



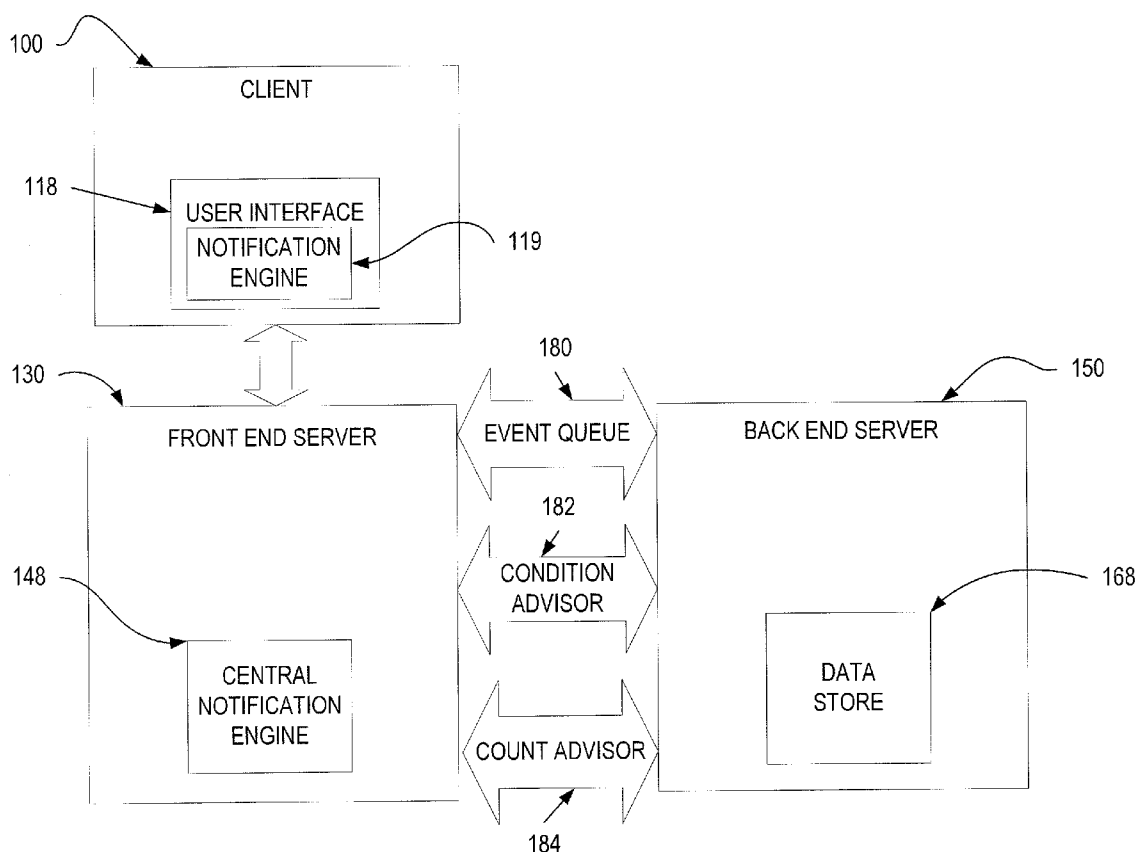
US 20120198053A1

(19) **United States**(12) **Patent Application Publication**
Ozhan et al.(10) **Pub. No.: US 2012/0198053 A1**(43) **Pub. Date: Aug. 2, 2012**(54) **WEB BASED CLIENT/SERVER
NOTIFICATION ENGINE****Publication Classification**(51) **Int. Cl.**
G06F 15/173 (2006.01)(52) **U.S. Cl.** **709/224**(57) **ABSTRACT**

Various technologies and techniques improve the updating of client content in a client/server arrangement. A client notification engine of a user interface subscribes to receive notifications from a central server side notification engine. The client notification engine polls the server side notification engine at a specified interval. The server side notification engine receives and aggregates notifications about and/or from one or more sources and aggregates them into a collection of relevant notifications. These notifications are sent to the client where the different subscriptions originated and are then used by the user interface in the client to update part of the content being displayed as appropriate.

(75) Inventors: **Ozan Ozhan**, Sammamish, WA (US); **James R. Van Eaton**, Woodinville, WA (US); **Russell L. Simpson**, Kirkland, WA (US)(73) Assignee: **MICROSOFT CORPORATION**, Redmond, WA (US)(21) Appl. No.: **13/196,528**(22) Filed: **Aug. 2, 2011****Related U.S. Application Data**

(63) Continuation of application No. 11/338,039, filed on Jan. 24, 2006, now Pat. No. 8,015,152.



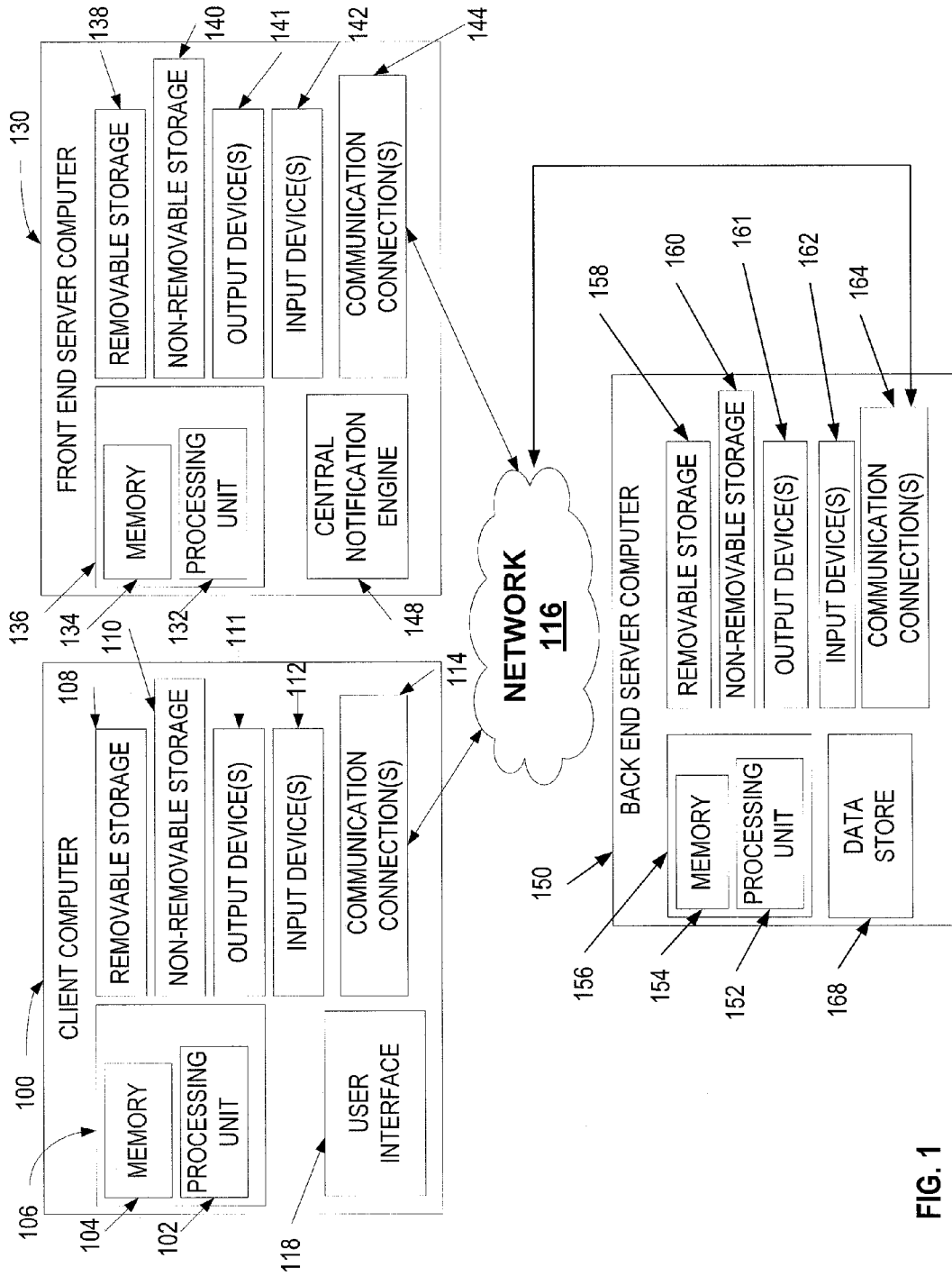


FIG. 1

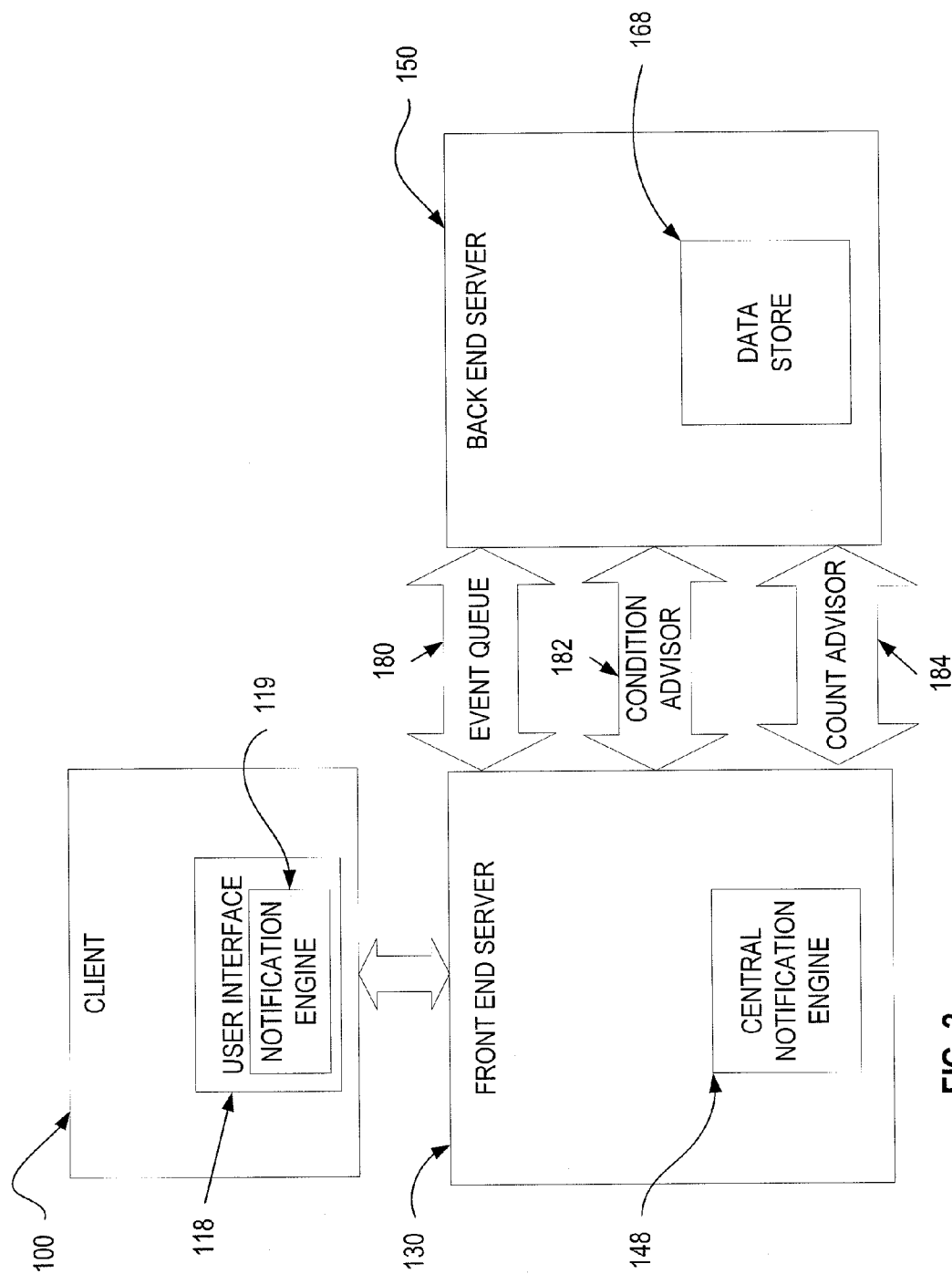
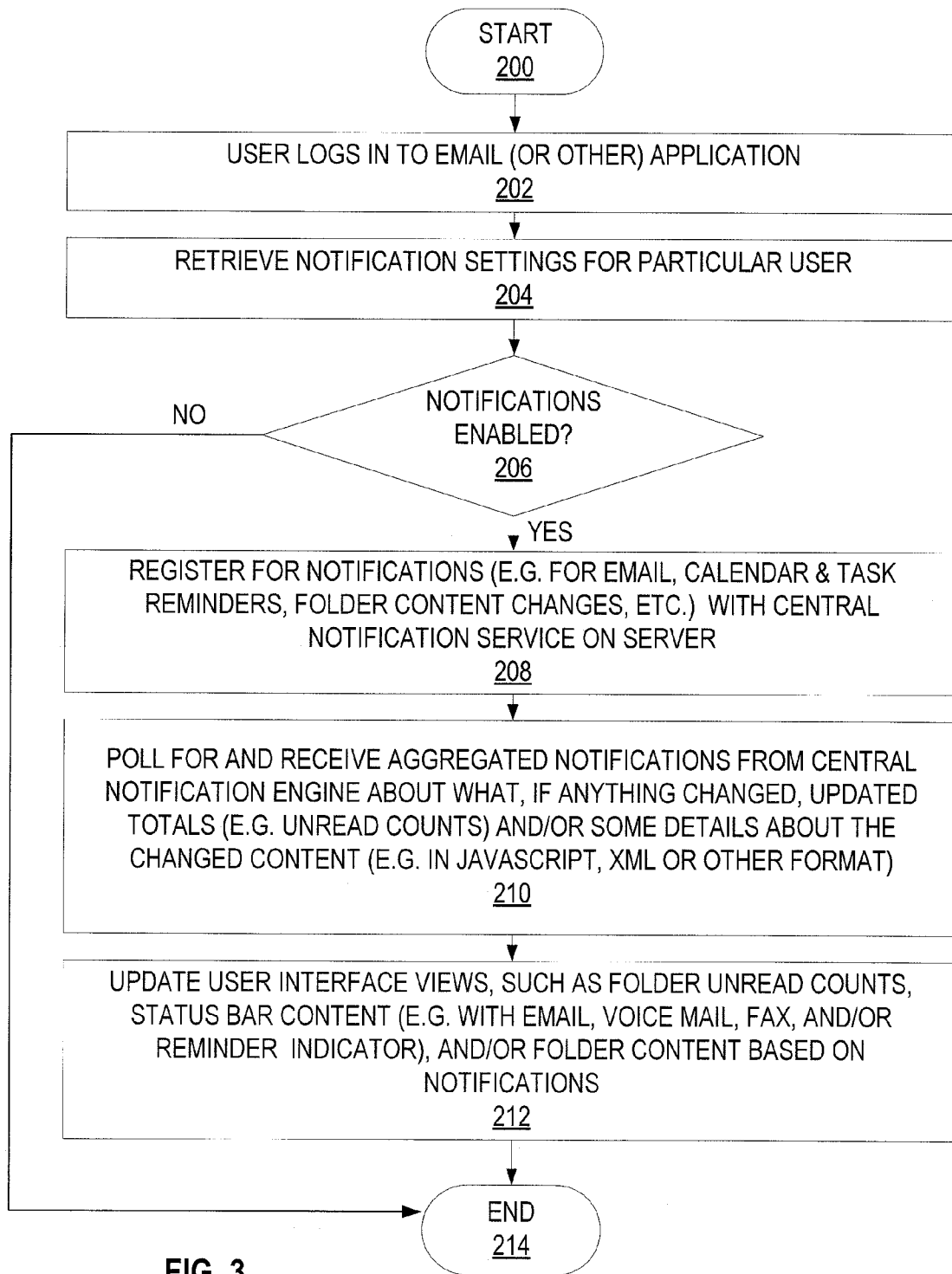
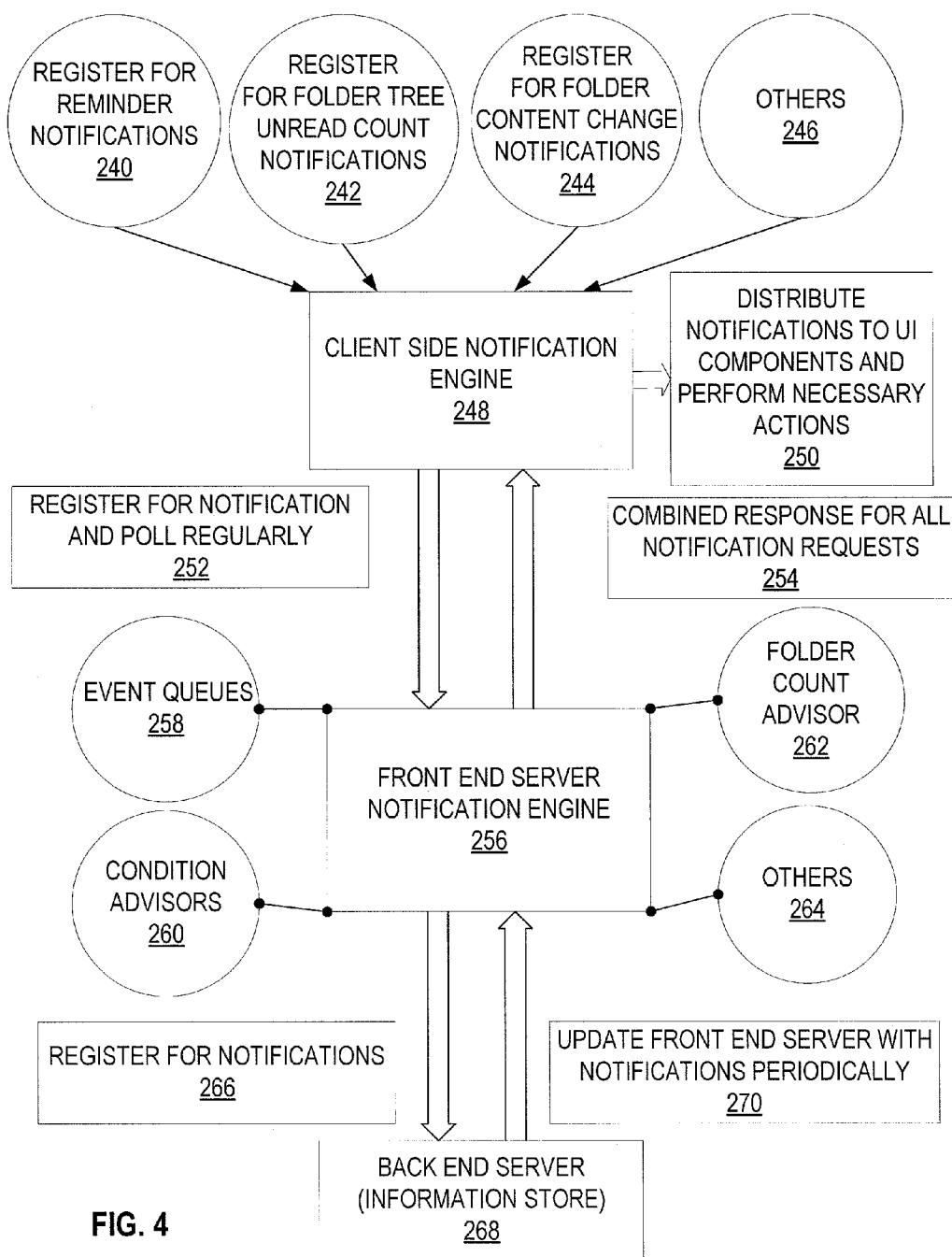
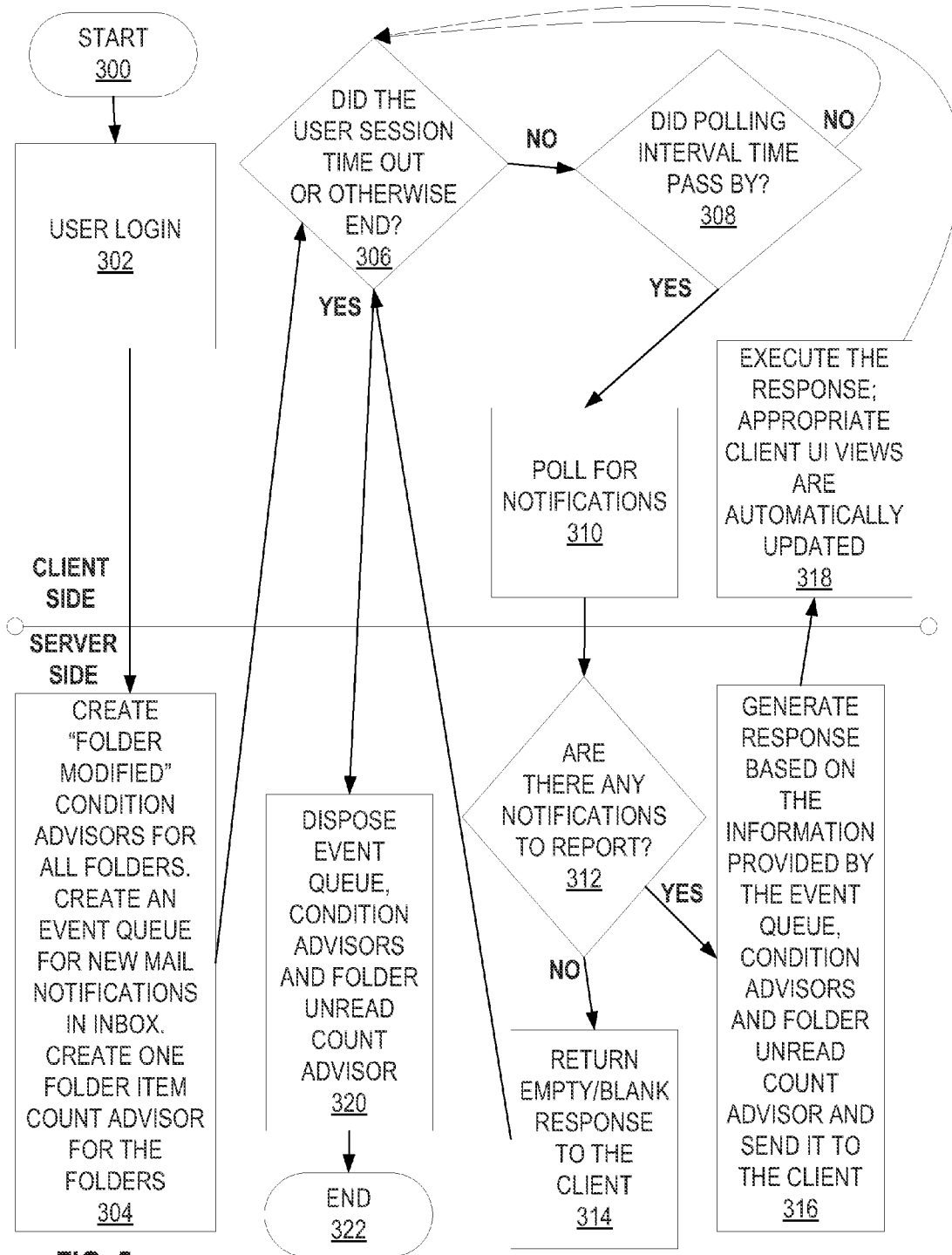


FIG. 2







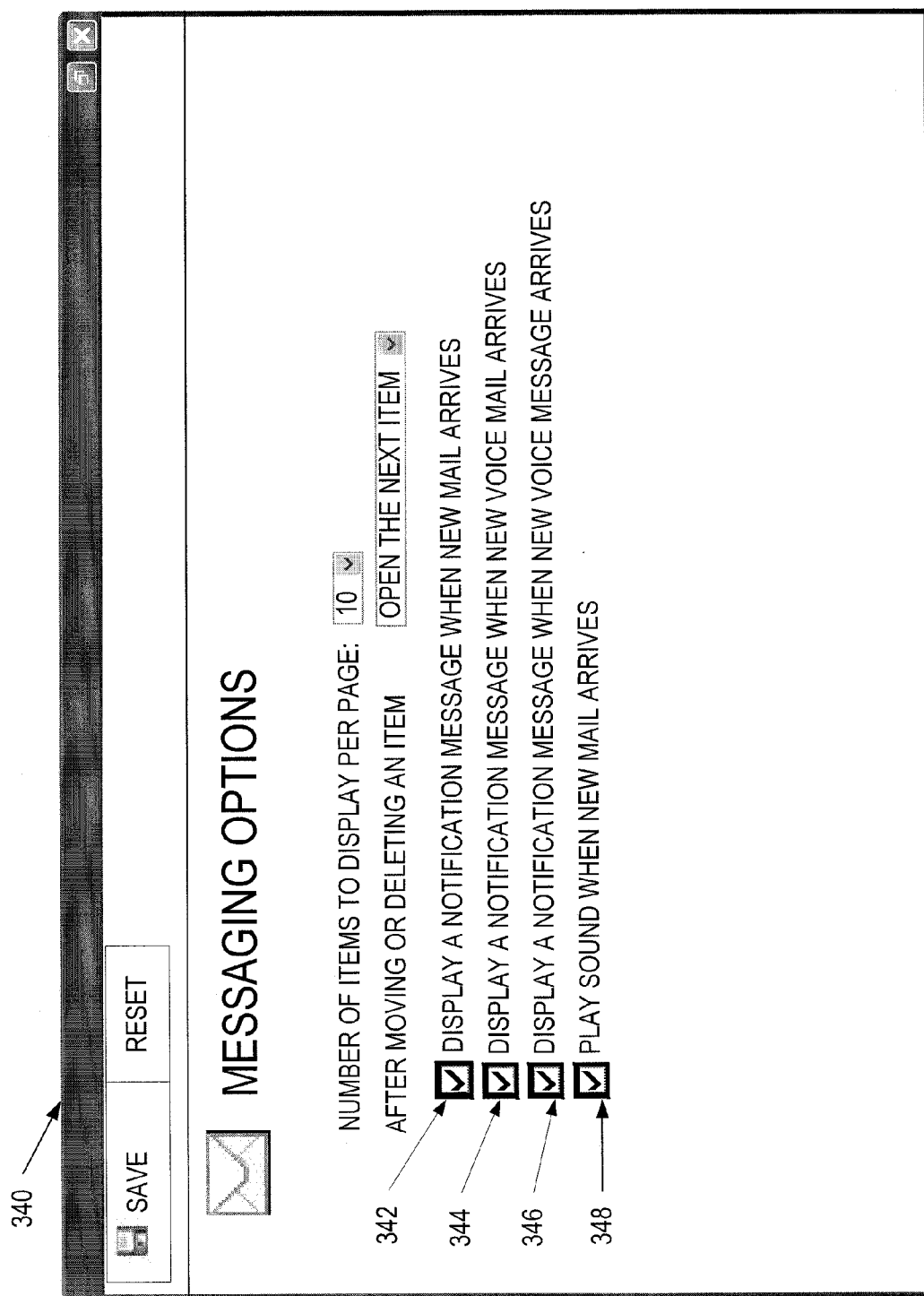


FIG. 6

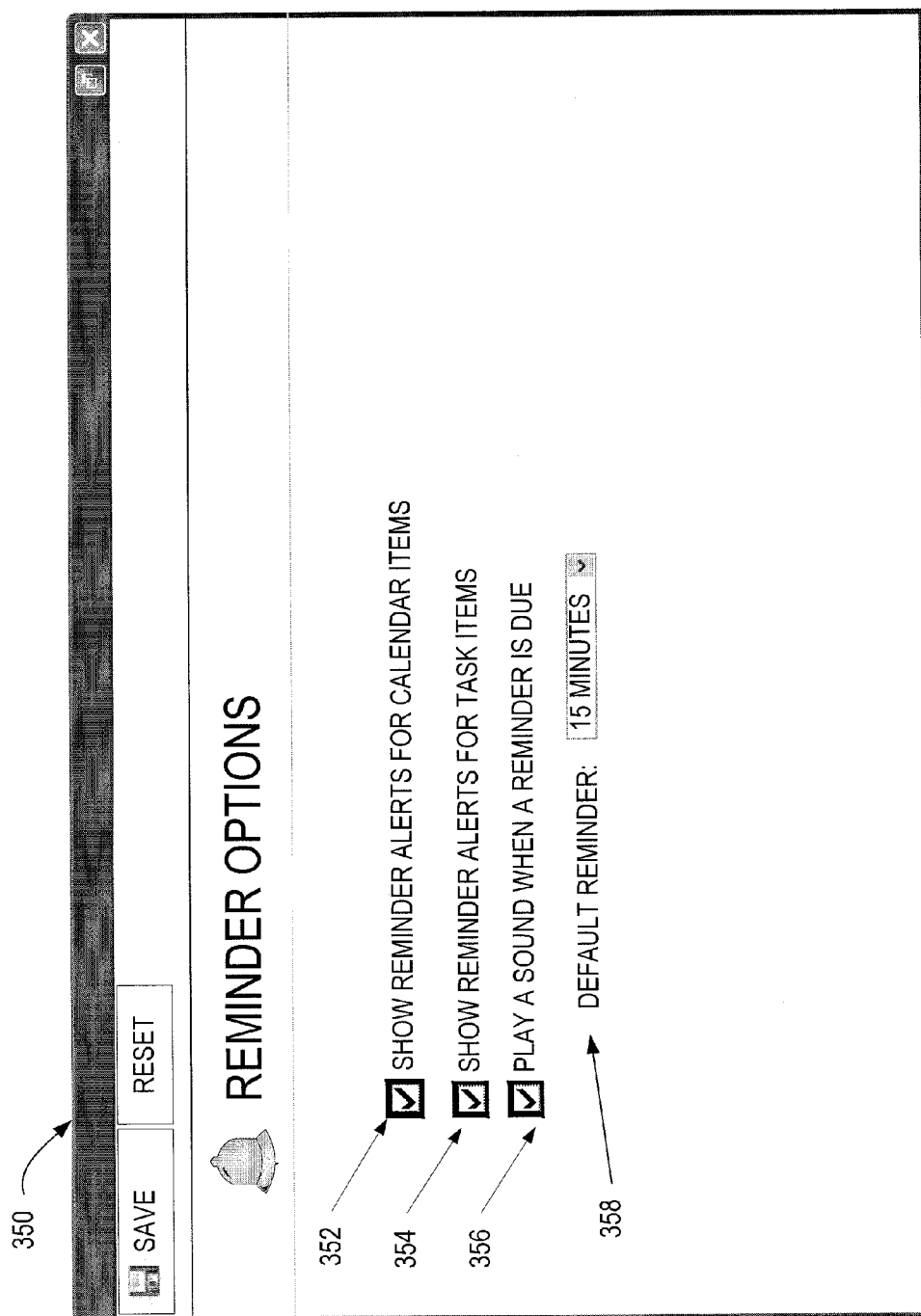


FIG. 7

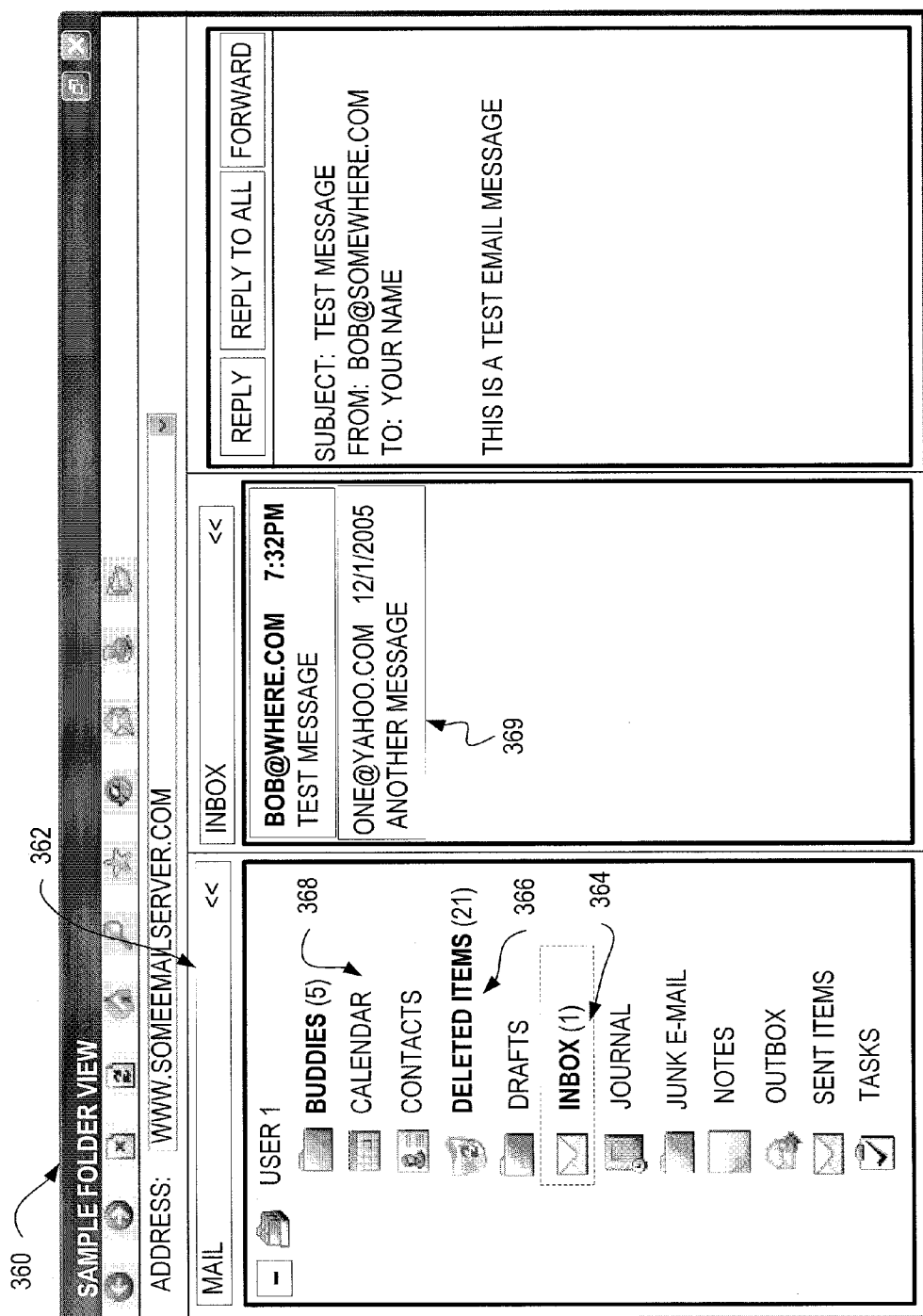


FIG. 8

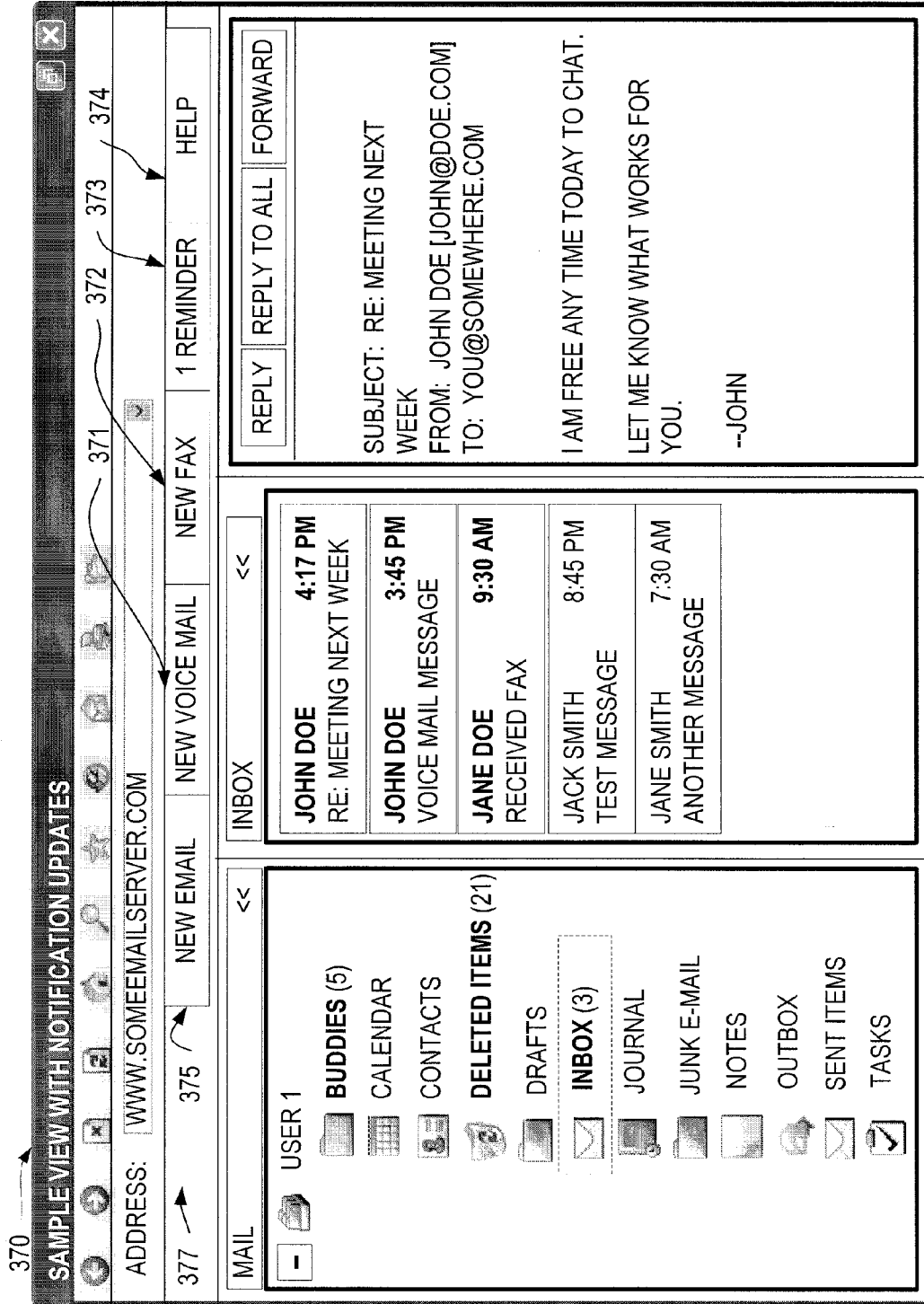


FIG. 9

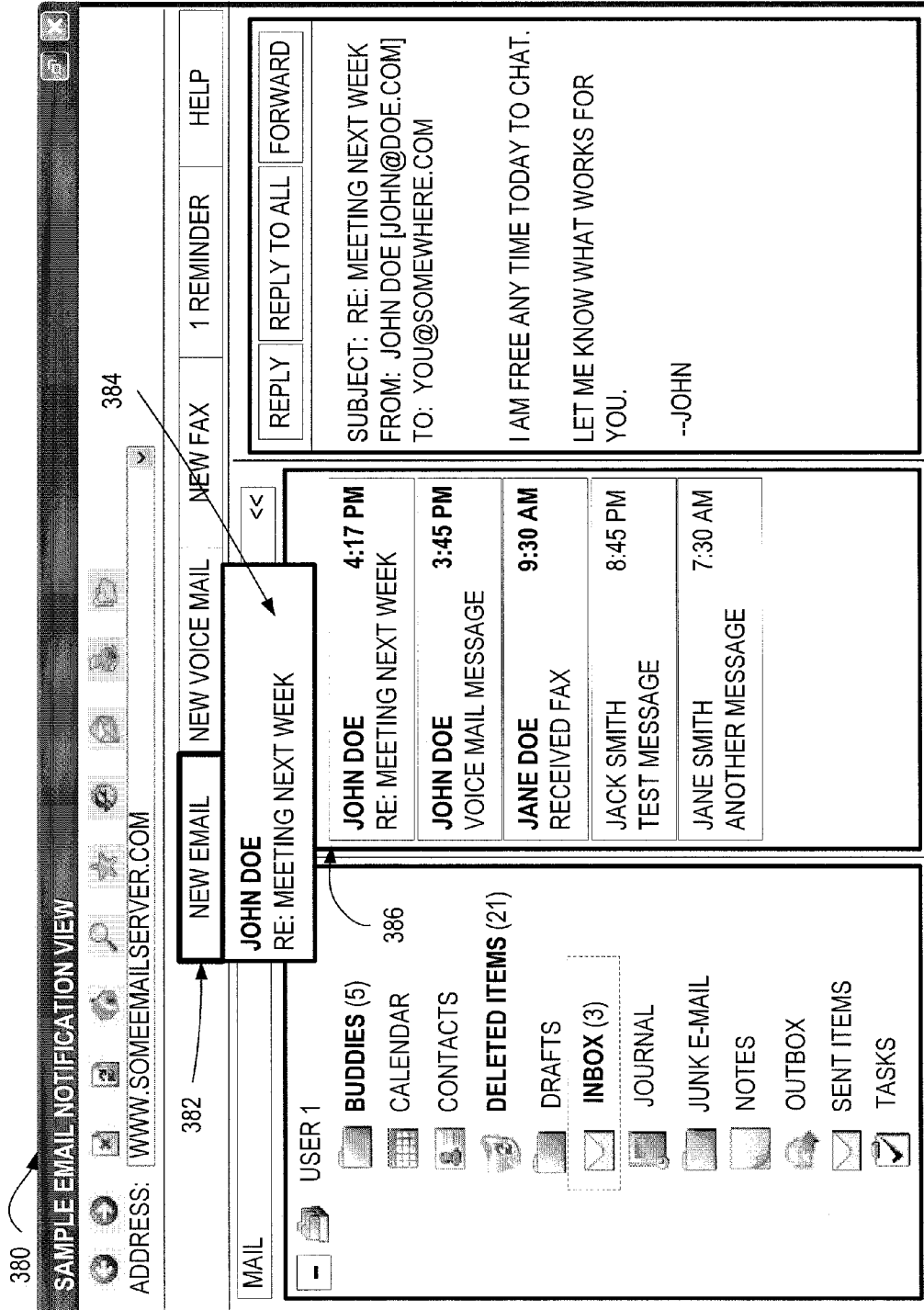


FIG. 10

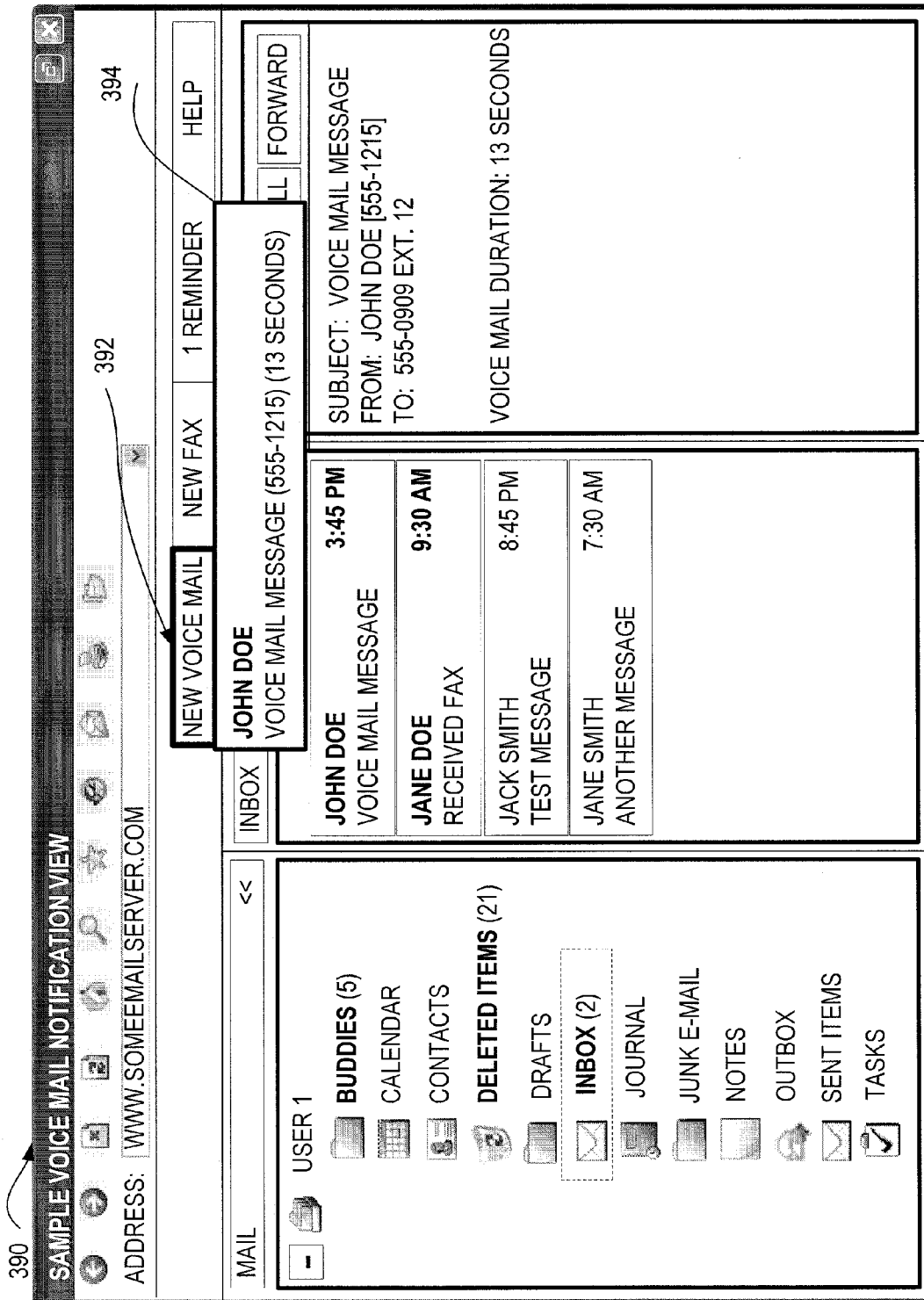


FIG. 11

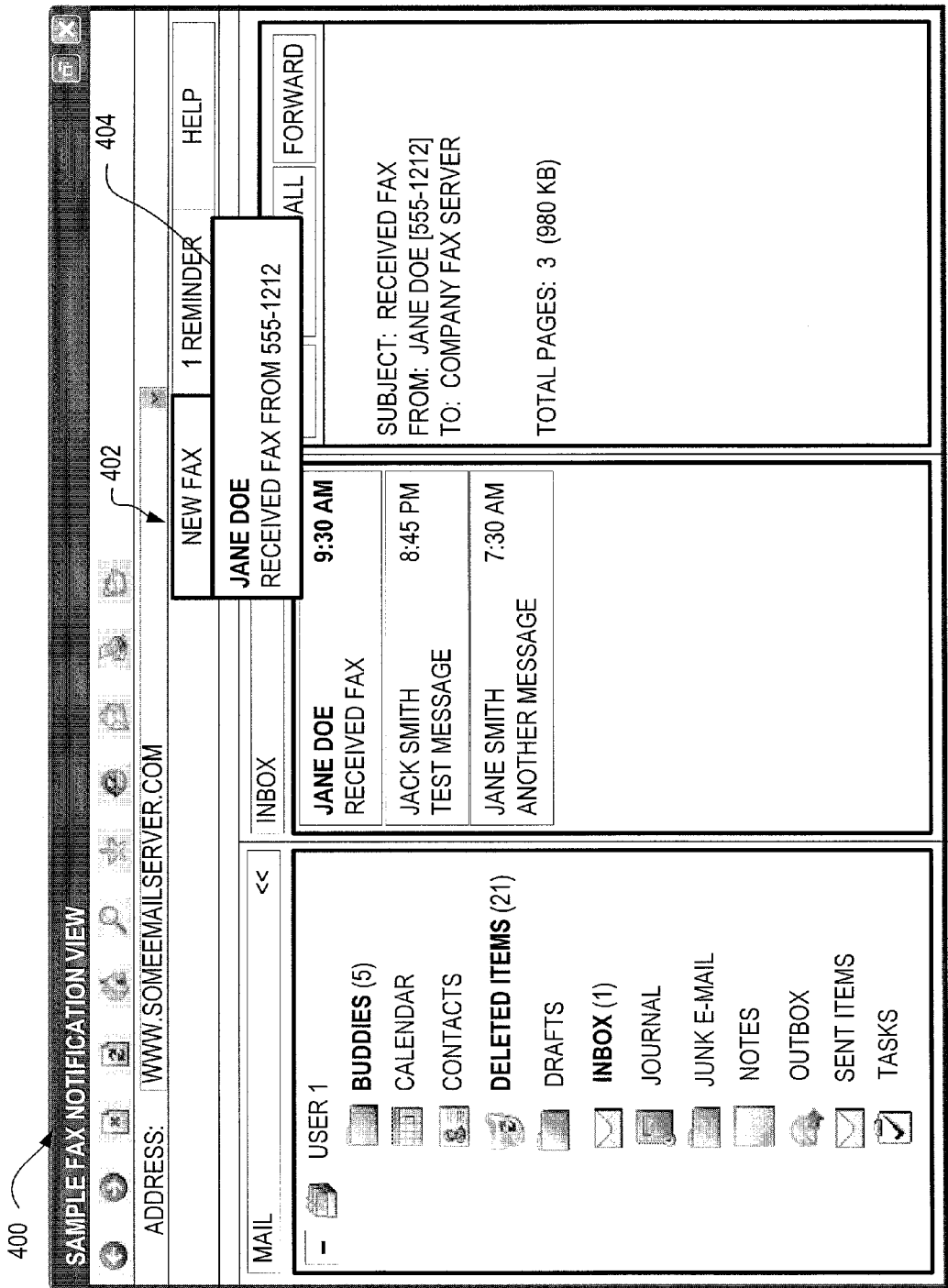


FIG. 12

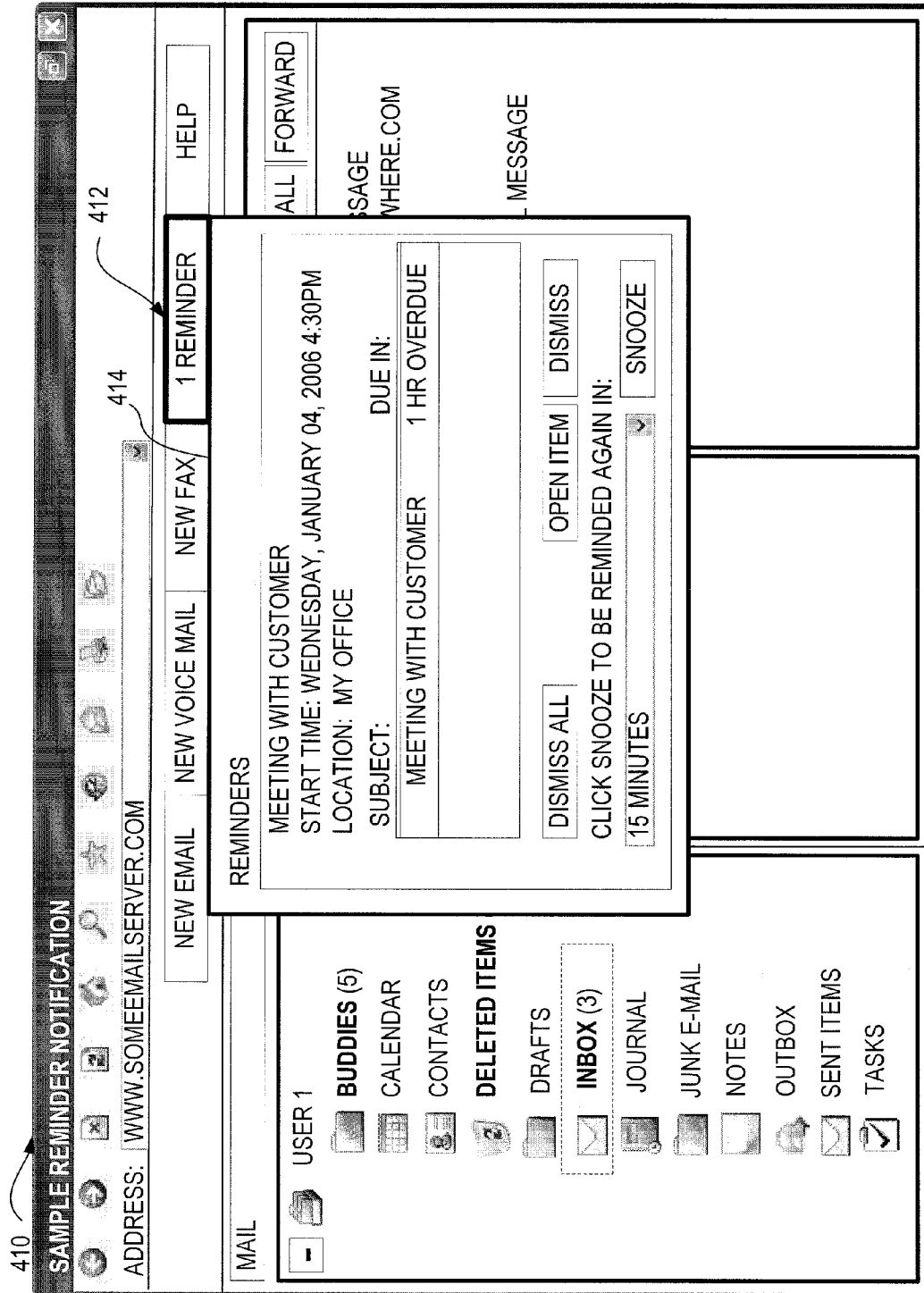


FIG. 13

WEB BASED CLIENT/SERVER NOTIFICATION ENGINE

CROSS-REFERENCES TO RELATED APPLICATIONS

[0001] This application is a continuation of application Ser. No. 11/338,039, filed Jan. 24, 2006, which is incorporated herein by reference.

BACKGROUND

[0002] In today's world of technology, it has become easier than ever before to communicate with people using one or more of a variety of communication methods, such as email, telephone, fax, instant messaging, and so on. Communication and personal organizer programs typically have the ability to display messages received from one or more of these various sources. Some communication programs operate in a web browser, such as MICROSOFT® Office OUTLOOK® Web Access (OWA), Yahoo Mail, AOL Mail, and others. With such disconnected applications, the server is not contacted until something is needed, such as when the user performs an action that requires the page to be updated or changed. When new communication messages are received on the server, the client is not updated with the new content until the user selects an option to perform a manual refresh of the page's contents, or until the user otherwise takes some action causing the client to request that the server provide such updated information.

SUMMARY

[0003] Various technologies and techniques are disclosed that improve the updating of client content in a client/server arrangement. A client notification engine of a user interface, such as a communication management or email application, subscribes to receive notifications from a server side notification engine. The client polls the server side notification engine at specified intervals. The server side notification engine receives and aggregates notifications about and/or from one or more sources and aggregates them into a collection of relevant notifications at a specified interval. These notifications are sent to the client where the different subscriptions originated and are then used by the user interface in the client to update part of the content being displayed as appropriate. In one implementation, a status bar is updated to indicate that new communications have been received, such as a new email, a new fax, and/or a new voice mail. Alternatively or additionally, a folder list is updated to display updated totals, such as the number of unread messages in each folder or the number of total items in each folder. Alternatively or additionally, the contents of the folder that the user is currently viewing are updated if they changed.

[0004] This Summary was provided to introduce a selection of concepts in a simplified form that are further described below in the Detailed Description. This Summary is not intended to identify key features or essential features of the claimed subject matter, nor is it intended to be used as an aid in determining the scope of the claimed subject matter.

BRIEF DESCRIPTION OF THE DRAWINGS

[0005] FIG. 1 is a diagrammatic view of parts of a system of one implementation.

[0006] FIG. 2 is a diagrammatic view of additional parts of the system of FIG. 1 of one implementation.

[0007] FIG. 3 is a high level process flow diagram for one implementation of the system of FIG. 1.

[0008] FIG. 4 is a logical diagram for one implementation of the system of FIG. 1 illustrating the communications between the client side notification engine and the front end server notification engine for subscribing to and managing notifications.

[0009] FIG. 5 is a process flow diagram for one implementation of the system of FIG. 1 illustrating the stages involved in registering for notifications, collecting notification responses, and processing the response received.

[0010] FIG. 6 is a simulated screen for one implementation of the system for FIG. 1 which illustrates allowing a user to specify messaging notification options.

[0011] FIG. 7 is a simulated screen for one implementation of the system for FIG. 1 which illustrates allowing a user to specify reminder notification options.

[0012] FIG. 8 is a simulated screen for one implementation of the system for FIG. 1 which illustrates an email application with unread totals that were updated based on the subscription process of FIGS. 4 and 5.

[0013] FIG. 9 is a simulated screen for one implementation of the system for FIG. 1 which illustrates an email application with a status bar that was updated based on the subscription process of FIGS. 4 and 5.

[0014] FIG. 10 is a simulated screen for one implementation of the system for FIG. 1 which illustrates the new email message that was received when the user selects the New Mail option on the status bar of the simulated screen of FIG. 9.

[0015] FIG. 11 is a simulated screen for one implementation of the system for FIG. 1 which illustrates the new voice mail message that was received when the user selects the New Voice Mail option on the status bar of the simulated screen of FIG. 9.

[0016] FIG. 12 is a simulated screen for one implementation of the system for FIG. 1 which illustrates the new fax message that was received when the user selects the New Fax option on the status bar of the simulated screen of FIG. 9.

[0017] FIG. 13 is a simulated screen for one implementation of the system for FIG. 1 which illustrates the new calendar reminder that was received when the user selects the Reminders option on the status bar of the simulated screen of FIG. 9.

DETAILED DESCRIPTION

[0018] For the purposes of promoting an understanding of the principles of the invention, reference will now be made to the embodiments illustrated in the drawings and specific language will be used to describe the same. It will nevertheless be understood that no limitation of the scope is thereby intended. Any alterations and further modifications in the described embodiments, and any further applications of the principles as described herein are contemplated as would normally occur to one skilled in the art.

[0019] The system may be described in the general context as a system that improves the updating of client content in a client/server arrangement. A client notification engine of a user interface subscribes to receive notifications from a server side notification engine. The client notification engine polls the server side notification engine at a specified interval. The server side notification engine receives and aggregates notifications about and/or from one or more sources and/or data stores and aggregates them into a collection of relevant notifications based on the context of the user. These notifications

are sent to the client where the different subscriptions originated and are then used by the user interface in the client to update part of the content being displayed as appropriate. A status bar or other area is updated in the user interface to indicate that new communications have been received, such as a new email, a new fax, and/or a new voice mail. Alternatively or additionally, a folder list is updated to display updated totals, such as the number of unread messages in each folder or the number of total items in each folder. Alternatively or additionally, the contents of the folder that the user is currently viewing are updated if they changed.

[0020] The term folder as used herein is referring to any collection of messages, however they are stored and/or are represented in a graphical user interface. One of ordinary skill in the art will appreciate that some operating systems do not use the term folder when referring to a collection of messages, and that such scenarios are still covered by the examples illustrated herein that use the term folder.

[0021] In one implementation, the system is a web-based communication application such as MICROSOFT® Office OUTLOOK® Web Access (OWA), Yahoo Mail, or AOL Mail. In another implementation, the system is any type of communication application, web-based or not, that is not required to maintain a constant connection to one or more data stores, such as MICROSOFT® Office OUTLOOK® and/or other email clients that support POP3 and/or other disconnected message protocols. In yet another implementation, the system is not a communication application, but serves other purposes, such as project scheduling, travel planning, or others.

[0022] As shown in FIG. 1, an exemplary computer system to use for implementing one or more parts of the system includes one or more computing devices, such as computing devices 100, 130, and/or 150. In its most basic configuration, computing devices 100, 130, and/or 150 typically include at least one processing unit (102, 132, and 152, respectively) and memory (104, 134, and 154, respectively). Depending on the exact configuration and type of computing device, memory (104, 134, or 154) may be volatile (such as RAM), non-volatile (such as ROM, flash memory, etc.) or some combination of the two. This most basic configuration is illustrated in FIG. 1 by lines 106, 136, and 156.

[0023] Additionally, devices 100, 130, and/or 150 may also have additional features/functionality. For example, devices 100, 130, and/or 150 may also include additional storage (removable and/or non-removable) including, but not limited to, magnetic or optical disks or tape. Such additional storage is illustrated in FIG. 1 by removable storage (108, 138, and 158, respectively) and non-removable storage (110, 140, and 160, respectively). Computer storage media includes volatile and nonvolatile, removable and non-removable media implemented in any method or technology for storage of information such as computer readable instructions, data structures, program modules or other data. Memory (104, 134, and 154), removable storage (108, 138, and 158), and non-removable storage (110, 140, and 160) are all examples of computer storage media. Computer storage media includes, but is not limited to, RAM, ROM, EEPROM, flash memory or other memory technology, CD-ROM, digital versatile disks (DVD) or other optical storage, magnetic cassettes, magnetic tape, magnetic disk storage or other magnetic storage devices, or any other medium which can be used to store the desired

information and which can be accessed by device 100, 130, and/or 150. Any such computer storage media may be part of device 100, 130, and/or 150.

[0024] Computing devices 100, 130, and/or 150 include one or more communication connections that allow computing devices 100, 130, and/or 150 to communicate with each other and/or one or more other computing devices over network 116. Communications connection(s) 114, 144, and 164 are examples of communication media. Communication media typically embodies computer readable instructions, data structures, program modules or other data in a modulated data signal such as a carrier wave or other transport mechanism and includes any information delivery media. The term “modulated data signal” means a signal that has one or more of its characteristics set or changed in such a manner as to encode information in the signal. By way of example, and not limitation, communication media includes wired media such as a wired network or direct-wired connection, and wireless media such as acoustic, RF, infrared and other wireless media. The term computer readable media as used herein includes both storage media and communication media.

[0025] In one implementation, computing device 100 is a client computer that communicates with front end server computer 130 using communication connection 114 and 144 over network 116. In such an implementation, user interface 118 of client computing device 100 communicates with notification engine 148 on server computing device 130 to subscribe to notifications and receive updated information. Front end server computer 130 communicates with back end server computing device 150 by network 116 using communication connections 144 and 164.

[0026] In one implementation, user interface 118 of client computing device 100 is a browser-based user interface, such as MICROSOFT® Office OUTLOOK® Web Access (OWA), server computing device 130 is a web server, and back end server computing device 150 hosts a data store for a communication program, such as MICROSOFT® Exchange. In another implementation, user interface 118 of client computing device 100 is a user interface included in an executable program located on client computing device 100, such as MICROSOFT® Office OUTLOOK®, MICROSOFT® Project, or Lotus Notes. It will be appreciated that front end server computer 130 and back end server computing device 150 can be the same computer in alternate embodiments. Furthermore, it will be appreciated that additional back end server computing device 150 could also be used, such as where multiple data stores are accessed by front end server computing device 130.

[0027] Computing devices 100, 130, and 150 may also have input device(s) (112, 142, and 162, respectively) such as keyboard, mouse, pen, voice input device, touch input device, etc. Output device(s) (111, 141, and 161, respectively) such as a display, speakers, printer, etc. may also be included. These devices are well known in the art and need not be discussed at length here.

[0028] Turning now to FIG. 2 with continued reference to FIG. 1, a diagrammatic view of additional parts of system of FIG. 1 of one implementation are illustrated. The same reference numerals are used on FIG. 2 for those items that are the same as on FIG. 1. Notification engine 119 of user interface 118 on client computing device 100 communicates with central notification engine 148 of front end server computing device 130 to subscribe to notifications. In one implementation, central notification engine 148 has a notification man-

ager class that contains methods for creating one or more event queues, deleting an event queue, flushing and/or disposing of an event queue, creating a condition advisor, deleting a condition advisor, flushing and/or disposing of a condition advisor, creating a folder count advisor, deleting a folder count advisor, flushing and/or disposing of a folder count advisor, and/or other methods for performing other operations.

[0029] Central notification engine **148** has an event queue object **180**, a condition advisor object **182**, and a count advisor object **184** that are operable to communicate with one or more data stores **168** on one or more back end server computing devices **150** to obtain updated information at specified data gathering intervals. A few non-limiting examples of such data stores include one or more message stores or products such as MICROSOFT® Exchange, a POP3 or IMAP email data store, a fax data store, and/or another file or database. The updated information is then aggregated by central notification engine **148** and returned to notification engine **119** on client computing device **100** for further processing by user interface **118**. In one implementation, only relevant information is returned, such as those specific to the context in which the user is working. As one non-limiting example, if the user is currently viewing his or her calendar, then detailed information about the calendar would be returned, but detailed information about the contents of the inbox would not be returned. In other implementations, more information is returned.

[0030] Turning now to FIG. **3** with continued reference to FIGS. **1** and **2**, a high level process flow for one implementation is presented. In one form, the process of FIG. **3** is at least partially implemented in the operating logic of computing device **100**, **130**, and/or **150**. The process begins at start point **200** with the user logging into an email or other application (stage **202**). Client computing device **100** retrieves notification settings for the particular user (stage **204**). If notifications are not enabled for the particular user (decision point **206**), then the process ends at end point **214**. If notifications are enabled for the particular user (decision point **206**), then notification engine **119** of client computing device **100** communicates with central notification engine **148** on front end server computing device **130** to register for notifications (stage **208**).

[0031] A few non-limiting examples of notifications include email messages, calendar reminders, task reminders, folder content changes, folder count totals, etc. Notification engine **119** polls for and receives notifications that were aggregated by central notification service about what, if anything changed, updated totals (such as unread item counts), and/or some details about the changed and/or new content (stage **210**).

[0032] In one implementation, the details about the changes and status of the various data that are received by the client are included in one or more text files, such as XML. In another implementation, the details are received in a scripting language format, such as JavaScript or VBScript, where the script is executed and/or consumed by the notification engine on the client. In yet another implementation, the details are received in another file type or format for interpretation, execution, and/or display on the client. User interface **118** interprets the information received from the central notification engine and updates the user interface display appropriately (stage **212**). In one implementation, folder unread counts are updated to indicate the number of unread messages contained in that folder. Alternatively or additionally, a status

or indicator bar in the user interface is updated to display whether there are new reminders and/or new messages, such as new email, fax, voice messages, and/or reminders. Alternatively or additionally, a custom-defined rule can be defined by the user for display in the status bar, such as to notify the user of any messages received from the boss. Alternatively or additionally, a folder the user is currently viewing is updated with any new content relevant to the particular display. Alternatively or additionally, other content can also be stored locally for quick retrieval once the user changes context where the information would be needed. The process then ends at end point **214**.

[0033] Turning now to FIG. **4** with continued reference to FIGS. **1** and **2**, a logical diagram describing the process for subscribing to and managing notifications in one implementation are illustrated. In one form, the process of FIG. **4** is at least partially implemented in the operating logic of computing device **100**, **130**, and/or **150**. Client computing device **100** registers for one or more notifications, such as reminder notifications (stage **240**), folder tree unread count notifications (stage **242**), folder content change notifications (stage **244**), and/or other notifications (stage **246**) with client side notification engine **248** (**119** on FIG. **2**). Client side notification engine **248** registers for notifications with front end server notification engine **256** (**148** on FIG. **2**) and polls regularly (stage **252**). Front end server notification engine **256** manages event queues **258**, condition advisors **260**, folder count advisor **262**, and/or other information tracking objects **264**.

[0034] Front end server notification engine **256** registers for notifications (stage **266**) with one or more data stores **168** on back end server computing device(s) **268** (**150** on FIG. **2**). Back end server computing device **268** updates front end server notification engine **256** with notifications periodically (stage **270**). In other words, the event queue(s), content advisors, and item count advisors are updated accordingly. In one implementation, front end server notification engine **256** combines the responses for all notification requests (stage **254**) and returns only the necessary ones (such as the relevant ones) to the client side notification engine **248**. The client side notification engine **248** distributes notifications to user interface components and performs the necessary actions (stage **250**), such as to update the display.

[0035] Turning now to FIG. **5** with continued reference to FIGS. **1** and **2**, the stages involved in registering for notifications, collecting notification responses, and processing the response received in one implementation are illustrated. In one form, the process of FIG. **5** is at least partially implemented in the operating logic of computing device **100**, **130**, and/or **150**. The process begins at start point **300** with the user logging in to the application (stage **302**). Client side notification engine **248** of user interface **118** registers for notifications with the central notification engine **148**. In one implementation, central notification engine **148** creates folder modified condition advisors for all folders, event queues for new notifications, such as in the Inbox, and/or folder item count advisors for some or all of the folders (stage **304**). If the session has not timed out or otherwise ended (decision point **306**), then the client notification engine **119** checks to determine whether the polling interval time has passed (decision **308**). The client notification engine **119** waits until the polling interval passes by (decision point **308**) to poll the central notification engine **148** for notifications (stage **310**). If there are notifications to report (decision point **312**), then the central notification engine **148** generates a response based on the

information in the event queue(s), condition advisors, and folder unread count advisor(s) and sends them to the client side notification engine 248 for further processing by the user interface 118 (stage 316). User interface 118 interprets and/or otherwise executes the response, and updates the appropriate user interface views (stage 318).

[0036] If there are no notifications to report (decision point 312), then the central notification engine 148 generates an empty or blank response and sends it to the client side notification engine 248 (stage 314). The process then repeats for each polling interval (decision point 308) or until the user session times out or the user closes the application (decision point 306). If the session times out or the user otherwise ends the session or application (decision point 306), such as by closing the browser or program, then the event queue, condition advisors, and folder unread count advisor objects are destroyed (stage 320) to free up system resources. The process then ends at end point 322.

[0037] FIG. 6 is a simulated screen 340 for one implementation of the system for FIG. 1 which illustrates allowing a user to specify messaging notification options. The user can select whether to enable or disable options that display a notification message when new mail arrives 342, display a notification message when a new voice mail arrives 344, display a notification when new voice message arrives 346, and/or to play a sound when new message arrives 348. In one implementation, if any one or more of these options are enabled (decision point 206 on FIG. 3), then user interface 118 of client computing device 100 registers for messaging event notifications with central notification engine 148 on front end server computing device 130.

[0038] FIG. 7 is a simulated screen 350 for one implementation of the system for FIG. 1 which illustrates allowing a user to specify reminder notification options. The user can select whether to enable or disable options that show reminder alerts for calendar items 352, show reminder alerts for task items 354, plays a sound when a reminder is due 356, and/or to set the default reminder time frame 358. In one implementation, if any one or more of options 352, 354, or 356 are enabled (decision point 206 on FIG. 3), then user interface 118 of client computing device 100 registers for reminder event notifications with central notification engine 148 on front end server computing device 130.

[0039] After messaging and/or reminder notifications are registered with central notification engine 148, user interface 118 then waits for the polling time to pass by (decision point 308), polls for and receives aggregated notifications from the central notification engine 148 (stage 310) and processes the response to update the user interface accordingly (stage 318).

[0040] Non-limiting examples of how the user interface 118 can be updated based on the aggregated notifications are shown in simulated screens 8-13. FIG. 8 is a simulated screen 360 for one implementation of the system for FIG. 1 which illustrates an email application with unread totals that were updated based on the event subscription process of FIGS. 3-5. Simulated screen 360 is a browser-based communication/personal organizer application that has various folders, such as Inbox 364, one or more user defined folder(s), Deleted Items 366, Calendar 368, and/or other folders, for displaying information to the user and allowing the user to manage his or her information and/or schedule. Upon receiving aggregated notifications from central notification engine (stage 210), folder counts are updated, such as "(7)" for Inbox 364, and/or others shown on screen 360. In one implementation, the totals represent the total number of unread items in the folder. In another implementation, the total represents the total number of items in the folder. Alternatively or additionally, the user

interface can be updated automatically to display new content that is relevant to the context that the user is working in. For example, since the user has the Inbox folder 364 selected, new messages can be displayed in message area 369 based upon a sort order setting specified by the user or by a system default setting.

[0041] As shown in FIG. 9, in one implementation, a status bar is updated based on the aggregated notifications received from central notification engine (stage 210). For example, status bar 377 on simulated screen 370 includes four notification messages: New Email 375, New Voice Mail 371, New Fax 372, and New Reminder 373 that represent the type of new messages and/or reminders (e.g. calendar and/or task reminders) that have been received by the user. Other variations are also possible that include some or additional message and/or reminder notifications than these. In one implementation, a Help option 374 is displayed in the status bar.

[0042] Turning now to FIG. 10, in one implementation, when the user selects the New Email notification message 382 (or a particular notification) in the status bar of screen 380, a snippet of the message 384 is shown near the status bar area to give the user a preview of the message. In one implementation, the New Email notification message 382 (or selected notification) then disappears after the user selects it from the status bar area. In another implementation, the New Email notification message 382 (or selected notification) is displayed until the user accesses the message in the Inbox folder and causes the status of the message to change to "read".

[0043] Instead of or in addition to showing a snippet of the message 384 when the user selects New Email notification message 382, the snippet 384 can be displayed for a specified period of time (such as 5 seconds) when the screen is first updated. In another implementation, when the user selects New Email notification message 382, contents 386 of inbox folder are updated to include the new message(s). In yet another implementation, contents 386 of inbox folder are updated automatically when the aggregated notifications are received from the central notification engine 148. Other variations are also possible that include combinations of these, fewer, and/or additional variations.

[0044] Similarly to FIG. 10, FIGS. 11-13 are simulated screens (390, 400, and 410, respectively) for one implementation of the system for FIG. 1 which illustrate what happens in the status bar area when the user selects the other options. For example, simulated screen 390 of FIG. 11 illustrates what happens in the status bar area when the user selects the New Voice Mail notification message 392. A snippet of the voice mail message 394 appears near the status bar and includes details such as the caller's phone number and the length of the message. Simulated screen 400 of FIG. 12 illustrates an example of what happens in the status bar area when the user selects the New Fax notification message 402. A snippet of the message 404 appears near the status bar and includes details such as the sender's fax number and/or the number of pages received. Alternatively or additionally, simulated screen 410 of FIG. 13 illustrates an example of what happens in the status bar area when the user selects the New Reminders notification message 412. A snippet of the reminder message 414 appears near the status bar and additional details about the appointment and/or task. In one implementation, calendar and task reminders are grouped together in the same reminder area. In another implementation, calendar reminders have a separate notification message on the status bar from task reminders.

[0045] With respect to simulated screens 9-13, numerous other variations are also possible for determining when and where to display the respective snippet, if at all. In some

implementations, part or all of the details related to the message and/or reminder are displayed and/or audibly rendered to the user in some fashion.

[0046] The examples in FIGS. 7-13 are for purposes of illustration only, and are not limiting in nature. For example, other variations are also possible, such as using the technologies and techniques discussed herein for receiving updated content from a server in applications other than communications programs, such as from a project planning application, such as MICROSOFT® Project. Other examples can include any type of application that does not maintain a constant connection with the server while a user is accessing the application.

[0047] Although the subject matter has been described in language specific to structural features and/or methodological acts, it is to be understood that the subject matter defined in the appended claims is not necessarily limited to the specific features or acts described above. Rather, the specific features and acts described above are disclosed as example forms of implementing the claims. All equivalents, changes, and modifications that come within the spirit of the implementations as described herein and/or by the following claims are desired to be protected.

[0048] For example, a person of ordinary skill in the computer software art will recognize that the client and/or server arrangements, user interface screen content, and/or data layouts as described in the examples discussed herein could be organized differently on one or more computers to include fewer or additional options or features than as portrayed in the examples.

What is claimed is:

1. A method for improving client-side content updates comprising:

sending a registration from a computing system to a central notification engine to register for update notifications, the registration including information identifying a plurality of folders to monitor for changes;

after sending the registration, sending a request from the computing system to the central notification engine for update notifications associated with the plurality of folders identified by the registration;

if the central notification engine has notifications to report, receiving a notification response from the central notification engine, the notification response including an aggregation of updates from a first data store and a second data store;

if the central notification engine has no notifications to report, receiving a notification response from the central notification engine after a polling interval expires, the notification response indicating that no updates have occurred.

2. The method of claim 1, wherein the updates include two or more of the following: email, calendar, contacts, notes, or tasks.

3. The method of claim 1, wherein the request comprises a polling request.

4. The method of claim 1, wherein the computing system includes a client-side notification engine.

5. The method of claim 1, further comprising, if the notification response includes the aggregation of updates, updating a user interface in response to receiving the notification response.

6. The method of claim 1, wherein, if the central notification engine has notifications to report, the notification

response includes a list of updated folders, the list identifying folders that have updated contents.

7. The method of claim 1, wherein if the central notification engine has no notifications to report, the notification is an empty response message.

8. The method of claim 1, wherein the notification response is represented in XML.

9. The method of claim 1, further comprising generating a visible indication of the notification in a status bar on a display.

10. The method of claim 1, wherein if the central notification engine has notifications to report, the notification response is received after the polling interval expires.

11. The method of claim 1, wherein the aggregation of updates includes a number of items in at least one of the plurality of folders identified by the registration.

12. A method executed at a central notification engine for updating content at a computing system, the method comprising:

receiving a registration from a computing system at a central notification engine, the registration including information identifying a plurality of folders to monitor for changes;

after receiving the registration, receiving a request from the computing system at the central notification engine for update notifications associated with the plurality of folders identified by the registration;

if the central notification engine has notifications to report, transmitting a notification response from the central notification engine, the notification response including an aggregation of updates from a first data store and a second data store;

if the central notification engine has no notifications to report, transmitting a notification response from the central notification engine after a polling interval expires, the notification response indicating that no updates have occurred.

13. The method of claim 12, wherein the notifications are selected from the group consisting of an email message, a fax message, a voice mail message, and a reminder message.

14. The method of claim 12, further comprising generating the notification response at the central notification engine, the notification response including information from at least one of a condition advisor and an item count advisor.

15. The method of claim 14, further comprising checking at least the condition advisor and the item count advisor to determine whether there are notifications to report.

16. The method of claim 14, wherein the condition advisor and item count advisor are associated with at least one of the plurality of folders identified by the registration.

17. The method of claim 12, wherein if the central notification engine has no notifications to report, the notification is an empty response message transmitted to the computing system.

18. The method of claim 12, wherein if the central notification engine has notifications to report, the notification response is transmitted after the polling interval expires.

19. The method of claim 12, wherein the aggregation of updates includes a number of items in at least one of the plurality of folders identified by the registration.

20. The method of claim 12, wherein the first data store and the second data store comprise first and second folders from among the plurality of folders identified in the request.

* * * * *