe Manager. This is indicated at the next block, **519**. If the user wishes to participate in another application, the user must go through the authentication process once again, including the login process.

Ladder Ranking

The application program interface that is shared in common with all the components illustrated in FIG. **1** also includes provision for a ladder ranking engine. A ladder ranking is a list of users that is organized or sorted according to a predetermined variable or metric. The ladder ranking is most easily understood in the context of a gaming application, where the predetermined variable likely refers to wins, losses, points scored, and the like. As a user improves his or

her performance, the user's ranking will improve, meaning that the user will move up a "ladder" of ranked users. Thus, the ladder ranking information can be used for various competitive purposes, such as contests and tournaments.

The ladder ranking information is collected via functionality in each multi-user application that periodically reports the application status to the corresponding application server. The status can include information such as progress of players in the game. The application servers then store the information to a system database that is indexed according to a user's account information and application currently being used. This information is managed by a ladder engine that can operate at any location of the network, for example, at the Universe Manager, and the data can be stored at data storage of the Universe Manager or in the database servers (FIG. **1**).

The system interface preferably provides for any registered user to request a ladder ranking, which will be provided through the ladder ranking engine. The request can come from a user via an application with which the user is currently participating. This ensures that non-participants cannot falsely obtain the ladder ranking information. The ladder ranking requests can be received by a lobby server or application server from a user, and the request can be forwarded to the ladder ranking engine at the Universe Manager or whatever other network entity that manages the ladder rankings. When a ladder ranking list is requested, all of the user accounts for the specified application are sorted based on the stored user performance data. The application status information preferably includes multiple statistics, which can be stored simultaneously in the database. For example, a gaming application can track wins, losses, points scored, points allowed, and other performance statistics of interest. Each metric can be sorted on, thus generating a ladder ranking according to the metric chosen by the user who requests the ladder ranking. Moreover, the ladder ranking engine provides sorting and retrieving of a ladder ranking in ascending or descending order. For example, a ladder ranking can be provided in order from most points to least points, or from least points to most points.

The various servers and databases of the system have no knowledge about the nature of the statistics. That is, the servers do not examine the underlying data to understand the difference between wins and losses or points and goals. Rather, the various applications define the data set to be collected for that application, and the servers and databases simply store the collected data in the database. Thus, each application will define its own data collection format, which will be supported by the database servers.

The data can be included in a 256-byte data field that is assigned to each user's account for each application with which the system interfaces. For example, the application code can execute the ladder ranking function by specifying data parameters of sort order, start byte, end byte. Upon receiving a ladder ranking message with these parameters, a server or database of the system will retrieve all data fields for all accounts associated with the calling application. The data in each data record between the start byte location and the end byte location will be treated as an integer value. The sort operation will then be performed on the retrieved data, in ascending or descending order depending on the value of a user-supplied sort order parameter. The sorted integer numbers can then be displayed to a user in accordance with known headings for the integer data. For example, a particular application might store performance data as number of wins, followed by number of losses, followed by points scored, followed by points allowed. When the performance data is retrieved, the data can be parsed to extract the requested data for proper display. Other applications can store different performance parameters in a different order, which will be known to the corresponding application server. In this way, the ladder ranking engine provides a powerful generic, cross-application ladder rankings system.

Clans Engine

Another feature of the system described herein is a clans engine that allows a designated user of any trusted application, a user referred to as a "leader", to name and create a clan. The leader can then issue invitations to other users for joining the clan. The system will queue up any invitations sent to registered users who are not online at the time the invitation is sent, for delivery at the invitee's next login. A user who receives a clan invitation can respond affirmatively or negatively and, if desired, can become a member of the clan.

The system supports a variety of clan features. Members of a clan can send private electronic messages to the members of the clan. The clan messages can be stored on the servers of the system until delivery, which occurs as each member completes the next login process. The system permits clans to elect new leaders and set up various organizational structures for their clan. Examples of organizational structures include dictatorships, where one leader is in charge of all decisions of the clan, or a democracy, where all members and the leader have equal votes in the clan decision making. The leader who initiates the clan can select which of these, or other, configurations will be utilized.

All of the various clan data, including the clan membership list, clan activity tracking, clan electronic messaging, and the like are saved by database servers of the system. The clan functionality is accessed through the program interface in accordance with the present invention, in a manner similar to that described above for the ladder ranking data. This permits many discrete functions to be provided and specified or deleted for each clan, making the composition rules and operation of each clan potentially exclusive. Moreover, the program interface permits the clan functionality to be used in a generic way for multiple applications. For example, in a gaining context, the same team or clan functionality can be applied whether the application is a flight simulator, car racing game, or action-shooter game.

In addition, multiple applications can share the same clans and membership servers and databases at the same time, without interfering with each other. User accounts can be associated with more than one clan in the same application or in clans that extend across multiple applications, without any impact to the user account or to the clan functionality.

The clan engine in accordance with the present invention manages the clan data using server-side processing, rather than relying on offline, Web-based clan management techniques or client-side arbitration, with nothing built into the actual application itself. Thus, any application developed for the program interface described herein can utilize the clan processing that is built into the interface specification, servers, and databases of the FIG. **1** system.

Network Device Construction

The network computer devices (clients and servers) shown in the block diagram of FIG. **1** comprise nodes of a computer network system **100**. FIG. **6** is a block diagram of a computer in the system **100** of FIG. **1**, illustrating the hardware components included in one of the computers that provide the functionality of the servers and clients. Those skilled in the art will appreciate that the servers and clients illustrated in FIG. **1** can all have a similar computer con-

struction, or can have alternative constructions consistent with the capabilities and respective functions described herein.

FIG. **6** shows an exemplary computer **600** such as might comprise any of the network computers. Each computer **600** operates under control of a central processor unit (CPU) **602**, such as a "Pentium" microprocessor and associated integrated circuit chips, available from Intel Corporation of Santa Clara, Calif., USA. A computer user can input commands and data from a keyboard and computer mouse **604**, and can view inputs and computer output at a display **606**. The display is typically a video monitor or flat panel display. The computer **600** also includes a direct access storage device (DASD) **608**, such as a hard disk drive. The memory **610** typically comprises volatile semiconductor random access memory (RAM). Each computer preferably includes a program product reader **612** that accepts a program product storage device **614**, from which the program product reader can read data (and to which it can optionally write data). The program product reader can comprise, for example, a disk drive, and the program product storage device can comprise removable storage media such as a magnetic floppy disk, a CD-R disc, a CD-RW disc, or DVD disc.

Each computer **600** can communicate with the others over a computer network **620** (such as the Internet or an intranet) through a network interface **618** that enables communication over a connection **622** between the network **620** and the computer. The network interface **618** typically comprises, for example, a Network Interface Card (NIC) or a modem that permits communications over a variety of networks.

The CPU **602** operates under control of programming steps that are temporarily stored in the memory **610** of the computer **600**. When the programming steps are executed, the computer performs its functions. Thus, the programming steps implement the functionality of the respective client or server. The programming steps can be received from the DASD **608**, through the program product storage device **614**, or through the network connection **622**. The program product storage drive **612** can receive a program product **614**, read programming steps recorded thereon, and transfer the programming steps into the memory **610** for execution by the CPU **602**. As noted above, the program product storage device can comprise any one of multiple removable media having recorded computer-readable instructions, including magnetic floppy disks and CD-ROM storage discs. Other suitable program product storage devices can include magnetic tape and semiconductor memory chips. In this way, the processing steps necessary for operation in accordance with the invention can be embodied on a program product.

Alternatively, the program steps can be received into the operating memory **610** over the network **620**. In the network method, the computer receives data including program steps into the memory **610** through the network interface **618** after network communication has been established over the network connection **622** by well-known methods that will be understood by those skilled in the art without further explanation. The program steps are then executed by the CPU **602** thereby comprising a computer process.

It should be understood that all of the network computers of the network system **100** illustrated in FIG. **1** can have a construction similar to that shown in FIG. **6**, so that details described with respect to the FIG. **6** computer **600** will be understood to apply to all computers of the system **100**. It should be appreciated that any of the network computers can have an alternative construction, so long as the computer can communicate with the other computers illustrated in FIG. **4** and can support the functionality described herein.

For example, with reference to FIG. **7**, the client computers **102** can comprise a computer entertainment system, such as a video game console system **700**. FIG. **7** is a block diagram of an exemplary hardware configuration of the video game console system **700**.

The video game console system **700** includes a central processing unit (CPU) **701** that is associated with a main memory **705**. The CPU **701** operates under control of programming steps that are stored in the OS-ROM **760** or transferred from a game program storage medium to the main memory **705**. The CPU **701** is configured to process information and execute instructions in accordance with the programming steps.

The CPU **701** is communicatively coupled to an input/output processor (IOP) **720** via a dedicated bus **725**. The IOP **720** couples the CPU **701** to an OS ROM **760** comprised of a non-volatile memory that stores program instructions, such as an operating system. The instructions are preferably transferred to the CPU via the IOP **720** at start-up of the main unit **700**.

The CPU **701** is communicatively coupled to a graphics processing unit (GPU) **710** via a dedicated bus **715**. The GPU **710** is a drawing processor that is configured to perform drawing processes and formulate images in accordance with instructions received from the CPU **701**. For example, the GPU **710** can render a graphics image based on display lists that are generated by and received from the CPU **701**. The GPU can include a buffer for storing graphics data. The GPU **710** outputs images to an AV output device **790** that is connected to the console system **700**.

The IOP **720** controls the exchange of data among the CPU **700** and a plurality of peripheral components in accordance with instructions that are stored in an IOP memory **730**. The peripheral components can include one or more input controllers **722**, a memory card **740**, a USB **745**, and an IEEE 1394 serial bus **750**. Additionally, a bus **755** is communicatively coupled to the IOP **720**. The bus **755** is linked to several additional components, including the OS ROM **760**, a sound processor unit (SPU) **765**, an optical disc control unit **775**, and a hard disk drive (HDD) **780**.

The SPU **765** is configured to generate sounds, such as music, sound effects, and voices, in accordance with commands received from the CPU **701** and the IOP **720**. The SPU **765** can include a sound buffer in which waveform data is stored. The SPU **765** generates sound signals and transmits the signals to speakers.

The disc control unit **775** is configured to control a program reader, which can comprise, for example, an optical disk drive that accepts removable storage media such as a magnetic floppy disk, an optical CD-ROM disc, a CD-R disc, a CD-RW disc, a DVD disk, or the like.

The memory card **740** can comprise a storage medium to which the CPU **701** can write and store data. Preferably, the memory card **740** can be inserted and removed from the IOP **720**. A user can store or save data using the memory card **740**. In addition, the video game system **700** is preferably provided with at least one hard disk drive (HDD) **780** to which data can be written and stored.

A data I/O interface, such as an IEEE 1394 serial bus **750** or a universal serial bus (USB) **745** interface, is preferably communicatively coupled to the IOP **720** in order to allow data to be transferred into and out of the video game system **700**, such as to the network illustrated in FIG. **1**.

The present invention has been described above in terms of a presently preferred embodiment so that an understand-

ing of the present invention can be conveyed. There are, however, many configurations for the system and application not specifically described herein but with which the present invention is applicable. The present invention should therefore not be seen as limited to the particular embodiment described herein, but rather, it should be understood that the present invention has wide applicability with respect to multi-user applications generally. All modifications, variations, or equivalent arrangements and implementations that are within the scope of the attached claims should therefore be considered within the scope of the invention.

What is claimed is:

[1. A method for ladder ranking in a game application, comprising:

receiving a request for a ladder ranking list from a player having a user account registered with the game application, wherein the game application is associated with a plurality of registered user accounts and the request for the ladder ranking list includes one or more game performance metrics identified by the player;

executing instructions stored in memory, wherein execution of the instructions by a processor:

retrieves game performance data from all user accounts registered with the game application, the game performance data stored at an application server;

sorts all user accounts registered with the game application based on the stored game performance data; and

generates a ladder ranking list including all sorted registered user accounts based on the one or more game performance metrics.]

[2. The method of claim 1, wherein the game performance data stored at the application server is collected during periodic game application status reports.]

[3. The method of claim 1, wherein the game performance metric includes the number of wins.]

[4. The method of claim 1, wherein the game performance metric includes the number of losses.]

[5. The method of claim 1, wherein the game performance metric includes points scored.]

[6. The method of claim 1, wherein the game performance metric includes points allowed.]

[7. The method of claim 1, wherein the ladder ranking list is sorted in ascending order.]

[8. The method of claim 1, wherein the ladder ranking list is sorted in descending order.]

[9. A system for ladder ranking in a game application, comprising:

a lobby server for receiving a request for a ladder ranking list from a player having a user account registered with the game application, wherein the game application is associated with a plurality of registered user accounts and the request for the ladder ranking list includes one or more game performance metrics identified by the player; and

a ladder engine stored in memory and executable by a processor to:

retrieve game performance data from all user accounts registered with the game application, the game performance data stored at an application server,

sort all user accounts registered with the game application based on the stored game performance data, and

generate a ladder ranking list including all sorted registered user accounts based on the one or more game performance metrics.]

[10. The system of claim 9, wherein the ladder engine executes further instructions to sort the ladder ranking list in ascending order.]

[11. The system of claim 9, wherein the ladder engine executes further instructions to sort the ladder ranking list in descending order.]

[12. A non-transitory computer readable storage medium having embodied thereon a program, the program being executable by a processor to perform a method for ladder ranking in a game application, the method comprising:

receiving a request for a ladder ranking list from a player having a user account registered with the game application, wherein the game application is associated with a plurality of registered user accounts and the request for the ladder ranking list includes one or more game performance metrics identified by the player;

retrieves game performance data from all user accounts registered with the game application;

sorts all user accounts registered with the game application based on the stored game performance data; and

generates a ladder ranking list including all sorted registered user accounts based on the one or more game performance metrics.]

13. A lobby server apparatus for parameter-based ranking in an application network, the lobby server apparatus comprising:

memory that stores game performance data regarding a game application hosted at a game server, the game application associated with a plurality of registered accounts;

a network interface that communicates directly with one or more client devices over a communication network connection, wherein the network interface:

receives a request for access to the game application, wherein the request is sent over the communication network connection from a first client device and identifies one of the registered accounts,

receives game performance data from the first client device via the communication network connection without directly communicating with the game server while the first client device is connected to the game server, the game performance data related to gameplay by the first client device of the game application hosted at the game server; and

receives a request from the first client device for a ranked list in relation to the game application hosted at the game server, wherein the ranked list is ranked in accordance with a selected parameter; and

a processor that executes ladder ranking engine instructions stored in memory, wherein execution of the ladder ranking engine instructions by the processor generates the ranked list in which the stored game performance data and the received game performance data is sorted based on the selected parameter.

14. The apparatus of claim 13, wherein the game performance data includes information regarding at least one of progress within the game application, wins, losses, points scored, points allowed, and other statistics specific to the game application.

15. The apparatus of claim 13, wherein the memory further stores the received game performance data in association with the registered account of the first client device.

16. The apparatus of claim 13, wherein the ranked list is specific to a contest or tournament.

17. The apparatus of claim 13, wherein the parameter is selected by the first client device.

18. The apparatus of claim 13, wherein the processor executes further instructions to provide information to the first client device regarding one or more other client devices and one or more games played by each other client device.

19. The apparatus of claim 13, wherein the processor executes further instructions to provide information to at least one other client device when the first client device participates in the game application.

20. The apparatus of claim 13, wherein the processor executes further instructions to provide information to the first client device regarding creation and management of a clan.

21. The apparatus of claim 13, wherein the processor executes further instructions to perform player-matching.

22. The apparatus of claim 13, wherein the processor executes further instructions to provide information to the first client device regarding available chat channels, available games or locations of other users.

23. The apparatus of claim 13, wherein the processor executes further instructions to authenticate the first client device.

24. A method for parameter-based ranking in an application network, the method comprising:

storing game performance data in memory of a lobby server regarding a game application hosted at a game server, the game application associated with a plurality of registered accounts, wherein the lobby server is in direct communication with one or more client devices over a communication network connection;

receiving a request for access to the game application, wherein the request is sent over the communication network connection from a first client device to the lobby server and identifies one of the registered accounts;

receiving game performance data sent from the first client device to the lobby server via the communication network connection without the lobby server directly communicating with the game server while the first client device is connected to the game server, the game performance data related to gameplay by the first client device of the game application hosted at the game server;

receiving a request sent from the first client device to the lobby server, the request for a ranked list in relation to the game application hosted at the game server, wherein the ranked list is ranked in accordance with a selected parameter; and

executing instructions stored in memory of the lobby server, wherein execution of the instructions by a processor of the lobby server generates the ranked list in which the stored game performance data and the received game performance data is sorted based on the selected parameter.

25. The method of claim 24, wherein the game performance data includes information regarding at least one of progress within the game application, wins, losses, points scored, points allowed, and other statistics specific to the game application.

26. The method of claim 24, further comprising storing the received game performance data in association with the registered account of the first client device.

27. The method of claim 24, wherein the ranked list is specific to a contest or tournament.

28. The method of claim 24, wherein the parameter is selected by the first client device.

29. The method of claim 24, wherein execution of further instructions by the processor provides information to the first client device regarding one or more other client devices and one or more games played by each other client device.

30. The method of claim 24, wherein execution of further instructions by the processor provides information to at least one other client device when the first client device participates in the game application.

31. The method of claim 24, wherein execution of further instructions by the processor provides information to the first client device regarding creation and management of a clan.

32. The method of claim 24, wherein execution of further instructions by the processor performs player-matching.

33. The method of claim 24, wherein execution of further instructions by the processor provides information to the first client device regarding available chat channels, available games or locations of other users.

34. The method of claim 24, wherein execution of further instructions by the processor authenticates the first client device.

35. A non-transitory computer-readable storage medium, having embodied thereon a program executable by a processor of a lobby server to perform a method for parameter-based ranking in an application network, the method comprising:

storing game performance data in memory of a lobby server regarding a game application hosted at a game server, the game application associated with a plurality of registered accounts, wherein the lobby server is in direct communication with one or more client devices over a communication network connection;

receiving a request for access to the game application, wherein the request is sent over the communication network connection from a first client device to the lobby server and identifies one of the registered accounts;

receiving game performance data sent from the first client device to the lobby server via the communication network connection without the lobby server directly communicating with the game server while the first client device is connected to the game server, the game performance data related to gameplay by the first client device of the game application hosted at the game server;

receiving a request sent from the first client device to the lobby server, the request for a ranked list in relation to the game application hosted at the game server, wherein the ranked list is ranked in accordance with a selected parameter; and

generating the ranked list in which the stored game performance data and the received game performance data is sorted by the lobby server based on the selected parameter.

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