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(54) **Title:** DESKTOP APPLICATION FOR ACCESS AND INTERACTION WITH WORKSPACES IN A CLOUD-BASED CONTENT MANAGEMENT SYSTEM AND SYNCHRONIZATION MECHANISMS THEREOF

(57) **Abstract:** Systems and methods for synchronizing workspaces in a web-based collaboration environment with local folders on computers of collaborators of the workspaces are disclosed. Collaborators of a workspace can edit copies of work items either at the collaboration environment server or at the computer. Updates to all synchronized folders are automatically performed. Conflicts between edits made by different collaborators to the same file are flagged, and a notification is sent to the author attempting to make edits to a version of a file that has already been updated by another collaborator.

DESKTOP APPLICATION FOR ACCESS AND INTERACTION WITH
WORKSPACES IN A CLOUD-BASED CONTENT MANAGEMENT SYSTEM
AND SYNCHRONIZATION MECHANISMS THEREOF

CROSS-REFERENCES TO RELATED APPLICATIONS

[0001] This application claims the benefit of U.S. Provisional Application No. 61/505,999, filed July 8, 2011, entitled "DESKTOP APPLICATION FOR ACCESS AND INTERACTION WITH WORKSPACES IN A CLOUD-BASED CONTENT MANAGEMENT SYSTEM AND SYNCHRONIZATION MECHANISMS THEREOF," and is related to co-pending U.S. Application No. 13/152,982, entitled, "REAL TIME NOTIFICATION OF ACTIVITIES THAT OCCUR IN A WEB-BASED COLLABORATION ENVIRONMENT", filed June 3, 2011, both of which applications are incorporated by reference herein in their entireties.

BACKGROUND

[0002] File synchronization is a process that maintains identical electronic copies of files at different locations. For example, if a file is changed, created, or deleted from a folder stored on a first computer, and that file is synchronized to a folder stored on a second computer, the copy of that file stored on the second computer is updated to reflect any changes made to the file at the first computer.

[0003] A typical use of file synchronization is for a user to synchronize his files at multiple locations, for example at a work computer and a home computer, to enable local access by the user to those files at either of these locations.

BRIEF DESCRIPTION OF THE DRAWINGS

[0004] Examples of a web-based collaboration platform that can synchronize a workspace or folder stored at a server with folders on the computer of one or more

collaborators of the workspace or folder are illustrated in the figures. The examples and figures are illustrative rather than limiting.

[0005] FIG. 1 illustrates an example diagram of a system where a sync server supports synchronization between folders in an online collaboration environment and folders on a local computer.

[0006] FIG. 2 depicts an example diagram of a web-based or online collaboration platform deployed in an enterprise or other organizational setting for organizing work items and workspaces.

[0007] FIG. 3A depicts a block diagram illustrating an example of components in the host server of a web-based collaboration environment.

[0008] FIG. 3B depicts a block diagram illustrating an example of components in a notification server for providing real time or near real time notifications of activities that occur in a web-based or online collaboration environment.

[0009] FIG. 4A depicts a block diagram illustrating an example of components in a sync client on a local computer that synchronizes work items stored locally with work items stored on a web-based collaboration environment.

[0010] FIG. 4B depicts a block diagram illustrating an example of components in a sync server of a web-based collaboration environment.

[0011] FIG. 5 depicts a screenshot of an example user interface for the web-based collaborative platform showing a user's folders stored by the platform that are synchronized with the user's computer.

[0012] FIG. 6 depicts a screenshot of the contents of the local sync folder on a collaborator's computer.

[0013] FIG. 7 depicts a flow diagram illustrating an example process of determining when to synchronize work items.

[0014] FIG. 8 depicts a flow diagram illustrating an example process of determining how to resolve a conflict.

[0015] FIG. 9 depicts a flow diagram illustrating an example process of resolving a hard conflict.

[0016] FIG. 10 depicts a flow diagram illustrating an example process of resolving a soft conflict.

[0017] FIG. 11 depicts a flow diagram illustrating an example process of starting up the sync client operating on a local computer.

[0018] FIG. 12 shows a diagrammatic representation of a machine in the example form of a computer system within which a set of instructions, for causing the machine to perform any one or more of the methodologies discussed herein, may be executed.

DETAILED DESCRIPTION

[0019] A system is described for synchronizing workspaces on a server for a web-based collaboration environment with local folders on computers of collaborators of the workspaces. An authorized collaborator of a workspace is permitted to enable the synchronization process between a server sync folder within the collaboration environment workspace and a local sync folder on the collaborator's local computer. Consequently, synchronization can occur among multiple locations with multiple users. A sync client on the local computer identifies a conflict when changes are made to copies of the same file locally or on the server sync folder. The sync client maintains a rules engine to determine the actions to take based upon the particular circumstances of conflicting changes.

[0020] Various aspects and examples of the invention will now be described. The following description provides specific details for a thorough understanding and enabling description of these examples. One skilled in the art will understand, however, that the invention may be practiced without many of these details. Additionally, some well-known structures or functions may not be shown or described in detail, so as to avoid unnecessarily obscuring the relevant description.

[0021] The terminology used in the description presented below is intended to be interpreted in its broadest reasonable manner, even though it is being used in

conjunction with a detailed description of certain specific examples of the technology. Certain terms may even be emphasized below; however, any terminology intended to be interpreted in any restricted manner will be overtly and specifically defined as such in this Detailed Description section.

[0022] FIG. 1 illustrates an example diagram of a system where a host server 100 and notification server 150 provide notifications of activities that occur in the online collaboration environment in real time or near real time to users 108. Further, sync server 120 supports synchronization of folders stored locally on a user's computer with folders stored by the host server 100 in repository 130.

[0023] The client devices 102 can be any system and/or device, and/or any combination of devices/systems that is able to establish a connection, including wired, wireless, cellular connections with another device, a server and/or other systems such as host server 100 and/or notification server 150 and/or sync server 120. Client devices 102 can include a sync client 300 to synchronize a local copy of a folder with a copy of a folder stored on the web-based collaboration environment server. Functions and techniques performed by the sync client 300 and the related components therein are described in detail with further reference to the example of FIG. 4A.

[0024] Client devices 102 will typically include a display and/or other output functionalities to present information and data exchanged between or among the devices 102 and/or the host server 100 and/or notification server 150 and/or the sync server 120.

[0025] For example, the client devices 102 can include mobile, hand held or portable devices or non-portable devices and can be any of, but not limited to, a server desktop, a desktop computer, a computer cluster, or portable devices including, a notebook, a laptop computer, a handheld computer, a palmtop computer, a mobile phone, a cell phone, a smart phone, a PDA, a Blackberry device, a Treo, a handheld tablet (e.g. an iPad, a Galaxy, Xoom Tablet, etc.), a tablet PC, a thin-client, a hand held console, a hand held gaming device or console, an iPhone, and/or any other portable, mobile, hand held devices, etc. In one embodiment, the client devices 102, host server

100, notification server 150, and sync server 120 are coupled via a network 106. In some embodiments, the devices 102 and host server 100 may be directly connected to one another.

[0026] The input mechanism on client devices 102 can include touch screen keypad (including single touch, multi-touch, gesture sensing in 2D or 3D, etc.), a physical keypad, a mouse, a pointer, a track pad, motion detector (e.g., including 1-axis, 2-axis, 3-axis accelerometer, etc.), a light sensor, capacitance sensor, resistance sensor, temperature sensor, proximity sensor, a piezoelectric device, device orientation detector (e.g., electronic compass, tilt sensor, rotation sensor, gyroscope, accelerometer), or a combination of the above.

[0027] Signals received or detected indicating user activity at client devices 102 through one or more of the above input mechanism, or others, can be used in the disclosed technology by various users or collaborators (e.g., collaborators 108) for accessing, through network 106, a web-based collaboration environment or online collaboration platform (e.g., hosted by the host server 100).

[0028] The collaboration platform or environment hosts workspaces with work items that one or more users can access (e.g., view, edit, update, revise, comment, add to discussions, download, preview, tag, or otherwise manipulate, etc.). A work item can generally include any type of digital or electronic content that can be viewed or accessed via an electronic device (e.g., device 102). The digital content can include .PDF files, .doc, slides (e.g., PowerPoint slides), images, audio files, multimedia content, web pages, blogs, etc. A workspace can generally refer to any grouping of a set of digital content in the collaboration platform. The grouping can be created, identified, or specified by a user or through other means. This user may be a creator user or administrative user, for example. The workspace can also include an online discussion area for collaborators to enter comments linked to a particular workspace or folder.

[0029] In general, a workspace can be associated with a set of users or collaborators (e.g., collaborators 108) which have access to the content included

therein. The levels of access (e.g., based on permissions or rules) of each user or collaborator to access the content in a given workspace may be the same or may vary among the users. Each user may have their own set of access rights to every piece of content in the workspace, or each user may have different access rights to different pieces of content. Access rights may be specified by a user associated with a work space and/or a user who created/uploaded a particular piece of content to the workspace, or any other designated user or collaborator.

[0030] In general, the collaboration platform allows multiple users or collaborators to access or collaborate on efforts on work items such that each user can see, remotely, edits, revisions, comments, or annotations being made to specific work items through their own user devices. For example, a user can upload a document to a work space for other users to access (e.g., for viewing, editing, commenting, discussing, signing-off, or otherwise manipulating). The user can login to the online platform and upload the document (or any other type of work item) to an existing work space or to a new work space. The document can be shared with existing users or collaborators in a work space.

[0031] A diagrammatic illustration of the online collaboration environment and the relationships between workspaces and users/collaborators are illustrated with further reference to the example of FIG. 2.

[0032] In one embodiment, actions performed on work items or other activities that occur in a work space can be detected in real time or in near real time. In addition, users, collaborators, or select users can be notified in real time or near real-time of these actions or activities. Various mechanisms can be used to notify users or collaborators, including through the web interface to access the collaboration platform, via email, and/or SMS, for example.

[0033] In one embodiment, work items in a workspace or folder within the collaboration environment can be synchronized to workspaces or folders on a collaborator's computer.

[0034] Functions and techniques disclosed for real time or near real time notification of activities that occur in the online platform on a work item or in a work space can be performed by a push-enabled server (e.g., the notification server 150 coupled to the host server 100 of the collaboration platform. Additionally, functions and techniques disclosed for synchronizing workspaces or folders within the collaboration environment with workspaces or folders on a collaborator's desktop can be performed by a sync server. Functions and techniques performed by the host server 100, the notification server 150, the sync server 120 and the related components therein are described, respectively, in detail with further reference to the examples of FIGS. 3A, 3B, and 3C.

[0035] In one embodiment, client devices 102 communicate with the host server 100 over network 106. In general, network 106, over which the client devices 102 and the host server 100 communicate, may be a cellular network, a telephonic network, an open network, such as the Internet, or a private network, such as an intranet and/or the extranet, or any combination thereof. For example, the Internet can provide file transfer, remote log in, email, news, RSS, cloud-based services, instant messaging, visual voicemail, push mail, VoIP, and other services through any known or convenient protocol, such as, but is not limited to the TCP/IP protocol, Open System Interconnections (OSI), FTP, UPnP, iSCSI, NSF, ISDN, PDH, RS-232, SDH, SONET, etc.

[0036] The network 106 can be any collection of distinct networks operating wholly or partially in conjunction to provide connectivity to the client devices 102 and the host server 100 and may appear as one or more networks to the serviced systems and devices. In one embodiment, communications to and from the client devices 102 can be achieved by, an open network, such as the Internet, or a private network, such as an intranet and/or the extranet. In one embodiment, communications can be achieved by a secure communications protocol, such as secure sockets layer (SSL), or transport layer security (TLS).

[0037] In addition, communications can be achieved via one or more networks, such as, but are not limited to, one or more of WiMax, a Local Area Network (LAN),

Wireless Local Area Network (WLAN), a Personal area network (PAN), a Campus area network (CAN), a Metropolitan area network (MAN), a Wide area network (WAN), a Wireless wide area network (WWAN), enabled with technologies such as, by way of example, Global System for Mobile Communications (GSM), Personal Communications Service (PCS), Digital Advanced Mobile Phone Service (D-Amps), Bluetooth, Wi-Fi, Fixed Wireless Data, 2G, 2.5G, 3G, 4G, IMT-Advanced, pre-4G, 3G LTE, 3GPP LTE, LTE Advanced, mobile WiMax, WiMax 2, WirelessMAN-Advanced networks, enhanced data rates for GSM evolution (EDGE), General packet radio service (GPRS), enhanced GPRS, iBurst, UMTS, HSPDA, HSUPA, HSPA, UMTS-TDD, 1xRTT, EV-DO, messaging protocols such as, TCP/IP, SMS, MMS, extensible messaging and presence protocol (XMPP), real time messaging protocol (RTMP), instant messaging and presence protocol (IMPP), instant messaging, USSD, IRC, or any other wireless data networks or messaging protocols.

[0038] FIG. 2 depicts an example diagram of a web-based or online collaboration platform deployed in an enterprise or other organizational setting 250 for organizing workspaces 205, 225, 245 which include work items 215, 235, 255 and providing a discussion workspace area 217, 237, 257 for the respective workspaces 205, 225, 245.

[0039] The web-based platform for collaborating on projects or jointly working on documents can be used by individual users and shared among collaborators. In addition, the collaboration platform can be deployed in an organized setting including but not limited to, a company (e.g., an enterprise setting), a department in a company, an academic institution, a department in an academic institution, a class or course setting, or any other types of organizations or organized setting.

[0040] When deployed in an organizational setting, multiple workspaces (e.g., workspace A, B C) can be created to support different projects or a variety of work flows. Each workspace can have its own associated work items. For example, work space A 205 and discussion workspace 217 may be associated with work items 215, work space B 225 and discussion workspace 237 can be associated with work items 235, and work space N 245 and discussion workspace 237 can be associated with work items 255. The work items 215, 235, and 255 may be unique to each work space but

need not be. For example, a particular word document can be associated with only one work space (e.g., work space A 205) or it may be associated with multiple work spaces (e.g., Work space A 205 and work space B 225, etc.).

[0041] In general, each work space has a set of users or collaborators associated with it. For example, work space A 205 is associated with multiple users or collaborators 206. In some instances, work spaces deployed in an enterprise may be department specific. For example, work space B may be associated with department 210 and some users shown as example user A 208, and workspace N 245 can be associated with departments 212 and 216 and users shown as example user B 214.

[0042] Each user associated with a work space can generally access the work items associated with the work space. The level of access will depend on permissions associated with the specific work space, and/or with a specific work item. Permissions can be set for the work space or set individually on a per work item basis. For example, the creator of a work space (e.g., one of user A 208 who creates work space B) can set one permission setting applicable to all work items 235 for other associated users and/or users associated with the affiliate department 210, for example. Creator user A 208 may also set different permission settings for each work item, which may be the same for different users, or varying for different users.

[0043] In one embodiment, a first type of permission level, e.g. an editor, can allow a user to have full read and write access to a workspace such that the user can view and download contents of the workspace as well as upload new content to the workspace. A second type of permission level, e.g. a viewer, can allow a user to have full read access to a workspace such that the user can view and download contents of the workspace but not upload or edit contents of the workspace. A third type of permission level, e.g. an uploader, can allow a user to have limited write access to contents of a workspace such that the user can see items in the workspace but not download or view the items, while being permitted to upload new content to the workspace.

[0044] In one embodiment, the ability of a user associated with a workspace to enable synchronization of the workspace with local folders on the user's computer can be tied to the permission level of the user. Alternatively, separate synchronization permission can be assigned by a creator or administrator of a workspace to individuals associated with the workspace. In some instances, synchronization permission can be associated with the workspace or the items in the workspace or based upon any other criteria.

[0045] In each work space A, B... N, when an action is performed on a work item by a given user or any other activity is detected in the work space, other users in the same work space may be notified in real time or in near real time. Activities which trigger real time notifications can include, by way of example but not limitation, adding, deleting, or modifying collaborators in the work space, adding, deleting a work item in the work space, creating a discussion topic in the work space.

[0046] The activity can be performed in relation to a discussion topic in the work space, for example, adding a response to a discussion topic, deleting a response, or editing a response in the work space. In addition, the activity is performed on a work item in the work space by the user, including, by way of example but not limitation, download or upload of a work item, deletion of editing of the work item, selecting, adding, deleting, and modifying a tag in the work item, preview of the work item or comment of the work item, setting or changing permissions of the work item, sharing a work item, emailing a link to the work item, and/or embedding a link to the work item on another website.

[0047] FIG. 3A depicts a block diagram illustrating an example of components in the host server 400 of a web-based collaboration environment with real time activity notification capabilities.

[0048] The host server 400 of the web-based or online collaboration environment can generally be a cloud-based service. The host server 400 can include, for example, a network interface 402, an activity detector 405, a notification engine 415, a permissions manager 435 and/or a notification prioritizer 455. The notification engine

415 can include a notification server manager 416 and/or a recipient selection module, the permission manager 435 can include a workspace manager 426, a collaboration manager 438, an organization tracker 440 having an enterprise tracker 441, and/or a work item manager 442; the notification prioritizer 455 can further include a rules module 456, a chronological ordering engine 458, and/or a relevance assessor 460. Additional or less components/modules/engines can be included in the host server 400 and each illustrated component.

[0049] The network interface 402 can be a networking module that enables the host server 400 to mediate data in a network with an entity that is external to the host server 400, through any known and/or convenient communications protocol supported by the host and the external entity. The network interface 402 can include one or more of a network adaptor card, a wireless network interface card (e.g., SMS interface, WiFi interface, interfaces for various generations of mobile communication standards including but not limited to 1G, 2G, 3G, 3.5G, 4G, LTE, etc.), Bluetooth, a router, an access point, a wireless router, a switch, a multilayer switch, a protocol converter, a gateway, a bridge, bridge router, a hub, a digital media receiver, and/or a repeater.

[0050] As used herein, a "module," "a manager," a "handler," a "detector," an "interface," or an "engine" includes a general purpose, dedicated or shared processor and, typically, firmware or software modules that are executed by the processor. Depending upon implementation-specific or other considerations, the module, manager, handler, or engine can be centralized or its functionality distributed. The module, manager, handler, or engine can include general or special purpose hardware, firmware, or software embodied in a computer-readable (storage) medium for execution by the processor. As used herein, a computer-readable medium or computer-readable storage medium is intended to include all mediums that are statutory (e.g., in the United States, under 35 U.S.C. 101), and to specifically exclude all mediums that are non-statutory in nature to the extent that the exclusion is necessary for a claim that includes the computer-readable (storage) medium to be valid. Known statutory computer-readable mediums include hardware (e.g., registers, random access memory (RAM), non-volatile (NV) storage, to name a few), but may or may not be limited to hardware.

[0051] One embodiment of the host server 400 includes the activity detector 405 which can detect an activity in the web-based collaboration environment. The activity can be a triggering activity which causes select or relevant users to be notified of the occurrence, which in one embodiment, is in real time or near real-time.

[0052] The detected activity can be performed by a user or collaborator in a work space and can be performed on a work item or relating to a work item, for example, download or upload of the work item, previewing, commenting of a work item, deletion or editing of the work item, commenting on a work item, identifying, selecting, adding, deleting, saving, editing, and modifying a tag in the work item, setting or changing permissions of the work item, sharing the work item including, for example, emailing a link to the work item, embedding a link to the work item on another website.

[0053] The types of activities that can be detected can also relate to changes to a work space, such as adding, deleting, or modifying collaborators in the work space; changes to work items such as adding, deleting, moving, or renaming a work item in the work space; creating a discussion topic in the work space, adding a response to a discussion topic, deleting a response, or editing a response in the work space; syncing the workspace with changes in local sync folders stored on computers of authorized collaborators.

[0054] Detected activity in a work space that is performed by a user or otherwise occurring can trigger notifications to be sent out, for example, via the notification engine 415. The notification engine 415 can notify users, which can be collaborators of the user who performed the activity in the work space via one or more of many mechanisms, including but not limited to, email, SMS, voice-message, text-based message, RSS, feed, etc.

[0055] In one embodiment, the notification is depicted through a web-browser used by the other user to access the web-based collaboration environment, for access in real time or near real time to when the activity was performed by the user. When notifying a user in real time through a web-browser, the notification engine 415 can utilize a push-enabled service to ensure real time notification. In one embodiment, the notification is

sent by a component or another server which implements push technology (e.g., the notification server 550 shown in the example of FIG. 3B). The push-enabled service can be implemented via long poll or HTTP streaming, for example, by the notification server 550 or another component, device which may be internal to or external to the host server 400.

[0056] The host server 400 can send a notification server an identification of the recipient to be notified and indicator of the activity to notify the recipient of. Use of an external push server, such as the notification server 550 is described with further reference to the example of FIG. 3B. The notification server 550 can be managed by the notification server manager 416 in the notification engine 415 which can communicate events to notify users in real-time via their browser interfaces. In one embodiment, the host server sends a notification server an identification of the recipient to be notified and indicator of the activity to notify the recipient of.

[0057] In general, recipients of an activity notification are selected based on criteria, for example, by the recipient selection module 418 of the notification engine 415. The criteria may be determined, for example, based on a work space in which the activity was performed in the online collaboration platform. Specifically, the criteria, is in one embodiment, determined based on permissions configured for the workspace, as managed, tracked, updated, implemented, revised, based by the permissions manager 435.

[0058] For example, the workspace can be associated with an enterprise and in such an instance, the criteria can specify that the recipient that is selected is an employee of the enterprise. Enterprise associations and affiliations can be managed by the organization tracker 440, for example; in some embodiments, enterprises and/or enterprise accounts can specifically be managed, tracked, monitored by the enterprise tracker 441. Permissions for the workspace can be configured by a creator or administrative user of the workspace. The collaboration manager 438 can determine, track, and implement relationships, roles, and/or access levels of multiple users/collaborators. For example, users may be a general user, a creator of the work space, a creator of a work item, or an administrative user. The permissions for a work

space can be configured by a user, creator, or the administrative user and is generally managed by the collaborations manager 438.

[0059] The criteria that are determined by work space permissions can be managed by the work space manager 436 in the permissions manager 435. The recipient selection module 418 can also determine the recipient selection criteria based on user affiliation with the workspace, including, one or more of, member, invited collaborator and collaborator in the workspace. Such user affiliation can be tracked and managed by, for example, the collaboration manger 438 of the permissions manager 435.

[0060] In one embodiment, the criteria are determined based on permissions associated with a work item on which the activity was performed in relation to in the workspace. Permissions associated with work items can be managed, tracked, updated, revised, or implemented, in one embodiment, by the work item manager 442. For example, the permissions associated with the work item can be set by, a creator of the work item or an administrative user of the work space. Each work space can include multiple work items where each of multiple work items has individually configurable permissions. The individually configured permissions can be determined by user roles and rights (e.g., as managed by the collaborations manager 438). The work item manager 442 can communicate with the collaboration manager 438 in setting, configuring, or re-configuring permissions associated with work items.

[0061] The notification of a triggering activity, can be presented to a selected user in the web-based or online collaboration environment such that the notification is accessible by the user in real time or near real time to when the triggering activity occurred. In one embodiment, the notification is presented via a user interface to the online collaboration platform, for example, when the recipient (e.g., selected recipient) is accessing the workspace (e.g., the same work space in which activity is detected) or when the recipient is accessing a different work space. Specifically, the real time or near real time notification can be presented to the user via the user interface if the user is online (e.g., online or otherwise logged into the web-based or online collaboration environment).

[0062] The notification engine 415 can determine the channel through which to notify selected users or recipients of activity. The channels that are used can include, indicators via a user interface to the online collaboration environment, SMS, audio message, text-based messages, email, desktop application, RSS, etc. The indicators presented via the user interface can include visual indicators (e.g., pop-up form including text and/or graphics), audio indicators, or any other types detectable by a user.

[0063] In one embodiment, the notification is presented in the user interface among other notifications in an order based on a rule, which may be configurable by the recipient or another user. Such prioritization in presentation can be determined, managed, tracked, implemented, revised, or updated by the notification prioritizer 455, for example. The notification prioritizer 455 can present the notification in the user interface.

[0064] The rule can indicate user preferences for notifications of activities based on one or more of, a type of activity that occurred and a user related to the activity. For example, a given user may explicitly or implicitly indicate preferences for activities or actions performed by specific other users or collaborators. A user may also indicate explicitly or implicitly preferences for types of activities that they wish to be notified of or not notified of. Users may also indicate that notifications for certain types of activities are to be prioritized over others. For example, a user may indicate that a notification for a 'comment on' activity is of a higher priority compared to a 'edit' activity.

[0065] In one embodiment, the notification is presented in the user interface among other notifications based on chronological order, for example as tracked or determined by the chronological ordering engine 458. For example, each notification can be depicted in the user interface based on the time ordering when each associated triggering activity occurred. Notification of the most recently occurred activity can be depicted above or below other notifications, or in a location where most easily accessed by the recipient user.

[0066] In one embodiment, the notification is presented in the user interface among other notifications based on relevance to the recipient, for example, as determined, tracked, monitored, or implemented by the relevance assessor 460. The relevance to the recipient can be represented by, for example, contextual and temporal parameters. For example, contextual parameters provide metrics indicating the recipient's current activity in the online collaboration platform. Current activity can be any activity of the user that occurred within a certain time frame (e.g., within the last minute, within the last 5 minutes, within the last 10 minutes, for example). Activity of the user can include, a document that the user edited, viewed, downloaded, commented on, tagged, or otherwise accessed. Activity of the user can also include activities surrounding a workspace, including creation/modification of a workspace or attributes of a workspace, such as modification of collaborators, permissions, etc.

[0067] Temporal parameters can, for example, provide metrics indicating the recipient's activities in the online collaboration platform over a period of time, a frequency with which the recipient has accessed a work item with which the activity relates to, and/or a frequency with which the recipient has accessed the work space in which the activity was performed.

[0068] FIG. 3B depicts a block diagram illustrating an example of components in a notification server 550 for providing real time or near real time notifications of activities that occur in a web-based or online collaboration environment.

[0069] The notification server 550 generally includes, for example, a push server 505, an SMS notifier 515, and/or a priority module 525. In one embodiment, the push server 505 includes a long poll engine 506 and/or an HTTP streaming engine 508. Additional or less components/modules/engines can be included in the notification server 550 and each illustrated component.

[0070] The notification server 550 can support the services of a collaboration platform or environment to provide real time or near real time notifications of activities. In one embodiment, the notification server 550 is integrated within a host server of a collaboration platform (e.g., the host server 100 shown in the example of FIG. 1 or the

host server 400 shown in the example of FIG. 4A, for example). The notification server 550 may also be externally coupled to the host server (e.g., the host server 100 or 400). In some instances, a portion of the functions implemented and performed by the notification server 550 can be implemented in part or in whole in the host server 100 or 400. For example, some of the components shown to be in the notification server 550 and associated functionalities can in part or in whole reside in the host server 100 or 400.

[0071] In one embodiment, the notification server 550 sends a notification of an activity that occurs within a collaboration platform to a recipient. The notification is sent by the server 550 such that the recipient is notified in real time or near real time to when the activity occurred or when the activity was performed. Real time notification can be performed via push technology, for example by the push server 505 through long polls (e.g., via the long poll engine 506) and/or through the HTTP streaming (e.g., via the HTTP streaming engine 506). The notification server 550 can communicate with the host server to determine a recipient to whom to notify. The notification server 550 can also determine the activity to notify the recipient of, for example through communication with the host server.

[0072] In one embodiment, the notification is presented in a feed stream among other notifications through a user interface on the user device according to relevancy to the user determined based on current or recent activity of the user in the web-based collaboration environment. The presentation priority in a user interface in a feed stream can be managed, in whole, or in part, for example, by the priority module 525 using information determined by the notification prioritizer (e.g., notification prioritizer 455 of host server 400 shown in the example of FIG. 3B).

[0073] In one embodiment, the notification server 550 can send notifications to users via SMS (e.g., through the SMS notifier 515). In this instance, the notification server 550 can be coupled to an SMS center which forwards the SMS text message to a mobile device over a cellular network. The notification can be sent via SMS in real time or near real time, or with a delay.

[0074] FIG. 4A depicts a block diagram illustrating an example of components in the sync client 300 running on a local computer that synchronizes copies of work items stored on the local computer with copies of work items stored in a server sync folder within a web-based collaboration environment.

[0075] The sync client 300 can include, for example, a conflicts manager 310, a triggering event module 320, a copying manager 330, a state module 340, and/or a state database 345. The conflicts manager 310 can include a rules engine 312 and/or an error notification module 314. Additional or fewer components/modules/engines can be included in the sync client 300 and each illustrated component.

[0076] One embodiment of the sync client 300 includes the triggering event module 320 which determines when synchronization of folders should occur. There are two types of triggering events for synchronization. The first type of triggering event occurs when a change has been made to the server sync folder. As a result of this event, a notification is sent from the notification server 550 to the triggering event module 320. In some instances, when a user has an application open and edits a file in the server sync folder, editing of the file causes the notification server 550 to send a notification to the triggering event module 320, causing the change to be downloaded to the local sync folders of other collaborators as part of the synchronization function. In some instances, the notification is sent to the triggering event module 320 after the user has saved the file and closed the application.

[0077] The notification server 550 can provide real time or near real-time notifications of activities that occur in a particular server sync folder. In one embodiment, the triggering event module 320 can subscribe to a real-time notification channel provided by the notification server 550 for a particular server sync folder to receive the notifications.

[0078] In one embodiment, the notifications provided by the notification server 550 inform the triggering event module 320 that a change has occurred in the server sync folder. In this case, the state module 340 requests from the current state manager 355

in the sync server 120 the current state of the folder/file tree for the server sync folder that the local sync folder is synchronized to. .

[0079] The state module 340 also accesses the last known state of the folder/file tree stored in the state database 345 and compares the current state with the last known state to determine which file and/or folder has changed. Once the changed files and/or folders have been identified, the copying manager 330 downloads the changed file(s) from the server sync folder to the local sync folder.

[0080] The second type of triggering event occurs when a change has been made to a local sync folder on a collaborator's computer. In one embodiment, a Windows operating system of the collaborator's computer provides file/folder monitoring on the computer and notifies the triggering event module 320. Other operating systems or programs running on collaborators' computer systems can provide a similar type of notification to the triggering event module 320. Once the triggering event module 320 has been notified of the change to the local sync folder, a notification is sent to the sync server 120.

[0081] When the second type of triggering event occurs, the copying manager 330 uploads the changed file to replace the copy of the file stored in the server sync folder. Once the file has been uploaded to the server sync folder, the local copy of the file stored on the computers of other collaborators of the workspace who have enabled the synchronization function are updated in a similar manner as described above for the first type of triggering event.

[0082] One embodiment of the sync client 300 includes the conflicts manager 310 which can identify when a conflict has occurred (i.e., a file or work item has been changed at both the server sync folder and the local sync folder) and determine how to resolve the conflict. If the triggering event module 320 receives a notification from the notification server 550 and the local file/folder monitoring system of the changes, the conflicts manager 310 identifies the changes made to the file/folder at each location. In one embodiment, the conflicts manager calls the rules engine 312 to determine what action to take to resolve the conflict.

[0083] The rules engine 312 stores rules for resolving conflicts. Rules are pre-defined but can be changed without changing the software implementing the rules engine. The rules engine 312 takes as input the types of changes that have occurred at the various synchronized folders, for example, edits to a work item, renaming of a work item, or moving of a work item to a different location. Then the rules engine 312 provides the action to be performed for the particular conflict.

[0084] There are two types of conflicts, a soft conflict and a hard conflict. A hard conflict occurs when the same operation occurs on both copies of the file, and a soft conflict occurs when a different operation occurs on each of the two copies of the file. In the case of a hard conflict, for example, when copies of a work item have been changed at the server sync folder and at a local sync folder, the conflicts manager 310 is not able to merge the changed files. In one embodiment, the conflicts manager 310 makes a copy of the changed work item in the local sync folder and renames the copy with the original file name and an identifier of the collaborator associated with the local sync folder. Next, the conflicts manager 310 downloads the changed work item from the server sync workspace to the local sync folder, and then uploads the copy of the work item with the modified file name to the server sync folder. Thus, two versions of the file are stored at the server sync folder and the local sync folder. Then, the error notification module 314 sends a message to the user to notify him that the changes in his version of the work item were not accepted but was uploaded to the server sync folder as a new version of the file with a new file name and requests the user to merge the two files manually.

[0085] In the case of a soft conflict, for example, when a file is moved on the server and edited locally, the conflict manager 310 can merge these two changes so that the file is moved locally to the new location and the local edits are uploaded to the server copy of the file.

[0086] FIG. 4B depicts a block diagram illustrating an example of components in the sync server 120 of a web-based collaboration environment. The sync server 120 can include, for example, a current state manager 355, a collaborator manager 350, and/or a notification logic module 352.

[0087] In one embodiment, the sync server 120 includes a current state manager 355 that maintains and tracks the current state of the folder/file tree. Changes made to the folder/file tree include, but are not limited to, saving, creating, deleting, moving, and renaming a file. In some instances, edits made to a file or folder are also tracked by the current state manager 355.

[0088] In one embodiment, the sync server 120 includes a collaborator manager 350 that tracks the permission levels of users. The term collaborator can refer to users who are given permission by a creator or administrator of a workspace to join that workspace. As discussed above, each collaborator of a workspace can be assigned a particular permission level or a default permission level. Not every collaborator of a workspace is permitted to synchronize the workspace stored at the host server with a folder stored on his computer. The collaborator must be assigned a synchronization permission by the creator or administrator of the workspace, or a synchronization permission can be associated with the workspace of the items in the workspace or based upon any other criteria. Thus, when a collaborator makes a request to the sync server 120 to establish synchronization between a local sync folder on his computer and a collaboration platform workspace, the collaborator manager 350 first determines whether that collaborator has a synchronization permission. Upon establishing that the collaborator has synchronization permission for a particular workspace, the collaborator is permitted to enable the synchronization function between the platform workspace and a local sync folder on the collaborator's computer.

[0089] In one embodiment, the sync server 120 includes a notification logic module 352 that determines who to notify when a change is detected. When the sync client 300 on a local computer is sent a change notification from either the notification server 550 that a change needs to be downloaded to the local sync folder or from the local file/folder monitoring system that a change has occurred in the local sync folder, it notifies the notification logic module 352. The notification logic module 352 works with the collaborator manager 350 to identify the users to be notified of the updates that will occur. The users to be notified are the users who are authorized collaborators of the

server sync folder that is synchronized with the local sync folder and are currently synchronizing a local sync folder to that particular server sync folder.

[0090] Once the users to be notified are identified, the notification logic module 352 can send the notification server 550 an identification of the recipients to be notified and the activity to notify the recipients of. Similar to the above description regarding the notification of a triggering activity, the notification can be presented to the identified users in real time or near real time to when the synchronization occurs using any of the above-described channels.

[0091] FIG. 5 depicts a screenshot of an example user interface for the web-based collaborative platform showing a collaborator's workspaces or folders stored by the collaboration platform that are synchronized with folders stored on the collaborator's computer. The 'Files and Folders' tab 570 shows the files and folders that are stored in the user's, Jane Doe, account at the web-based collaborative platform. In this example, there are four folders. Two of the folders, named Default Sync Folder and Project Alpha, are marked with a sync icon 560, 561. These icons indicate that the folders have been enabled by the collaborator for synchronizing with the local sync folder stored on the collaborator's computer. When a change is made to one of the files in these folders at the server, the changes are downloaded to the local sync folder.

[0092] FIG. 6 depicts a screenshot of the contents of the local sync folder on Jane Doe's computer. Copies of the same folders that were identified with a sync icon in FIG. 5 are available in a local sync folder on Jane Doe's computer, Default Sync Folder and Project Alpha. As part of the synchronization function, when a change is made to one of the files in these local folders on Jane Doe's computer, the changes are uploaded to the server sync folder.

[0093] FIG. 7 is a flow diagram illustrating an example process 700 of determining when to synchronize work items between a server sync folder stored within the web-based collaboration platform and a synchronized local sync folder on the computer of a collaborator of the server sync folder. This process can be applied to each local sync

folder on the computer of authorized and synchronized collaborators of the server sync folder.

[0094] At decision block 702, the sync client 300 operating on a local computer determines if it has received a notification from the notification server that a change has occurred to the folder/file tree of the user within the web-based collaboration platform and a notification from the local file/folder monitoring system that a change has occurred at the local sync folder. If both notifications have been received (block 702 – Yes), the process continues to decision block 825 in FIG. 8, which is described below.

[0095] If both notifications have not been received (block 702 – No), at decision block 705, the sync client 300 determines if it has received just a notification from the notification server of a change to the folder/file tree of the user within the web-based collaboration platform. If the sync client 300 received just the notification from the notification server (block 705 – Yes), at block 710, the sync client 300 will get from the current state manager 355 the current state of the folder/file tree to be sync'd. At block 715, the sync client 300 compares the current state of the folder/file tree to the last known state of the folder/file tree to determine changes in the server sync folder. Then at block 720, the sync client 300 downloads the identified files or work items that have been changed to the local sync folder. Then at block 722, the sync client 300 updates the state of the file tree to reflect the new changes. The process continues to decision block 725.

[0096] At decision block 725, the sync client 300 determines if it has received a notification from the local file/folder monitoring system that a change has been made to the local sync folder.

[0097] If a notification has been received (block 725 – Yes), at block 730 the sync client 300 uploads the changed files/folders from the local sync folder to the server sync folder stored in the web-based collaboration platform. Then at block 740, the sync client 300 updates the state of the folder/file tree to reflect the new changes. The process returns to decision block 702.

[0098] If the sync client 300 did not receive a notification from just the notification server (block 705 – No), the process continues to decision block 725, as described above.

[0099] If the sync client 300 did not receive a notification from the local monitoring system (block 725 – No), the process continues to decision block 702, as described above.

[00100] FIG. 8 is a flow diagram illustrating an example process 800 of determining how to resolve a conflict.

[00101] At block 805, the sync client 300 operating on a local computer receives a notice from the notification server that a change has occurred to the synchronized server sync folder. Then at block 810, the sync client 300 gets the current state of the folder/file tree from the current state manager 355. And at block 815, the sync client 300 compares the current state of the folder/file tree to the last known state of the folder/file tree to determine changes to the server sync folder.

[00102] Then at block 820, before the sync client 300 has synchronized the changes made to the server sync folder with the local sync folder, the sync client 300 receives a notice from the local file/folder monitoring system that a change has occurred at the local sync folder.

[00103] At decision block 825, the sync client 300 determines if there is a conflict between the change(s) made at the server sync folder and the change(s) made at the local sync folder. There is a conflict if a change has been made to the same file at both the server sync folder and the local sync folder. If there is a conflict (block 825 – Yes), the sync client 300 accesses the rules engine at block 830 to determine the action to perform.

[00104] If there is no conflict (block 825 – No), the sync client 300 proceeds to synchronize the server and local sync folder according to process 700 described above, for example.

[00105] FIG. 9 depicts a flow diagram illustrating an example process 900 of resolving a hard conflict. At block 905, the sync client 300 operating on a local

computer is notified by the notification server that a change has occurred to the synchronized server sync folder, gets the current state of the folder/file tree, and compares the current state with the last known state to determine that a particular file has been edited in the server sync folder.

[00106] Then at block 910, the sync client 300 is notified by the local file/folder monitoring system that the same file in the local sync folder has been edited.

[00107] The sync client 300 creates a new local copy of the edited version of the file on the local computer at block 915. The new local copy is given a new name that includes the old file name and a user identification, for example, a copy of the user's email identifier, to distinguish the file from the original file. At block 920, the sync client 300 downloads the server's copy of the edited file to the local original copy of the file in the local sync folder. Then at block 925, the sync client 300 uploads the new local copy of the local edited file, with the new distinguishing file name, from the local sync folder to the server sync folder.

[00108] At block 930, the sync client 300 sends a message to collaborator user who edited the file on the local computer to manually merge the server's copy of the edited file and the user's copy of the edited file. The collaborator can delete the local copy of the edited file from the server sync folder, typically occurring after merging of the files.

[00109] FIG. 10 depicts a flow diagram illustrating an example process 1000 of resolving a soft conflict.

[00110] At block 1005, the sync client 300 operating on a local computer is notified by the notification server that a change has occurred to the synchronized server sync folder, gets the current state of the folder/file tree, and compares the current state with the last known state to determine that a particular file in the server sync folder has been renamed.

[00111] Then at block 1010, the sync client 300 is notified by the local file/folder monitoring system that the same file in the local sync folder has been edited.

[00112] Next, at block 1015, the sync client 300 edits the name of the file in the local sync folder, and at block 1020 uploads the edited copy of the file from the local sync folder to the renamed file in the server sync folder.

[00113] The first time that the sync client 300 is started on a local computer, the authorized collaborator logs in to the sync server with his name and password for the web-based collaborative environment. The sync server authenticates the user with the host server and sends a security token back to the sync client. Then whenever the sync client needs to communicate with the sync server, for example to download or upload work items, the client uses the security token.

[00114] FIG. 11 depicts a flow diagram illustrating an example process 1100 of starting up a sync client 300 operating on a local computer of an authorized collaborator. In some instances, the sync client 300 is started for the first time on a local computer. In some instances, the sync client 300 may be shut down or taken offline. As a result, the sync client 300 will not receive any notifications from the notification server about changes that occur to the server sync folder. Process 1100 describes the process of starting up the sync client 300.

[00115] At block 1105, the sync client 300 subscribes to the real-time notifications channel provided by the notification server to be notified of any changes that are made to the server sync folder. Then at block 1110, the current state manager 355 gets the current state of the folder/file tree that the collaborator has permission to synchronize with. And at block 1115, the sync client 300 compares the current state of the folder/file tree to the last known state of the folder/file tree. If the sync client 300 is being started up for the first time on the local computer, there will be no last known state.

[00116] Then at decision block 1118, the sync client 300 determines if any changes occurred in the server sync folder. If there have been any changes (block 1118 - Yes), at block 1120, the sync client 300 performs a sync of the server sync folder with the local sync folder according to process 700 described above, for example. For the situation where the sync client 300 is being started up for the first time, the work items

in the server sync folder that the collaborator has permission to synchronize with will be downloaded to the local computer.

[00117] Then at block 1125, the sync client 300 relies on notifications to trigger the sync process, for example process 700 described above.

[00118] If there have not been any changes to the server sync folder (block 1118 – No), the process continues to block 1125, as described above.

[00119] FIG. 12 shows a diagrammatic representation of a machine 1200 in the example form of a computer system within which a set of instructions, for causing the machine to perform any one or more of the methodologies discussed herein, may be executed.

[00120] In alternative embodiments, the machine operates as a standalone device or may be connected (e.g., networked) to other machines. In a networked deployment, the machine may operate in the capacity of a server or a client machine in a client-server network environment, or as a peer machine in a peer-to-peer (or distributed) network environment.

[00121] The machine may be a server computer, a client computer, a personal computer (PC), a user device, a tablet PC, a laptop computer, a set-top box (STB), a personal digital assistant (PDA), a cellular telephone, an iPhone, an iPad, a Blackberry, a processor, a telephone, a web appliance, a network router, switch or bridge, a console, a hand-held console, a (hand-held) gaming device, a music player, any portable, mobile, hand-held device, or any machine capable of executing a set of instructions (sequential or otherwise) that specify actions to be taken by that machine.

[00122] While the machine-readable medium or machine-readable storage medium is shown in an exemplary embodiment to be a single medium, the term “machine-readable medium” and “machine-readable storage medium” should be taken to include a single medium or multiple media (e.g., a centralized or distributed database, and/or associated caches and servers) that store the one or more sets of instructions. The term “machine-readable medium” and “machine-readable storage medium” shall also be taken to include any medium that is capable of storing, encoding or carrying a set of

instructions for execution by the machine and that cause the machine to perform any one or more of the methodologies of the presently disclosed technique and innovation.

[00123] In general, the routines executed to implement the embodiments of the disclosure, may be implemented as part of an operating system or a specific application, component, program, object, module or sequence of instructions referred to as "computer programs." The computer programs typically comprise one or more instructions set at various times in various memory and storage devices in a computer, and that, when read and executed by one or more processing units or processors in a computer, cause the computer to perform operations to execute elements involving the various aspects of the disclosure.

[00124] Moreover, while embodiments have been described in the context of fully functioning computers and computer systems, those skilled in the art will appreciate that the various embodiments are capable of being distributed as a program product in a variety of forms, and that the disclosure applies equally regardless of the particular type of machine or computer-readable media used to actually effect the distribution.

[00125] Further examples of machine-readable storage media, machine-readable media, or computer-readable (storage) media include, but are not limited to, recordable type media such as volatile and non-volatile memory devices, floppy and other removable disks, hard disk drives, optical disks (e.g., Compact Disk Read-Only Memory (CD ROMS), Digital Versatile Disks, (DVDs), etc.), among others, and transmission type media such as digital and analog communication links.

[00126] The network interface device enables the machine 1200 to mediate data in a network with an entity that is external to the host server, through any known and/or convenient communications protocol supported by the host and the external entity. The network interface device can include one or more of a network adaptor card, a wireless network interface card, a router, an access point, a wireless router, a switch, a multilayer switch, a protocol converter, a gateway, a bridge, bridge router, a hub, a digital media receiver, and/or a repeater.

[00127] The network interface device can include a firewall which can, in some embodiments, govern and/or manage permission to access/proxy data in a computer network, and track varying levels of trust between different machines and/or applications. The firewall can be any number of modules having any combination of hardware and/or software components able to enforce a predetermined set of access rights between a particular set of machines and applications, machines and machines, and/or applications and applications, for example, to regulate the flow of traffic and resource sharing between these varying entities. The firewall may additionally manage and/or have access to an access control list which details permissions including for example, the access and operation rights of an object by an individual, a machine, and/or an application, and the circumstances under which the permission rights stand.

[00128] Other network security functions can be performed or included in the functions of the firewall, can be, for example, but are not limited to, intrusion-prevention, intrusion detection, next-generation firewall, personal firewall, etc. without deviating from the novel art of this disclosure.

Conclusion

[00129] Unless the context clearly requires otherwise, throughout the description and the claims, the words "comprise," "comprising," and the like are to be construed in an inclusive sense (i.e., to say, in the sense of "including, but not limited to"), as opposed to an exclusive or exhaustive sense. As used herein, the terms "connected," "coupled," or any variant thereof means any connection or coupling, either direct or indirect, between two or more elements. Such a coupling or connection between the elements can be physical, logical, or a combination thereof. Additionally, the words "herein," "above," "below," and words of similar import, when used in this application, refer to this application as a whole and not to any particular portions of this application. Where the context permits, words in the above Detailed Description using the singular or plural number may also include the plural or singular number respectively. The word "or," in reference to a list of two or more items, covers all of the following interpretations of the word: any of the items in the list, all of the items in the list, and any combination of the items in the list.

[00130] The above Detailed Description of examples of the invention is not intended to be exhaustive or to limit the invention to the precise form disclosed above. While specific examples for the invention are described above for illustrative purposes, various equivalent modifications are possible within the scope of the invention, as those skilled in the relevant art will recognize. While processes or blocks are presented in a given order in this application, alternative implementations may perform routines having steps performed in a different order, or employ systems having blocks in a different order. Some processes or blocks may be deleted, moved, added, subdivided, combined, and/or modified to provide alternative or subcombinations. Also, while processes or blocks are at times shown as being performed in series, these processes or blocks may instead be performed or implemented in parallel, or may be performed at different times. Further any specific numbers noted herein are only examples. It is understood that alternative implementations may employ differing values or ranges.

[00131] The various illustrations and teachings provided herein can also be applied to systems other than the system described above. The elements and acts of the various examples described above can be combined to provide further implementations of the invention.

[00132] Any patents and applications and other references noted above, including any that may be listed in accompanying filing papers, are incorporated herein by reference. Aspects of the invention can be modified, if necessary, to employ the systems, functions, and concepts included in such references to provide further implementations of the invention.

[00133] These and other changes can be made to the invention in light of the above Detailed Description. While the above description describes certain examples of the invention, and describes the best mode contemplated, no matter how detailed the above appears in text, the invention can be practiced in many ways. Details of the system may vary considerably in its specific implementation, while still being encompassed by the invention disclosed herein. As noted above, particular terminology used when describing certain features or aspects of the invention should not be taken to imply that the terminology is being redefined herein to be restricted to any specific

characteristics, features, or aspects of the invention with which that terminology is associated. In general, the terms used in the following claims should not be construed to limit the invention to the specific examples disclosed in the specification, unless the above Detailed Description section explicitly defines such terms. Accordingly, the actual scope of the invention encompasses not only the disclosed examples, but also all equivalent ways of practicing or implementing the invention under the claims.

[00134] While certain aspects of the invention are presented below in certain claim forms, the applicant contemplates the various aspects of the invention in any number of claim forms. For example, while only one aspect of the invention is recited as a means-plus-function claim under 35 U.S.C. § 112, sixth paragraph, other aspects may likewise be embodied as a means-plus-function claim, or in other forms, such as being embodied in a computer-readable medium. (Any claims intended to be treated under 35 U.S.C. § 112, ¶ 6 will begin with the words "means for.") Accordingly, the applicant reserves the right to add additional claims after filing the application to pursue such additional claim forms for other aspects of the invention.

CLAIMS

We claim:

- [c1] 1. A method, comprising:
maintaining a workspace in a web-based collaborative environment for a plurality of collaborators, wherein one or more of the collaborators of the workspace perform activities on one or more work items within the workspace;
if one or more of the collaborators has a synchronization permission for the workspace, permitting each of the one or more of the collaborators to enable synchronization to occur between the workspace and a local sync folder on each of the one or more of the collaborators' computers when a change is detected at the workspace or at the local sync folder.
- [c2] 2. The method of claim 1, wherein requirements for the synchronization permission for the workspace is determined by a creator or administrative user of the workspace.
- [c3] 3. The method of claim 1, further comprising:
receiving an event notification from an editing collaborator's computer of a new change in an editing collaborator's local sync folder;
copying the new change from the editing collaborator's local sync folder to the workspace.
- [c4] 4. The method of claim 3, further comprising:
sending a notification of the new change to the workspace to selected collaborators of the workspace.
- [c5] 5. The method of claim 4, wherein the notification is made in real time or near real time to when the copying occurred.

[c6] 6. The method of claim 4, wherein the selected collaborators are selected based on permissions configured for the workspace.

[c7] 7. The method of claim 1, further comprising:
maintaining a set of synchronized electronic folders, wherein the set of synchronized electronic folders includes the workspace, a first local sync folder stored on a first electronic device of a first collaborator, and a second local sync folder stored on a second electronic device of a second collaborator; wherein the first collaborator and the second collaborator are collaborators of the workspace.

[c8] 8. The method of claim 7, further comprising:
receiving at the first electronic device a first event notification of a first change to a work item in the workspace;
receiving at the first electronic device a second event notification of a second change to a local copy of the work item in the first local sync folder;
accessing a rule engine to determine a first action for handling synchronization of the work item in the first local sync folder and the workspace.

[c9] 9. The method of claim 8, if the first change and the second change are a hard conflict, the first action comprises:
creating a first copy of the local copy of the work item in the first local sync folder;
renaming the first copy, wherein a new name of the first copy includes an identification of the first collaborator;
downloading the work item from the workspace to the first local sync folder;
uploading the renamed first copy to the workspace;
notifying the first collaborator that the second change was not merged into the work item in the workspace.

[c10] 10. The method of claim 9, further comprising:

sending a first notification of the uploaded first copy to the workspace to selected collaborators of the workspace.

[c11] 11. The method of claim 10, wherein the first notification is made in real time or near real time to when the uploading occurred.

[c12] 12. The method of claim 9, further comprising:
receiving at the second electronic device a third event notification of the first change to the work item in the workspace;
receiving at the second electronic device a fourth event notification of the uploading of the renamed first copy to the workspace;
downloading the work item with the first change from the workspace to the first local sync folder.

[c13] 13. The method of claim 8, if the first change and the second change are a soft conflict, the first action comprises:
downloading the work item from the workspace to the first local sync folder;
merging the second change with the downloaded work item.
merging the second change with the work item in the workspace.

[c14] 14. The method of claim 13, further comprising:
sending a second notification of the work item with the merged second change to the workspace to selected collaborators of the workspace.

[c15] 15. The method of claim 14, wherein the second notification is made in real time or near real time to when the uploading occurred.

[c16] 16. A system, comprising:
a triggering event module configured to receive notifications about changes made to a server sync folder and a local sync folder synchronized to the

server sync folder, wherein the server sync folder is stored in a web-based collaborative platform, and further wherein the local sync folder is stored at a computer of a collaborator of the server sync folder who has synchronization permission;

a copying manager configured to copy a change in one of the synchronized folders to the other synchronized folder.

[c17] 17. The system of claim 16, further comprising a notification server configured to send a notification to selected collaborators of the server sync folder when the server sync folder is synchronized to the local sync folder.

[c18] 18. The system of claim 16, further comprising:
a conflicts manager configured to identify a conflict if a work item has been changed in the server sync folder and the local sync folder and to determine an action to be performed in response to the conflict.

[c19] 19. The system of claim 18, further comprising:
a rules engine configured to receive information about the conflict and to search among pre-defined rules for the action to be performed.

[c20] 20. A system, comprising:
means for maintaining a workspace in a web-based collaborative environment, wherein one or more of the collaborators of the workspace perform activities on one or more work items within the workspace;
if one or more of the collaborators has a synchronization permission for the workspace, permitting each of the one or more of the collaborators to enable synchronization to occur between the workspace and a local sync folder on each of the one or more of the collaborators' computers when a change is detected at the workspace or at the local sync folder.

- [c21] 21. The method of claim 20, further comprising:
means for receiving an event notification from an editing collaborator's
computer of a new change in the editing collaborator's local sync folder;
means for copying the new change from the editing collaborator's local sync
folder to the workspace;
means for sending a notification of the new change to the workspace to
selected collaborators of the workspace.

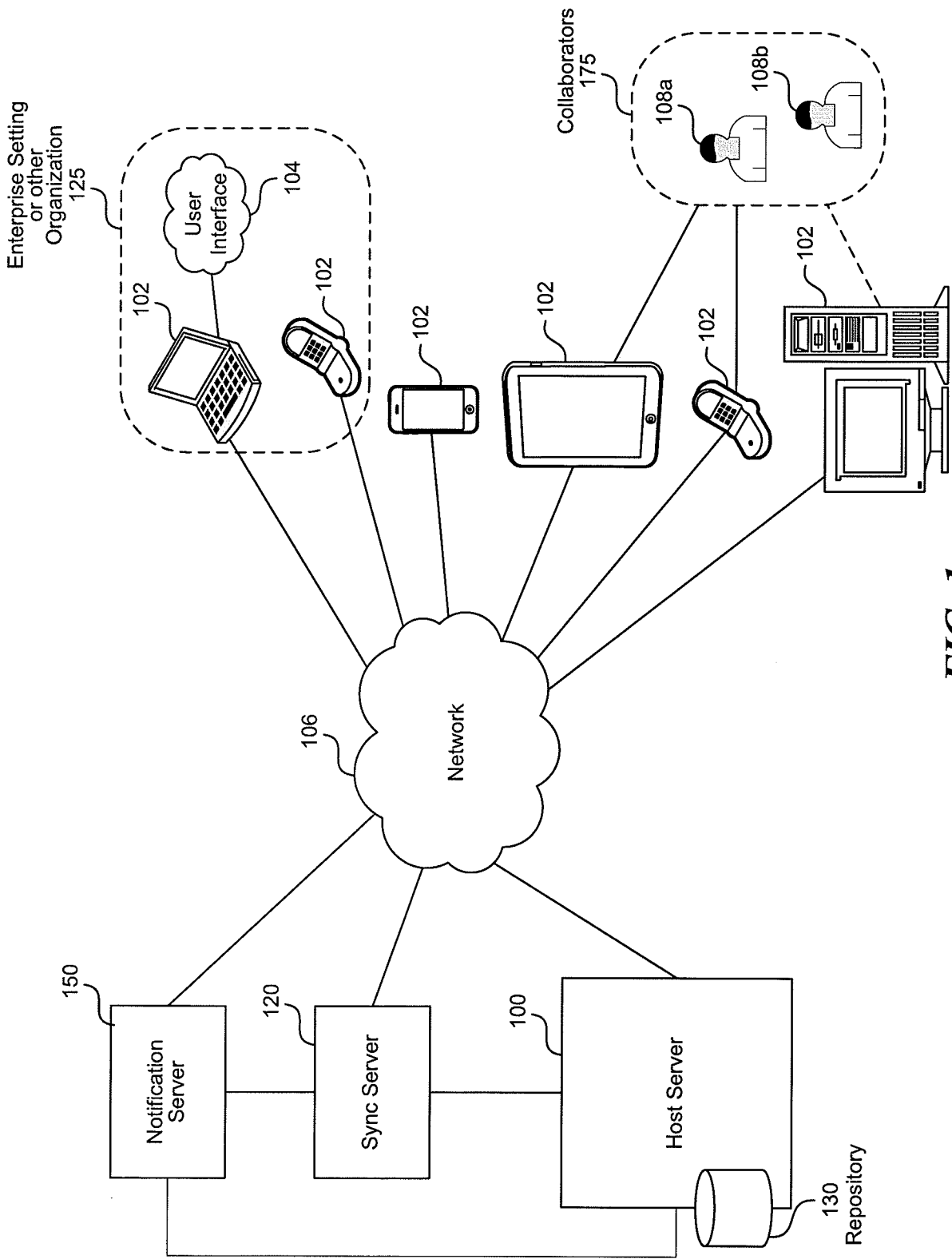


FIG. 1

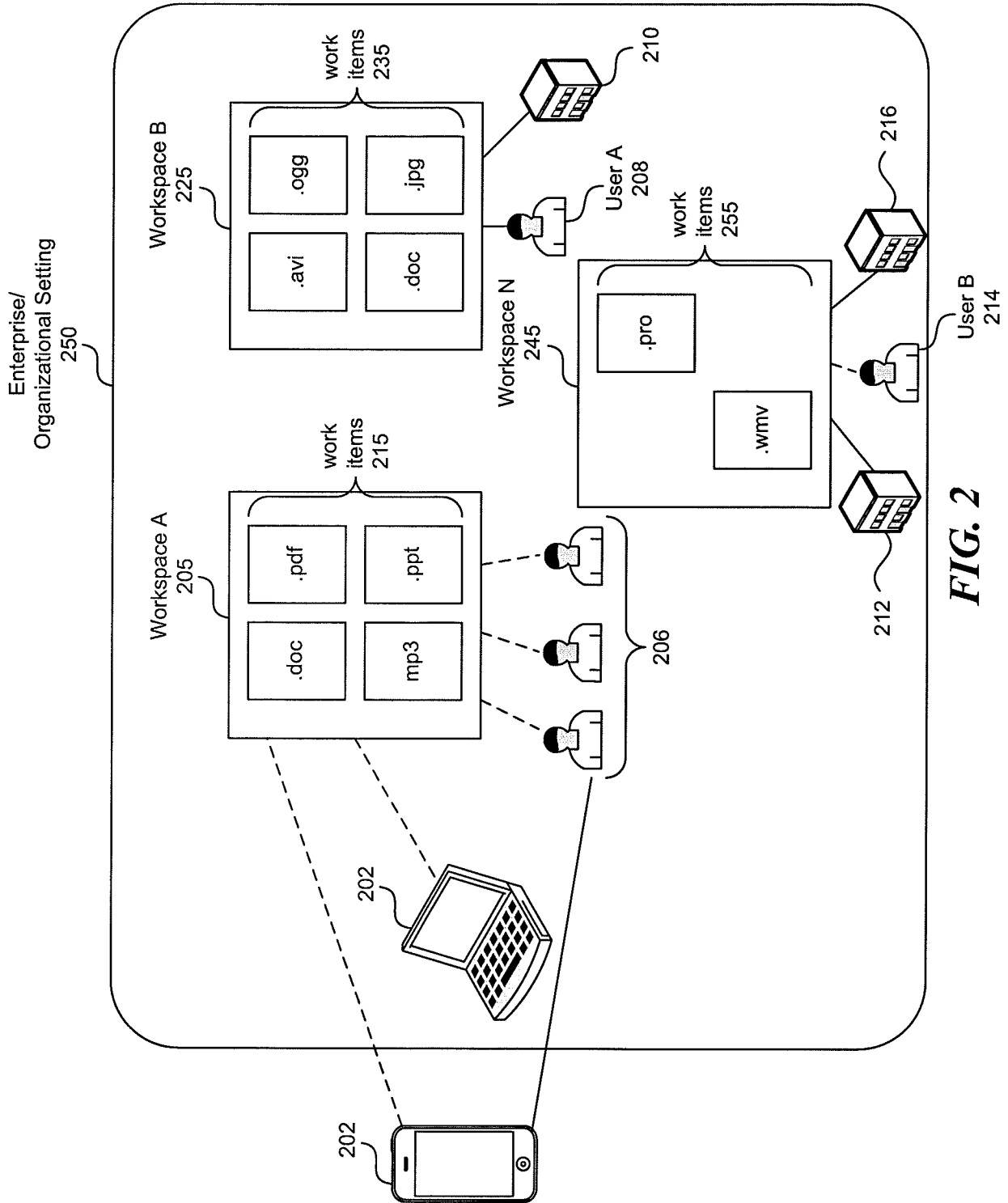


FIG. 2

Host Server
400

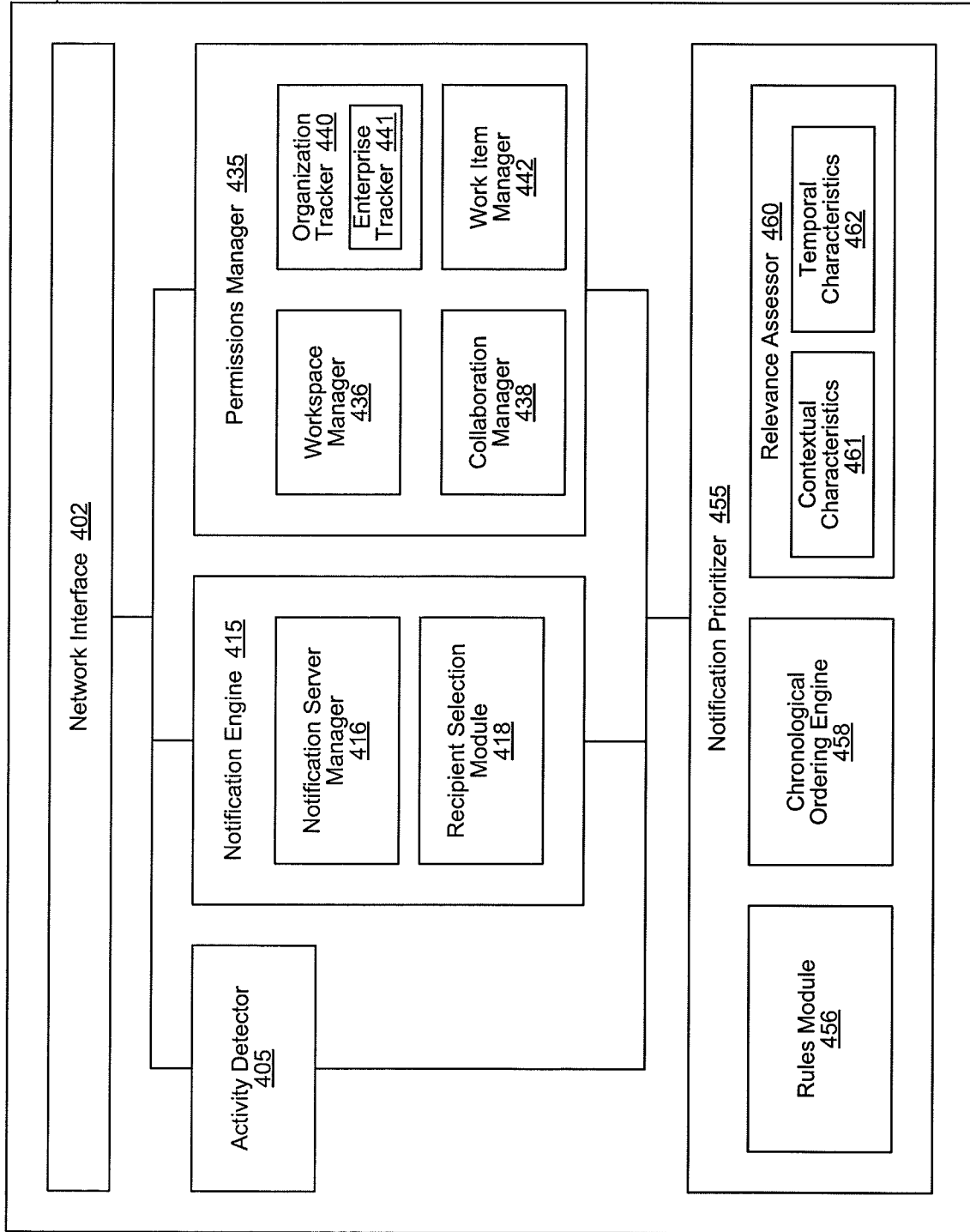


FIG. 3A

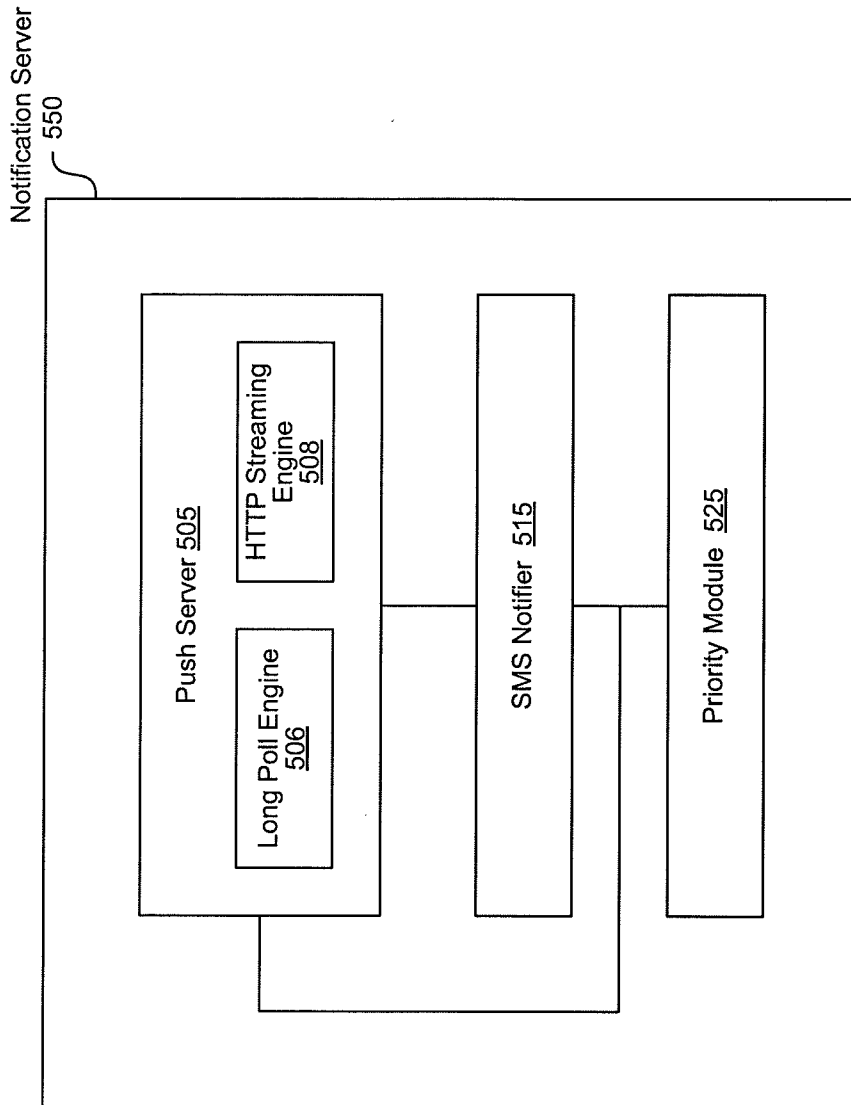


FIG. 3B

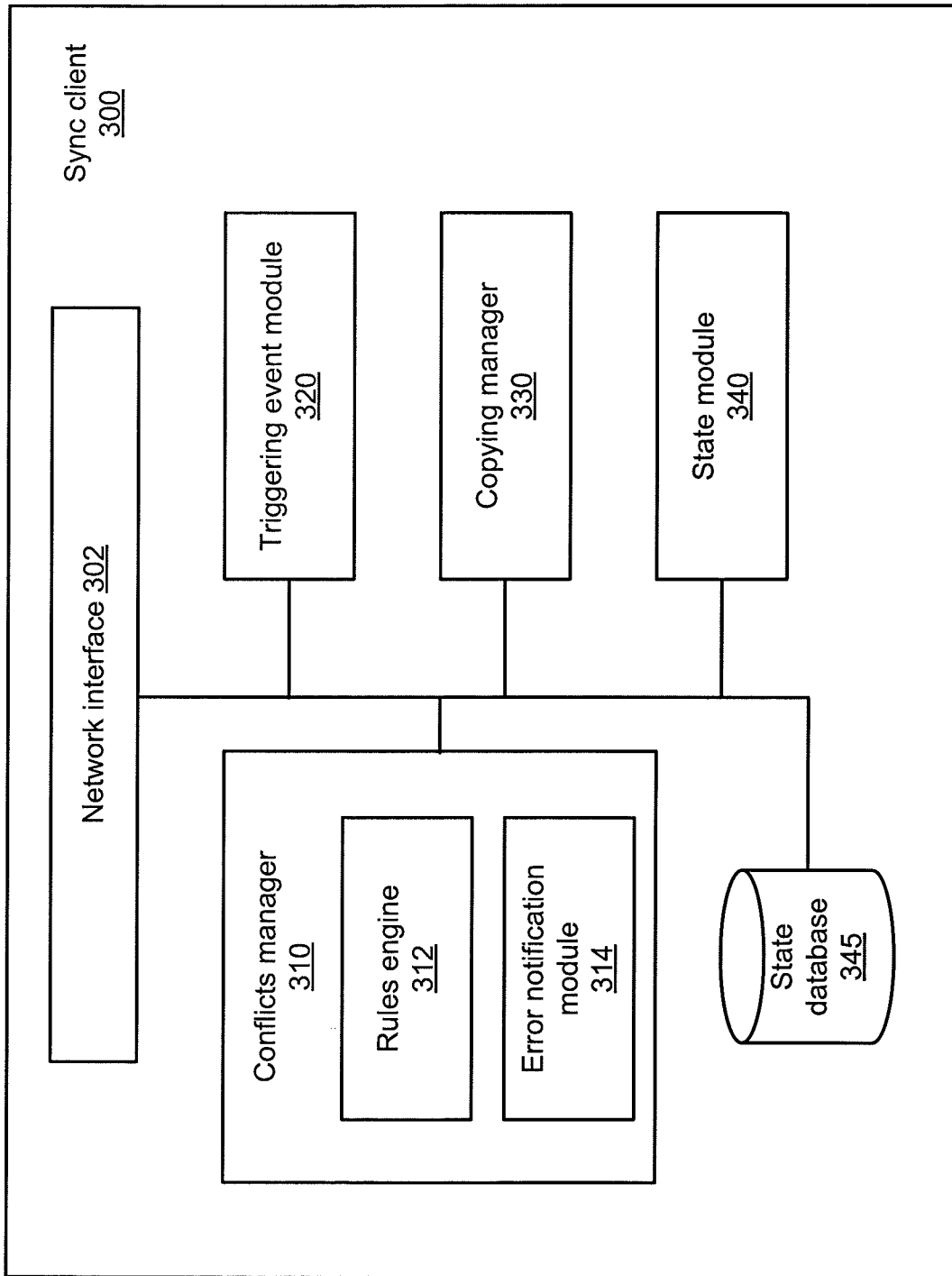


FIG. 4A

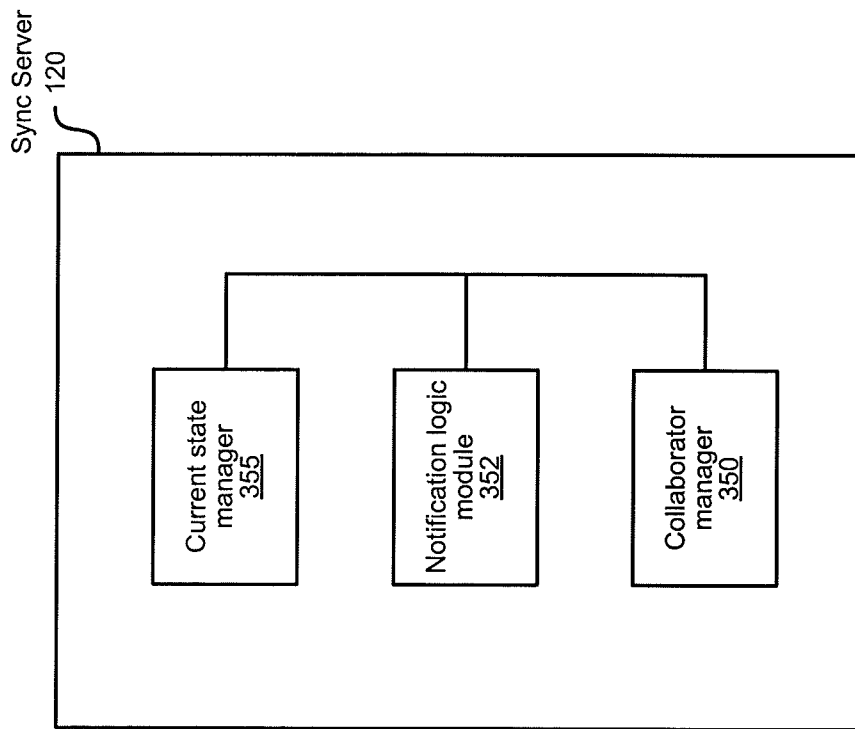


FIG. 4B

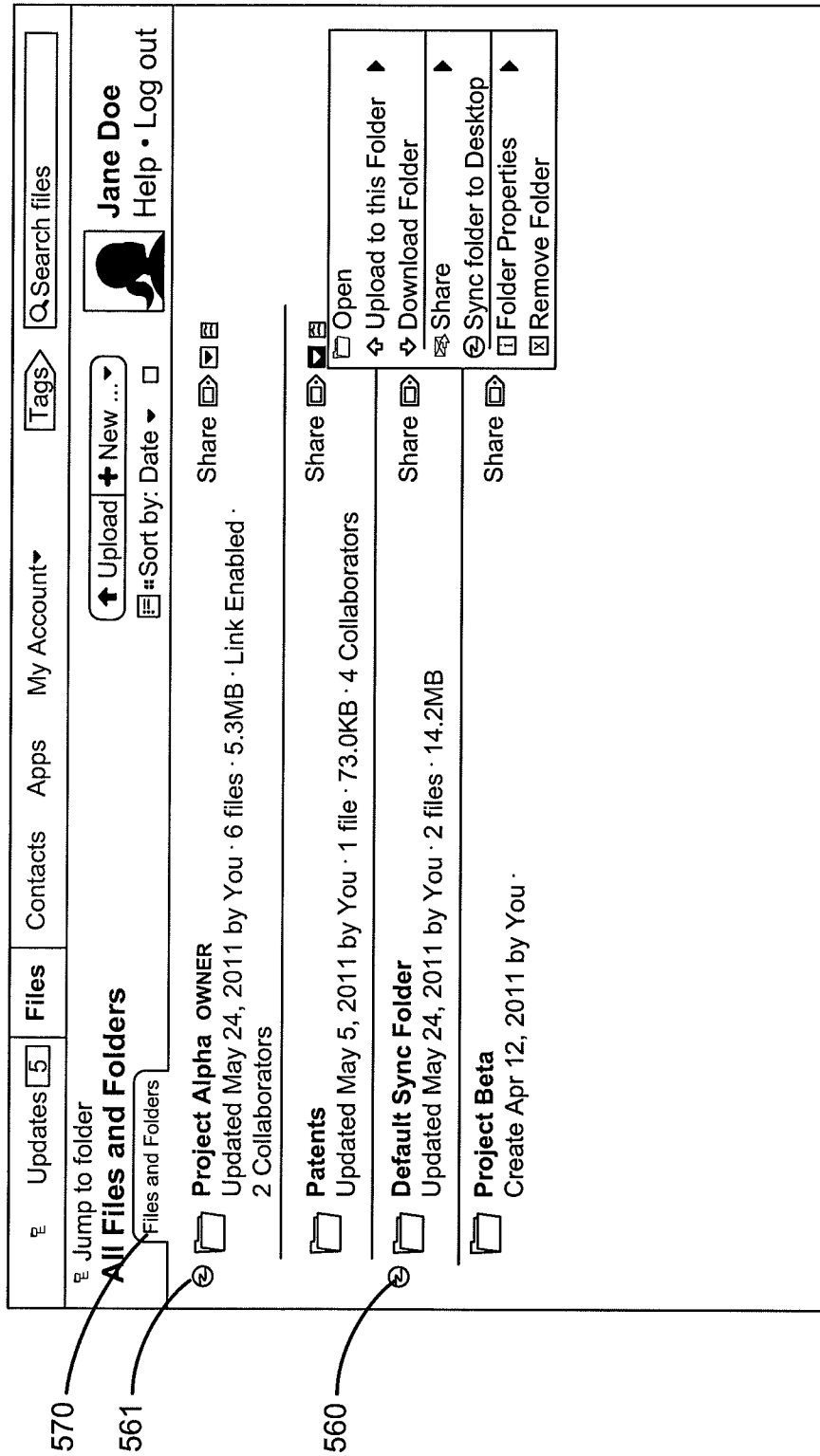


FIG. 5

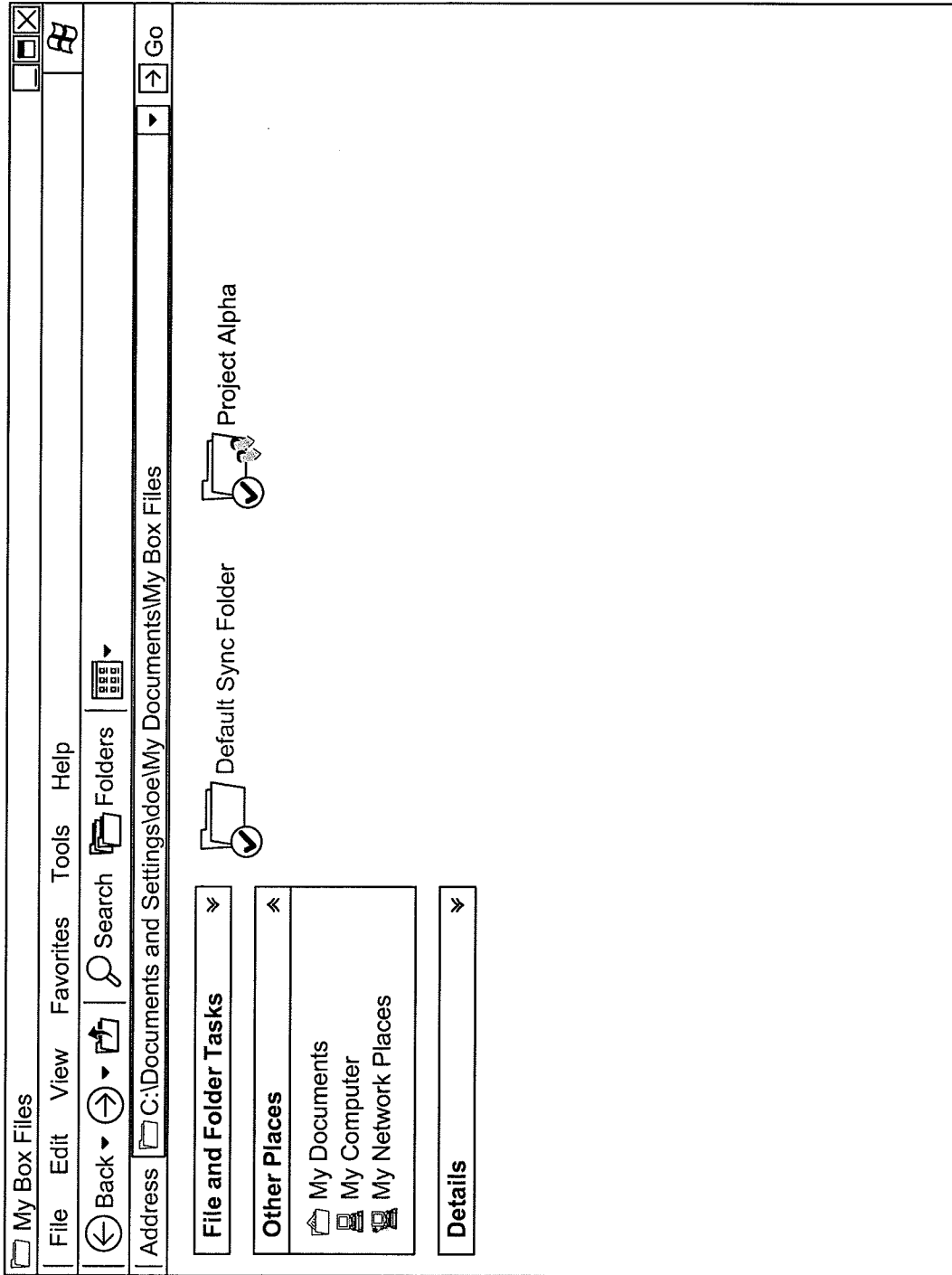


FIG. 6

700 →

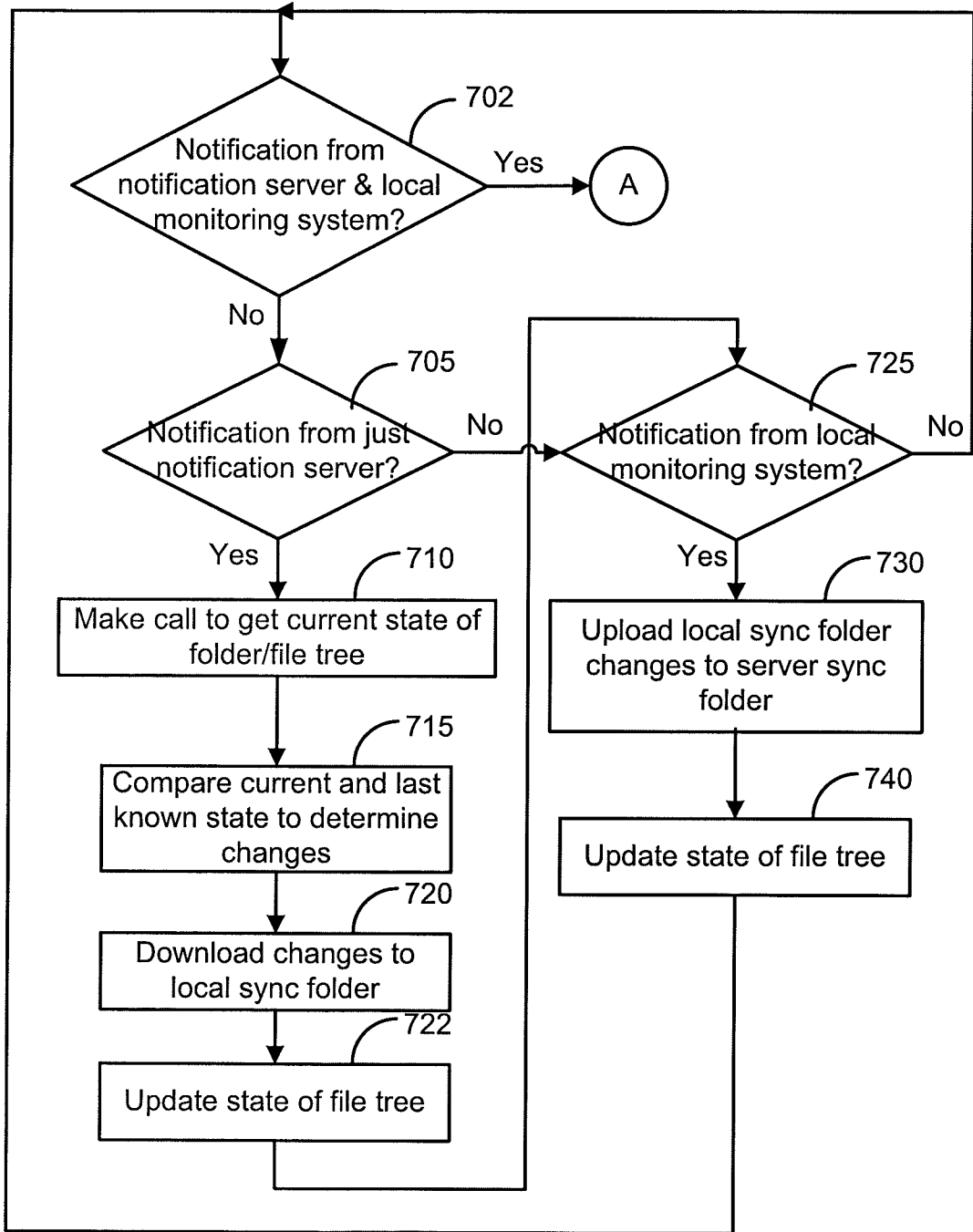


FIG. 7

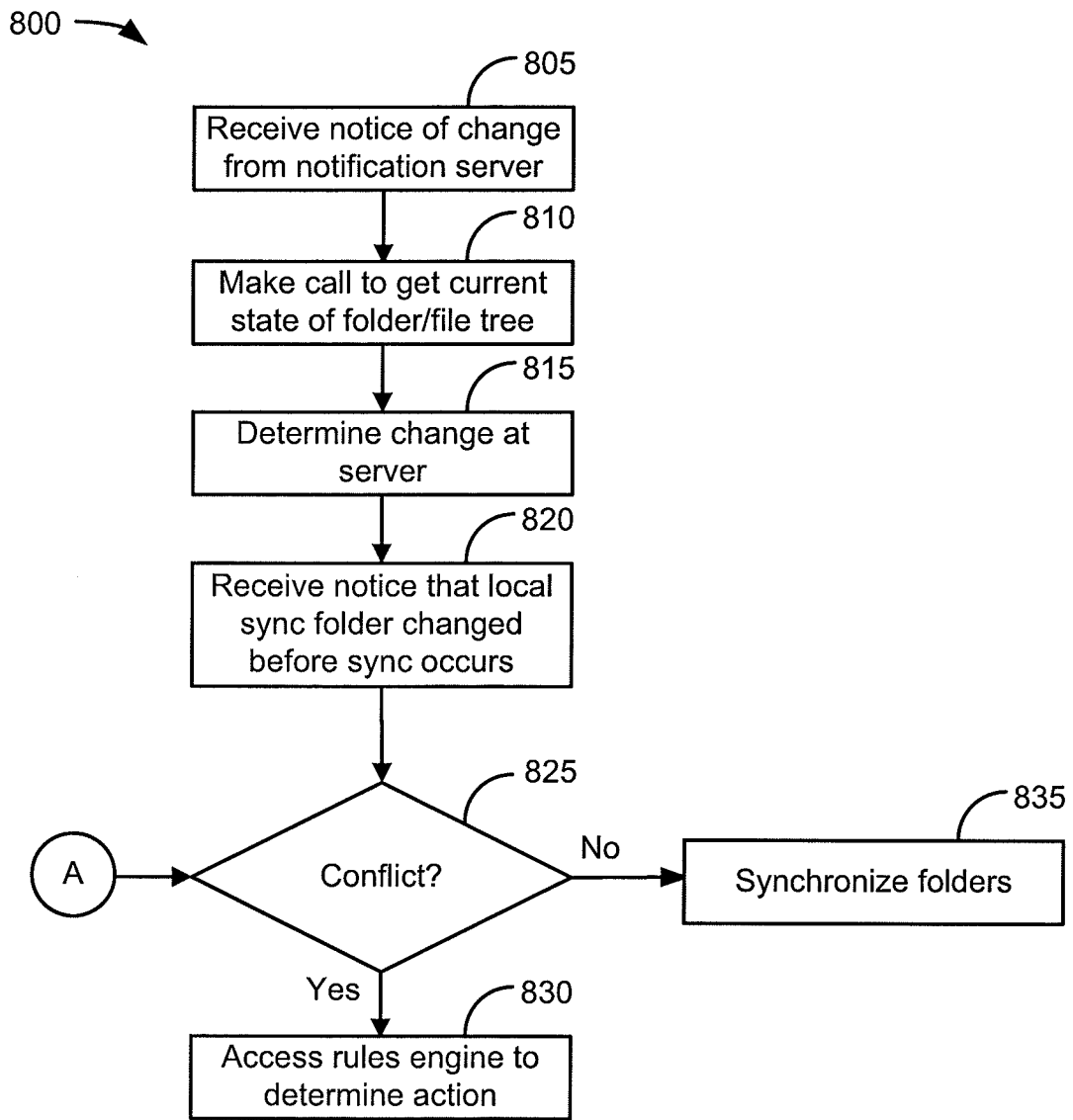
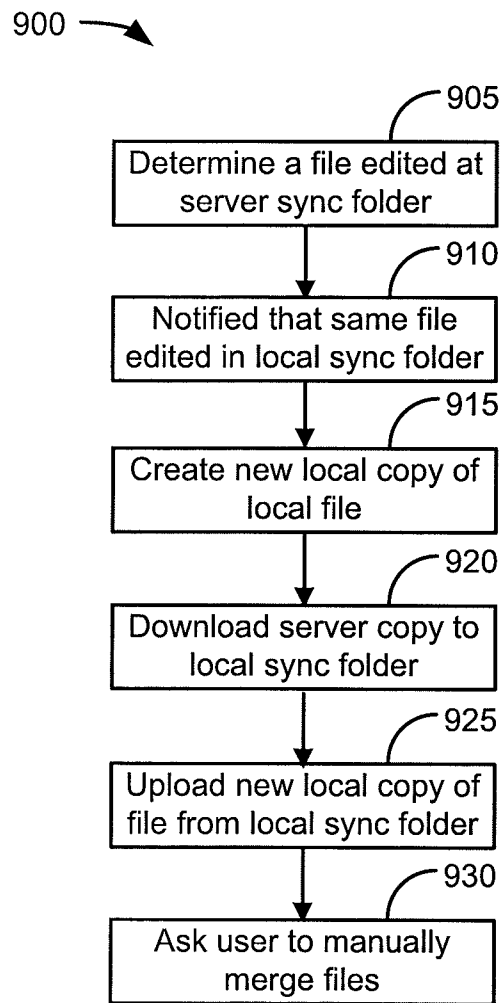


FIG. 8

**FIG. 9**

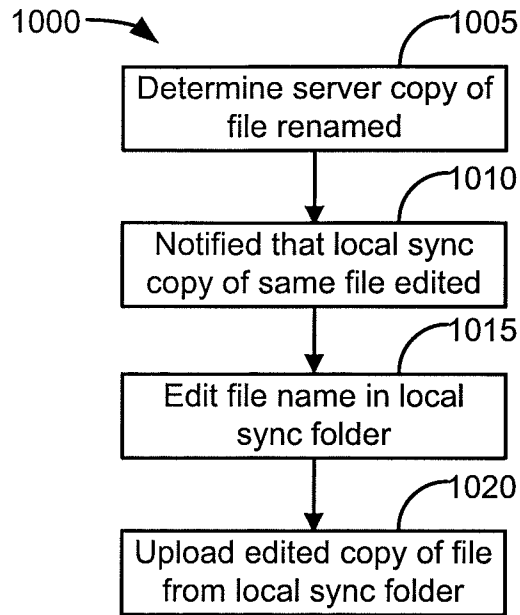


FIG. 10

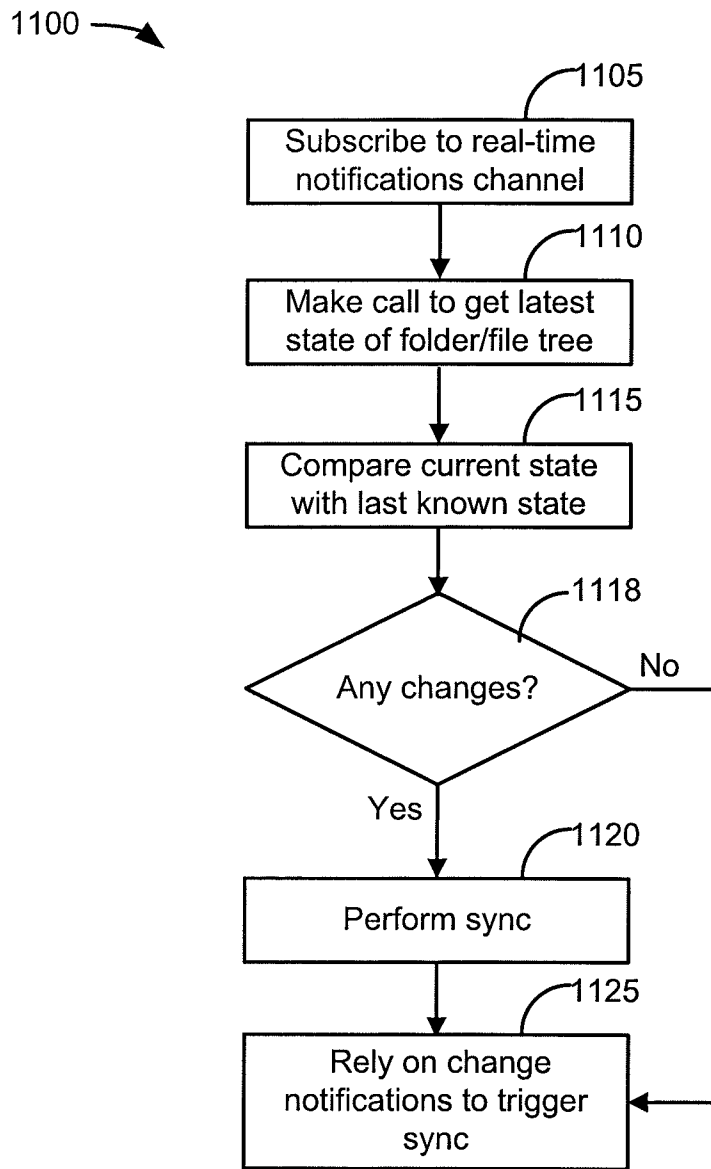


FIG. 11

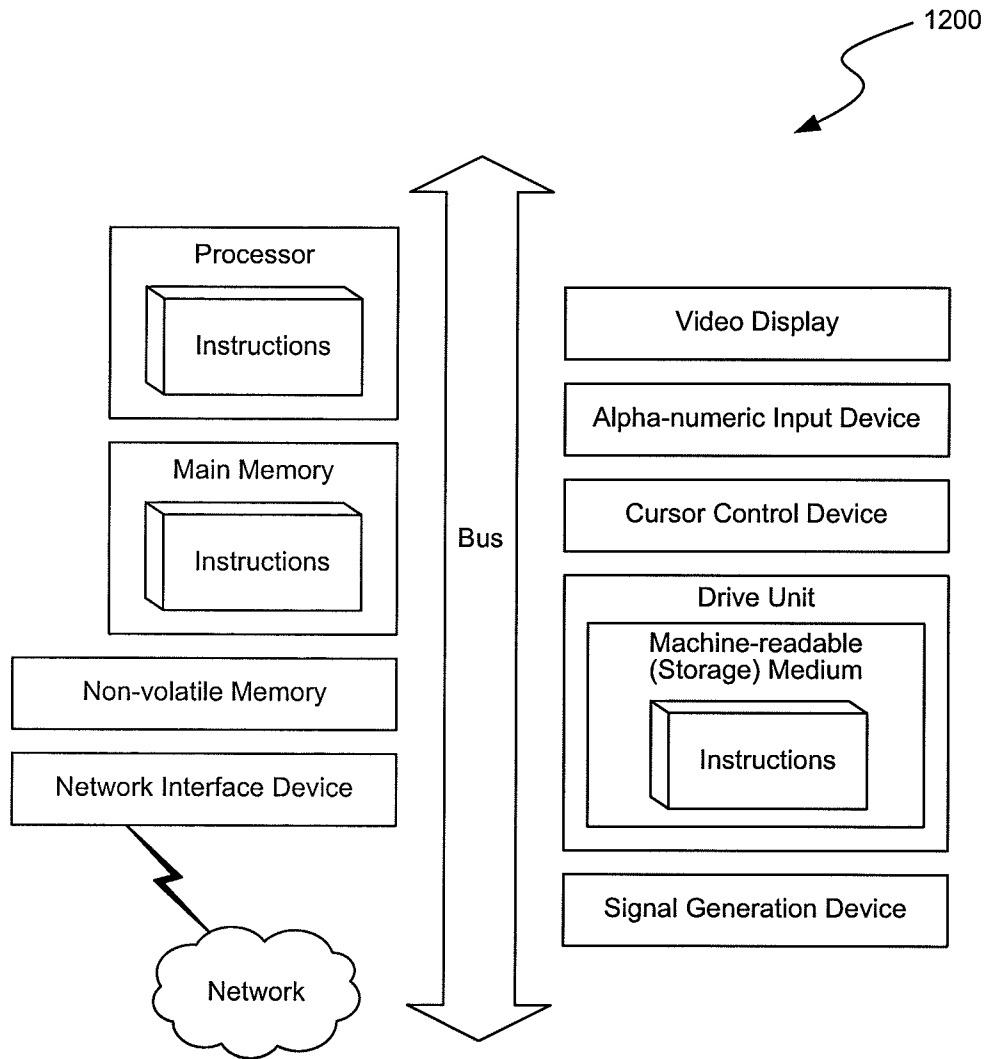


FIG. 12