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(54) Title: VIRTUALIZED HOSTING AND DISPLAYING OF CONTENT USING A SWAPPABLE MEDIA PLAYER

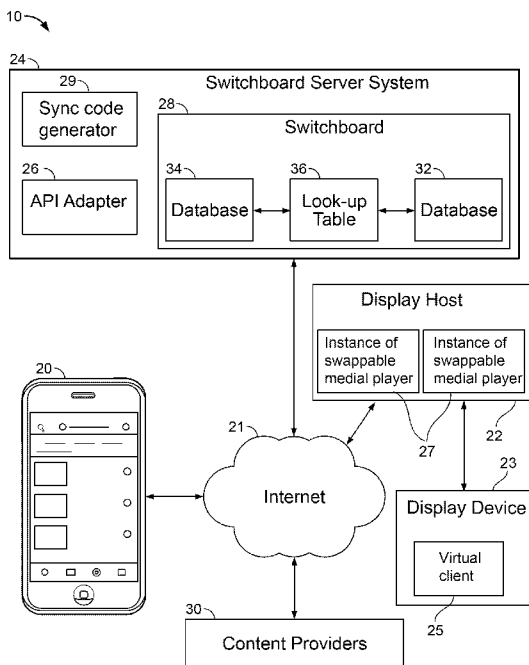


FIG. 1

(57) Abstract: A system for presenting content includes a display device storing a virtual client. A display host is operable to execute multiple instances of a browser each of which operates as a swappable media player that is operable to retrieve and load any of a plurality of different media players needed to play specified content. The display host is operable to perform operations including receiving from a switchboard server system a message indicating that a specified media player is to be used to play particular content using a first instance of a swappable media player, retrieving and loading the specified media player from a content provider using the first instance of the swappable media player, playing the particular content in a first session using the specified media player, and causing a presentation of the content to be mirrored onto the virtual client residing on the display device.

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## VIRTUALIZED HOSTING AND DISPLAYING OF CONTENT USING A SWAPPABLE MEDIA PLAYER

### BACKGROUND

[0001] Techniques are known to facilitate operating a display device remotely from a personal computing device, such as a mobile phone, in order to view a video file or other content on the display device. For example, U.S. Patent Application No. 13/157,821 describes a system in which a server system acts as a single interface that can be used to control any one of multiple media players (*i.e.*, computer software applications for playing video or other content) that may be needed to play different video or other files on a display device such as a television screen. As an example, the display device may receive from the server system a message, based on input from a mobile phone, that instructs the display device to access a content provider, load a specific media player, load specific content (e.g., a video) to be played on the display device, and play the content on the display device using the media player.

[0002] Recently, various types of display devices have become popular and their use has become widespread. For example, some applications can be run on a gaming console, a tablet computer, a television set, or a set-top box, where the display device serves as a platform for audio-visual media such as books, movies, music, games or web content. However, some of these display devices have somewhat limited processing power and, therefore, may not be sufficiently powerful to run a swappable media player such as described in the foregoing patent application. Thus, using the techniques described in the foregoing patent application to control the display of content on such display devices presents a challenge.

### SUMMARY

[0003] The present disclosure describes techniques to facilitate controlling the content that is displayed on various display devices, using a personal computing device such as a mobile phone. The techniques make use of a display host that acts, in part, as a swappable media player so that a wide range of video or other content can be played on the display device regardless of the particular media player that may be needed to play the video or other file.

[0004] In one aspect, for example, a machine-implemented method of presenting content on a display device includes receiving, in a display host, a communication from a display device. The display host is operable to execute multiple instances of a browser each of which operates as a swappable media player, wherein each instance of the swappable media player is operable to retrieve and load any of a plurality of different media players needed to play specified content. The method includes opening a first session using a first instance of the swappable media player, and requesting assignment of a unique identifier for the first session from a switchboard server system. A unique identifier for the first session is received from the switchboard server system. The method includes displaying the unique identifier in the first session, and causing the display of the unique identifier to be mirrored onto a virtual client residing on the display device.

[0005] The foregoing method can be used, for example, to establish a link between a particular instance of the swappable media player and a particular display device. The unique identifier displayed on the virtual client residing on the display device then can be entered into a computing device (e.g., a mobile phone) that is to be used to select and control the playing of content on the display device.

[0006] According to another aspect, the method includes receiving in the display host a message indicating that particular content is to be played in a first session using a specified media player. The specified media player can be retrieved and loaded, and the particular content can be played in the first session using the specified media player. The method can include causing a presentation of the content to be mirrored onto the virtual client residing on the display device. In some implementations, the method includes receiving in the display host a second message indicating that particular second content is to be played in the first session using a specified second media player. The specified second media player can be retrieved and loaded, and the particular second content can be played in the first session using the specified second media player. The method can include causing a presentation of the second content to be mirrored onto the virtual client residing on the display device.

[0007] Systems for presenting content are described as well. For example, in some implementations, a system for presenting content includes a display device storing a virtual client. The system includes a display host operable to execute multiple instances of a browser each of which operates as a swappable media player, wherein each instance of the swappable media player is operable to retrieve and load any of a plurality of different media players needed to play specified content. The system also includes a switchboard server system. The display host is operable to perform operations including receiving from the switchboard server system a message indicating that a specified media player is to be used to play particular content using a first instance of a swappable media player, retrieving and loading the specified media player from a content provider using the first instance of the swappable media player, playing the particular content in a first session using the specified media player, and causing a presentation of the content to be mirrored onto the virtual client residing on the display device. In some implementations, the message indicating that a specified media player is to be used to play particular content using a first instance of a swappable media player includes a unique identifier for the first session. Also, in some implementations, the display host is further operable to incorporate a watermark into the content before the content is mirrored onto the virtual client, wherein the watermark includes the unique identifier.

[0008] Various implementations include one or more of the following advantages. For example, the techniques described here can be used even if the display device has somewhat limited processing power and would not be sufficiently powerful to run the swappable media player. Furthermore, the techniques can facilitate centralized processing of the swappable media player for multiple display devices (e.g., television sets located in multiple guest rooms in a hotel).

[0009] Other aspects, features and advantages will be apparent from the following detailed description, the accompanying drawings, and the claims.

#### BRIEF DESCRIPTION OF THE DRAWINGS

[0010] FIG. 1 is a block diagram illustrating an example of a system according to the invention.

[0011] FIG. 2 illustrates a method for establishing a session for playing content on a user-selected display device using a swappable media player.

[0012] FIG. 3 illustrates an example for playing user-selected content on a user-selected display device.

[0013] FIG. 4 illustrates another example for playing user-selected content on a user-selected display device.

#### DETAILED DESCRIPTION

[0014] As shown in FIG. 1, a system 10 synchronizes a connection between a control device 20 and a display device 23 to facilitate the playing of content on the display device 23. For example, a user of the first device 20 can select content and control the content displayed on the display device 23. For purposes of illustration, in the following discussion, it is assumed that first device 20 is a personal computing device such as a mobile phone that includes a display, an internal microprocessor or other processing circuitry, a keypad, keyboard, touchscreen, mouse, trackball, or other device to receive user selections and other input, and a transceiver to establish communications to the Internet 21. More generally, however, the first device 20 can be any type of handheld or other Internet-enabled personal computing device, including personal computers, e-books, kiosks, tablets, smart phones and media players. In some cases, input from the user can be received in forms other than tactile input (e.g., acoustic or speech). Examples of the display device 23 include a gaming console, tablet computer, set-top box, television set, personal computer or laptop computer with a display screen. In some implementations, the display device 23 may have limited processing power. Although FIG. 1 shows only a single display device 23 coupled to the display host 22, there may be multiple display devices coupled to the display host 23 at the same time. Furthermore, the display devices may be of different types.

[0015] In the illustrated example, the mobile phone 20 is operable to display an application or web site that contains information and links to content providers 30 on a computer network such as the Internet 21. A display host 22, which may be implemented, for example, as a server system or other computing device (e.g., a personal home computer), is coupled to the Internet and is operable to link back to a

switchboard server system 24 from which the display host 22 receives messages regarding the playing of specified content.

[0016] The display host 22 is operable to execute multiple sessions of a browser each of which operates as a swappable media player. Each session operates as a virtual display device that includes a unique instance 27 of the swappable media player and is assigned a unique synchronization code (“sync code”), which serves as an identifier for the session. Each session is associated with a specified display device such as the display device 23. The display device 23 may be connected to the display host, for example, through a wireless connection, a wired connection (e.g., a co-axial cable), or through the Internet 21 or other network.

[0017] The various instances 27 of the swappable media player run on the display host 22 are independent of one another. Thus, each instance 27 of the swappable media player can play content (e.g., a video) during a particular session that differs from the content being played by other instances 27. Furthermore, the different instances 27 of the swappable media player running on the display host 22 may use different media players (i.e., software applications to play the content) from one another depending on the particular content being played by each instance. In addition, as discussed in greater detail below, each particular instance 27 of the swappable media player can retrieve the appropriate media player needed to play the specified content.

[0018] In the illustrated example, the display device 23 includes a thin, virtual client 25 that can display content (e.g., a video) being played by a specific instance 27 of the swappable media player on the display host 22. The virtual client 25 relies on the display host 22 to perform the data processing required for displaying the selected content. The display device 23 may be a dedicated thin client terminal or a computing device with thin client software that sends user input to the display host 22 and receives screen output in return. Although the virtual client 25 processes the user interface, it need not process data.

[0019] As explained in greater detail below, the virtual client 25 can have a unique identifier associated with it. In some cases, the unique identifier may be assigned

when the software program is downloaded to the display device 23. When the display device 23 connects to the display host 22, the unique identifier associated with the virtual client 25 on the display device 23 is paired with a unique assigned sync code, which, in turn, is associated with a particular instance 27 of the swappable media player so that the appropriate session is paired with the correct virtual client and display device (e.g., virtual client 25 on display device 23).

[0020] The following paragraphs describe how a connection can be established between the mobile phone 20 and the display device 23 so that the mobile phone can be used to control the display and playing of content on the display device 23. As indicated by FIG. 2, when the display device 23 initially connects to the display host 22, the display device 23 sends the unique identifier associated with the virtual client 25 to the display host 22 (see 100 in FIG. 2). In the event there is no such unique identifier provided by the display device 23, the display host 22 automatically can assign a unique identifier to the display device 23. The display host 22 opens a session using a particular instance 27 of the swappable media player (see 102 in FIG. 2). The session is associated uniquely with the identifier for the virtual client 25/display device 23. The display host 22, which stores (e.g., in a database) the one-to-one correspondence between the session and the display device 23, also requests a sync code from the switchboard server system 24 (see 104 in FIG. 2). The switchboard server system 24 assigns a unique sync code to be used by the display host 23 for the session (see 106 in FIG. 2), and stores the correspondence between the sync code and the display host session in a database for future reference. The switchboard server system 24 includes a sync code generator 29 to generate the sync codes and can use, for example, the display host's browser cookie as an identifier for the display host 23. The switchboard server system 24 then sends the assigned sync code to the display host 22 (see 108 in FIG. 2). Upon receiving the sync code assigned to the particular session, the display host 22 stores (e.g., in a database) the association between the sync code and the particular session, and displays an image of the sync code in the corresponding instance 27 of the swappable media player (see 110 in FIG. 2). The image displayed in the instance 27 is mirrored onto the virtual client 25 on the display device 23 using, for example, a virtual network connection (VMC) or other virtualization technology (see 112 in FIG. 2). The sync code may be displayed, for example, as text or as a QR code.

[0021] Once the sync code appears on the display device 23, the user of the mobile phone 20 can enter the sync code into the mobile phone, for example, manually (e.g., using a keyboard) or by scanning the displayed sync code into the mobile phone (see 114 in FIG. 2). The code can be scanned, for example, using optical scanning or RFID techniques. The mobile phone 20 then sends a message containing the sync code to the switchboard server system 24 (see 116 in FIG. 2), which associates the received sync code with the matching sync code already stored in its database (see 118 in FIG. 2). The switchboard server system 24 includes a look-up table 36 that, based on the sync code, stores the correspondence between the mobile phone 20 and the session of the swappable media player on the display host 22. Thus, once the sync code is entered into, or captured by, the mobile phone 20, it is sent from the mobile phone 20 to the switchboard server system 24, which stores the information in the look-up table 36 so as to establish a connection, through the switchboard server system 24, between the mobile phone 20 and the particular session of the swappable media player on the display device 23. As there is a one-to-one correspondence between the sync code, the particular session on the display host 22 and the display device 23, the mobile phone 20 effectively can be paired with, and thus connected to, the virtual client 25 operating on the display device 23 by way of the switchboard server system 24 and the unique session of the swappable media player running on the display host 22.

[0022] Next, the switchboard server system 24 sends a message to the display host 22 indicating that the swappable media player on the display host 22 and the mobile device 20 are connected (see 120 in FIG. 2). The particular instance 27 of the swappable media player can display an indication (e.g., a message or other indicator) that it is connected to the mobile device 20 (see 122 in FIG. 2). This indication is mirrored onto the display device 23 (see 124 in FIG. 2), allowing the user of the mobile phone 20 to confirm that the phone can be used to control the playing of content on the display device 23, as explained below.

[0023] The following paragraphs describe how a user of the mobile phone 20 can select content and cause the content to be displayed on the display device 23. When a user makes a selection using the mobile phone 20 for particular content to be

displayed on the display device 23, a message is sent through the Internet 21 to the switchboard server system 24. The message may, for example, identify particular content to be played and a media player needed to play the content, and also may contain the sync code. A corresponding message then is passed along to the display host 22, which acts on a transmission code contained within the signal and performs specified actions based on the transmission code. For example, in some scenarios, the message from the switchboard server system 24 instructs the particular instance 27 of the swappable media player on the display host 22 to access a content provider 30 through the Internet 21, load a specific media player, load the media player-specific content and play the content. The particular instance 27 of the swappable media player on the display host 22 plays the specified content using the session of the swappable media player associated with the display device 23. The contents of the session are mirrored automatically onto the display device 23 via the virtual client 25, thereby allowing the user of the mobile phone 20 to view the content on the display device 23. The mobile phone 20 also can be used to issue playback commands (e.g., play, pause, fast-forward, rewind, stop, etc.) to control the session.

[0024] Although in some examples the content is a video to be played on the display 23, the system 10 can be used for other types of content as well. Thus, depending on the implementation, the content may include one or more of the following: video, audio, interactive video game, streaming media, multimedia, images, slides (e.g., a PowerPoint presentation) or other types of dynamic content.

[0025] FIG. 3 illustrates further details of the flow of information and signals according to some implementations. The mobile phone 20 is operable to display an application or web site that contains information and links to content providers 30 on the Internet 21. The user operates the mobile phone 20 so as to start the application or access the web site (block 200). In some implementations, a logo appears on the mobile phone's display. By selecting the logo, the user causes a menu to expand and present various options. The options can include, for example: (i) add new content to a playlist, (ii) play a listed item on a secondary device, (iii) play a listed item on the mobile phone 20. If the user selects to add new content to the playlist, the user is presented with a screen that allows him to enter user-defined search parameters or to select predefined search parameters to request video data. The search parameters are

sent from the mobile phone 20 as part of a request for video data that satisfy the search parameters (block 202). The request is transmitted via the Internet 21 to the appropriate content provider web site. In response, the content provider 30 provides metadata (e.g., titles, links to the videos) for one or more video files that satisfy the search parameters. The metadata can be provided to the mobile phone 20, for example, in the form of an XML data file 204. Upon receiving the data file, the mobile phone 20 displays a list of one or more videos based on the information received from the content provider 30 (block 206).

[0026] If desired, the user can take one of several actions, including selecting one of the videos from the displayed list to be played or initiating a command with respect to a video that already has been loaded to the display host 22 (blocks 208). The mobile phone 20 then formats and transmits a message to the switchboard server system 24 (block 210). The message from the mobile phone 20 contains a transmission code that includes data regarding the user information (e.g., user identification or account number), the location and name of the media player for the selected video, a playback command (e.g., play, pause, rewind, fast-forward, etc.), and the video file to be acted upon. The message also includes the sync code previously acquired from the display device 23.

[0027] The message from the mobile phone 20 is transmitted over the Internet or other network 21 and is received by the switchboard server system 24 (block 212). Based on information in the message from the mobile phone 20, the switchboard server system 24 can verify that the user has an account (block 214), and the contents of the message, as well as the date and time of receipt of the message, can be added to a personal computing device database 32 (block 216) which forms part of a switchboard 28 (see FIG. 1). In general, all messages from a particular user's personal computing device 20 can be stored in the database 32 corresponding to an account for the particular user. Thus, the database 32 stores a record of all messages received from a user's personal computing device 20, as well as the user's identification, an indication of the host display 22, an identification of the media player that is required for the selected video, and an identification of the selected video. The switchboard server system 24 also can perform a target verification (block 218), which can include checking whether a connection to the display host 22 already

is established for the mobile phone 20. Signals sent from the mobile device 20 to its associated database 32 are copied to a database 34 associated with the session of the swappable media player on the display host 22 based on the sync code.

[0028] In the illustrated implementation, the playback control command in the message from the mobile phone 20 contains a JavaScript reference to control the media player needed to play the selected video. Various types of video players may use different JavaScript commands to control their respective playback. Therefore, in the illustrated implementation, a universal adapter 26 is provided to interpret and convert a standard or universal command (e.g., play, pause, etc.) into the specific command recognized by the media player. Each time a signal is received from the mobile device 20, the API adapter 26 checks and identifies the specific media player that is being requested. Based on this information, the system loads the appropriate set of protocols or application programming interfaces (APIs) from its library and converts the incoming commands from the mobile device 20 into the correct JavaScript (or other programming) code used by the target device 22 to control the specific media player (block 220). The switchboard server system 24 then copies the converted version of the message to the database 34 associated with the display host 22, as indicated above in connection with block 222.

[0029] The universal adapter 26 can be implemented, for example, as a look-up table. For example, for a universal command “New Video,” the universal adapter 26 provides the corresponding command for each of several specific media players (e.g., “yt\_loadVideo” for YouTube). Similarly, for a universal command “Pause,” the universal adapter 26 provides the corresponding command for each of several specific media players (e.g., “pauseVideo” for Ted.com). Other universal commands and the corresponding command(s) for one or more media players (i.e., software applications to play the content) also can be stored by the universal adapter 26.

[0030] The display host 22 periodically checks the entries in the database 34 to determine if there are any new messages for it (block 224). For example, in some implementations, the display host 22 polls the associated database 34 at some predetermined time interval (e.g., every half second). In some implementations, instead of the display host 22 periodically checking whether there are any messages

for it in the database 34, the server system 24 can push the messages to the display host 22. In any event, the system is arranged so that the display host 22 receives the messages intended for it.

[0031] When the display host 22 receives a message from the switchboard server system 24 (block 226), the display host executes the message (block 228). In some cases, the media player required to play the video indicated in the message is not presently loaded in the display host 22. For example, the received command may be to “play” a particular video. If the media player needed to play the video is not already loaded in the display host 22, the display host 22 requests and obtains a copy of the appropriate media player 40 as well as a copy of the video file 42 from a content provider 30, loads the media player and then plays the video in the particular session of the swappable media player indicated by the sync code (block 230). Likewise, if the appropriate media player already is loaded in the display device, but the particular video is not, then the display host 22 requests and obtains a copy of the video file 42 from the content provider 30 and proceeds to play the video in the particular session based on the sync code.

[0032] As the session of the swappable media player on the display host 22 plays the video, each frame is captured and transmitted to the display device 23 using for example, appropriate virtualization technology (e.g., a virtual network connection). Thus, the video playing in the particular session associated with the display device 23 is mirrored onto the virtual client 25 running on the display device 23 in substantially real time, thereby allowing the user to view the video on the display device 23.

[0033] Once the video is playing on the display device 22, the user of the mobile phone 20 can control the playing of the video by entering appropriate commands (e.g., pause, fast forward, rewind, stop, play, etc.) through the mobile phone. Each command is incorporated into a message that is transmitted to the switchboard server system 24, which copies the message into database entries associated with the particular display host 22 (i.e., after performing any conversion of the command by the API adapter 26). Once the message is retrieved by or sent to the display host 22, the display host proceeds to execute the command.

[0034] The user of the mobile phone 20 may subsequently select other content to be played on the display device 23. If a different media player is needed to play this other content, the particular instance 27 of the swappable media player that is associated with the sync code retrieves the appropriate media player from a content provider 30. Thus, the same session of the swappable media player on the display host 22 can be used to play the other content regardless of whether the same or a different media player is needed.

[0035] In some implementations it may be desirable to provide a form of digital rights security with respect to the content that is being provided to the display device 23. For example, as shown in FIG. 4, before providing the requested content to the display device 23, a watermarking module 50 in the display host 22 can provide a watermark that incorporates, for example, a time stamp, the sync code, and the unique identifier associated with the virtual client 25 and the display device 23. The watermark can be inserted, for example, into the content (e.g., the video) using known techniques in a manner that is detectable by software, but that is not discernable by the human eye. In some cases, the video signal that is transmitted to the virtual client 25 can be encrypted by the display host 22 and then decrypted on the client side.

[0036] As mentioned above, the system and methods described above also can be used with various types of content other than video. In that case, different types of user-initiated commands may be available to control playing or display of the content. For example, for interactive video games, the user-initiated commands may include control commands appropriate for the particular game.

[0037] Although in many scenarios there will be a one-to-one correspondence between a computing device 20 that controls the content on a display device 23, the techniques described here also can be incorporated into co-viewing situations, for example, where multiple computing devices (e.g., mobile phones) interact with a single display device 23, a single computing device 20 controls communications with multiple displays 23, or multiple computing devices 20 control communications with multiple displays 23.

[0038] For example, a single computing device 20 may be used to control multiple display devices 23 so that the same content is displayed on each of the display devices at the same time (e.g., multiple television sets in a bar). In that case, a different sync code may be associated with each of the display devices 23, with each display device 23 associated with a different session of the swappable media player on the display host 22. Each message from the computing device 20 may include a series of sync codes so that all of the display devices are controlled using the same message from the computing device 20. In other implementations, each message from the computing device 20 may include a group identifier, which is associated at the switchboard server system 24 with multiple sync codes, each of which corresponds to a different session of the swappable media player on the display host 22.

[0039] The techniques described in this document can be applied in a wide range of contexts. For example, a hotel can have a central server that operates as the display host 22 and each television in the guest rooms can serve as a virtual client 25. The techniques also can be applied beyond a single location. For example, a cable operator can host the display host 22 and a set-top box in each subscriber's home can serve as a virtual client 25. In addition, a personal home computer can serve as the host display 22, with one or more display devices 23 connected to it.

[0040] Implementations of the subject matter and the operations described in this specification can include digital electronic circuitry, or in computer software, firmware, or hardware, including the structures disclosed in this specification and their structural equivalents, or in combinations of one or more of them. Implementations of the subject matter described in this specification can include one or more computer programs, i.e., one or more modules of computer program instructions, encoded on computer storage medium for execution by, or to control the operation of, data processing apparatus. Alternatively or in addition, the program instructions can be encoded on an artificially-generated propagated signal, e.g., a machine-generated electrical, optical, or electromagnetic signal that is generated to encode information for transmission to suitable receiver apparatus for execution by a data processing apparatus. A computer storage medium can be, or can be included in, a computer-readable storage device, a computer-readable storage substrate, a random or serial access memory array or device, or a combination of one or more of them.

Moreover, while a computer storage medium is not a propagated signal, a computer storage medium can be a source or destination of computer program instructions encoded in an artificially-generated propagated signal. The computer storage medium can also be, or be included in, one or more separate physical components or media (e.g., multiple CDs, disks, or other storage devices).

[0041] The operations described in this specification can include operations performed by a data processing apparatus on data stored on one or more computer-readable storage devices or received from other sources. The term “data processing apparatus” encompasses all kinds of apparatus, devices, and machines for processing data, including by way of example a programmable processor, a computer, a system on a chip, or multiple ones, or combinations, of the foregoing. The apparatus and execution environment can realize various different computing model infrastructures, such as web services, distributed computing and grid computing infrastructures.

[0042] A computer program (also known as a program, software, software application, script, or code) can be written in any form of programming language, including compiled or interpreted languages, declarative or procedural languages, and it can be deployed in any form, including as a stand-alone program or as a module, component, subroutine, object, or other unit suitable for use in a computing environment. A computer program may, but need not, correspond to a file in a file system. A program can be stored in a portion of a file that holds other programs or data (e.g., one or more scripts stored in a markup language document), in a single file dedicated to the program in question, or in multiple coordinated files (e.g., files that store one or more modules, sub-programs, or portions of code). A computer program can be deployed to be executed on one computer or on multiple computers that are located at one site or distributed across multiple sites and interconnected by a communication network.

[0043] Processors suitable for the execution of a computer program include, by way of example, both general and special purpose microprocessors, and any one or more processors of any kind of digital computer. Generally, a processor will receive instructions and data from a read-only memory or a random access memory or both.

Elements of a computer include a processor for performing actions in accordance with instructions and one or more memory devices for storing instructions and data.

[0044] Generally, a computer will also include, or be operatively coupled to receive data from or transfer data to, or both, one or more mass storage devices for storing data, e.g., magnetic, magneto-optical disks, or optical disks. However, a computer need not have such devices. Moreover, a computer can be embedded in another device, e.g., a mobile telephone, a personal digital assistant (PDA), a mobile, audio or video player, a game console, a Global Positioning System (GPS) receiver, or a portable storage device (e.g., a universal serial bus (USB) flash drive), to name just a few. Devices suitable for storing computer program instructions and data include all forms of non-volatile memory, media and memory devices, including by way of example semiconductor memory devices, e.g., EPROM, EEPROM, and flash memory devices; magnetic disks, e.g., internal hard disks or removable disks; magneto-optical disks; and CD-ROM and DVD-ROM disks. The processor and the memory can be supplemented by, or incorporated in, special purpose logic circuitry.

[0045] Although this specification contains many specific implementation details, these should not be construed as limitations on the scope of any inventions or of what may be claimed, but rather as descriptions of features specific to particular implementations of particular inventions. Certain features that are described in this specification in the context of separate implementations can also be implemented in combination in a single implementation. Conversely, various features that are described in the context of a single implementation can also be implemented in multiple implementations separately or in any suitable subcombination. Moreover, although features may be described above as acting in certain combinations and even initially claimed as such, one or more features from a claimed combination can in some cases be excised from the combination, and the claimed combination may be directed to a subcombination or variation of a subcombination.

[0046] Similarly, while operations are depicted in the drawings in a particular order, this should not be understood as requiring that such operations be performed in the particular order shown or in sequential order, or that all illustrated operations be performed, to achieve desirable results. In certain circumstances, multitasking and

parallel processing may be advantageous. Moreover, the separation of various system components in the implementations described herein and the attachments hereto should not be understood as requiring such separation in all implementations, and it should be understood that the described program components and systems can generally be integrated together in a single software product or packaged into multiple software products.

[0047] Thus, although particular implementations have been described, other implementations are within the scope of the claims.

What is claimed is:

1. A machine-implemented method of presenting content on a display device, the method comprising:
  - receiving, in a display host, a communication from a display device, wherein the display host is operable to execute multiple instances of a browser each of which operates as a swappable media player, wherein each instance of the swappable media player is operable to retrieve and load any of a plurality of different media players needed to play specified content;
  - opening a first session using a first instance of the swappable media player;
  - requesting assignment of a unique identifier for the first session from a switchboard server system;
  - receiving a unique identifier for the first session from the switchboard server system;
  - displaying the unique identifier in the first session; and
  - causing the display of the unique identifier to be mirrored onto a virtual client residing on the display device.
2. The method of claim 1 wherein the unique identifier comprises a QR code.
3. The method of claim 1 further including:
  - receiving in the display host a message indicating that particular content is to be played in the first session using a specified media player;
  - retrieving and loading the specified media player;
  - playing the particular content in the first session using the specified media player; and
  - causing a presentation of the content to be mirrored onto the virtual client residing on the display device.
4. The method of claim 3 further including:
  - receiving in the display host a second message indicating that particular second content is to be played in the first session using a specified second media player;
  - retrieving and loading the second media player;

playing the particular second content in the first session using the specified second media player; and

causing a presentation of the second content to be mirrored onto the virtual client residing on the display device.

5. The method of claim 1 wherein the content comprises video.
6. The method of claim 1 wherein the content comprises streaming media.
7. The method of claim 1 wherein the content comprises visual content.
8. The method of claim 1 further including contacting the switchboard server system to check whether there is a message for the first session, wherein the first session is identified to the switchboard session using the previously assigned unique identifier.
9. The method of claim 1 further including:
  - receiving, in the display host, a communication from a second display device;
  - opening a second session using a second instance of the swappable media player;
  - requesting from the switchboard server system assignment of a second unique identifier for the second session;
  - receiving a second unique identifier for the second session from the switchboard server system;
  - displaying the second unique identifier in the second session; and
  - causing the second unique identifier to be mirrored onto a virtual client residing on the second display device.
10. The method of claim 9 further including:
  - receiving in the display host a second message indicating that particular second content is to be played in the second session using a specified second media player;
  - retrieving and loading the second media player;
  - playing the particular second content in the second session using the specified second media player; and

causing a presentation of the second content to be mirrored onto the virtual client residing on the second display device.

11. The method of claim 10 wherein the first and second sessions at least partially overlap in time with one another.

12. The method of claim 3 wherein the display host retrieves the specified media player from a content provider via the Internet.

13. A system for presenting content comprising:

a display device storing a virtual client;

a display host operable to execute multiple instances of a browser each of which operates as a swappable media player, wherein each instance of the swappable media player is operable to retrieve and load any of a plurality of different media players needed to play specified content; and

a switchboard server system,

wherein the display host is operable to perform operations including:

receiving a communication from the display device;

opening a first session using a first instance of the swappable media player;

requesting assignment of a unique identifier for the first session from the switchboard server system;

receiving a unique identifier for the first session from the switchboard server system;

displaying the unique identifier in the first session; and

causing the image of the unique identifier to be mirrored onto the virtual client residing on the display device.

14. The system of claim 13 wherein the display host is further operable to perform operations including:

receiving a message from the switchboard server system indicating that particular content is to be played in the first session using a specified media player;

retrieving the second media player from a content provider and loading the second media player;

playing the particular content in the first session using the specified media player; and

causing a presentation of the content to be mirrored onto the virtual client residing on the display device.

15. The system of claim 14 wherein the display host is further operable to perform operations including:

receiving a second message from the switchboard server system indicating that particular second content is to be played in the first session using a specified second media player;

retrieving the second media player from a content provider and loading the second media player;

playing the particular second content in the first session using the specified second media player; and

causing a presentation of the second content to be mirrored onto the virtual client residing on the display device.

16. The system of claim 14 wherein the system includes a second display device storing a virtual client, wherein the display host is further operable to perform operations including:

receiving a communication from the second display device;

opening a second session using a second instance of the swappable media player;

requesting from the switchboard server system assignment of a second unique identifier for the second session;

receiving a second unique identifier for the second session from the switchboard server system;

displaying the second unique identifier in the second session;

causing the image of the second unique identifier to be mirrored onto the virtual client residing on the second display device.

receiving a second message from the switchboard server system indicating that particular second content is to be played in the second session using a specified second media player;

retrieving the second media player from a content provider and loading the second media player;  
playing the particular second content in the second session using the specified second media player; and  
causing a presentation of the second content to be mirrored onto the virtual client residing on the second display device.

17. A machine-implemented method of presenting content on a display device, the method comprising:

receiving in a display host a message indicating that a specified media player is to be used to play particular content using a first instance of a swappable media player, wherein the display host is operable to execute multiple instances of the swappable media player, wherein each instance of the swappable media player is operable to retrieve and load any of a plurality of different media players needed to play specified content;

retrieving and loading the specified media player using the first instance of the swappable media player;

playing the particular content in a first session using the specified media player; and

causing a presentation of the content to be mirrored onto a virtual client residing on a display device associated with the first session.

18. The method of claim 17 including:

receiving in the display host a second message indicating that a specified second media player is to be used to play particular second content using the first instance of a swappable media player;

retrieving and loading the second media player using the first instance of the swappable media player;

playing the particular second content in the first session using the specified second media player; and

causing a presentation of the second content to be mirrored onto the virtual client residing on the display device.

19. The method of claim 17 wherein the message indicating that a specified media player is to be used to play particular content using a first instance of a swappable media player includes a unique identifier for the first session.

20. The method of claim 19 wherein causing a presentation of the content to be mirrored onto the virtual client includes incorporating a watermark into the content before it is mirrored onto the virtual client, wherein the watermark includes the unique identifier.

21. The method of claim 20 wherein the watermark also includes another identifier that is uniquely associated with the virtual client.

22. A system for presenting content comprising:

a display device storing a virtual client;

a display host operable to execute multiple instances of a browser each of which operates as a swappable media player, wherein each instance of the swappable media player is operable to retrieve and load any of a plurality of different media players needed to play specified content; and

a switchboard server system,

wherein the display host is operable to perform operations including:

receiving from the switchboard server system a message indicating that a specified media player is to be used to play particular content using a first instance of a swappable media player;

retrieving and loading the specified media player from a content provider using the first instance of the swappable media player;

playing the particular content in a first session using the specified media player; and

causing a presentation of the content to be mirrored onto the virtual client residing on the display device.

23. The system of claim 22 wherein the message indicating that a specified media player is to be used to play particular content using a first instance of a swappable media player includes a unique identifier for the first session.

24. The system of claim 23 the display host is further operable to incorporate a watermark into the content before the content is mirrored onto the virtual client, wherein the watermark includes the unique identifier.

25. The system of claim 24 wherein the watermark also includes another identifier that is uniquely associated with the virtual client.

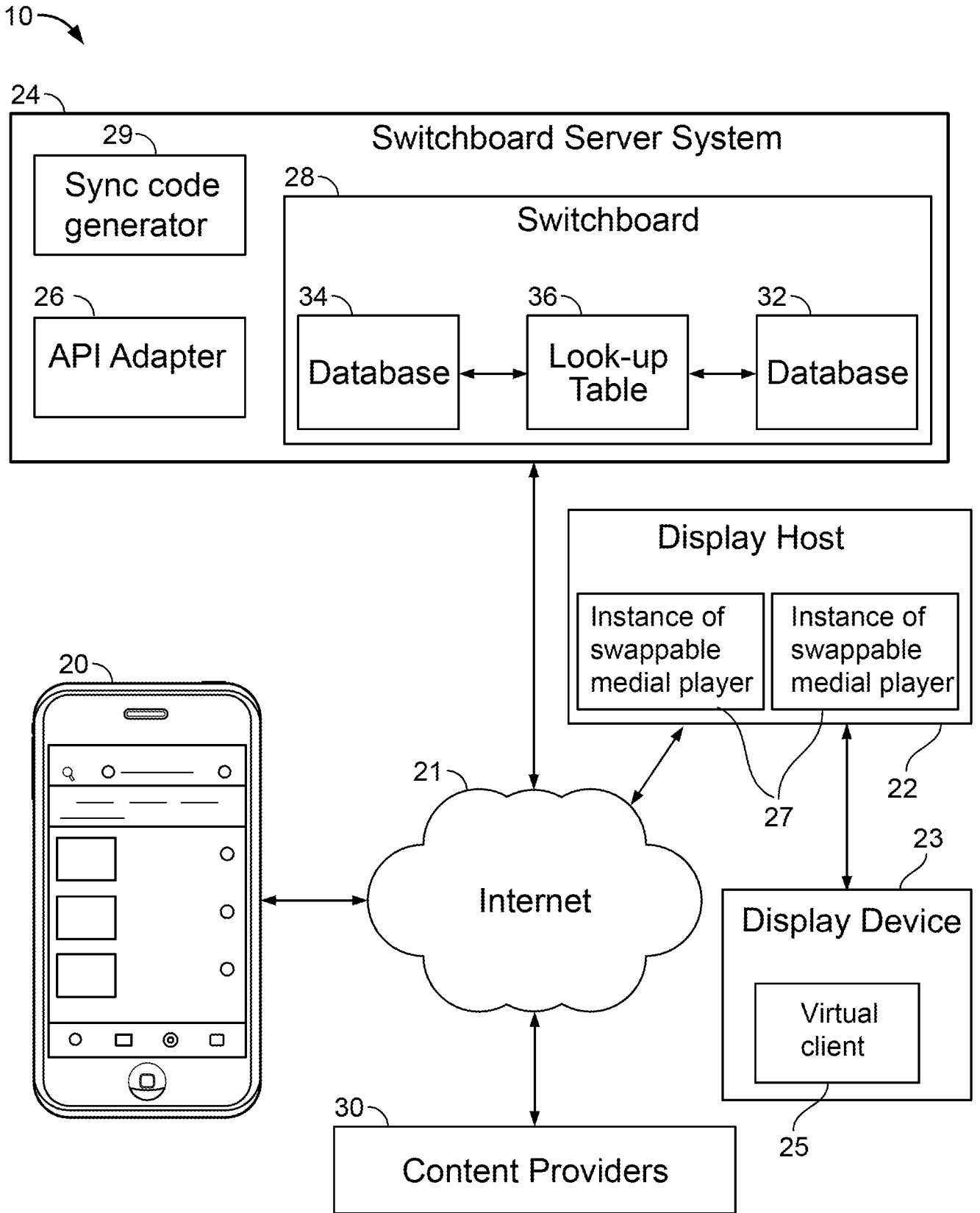


FIG. 1

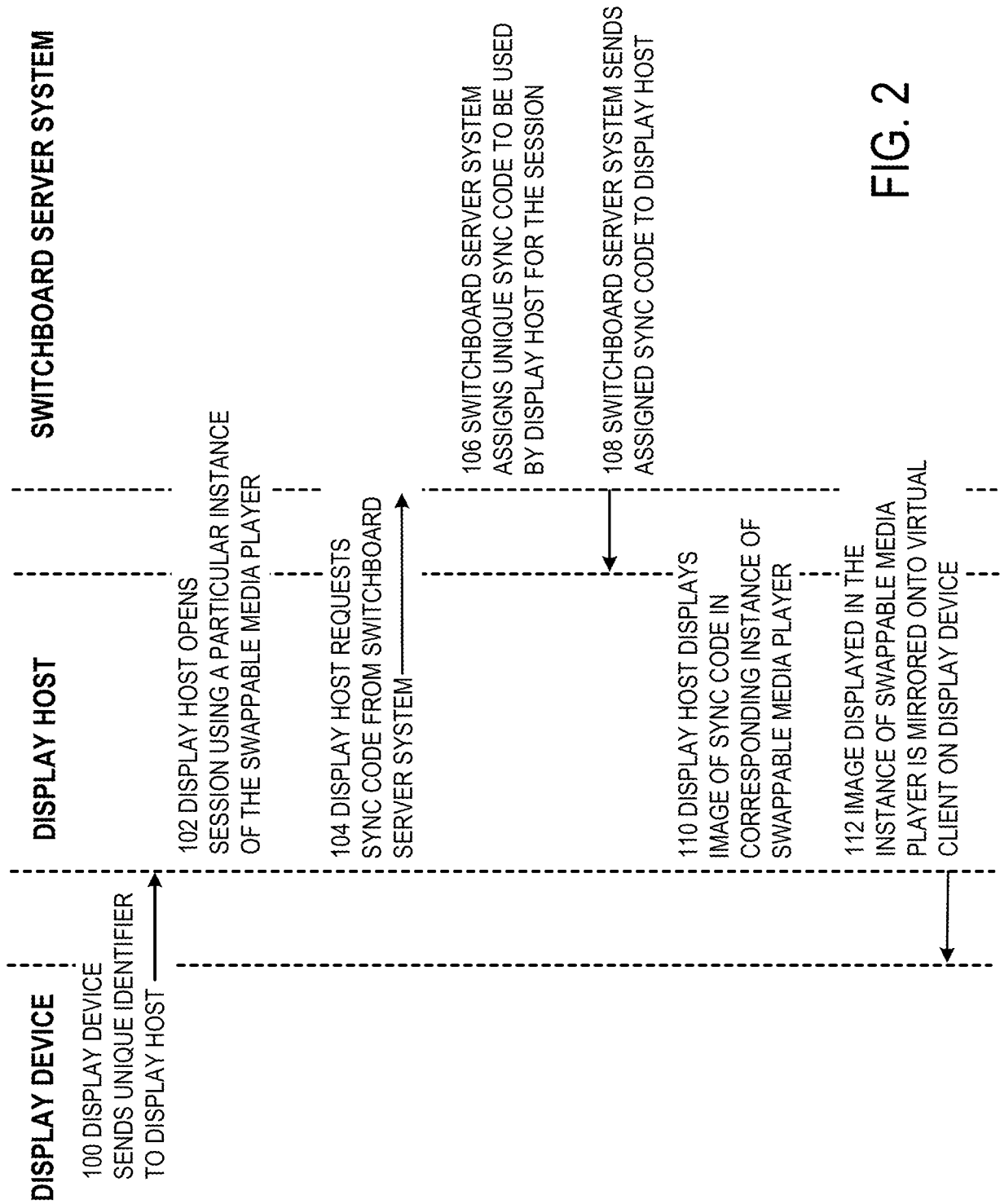


FIG. 2

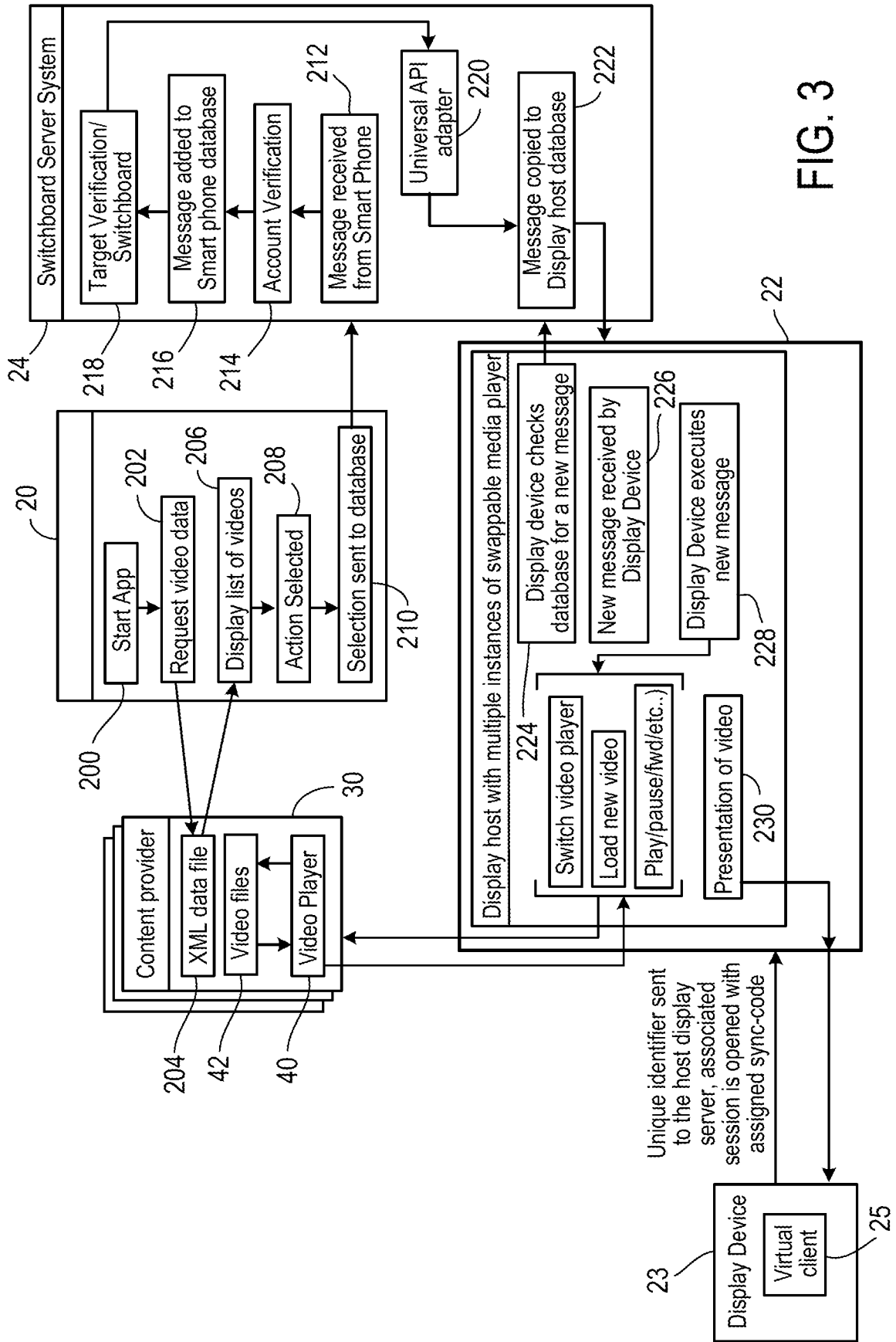


FIG. 3

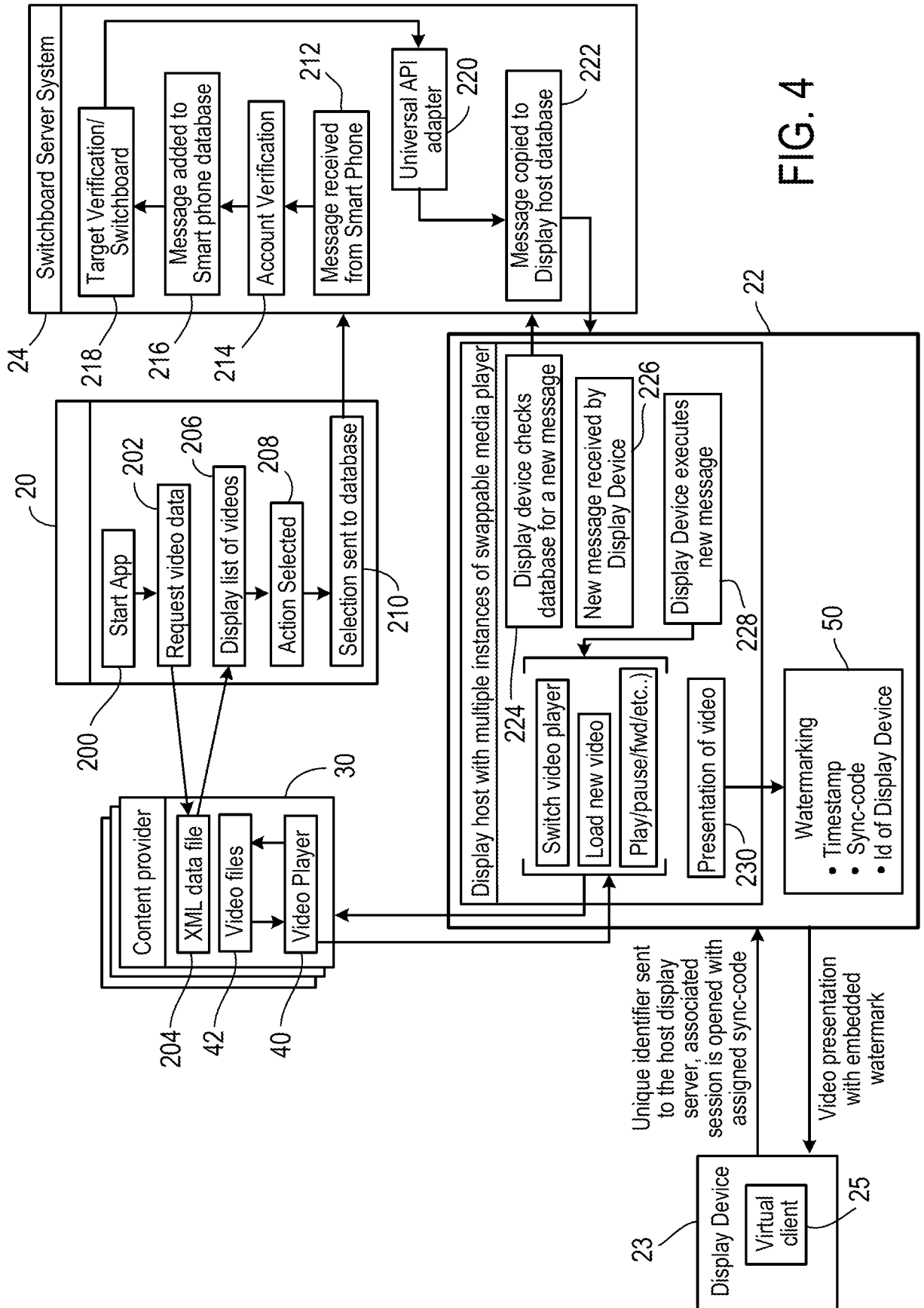


FIG. 4

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2013/047486

## A. CLASSIFICATION OF SUBJECT MATTER

G06F 13/12 (2006.01) G06F 3/14 (2006.01)

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

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

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)

WPI, EPODOC: Keywords (VIDEO MEDIA RETRIEVE DOWNLOAD STREAM MIRROR DUPLICATE SIMULTANEOUS MULTI WINDOW SCREEN PARALLEL RELOCATE RESUME CONTINUE MIGRATE MOVE SECOND OTHER DISPLAY MONITOR CLIENT VIRTUAL THIN BROWSER PLAYER SESSION IDENTIFIER ID) & like terms ; Patent full text (English) keywords (VIDEO MEDIA RETRIEVE DOWNLOAD STREAM MIRROR DUPLICATE SIMULTANEOUS MULTI WINDOW SCREEN PARALLEL RELOCATE RESUME CONTINUE MIGRATE MOVE SECOND OTHER DISPLAY MONITOR CLIENT VIRTUAL THIN BROWSER PLAYER SESSION IDENTIFIER ID) & like terms ; Google scholar keywords (qr display multimedia server display pause resize QR Screen client virtual thin Video media Relocate resume continue second other) ; Patent lens keywords (Screen client display client virtual client thin Video media)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
	Documents are listed in the continuation of Box C	



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	"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
"E" earlier application or patent but published on or after the international filing date	"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
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"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
"O" document referring to an oral disclosure, use, exhibition or other means	"&"	document member of the same patent family
"P" document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search 9 August 2013	Date of mailing of the international search report 09 August 2013
<b>Name and mailing address of the ISA/AU</b>  AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA Email address: pct@ipaustalia.gov.au Facsimile No.: +61 2 6283 7999	<b>Authorised officer</b>  Peter Garay AUSTRALIAN PATENT OFFICE (ISO 9001 Quality Certified Service) Telephone No. +61262832451

**INTERNATIONAL SEARCH REPORT**

International application No.

C (Continuation).

DOCUMENTS CONSIDERED TO BE RELEVANT

**PCT/US2013/047486**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2009/0172780 A1 (SUKEDA et al.) 02 July 2009 The whole document, especially abstract, figures 1, 4, 5, 9, 11, 18, paragraphs 0009, 0048, 0050, 0054, 0077, 0078	1-25
A	US 2012/0059875 A1 (CLARK) 08 March 2012 The whole document, especially abstract, figures 1-6, paragraphs 0009-0017, 0038-0102	1-25
A	EP 2175607 A1 (NEC CORPORATION) 14 April 2010 The whole document, especially abstract, figures 1, 3, 4, paragraphs 0040-0108	1-25
A	US 2011/0131607 A1 (THOMAS et al.) 02 June 2011 The whole document, especially abstract, figures 1, 8, paragraphs 0006-0010, 0047-0055, 0058-0062, 0070	1-25
A	US 2009/0108057 A1 (MU et al.) 30 April 2009 The whole document, especially abstract, figures 1, 3, 5	1-25

**INTERNATIONAL SEARCH REPORT**

Information on patent family members

International application No.

**PCT/US2013/047486**

This Annex lists known patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

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Due to data integration issues this family listing may not include 10 digit Australian applications filed since May 2001.

Form PCT/ISA/210 (Family Annex)(July 2009)

**INTERNATIONAL SEARCH REPORT**

Information on patent family members

International application No.

**PCT/US2013/047486**

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Due to data integration issues this family listing may not include 10 digit Australian applications filed since May 2001.

Form PCT/ISA/210 (Family Annex)(July 2009)

**INTERNATIONAL SEARCH REPORT**

Information on patent family members

International application No.

**PCT/US2013/047486**

This Annex lists known patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

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**End of Annex**