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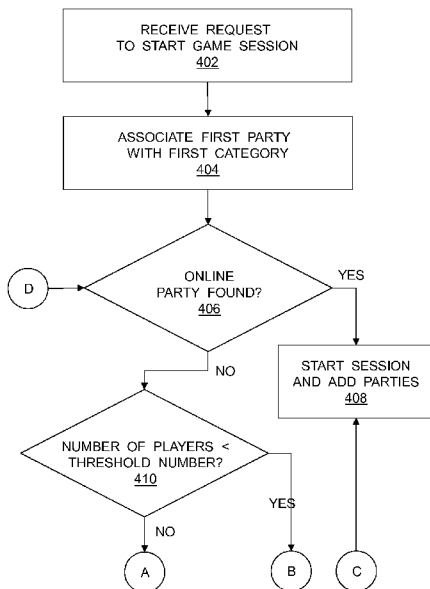


FIG. 4A

(57) **Abstract:** A method for managing a game session of a multiplayer game is provided. A request to start a game session of the multiplayer game is received from a first party. The first party is associated with a first category of players of the multiplayer game, and the number of players within the first category is determined. If the number of players within the first category is below a threshold number, an invite is sent to at least a second party associated with the first category. Upon receiving a request to join a game session of the multiplayer game from the at least a second party, a game session of the multiplayer game is started by accepting the request from the first party, and the at least a second party is added to the game session of the multiplayer game.

METHOD AND SYSTEM FOR MANAGING MULTIPLAYER GAME SESSIONS

TECHNICAL FIELD

[0001] The present disclosure relates generally to multiplayer games, and more specifically, to methods for managing a game session of a multiplayer game. Moreover, 5 the present disclosure relates to systems for managing a game session of a multiplayer game. Furthermore, the present disclosure also concerns apparatus suitable for use in the aforementioned systems.

BACKGROUND

10 [0002] Multiplayer games are games in which two or more players play together, for example, against each other. A problem faced by the multiplayer games is to match up two or more players together in a meaning full manner. The meaning full manner refers to a situation wherein players in a game session have at least one characteristic feature that is common or close to common. Examples of such characteristic feature include 15 skills of players, game levels, skill levels, highest scores of the players. As an example, it could be desirable to match up only those players who are within a certain game level.

[0003] At present, matching in a multiplayer game is performed by a server system, which has information about characteristics of players of the game. The players are clustered into different skill-level clusters. For a given player, the matching is 20 performed within his/her cluster, by connecting players who are online at a given time and have indicated willingness to start playing the game.

[0004] A problem with this approach is that if the size of the cluster is too small, the given player may have to wait too long to find another player. On the other hand, if the size of the cluster is too large, the given player may be matched up with a player whose 25 skill levels are not similar to his/her skill levels.

SUMMARY

[0005] The present disclosure seeks to provide an improved method for managing a game session of a multiplayer game.

5 [0006] The present disclosure also seeks to provide an improved system for managing a game session of a multiplayer game.

[0007] A further aim of the present disclosure is to at least partially overcome at least some of the problems of the prior art, as discussed above.

[0008] In a first aspect, embodiments of the present disclosure provide a method for managing a game session of a multiplayer game, the method comprising:

- 10
- receiving a request to start a game session of the multiplayer game from a first party;
 - associating the first party with a first category of players of the multiplayer game;
 - determining a number of players within the first category;
 - sending an invite to at least a second party associated with the first category if the number of players within the first category is below a threshold number;

15

 - receiving a request to join a game session of the multiplayer game from the at least a second party associated with the first category;
 - starting a game session of the multiplayer game by accepting the request from the first party; and
 - adding the at least a second party to the game session of the multiplayer game.

20 [0009] In a second aspect, embodiments of the present disclosure provide a system for managing a game session of a multiplayer game, the system comprising a game server configured to:

- receive a request to start a game session of the multiplayer game from a first party;
- associate the first party with a first category of players of the multiplayer game;

- determine a number of players within the first category;
- send an invite to at least a second party associated with the first category if the number of players within the first category is below a threshold number;
- receive a request to join a game session of the multiplayer game from the at least a
5 second party associated with the first category;
- start a game session of the multiplayer game by accepting the request from the first party; and
- add the at least a second party to the game session of the multiplayer game.

[0010] In a third aspect, embodiments of the present disclosure provide an apparatus
10 comprising:

- a memory for storing instructions;
 - a processor coupled to the memory;
 - a display coupled to the processor; and
 - a communication interface coupled to the processor;
- 15 wherein the processor is configured to execute the instructions to:
- use the communication interface to receive, via a push notification message, first data indicative of an invite to join a game session of a multiplayer game;
 - analyze the first data to render the invite on the display;
 - determine, from a user's input, whether or not the user has accepted the invite to join
20 the game session of the multiplayer game; and
 - start the multiplayer game stored in the memory, if the user has accepted the invite to join the game session of the multiplayer game.

[0011] Additional aspects, advantages, features and objects of the present disclosure would be made apparent from the drawings and the detailed description of the illustrative embodiments construed in conjunction with the appended claims that follow.

[0012] It will be appreciated that features of the present disclosure are susceptible to being combined in various combinations without departing from the scope of the present disclosure as defined by the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] The summary above, as well as the following detailed description of illustrative embodiments, is better understood when read in conjunction with the appended drawings. For the purpose of illustrating the present disclosure, exemplary constructions of the disclosure are shown in the drawings. However, the present disclosure is not limited to specific methods and instrumentalities disclosed herein. Moreover, those in the art will understand that the drawings are not to scale. Wherever possible, like elements have been indicated by identical numbers.

[0014] Embodiments of the present disclosure will now be described, by way of example only, with reference to the following diagrams wherein:

FIG. 1 is a schematic illustration of a network environment, wherein a system for managing a game session of a multiplayer game is implemented pursuant to embodiments of the present disclosure;

FIGS. 2A and 2B are schematic illustrations of an example data flow when a game session of a multiplayer game is managed, in accordance with an embodiment of the present disclosure;

FIG. 3 is a schematic illustration of various components of an apparatus, in accordance with an embodiment of the present disclosure; and

FIGS. 4A, 4B and 4C collectively are an illustration of steps of a method for managing a game session of a multiplayer game, in accordance with an embodiment of the present disclosure.

[0015] In the accompanying drawings, an underlined number is employed to represent an item over which the underlined number is positioned or an item to which the

underlined number is adjacent. A non-underlined number relates to an item identified by a line linking the non-underlined number to the item. When a number is non-underlined and accompanied by an associated arrow, the non-underlined number is used to identify a general item at which the arrow is pointing.

5 DETAILED DESCRIPTION OF EMBODIMENTS

[0016] The following detailed description illustrates embodiments of the present disclosure and ways in which they can be implemented. Although some modes of carrying out the present disclosure have been disclosed, those skilled in the art would recognize that other embodiments for carrying out or practising the present disclosure are also possible.

GLOSSARY

[0017] Brief definitions of terms used throughout the present disclosure are given below.

[0018] The term “multiplayer game” generally refers to a game in which two or more players play together in real time or near real time. As an example, a multiplayer game can be a strategy game, wherein two or more players play against each other in real time or near real time.

[0019] The term “game session” generally refers to a given session of a multiplayer game in which a plurality of players, who have joined the given session, play the multiplayer game together in real time or near real time.

[0020] The term “leader board” generally refers to a scoreboard of a multiplayer game. According to an embodiment of the present disclosure, a leader board of a given multiplayer game includes names of players of the given multiplayer game and ranking positions of these players. Additionally, optionally, the leader board also includes individual highest scores and/or current scores of the players.

[0021] The term “game server” generally refers to a server that provides a multiplayer game service to a plurality of parties, namely clients.

[0022] The term “party” generally refers to a client associated with a player of a multiplayer game.

[0023] The term “server” generally refers to an application, program, process or device in a client/server relationship that responds to requests for information or services by another application, program, process or device (a client) on a communication network. The term “server” also encompasses software that makes the act of serving information or providing services possible.

[0024] The term “client” generally refers to an application, program, process or device in a client/server relationship that requests information or services from another application, program, process or device (a server) on a communication network. Importantly, the terms “client” and “server” are relative since an application may be a client to one application but a server to another application. The term “client” also encompasses software that makes the connection between a requesting application, program, process or device and a server possible, such as an File Transfer Protocol (FTP) client.

[0025] The terms “connected” or “coupled” and related terms are used in an operational sense and are not necessarily limited to a direct connection or coupling. Thus, for example, two devices may be coupled directly, or via one or more intermediary media or devices. As another example, devices may be coupled in such a way that information can be passed there between, while not sharing any physical connection with one another. Based upon the present disclosure provided herein, one of ordinary skill in the art will appreciate a variety of ways in which connection or coupling exists in accordance with the aforementioned definition.

[0026] The terms “first”, “second”, and the like, herein do not denote any order, quantity, or importance, but rather are used to distinguish one element from another. Furthermore, the terms “a” and “an” herein do not denote a limitation of quantity, but rather denote the presence of at least one of the referenced item.

[0027] The phrases “in an embodiment”, “in accordance with an embodiment” and the like generally mean the particular feature, structure, or characteristic following the

phrase is included in at least one embodiment of the present disclosure, and may be included in more than one embodiment of the present disclosure. Importantly, such phrases do not necessarily refer to the same embodiment.

5 [0028] If the specification states a component or feature “may”, “can”, “could”, or “might” be included or have a characteristic, that particular component or feature is not required to be included or have the characteristic.

EMBODIMENTS OF THE PRESENT DISCLOSURE

[0029] In a first aspect, embodiments of the present disclosure provide a method for managing a game session of a multiplayer game, the method comprising:

- 10 - receiving a request to start a game session of the multiplayer game from a first party;
- associating the first party with a first category of players of the multiplayer game;
- determining a number of players within the first category;
- sending an invite to at least a second party associated with the first category if the number of players within the first category is below a threshold number;
- 15 - receiving a request to join a game session of the multiplayer game from the at least a second party associated with the first category;
- starting a game session of the multiplayer game by accepting the request from the first party; and
- adding the at least a second party to the game session of the multiplayer game.

20 [0030] According to an embodiment of the present disclosure, the aforementioned method is performed by a game server, wherein the game server provides a multiplayer game service to a plurality of parties, including the first party and the at least a second party.

[0031] Throughout the present disclosure, the term “first party” refers to a client
25 associated with a player of the multiplayer game, who has made the request to start a

new game session, while the term “at least a second party” refers to at least one client associated with at least one player of the multiplayer game to which the invite is sent. Hereinafter, the player who has made the request to start the game session is referred to as “*initiating player*”, while the at least one player to whom the invite is sent is referred to as “*receiving player*”.

[0032] The first party and the at least a second party are associated with a same category of players of the multiplayer game, namely the first category of players. According to an embodiment of the present disclosure, the first category is a category in which the first party and the at least a second party have substantially similar skill levels related to the multiplayer game. Optionally, in this regard, the skill levels are derived from a leader board of the multiplayer game. Additionally or alternatively the category can refer to a group of players in same stage or level of the multiplayer game. Additionally or alternatively the category can refer to a group of players playing belonging in a same group of players such as a team of players or players from certain location (country, area, continent) or from certain demography (male, female, age). Additionally or alternatively the category can refer to players having same or similar game devices. Additionally or alternatively the category can refer to players having same or similar resources in the game. The resources can refer to available credits in the game, available tools, weapons, assets, progress level of the game objects etc.

[0033] According to an embodiment of the present disclosure, the first category includes players whose ranking positions are within a predetermined range with respect to a ranking position of the initiating player, such that the first category includes both players with better ranking positions and players with worse ranking positions with respect to the initiating player. Optionally, in this regard, the first category includes players whose ranking positions fall within ranking positions “ $x+y$ ” and “ $x-y$ ” in the leader board, wherein “ x ” is the ranking position of the initiating player and “ y ” is a positive integer, for example, such as 5, 10, 15, and so forth. As an example, if the ranking position of the initiating player, x , is “30” and y is “10”, then the first category includes players whose ranking positions fall within ranking positions “20” and “40”, and the number of players within the first category is 20. As another example, if the ranking position of the initiating player, x , is “1” and y is “9”, then the first category

includes players whose ranking positions fall within ranking positions “2” and “10”, and the number of players within the first category is 9.

[0034] According to another embodiment of the present disclosure, the first category includes players having a certain type of subscription to the multiplayer game.

5 Optionally, in such a case, the number of players within the first category is the number of players in that certain type of subscription.

[0035] When the number of players within the first category is below the threshold number, it is likely that the initiating player does not find another player to play the multiplayer game within a desired waiting time. Therefore, in order to increase a
10 likelihood of the initiating player finding at least one player to play the multiplayer game, the invite is sent to at least one player within the first category.

[0036] According to an embodiment of the present disclosure, the method further includes sending the invite to more players within the first category, if the request to join from the at least a second party is not received within a second predetermined
15 period of time.

[0037] Optionally, in this regard, the invite is sent to a plurality of parties associated with the first category. More optionally, the invite is sent to all parties associated with the first category.

[0038] Moreover, according to an embodiment of the present disclosure, the invite is
20 sent using push notification technology. Optionally, in this regard, the invite is sent as a push notification message, which includes information that enables a game device of the receiving player to start an application of the multiplayer game (hereinafter referred to as “*game application*”), if the receiving player chooses to start the game application, for example, by clicking on the push notification message. As an example, the invite can be
25 sent using the Apple Push Notification service (APNs) by Apple Inc. (“Apple” is a registered trademark).

[0039] It is to be noted here that the game application is not required to be already running on the game device of the receiving player at the time when the push notification message is received, as the game application can be launched from the push

notification message itself. In other words, there is no requirement for the game application to be active at the time of receipt of the push notification message.

[0040] Furthermore, according to an embodiment of the present disclosure, the method further comprises determining the threshold number based upon a probability of at least one party to join in the multiplayer game within a first predetermined period of time. As an example, the first predefined period of time can be a waiting time of 15 seconds, 10 seconds, 5 seconds or shorter, 30 seconds, 60 seconds or longer. Optionally, the probability of at least one party to join is a function of the number of players in the first category, an average time in which players start a new game session, and a desired waiting time for at least one other party to join.

[0041] In other words, if the probability of at least one party to join is greater than a predetermined threshold value, no invite is required to be sent. As an example, the predetermined threshold value can be 0.95.

[0042] For illustration purposes only, there will now be considered an example of how the threshold number is determined. It will be appreciated that a new game session of a multiplayer game can be started only when there are at least two players who have indicated willingness to play the multiplayer game. In the illustrated example, there will now be considered the following:

- (i) a player " G_0 " has indicated willingness to play the multiplayer game, namely by making a request to start a new game session of the multiplayer game;
- (ii) " n " is the number of other players " G_1 ", " G_2 ",..." G_n " within a category associated with the player " G_0 ";
- (iii) " $t1$ " is a time in which at least one of the other players would also indicate willingness to play the multiplayer game with a probability " $p1$ " of 1; in other words, the at least one of the other players will definitely join the game session within time " $t1$ ";
- (iv) " $p2$ " is a probability that the player " G_0 " would wait for at least one of the other players to join the game session till time " $t2$ "; and

(v) “ p_3 ” is a probability that a given player would join the game session by time “ t_2 ”; $p_3 = t_2/t_1$.

[0043] For “ n ” number of the other players, a probability that at least one of the other players would join the game session by time “ t_2 ” can be calculated as:

$$5 \quad p_3 \times n$$

[0044] The probability that at least one of the other players would join the game session by time “ t_2 ” should be greater than or equal to the probability that the player “ G_0 ” would wait for at least one of the other players to join the game session till time “ t_2 ”. Thus, the number of the other players within the category can be calculated as follows:

$$10 \quad p_3 \times n \geq p_2$$

$$n \geq p_2/p_3 = p_2/(t_2/t_1) = p_2 \times t_1/t_2$$

[0045] As an example, if the time “ t_1 ” is 100 seconds, the time “ t_2 ” is 15 seconds and the probability “ p_2 ” is 0.9, then the threshold number is six ($= 0.9 \times 100 / 15 = 6$). In other words, there should be at least six other players to achieve an expected waiting
15 time of 15 seconds. In such a case, an invite would be sent if the number of players within the category is less than six.

[0046] As another example, if the time “ t_1 ” is 100 seconds, the time “ t_2 ” is 5 seconds and the probability “ p_2 ” is 0.9, then the threshold number is 18 ($= 0.9 \times 100/5$). In other words, there should be at least 18 other players to achieve an expected waiting time of 5
20 seconds. In such a case, an invite would be sent if the number of players within the category is less than 18.

[0047] Optionally, the time “ t_1 ” and the probability “ p_2 ” are determined based upon statistical data of the multiplayer game. Such statistical data is optionally collected by the game server. As an example, the statistical data can be collected for a predetermined
25 number of most recent game sessions of the multiplayer game. As another example, the statistical data can be collected for game sessions started and/or ended within a predetermined time period.

[0048] It is to be noted here that the above calculations have been performed for a two-player game. For a three-player game, a new game session can be started only when there are at least three players who have indicated willingness to play. In general for N player game a new game session can be started only when there are at least N players
5 who have indicated willingness to play.

[0049] Moreover, according to an embodiment of the present disclosure, the method further comprises sending an invite to at least a third party associated with a second category, if the request to join from the at least a second party is not received within a second predetermined period of time.

10 [0050] The second category is different from the first category. Optionally, the number of players within the second category is larger than the number of players within the first category. This increases a likelihood of the initiating player finding at least one player to play the multiplayer game.

15 [0051] As an example, the second category could include players whose ranking positions fall within ranking positions “ $x+z$ ” and “ $x-z$ ” in the leader board, wherein “ z ” is a positive integer greater than “ y ”. In such a case, the second category is a superset of the first category.

20 [0052] For illustration purposes only, there will now be considered an example implementation of the aforementioned method pursuant to embodiments of the present disclosure. Game devices of players A and B have a game application of a same multiplayer game installed therein. For the players A and B to be able to play the multiplayer game together in real time or near real time, it is required that both the players A and B start the game application on their respective game devices and the game devices are connected in a same game session.

25 [0053] An example operation loop includes the following steps:

Step 1: A first player starts the game application on his/her game device and indicates willingness to play the multiplayer game. Correspondingly, a request to start a new game session of the multiplayer game is sent to a game server.

Step 2: The game server associates the first player with a first category of players, and searches for other online players within the first category, namely other players within the first category who have also indicated willingness to play the multiplayer game. If no online player is found in the search, a step 3 is performed.

5 Otherwise, if at least one online player is found in the search, the game server starts a new game session of the multiplayer game and adds the first player and the at least one online player to the new game session.

Step 3: The game server determines whether or not the number of players within the first category is less than a threshold number. If it is determined that the number of

10 players within the first category is more than or equal to the threshold number, a step 4 is performed. Otherwise, if it is determined that the number of players within the first category is less than the threshold number, a step 5 is performed.

Step 4: The game server waits for a first predetermined period of time. If none of the players within the first category indicates willingness to play the multiplayer game

15 within the first predetermined period of time, the game server associates the first player with a second category of players, and repeats the step 2 for the second category of players.

Step 5: The game server sends, to a push notification server, a request to send an invite to at least a second player within the first category.

20 Step 6: The push notification server then sends the invite to the at least a second player within the first category.

Step 7: If the at least a second player indicates willingness to play the multiplayer game against the first player, a request to join a game session of the multiplayer game is sent to the game server and a step 8 is performed. If the request to

25 join from the at least a second player is not received within a second predetermined period of time, the game server associates the first player with a second category of players, and repeats the step 2 for the second category of players.

Step 8: The game devices of the first player and the at least a second player are connected in a same game session, thereby enabling the first player and the at least a

second player to play the multiplayer game against each other. The game session is synchronized via the game server.

Step 9: After the game session of the multiplayer game is ended, a leader board of the multiplayer game is updated. Optionally, in this step, relative ranking positions of the first player and the at least a second player are updated.

[0054] In a second aspect, embodiments of the present disclosure provide a system for managing a game session of a multiplayer game, the system comprising a game server configured to:

- receive a request to start a game session of the multiplayer game from a first party;
- 10 - associate the first party with a first category of players of the multiplayer game;
- determine a number of players within the first category;
- send an invite to at least a second party associated with the first category if the number of players within the first category is below a threshold number;
- receive a request to join a game session of the multiplayer game from the at least a second party associated with the first category;
- 15 - start a game session of the multiplayer game by accepting the request from the first party; and
- add the at least a second party to the game session of the multiplayer game.

[0055] The game server provides a multiplayer game service to a plurality of parties, including the first party and the at least a second party.

[0056] The first party and the at least a second party are associated with a same category of players of the multiplayer game, namely the first category of players. According to an embodiment of the present disclosure, the first category is a category in which the first party and the at least a second party have substantially similar skill levels related to the multiplayer game. Optionally, in this regard, the skill levels are derived

from a leader board of the multiplayer game, wherein the leader board is stored in a game server database associated with the game server.

[0057] Optionally, the game server is further configured to send the invite to a plurality of parties associated with the first category. More optionally, the game server is further
5 configured to send the invite to all parties associated with the first category.

[0058] Moreover, according to an embodiment of the present disclosure, the game server is further configured to send the invite via a push notification server. Optionally, in this regard, the invite is sent as a push notification message, which includes information that enables a game device associated with the at least a second party to
10 start an application of the multiplayer game, if the at least a second party chooses to start the game application, for example, by clicking on the push notification message.

[0059] Furthermore, according to an embodiment of the present disclosure, the game server is further configured to determine the threshold number based upon a probability of at least one party to join in the multiplayer game within a first predetermined period
15 of time, wherein the time is counted at the game server. Alternatively the threshold number can be a pre determined number. The predetermined number can be stored in a game server. Optionally the threshold number can be adjusted from time to time.

[0060] According to an embodiment of the present disclosure, the game server is further configured to send an invite to at least a third party associated with a second category if
20 the request to join from the at least a second party is not received within a second predetermined period of time.

[0061] For illustration purposes only, there will now be considered an example environment, wherein a system for managing a game session of a multiplayer game is implemented pursuant to embodiments of the present disclosure. One such example
25 environment has been illustrated in conjunction with FIG. 1 as explained in more detail below.

[0062] The example environment includes a plurality of game devices associated with a plurality of players, a game server, a game server database associated with the game server, a push notification server, and a communication network.

[0063] The game server is coupled in communication with the game devices and the push notification server via the communication network. The communication network can be a collection of individual networks, interconnected with each other and functioning as a single large network. Such individual networks may be wired, wireless, or a combination thereof. Examples of such individual networks include, but are not limited to, Local Area Networks (LANs), Wide Area Networks (WANs), Metropolitan Area Networks (MANs), Wireless LANs (WLANs), Wireless WANs (WWANs), Wireless MANs (WMANs), the Internet, second generation (2G) telecommunication networks, third generation (3G) telecommunication networks, fourth generation (4G) telecommunication networks, Worldwide Interoperability for Microwave Access (WiMAX) networks, and short-range wireless communication networks, such as a “Bluetooth” network (“Bluetooth” is a registered trademark).

[0064] Examples of the game devices include, but are not limited to, mobile phones, smart telephones, Mobile Internet Devices (MIDs), tablet computers, Ultra-Mobile Personal Computers (UMPCs), phablet computers, Personal Digital Assistants (PDAs), web pads, Personal Computers (PCs), handheld PCs, laptop computers, desktop computers, Network-Attached Storage (NAS) devices, large-sized touch screens with embedded PCs, and interactive entertainment devices, such as game consoles, Television (TV) sets and Set-Top Boxes (STBs). Some specific examples of the game devices include, but are not limited to, iPhone, iPad, Android phone, Android web pad, Windows phone, and Windows web pad (these names include registered trademarks).

[0065] The game server provides a multiplayer game service to clients associated with the game devices. The game devices have a game application (namely, client) of the multiplayer game installed therein, wherein the game application is configured to communicate with the game server. The game server coordinates and synchronizes the game application running on game devices of players who are playing together, for example, against each other.

[0066] Moreover, the game server stores, at the game server database, information pertaining to rules of the multiplayer game and other game-related information. Optionally, the game-related information includes a leader board of the multiplayer game. Additionally, optionally, the game-related information includes at least one of:

credits of the players, scores of the players, status of games being played by the players, progress of the games being played by the players, game levels at which the players are playing, skills of the players, and/or associated time-stamps.

[0067] Furthermore, the game server uses a push notification service provided by the push notification server, when invites are required to be sent. Optionally, in this regard, the game server defines communication content of the invites.

[0068] In a third aspect, embodiments of the present disclosure provide an apparatus comprising:

- a memory for storing instructions;
 - 10 a processor coupled to the memory;
 - a display coupled to the processor; and
 - a communication interface coupled to the processor;
- wherein the processor is configured to execute the instructions to:
- use the communication interface to receive, via a push notification message, first data indicative of an invite to join a game session of a multiplayer game;
 - 15 - analyze the first data to render the invite on the display;
 - determine, from a user's input, whether or not the user has accepted the invite to join the game session of the multiplayer game; and
 - start the multiplayer game stored in the memory, if the user has accepted the invite to
 - 20 join the game session of the multiplayer game.

[0069] Examples of the apparatus include, but are not limited to, mobile phones, smart telephones, Mobile Internet Devices (MIDs), tablet computers, Ultra-Mobile Personal Computers (UMPCs), phablet computers, Personal Digital Assistants (PDAs), web pads, Personal Computers (PCs), handheld PCs, laptop computers, desktop computers, Network-Attached Storage (NAS) devices, large-sized touch screens with embedded

PCs, and interactive entertainment devices, such as game consoles, Television (TV) sets and Set-Top Boxes (STBs). Some specific examples of the apparatus include, but are not limited to, iPhone, iPad, Android phone, Android web pad, Windows phone, and Windows web pad (these names include registered trademarks).

5 [0070] Furthermore, an example of the apparatus has been illustrated in conjunction with FIG. 3 as explained in more detail below. The apparatus includes, but is not limited to, a memory, computing hardware such as a processor, a display, other Input/Output (I/O) devices, a communication interface, and a power source.

[0071] The power source supplies electrical power to various components of the
10 apparatus. The power source may, for example, include a rechargeable battery.

[0072] The memory optionally includes non-removable memory, removable memory, or a combination thereof. The non-removable memory, for example, includes Random-Access Memory (RAM), Read-Only Memory (ROM), flash memory, or a hard drive. The removable memory, for example, includes flash memory cards, memory sticks, or
15 smart cards.

[0073] The memory stores a game application, while the processor is operable to execute the game application. Executing the game application on the processor results in generating and rendering a graphical user interface on the display.

[0074] The I/O devices facilitate a user input interface, which is optionally configured
20 to detect an input corresponding to moving a pointer object, clicking or tapping the pointer object, or swiping a touch-sensitive object over the graphical user interface.

[0075] In an embodiment, the display is a touch-sensitive display screen that is operable to provide the user input interface. The touch-sensitive display screen is operable to receive tactile inputs from a user. These tactile inputs may, for example, include
25 clicking, tapping, pointing, moving, pressing and/or swiping with a finger or a touch-sensitive object like a pen.

[0076] Additionally or alternatively, optionally, the I/O devices include a mouse, a keyboard or a joystick that is operable to receive inputs corresponding to clicking, pointing, and/or moving a pointer object on the graphical user interface.

[0077] Moreover, optionally, the I/O devices also include a speaker for providing an audio output to the user, and a microphone for receiving an audio input from the user.

[0078] Furthermore, the communication interface enables the processor to communicate with a game server, for example, via a communication network. The communication interface also enables the processor to receive a push notification message pertaining to an invite to join a game session of a multiplayer game.

10 DETAILED DESCRIPTION OF THE DRAWINGS

[0079] Referring now to the drawings, particularly by their reference numbers, FIG. 1 is a schematic illustration of a network environment **100**, wherein a system for managing a game session of a multiplayer game is implemented pursuant to embodiments of the present disclosure.

15 [0080] The network environment **100** includes a plurality of game devices associated with a plurality of players, depicted as a game device **102a**, a game device **102b** and a game device **102c** (hereinafter collectively referred to as game devices **102**). The network environment **100** also includes a game server **104**, a game server database **106** associated with the game server **104**, a push notification server **108**, and a
20 communication network **110**.

[0081] FIG. 1 is merely an example, which should not unduly limit the scope of the claims herein. It is to be understood that the specific designation for the network environment **100** is provided as an example and is not to be construed as limiting the network environment **100** to specific numbers, types, or arrangements of game devices,
25 game servers, game server databases, push notification servers and communication networks. A person skilled in the art will recognize many variations, alternatives, and modifications of embodiments of the present disclosure.

[0082] FIGs. 2A and 2B are schematic illustrations of an example data flow when a game session of a multiplayer game is managed, in accordance with an embodiment of the present disclosure.

[0083] A player associated with a game device **202** (hereinafter referred to as “*initiating player*”) starts a game application of a multiplayer game on the game device **202**, and initiates a request to start a new game session of the multiplayer game. Consequently, at a step S2.1, the game device **202** sends the request to a game server **204**, via a communication network **206**.

[0084] At a step S2.2, the game server **204** then associates the initiating player with a category, using information stored at a game server database **208**.

[0085] At a step S2.3, the game server **204** searches for other online players (in practice other online players are those who have also initiated a request to start a new game session. I.e. matching two players who have both initiated a request to start a new game session), within the category. If no online player is found in the search, the game server **204** determines whether or not the number of players within the category is less than a threshold number. If it is determined that the number of players within the category is less than the threshold number, a step 2.4 is performed.

[0086] At the step 2.4, the game server **204** sends, to a push notification server **210**, a request to send an invite to at least one other player within the category. Consequently, at a step 2.5, the push notification server **210** sends the invite to a game device **212** associated with the at least one other player (hereinafter referred to as “*receiving player*”), via the communication network **206**.

[0087] At a step 2.6, the receiving player accepts the invite. Consequently, at a step 2.7, the game device **212** sends a request to join to the game server **204**.

[0088] At a step 2.8, the game server **204** starts a new game session of the multiplayer game and adds the initiating player and the receiving player to the new game session. The game server **204** synchronizes the game session.

[0089] At a step 2.9, when the game session ends, the game server **204** updates the information stored at the game server database **208**.

[0090] FIG. 2 is merely an example, which should not unduly limit the scope of the claims herein. A person skilled in the art will recognize many variations, alternatives,
5 and modifications of embodiments of the present disclosure.

[0091] FIG. 3 is a schematic illustration of various components of an apparatus **300**, in accordance with an embodiment of the present disclosure. The apparatus **300** includes, but is not limited to, a memory **302**, computing hardware such as a processor **304**, a display **306**, other Input/Output (I/O) devices **308**, a communication interface **310**, and a
10 power source **312**.

[0092] FIG. 3 is merely an example, which should not unduly limit the scope of the claims herein. It is to be understood that the specific designation for the apparatus **300** is provided as an example and is not to be construed as limiting the apparatus **300** to specific numbers, types, or arrangements of modules and/or components of the
15 apparatus **300**. A person skilled in the art will recognize many variations, alternatives, and modifications of embodiments of the present disclosure. For example, the apparatus **300** could be implemented as the game devices **102**, **202** and **212**, and vice versa.

[0093] FIGS. 4A, 4B and 4C collectively are an illustration of steps of a method for managing a game session of a multiplayer game, in accordance with an embodiment of
20 the present disclosure. The method is depicted as a collection of steps in a logical flow diagram, which represents a sequence of steps that can be implemented in hardware, software, or a combination thereof.

[0094] At a step **402**, a game server receives a request to start a game session of the multiplayer game from a first party.

[0095] At a step **404**, the game server associates the first party with a first category of
25 players of the multiplayer game.

[0096] At a step **406**, the game server searches for other online parties associated with the first category. If at least one online party is found in the search, a step **408** is

performed. At the step **408**, the game server starts a new game session of the multiplayer game, and adds the first party and the at least one online party to the new game session.

[0097] If, at the step **406**, no online party is found, a step **410** is performed.

- 5 [0098] At the step **410**, the game server determines whether or not the number of players within the first category is less than a threshold number. If it is determined that the number of players within the first category is more than or equal to the threshold number, a step **412** is performed.

- 10 [0099] At the step **412**, the game server waits for a first predetermined period of time. If any party indicates willingness to join, the step **408** is performed. If none of the players within the first category indicates willingness to play the multiplayer game within the first predetermined period of time, a step **414** is performed.

[00100] At the step **414**, the game server associates the first party with another category of players, and repeats the step **406** for this category of players.

- 15 [00101] If, at the step **410**, it is determined that the number of players within the first category is less than the threshold number, a step **416** is performed. At the step **416**, the game server sends, to a push notification server, a request to send an invite to at least a second party within the first category.

- 20 [00102] At a step **418**, the push notification server sends the invite to the at least a second party associated with the first category.

- [00103] At a step **420**, the game server checks whether a request to join a game session of the multiplayer game has been received from the at least a second party within a second predetermined period of time. If the game server receives a request to join, a step **422** is performed. At a step **422**, the game server starts a new game session and adds the first party and the at least a second party to the game session.
- 25

[00104] If the request to join from the at least a second party is not received within the second predetermined period of time, a step **424** is performed. At the step

424, the game server associates the first party with a second category of players, and repeats the step 406 for the second category of players.

[00105] The steps 402 to 424 are only illustrative and other alternatives can also be provided where one or more steps are added, one or more steps are removed, or one
5 or more steps are provided in a different sequence without departing from the scope of the claims herein.

[00106] Modifications to embodiments of the present disclosure described in the foregoing are possible without departing from the scope of the present disclosure as defined by the accompanying claims. Expressions such as “including”, “comprising”,
10 “incorporating”, “consisting of”, “have”, “is” used to describe and claim the present disclosure are intended to be construed in a non-exclusive manner, namely allowing for items, components or elements not explicitly described also to be present. Reference to the singular is also to be construed to relate to the plural.

CLAIMS

1. A method for managing a game session of a multiplayer game, the method comprising:
- receiving a request to start a game session of the multiplayer game from a first party;
 - 5 - associating the first party with a first category of players of the multiplayer game;
 - determining a number of players within the first category;
 - sending an invite to at least a second party associated with the first category if the number of players within the first category is below a threshold number;
 - receiving a request to join a game session of the multiplayer game from the at least a
10 second party associated with the first category;
 - starting a game session of the multiplayer game by accepting the request from the first party; and
 - adding the at least a second party to the game session of the multiplayer game.
2. A method of claim 1, wherein the first category is a category in which the first party
15 and the at least a second party have substantially similar skill levels related to the multiplayer game and the skill levels are derived from a leader board of the multiplayer game.
3. A method of any of the claims 1-2, further comprising determining the threshold number based upon a probability of at least one party to join in the multiplayer game
20 within a first predetermined period of time.
4. A method of any of the claims 1-3, wherein the invite is sent using push notification technology.
5. A method of any of the claims 1-4, wherein the invite is sent to a plurality of parties associated with the first category.

6. A method of claim 5, wherein the invite is sent to all parties associated with the first category.
7. A method of any of the claims 1-6, further comprising sending an invite to at least a third party associated with a second category if the request to join from the at least a second party is not received within a second predetermined period of time.
8. A system for managing a game session of a multiplayer game, the system comprising a game server configured to:
- receive a request to start a game session of the multiplayer game from a first party;
 - associate the first party with a first category of players of the multiplayer game;
 - 10 - determine a number of players within the first category;
 - send an invite to at least a second party associated with the first category if the number of players within the first category is below a threshold number;
 - receive a request to join a game session of the multiplayer game from the at least a second party associated with the first category;
 - 15 - start a game session of the multiplayer game by accepting the request from the first party; and
 - add the at least a second party to the game session of the multiplayer game.
9. A system of claim 8, wherein the first category is a category in which the first party and the at least a second party have substantially similar skill levels related to the multiplayer game and the skill levels are derived from a leader board stored in a game server database associated with the game server.
- 20
10. A system of any of the claims 8-9, wherein the game server is further configured to determine the threshold number based upon a probability of at least one party to join in the multiplayer game within a first predetermined period of time, wherein the time is counted at the game server.
- 25

11. A system of any of the claims 8-10, wherein the game server is further configured to send the invite via a push notification server.
12. A system of any of the claims 8-11, wherein the game server is further configured to send the invite to a plurality of parties associated with the first category.
- 5 13. A system of claim 12, wherein the game server is further configured to send the invite to all parties associated with the first category.
14. A system of any of the claims 8-13, wherein the game server is further configured to send an invite to at least a third party associated with a second category if the request to join from the at least a second party is not received within a second predetermined
10 period of time.
15. An apparatus comprising:
- a memory for storing instructions;
 - a processor coupled to the memory;
 - a display coupled to the processor; and
 - 15 - a communication interface coupled to the processor;
- wherein the processor is configured to execute the instructions to:
- use the communication interface to receive, via a push notification message, first data indicative of an invite to join a game session of a multiplayer game;
 - analyze the first data to render the invite on the display;
 - 20 - determine, from a user's input, whether or not the user has accepted the invite to join the game session of the multiplayer game; and
 - start the multiplayer game stored in the memory, if the user has accepted the invite to join the game session of the multiplayer game.

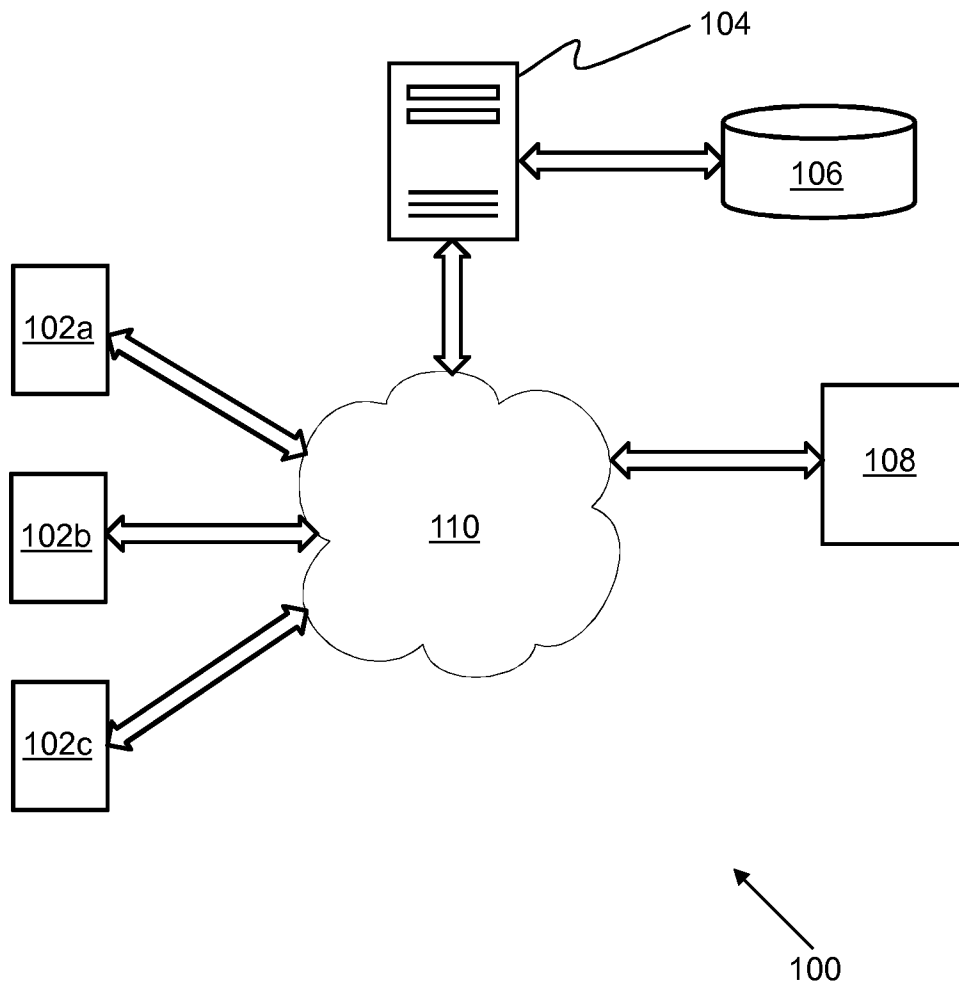


FIG. 1

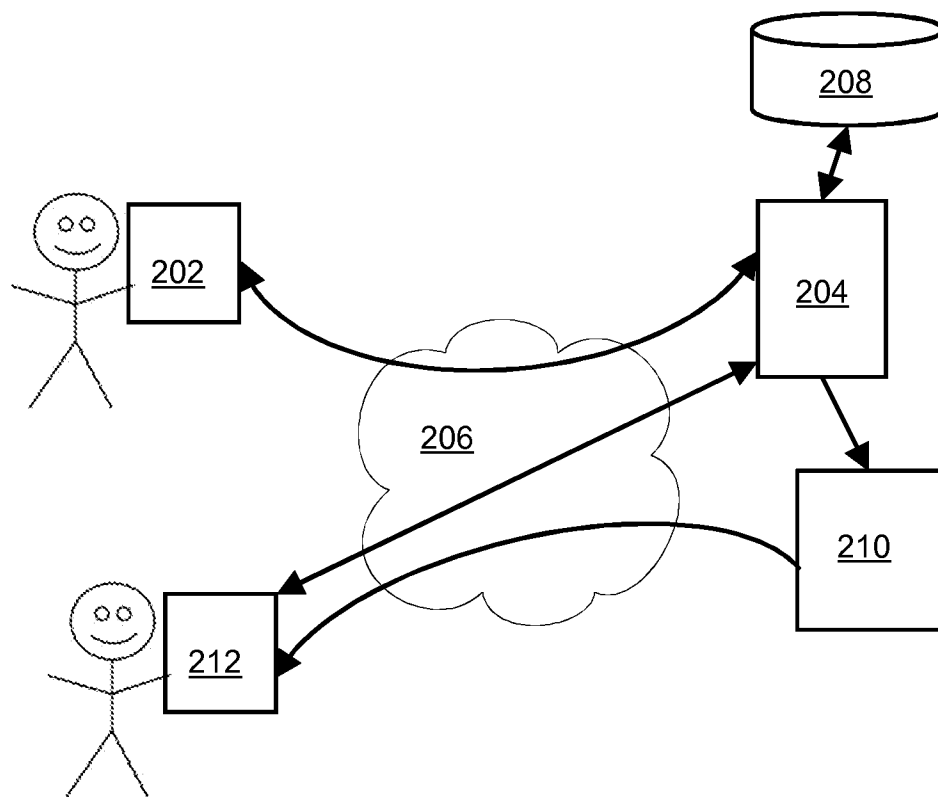


FIG. 2A

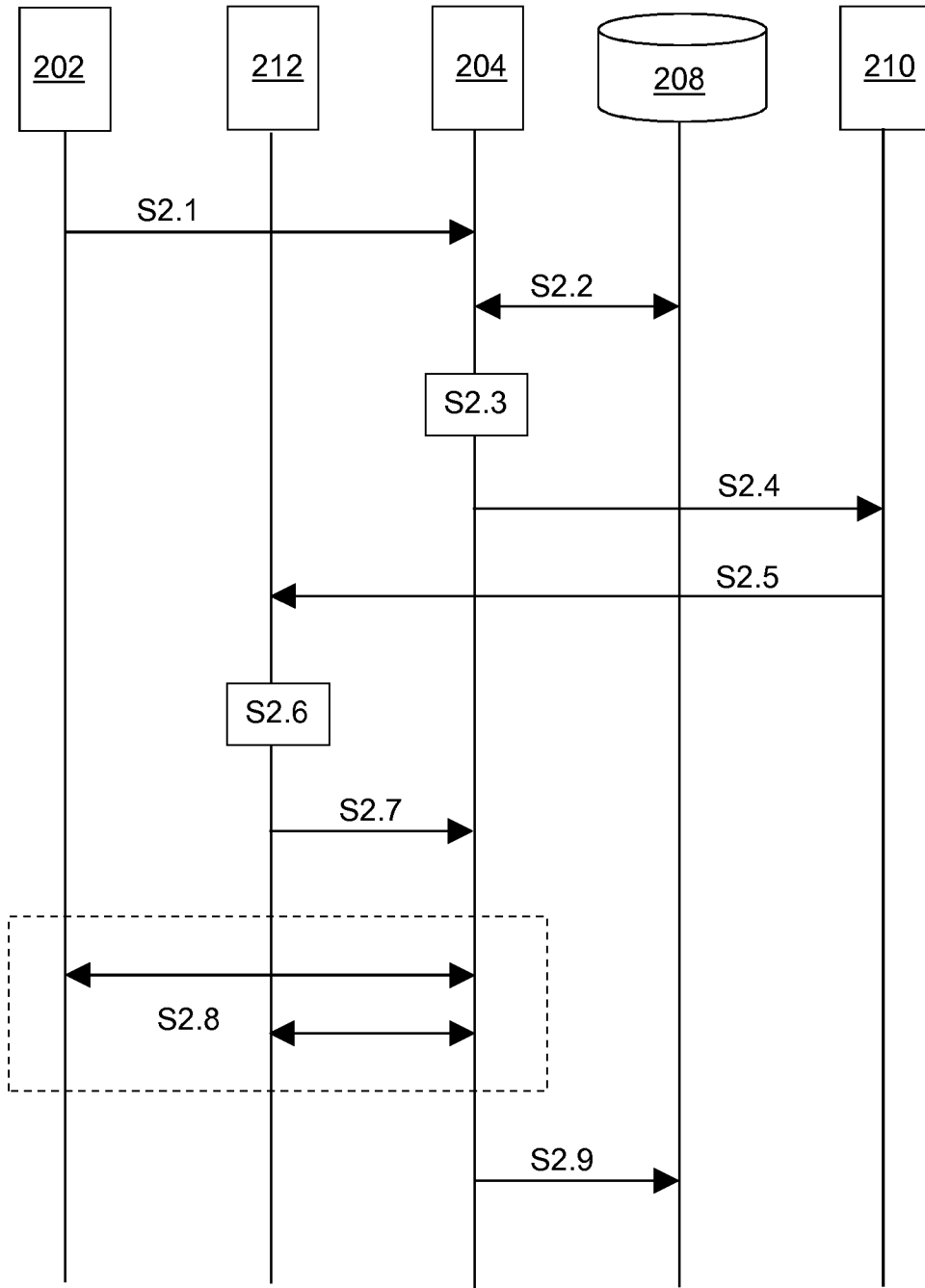


FIG. 2B

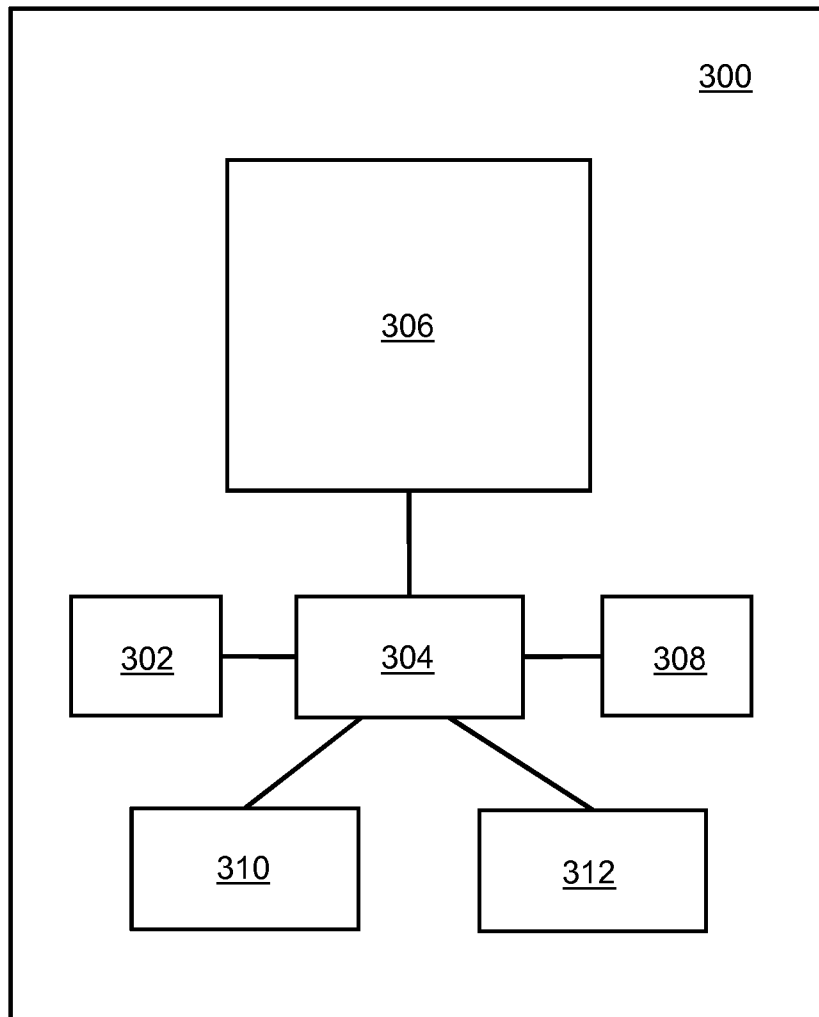


FIG. 3

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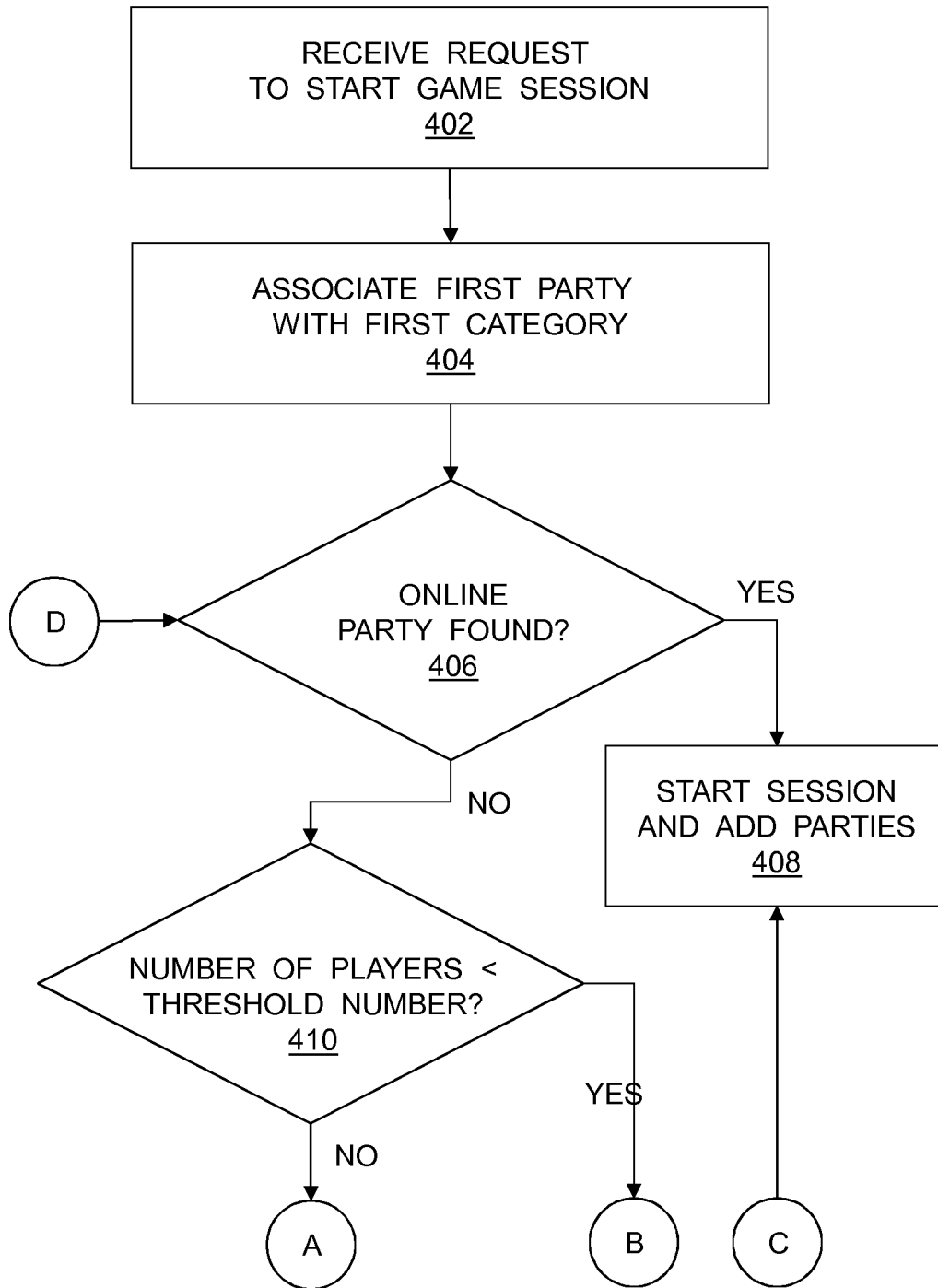


FIG. 4A

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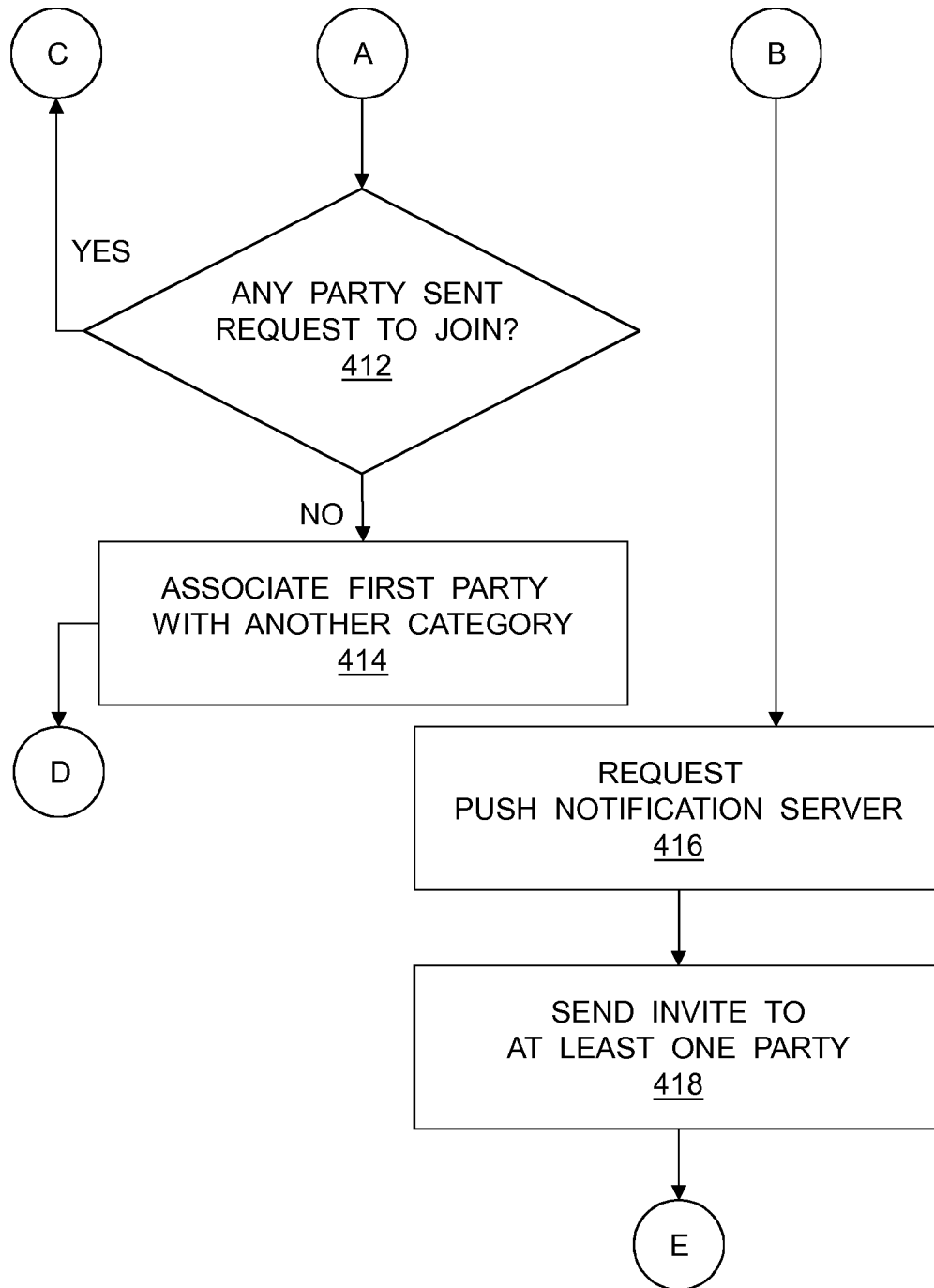


FIG. 4B

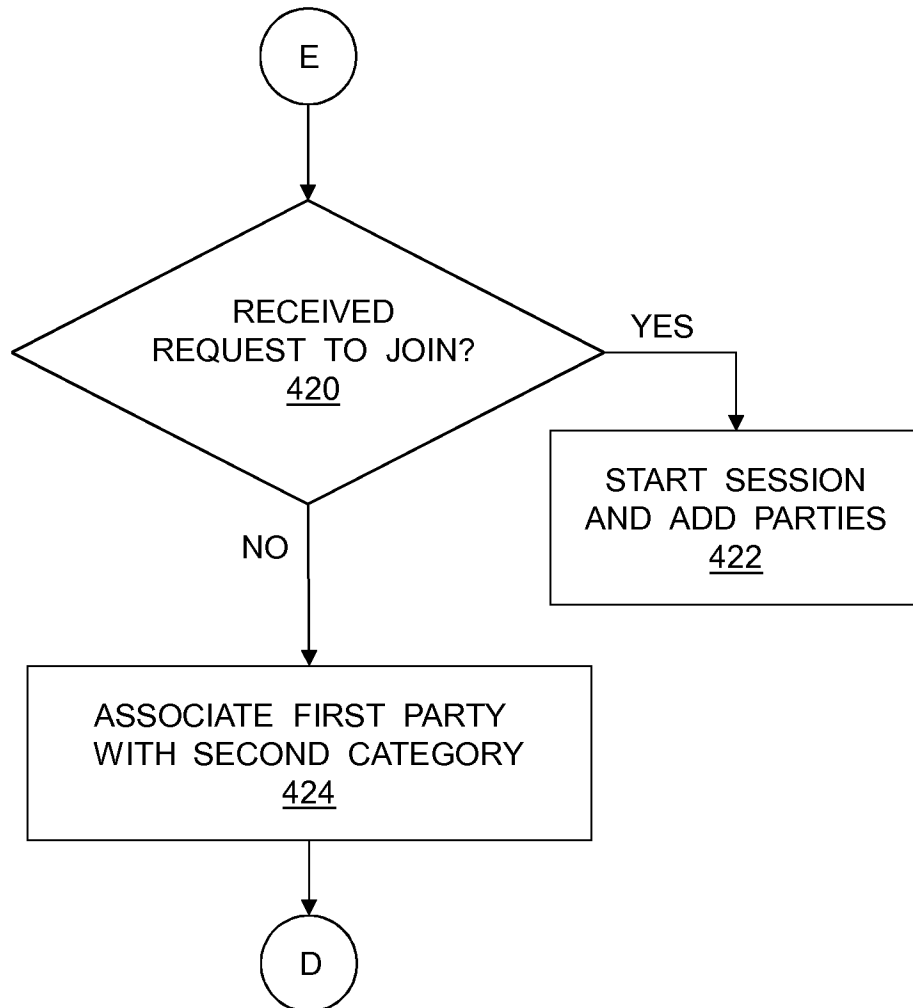


FIG. 4C

INTERNATIONAL SEARCH REPORT

International application No
PCT/FI2015/050946A. CLASSIFICATION OF SUBJECT MATTER
INV. A63F13/795 A63F13/79
ADD.

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)
A63F

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

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

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 1 570 887 A1 (MICROSOFT CORP [US]) 7 September 2005 (2005-09-07) paragraphs [0051] - [0053] figure 5	1-15
X	US 2014/274402 A1 (MICHEL THEODORE L [US] ET AL) 18 September 2014 (2014-09-18) paragraphs [0001] - [0007] figure 1	1-15



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

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Date of the actual completion of the international search

13 September 2016

Date of mailing of the international search report

20/09/2016

Name and mailing address of the ISA/

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/FI2015/050946

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