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(54) **ENABLING COLLABORATION BETWEEN USERS**

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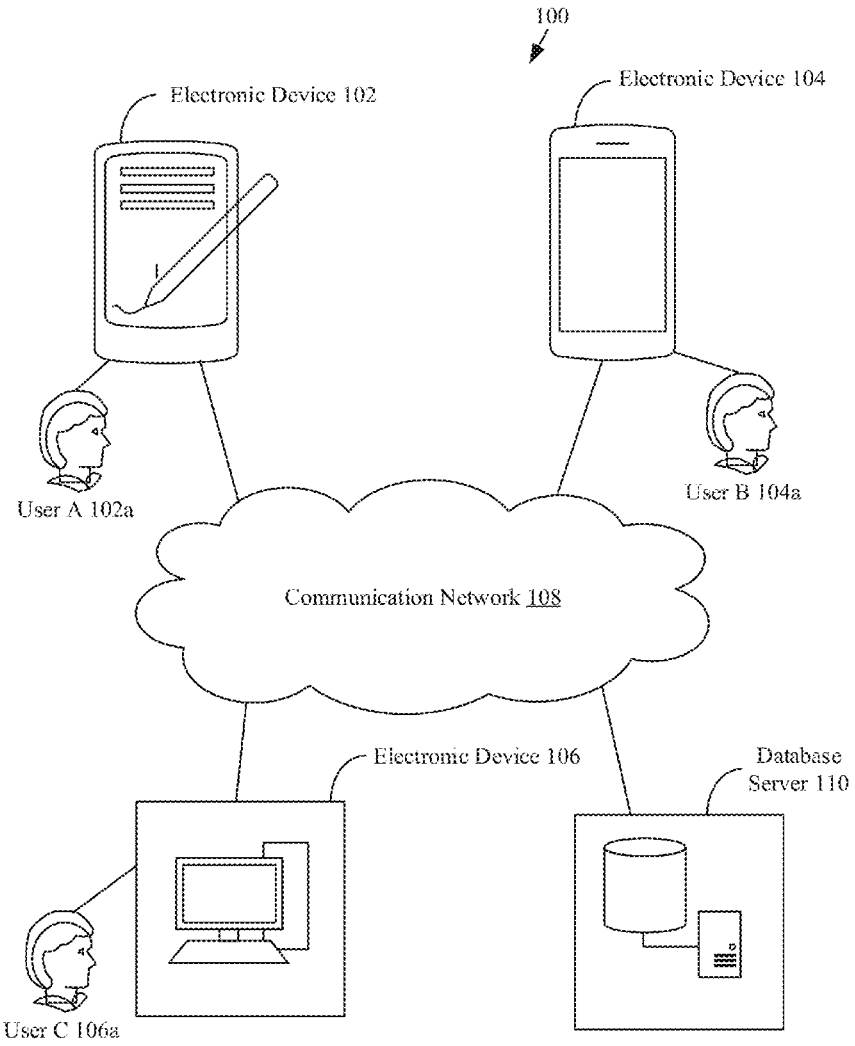
(57) **ABSTRACT**

Provided is a method and system for enabling collaboration between users. The method is implemented by a collaborative canvas application executing on an electronic device including one or more processors. The method includes creating an interactive collaboration session amongst a plurality of users. The method includes receiving one or more interactions associated with a plurality of applications from the plurality of users. The plurality of applications are initiated within the interactive collaboration session. Each of the plurality of applications are accessed natively by each of the plurality of users. The method includes synchronizing in real-time each of the one or more interactions received from the plurality of users for enabling collaboration between the plurality of users.



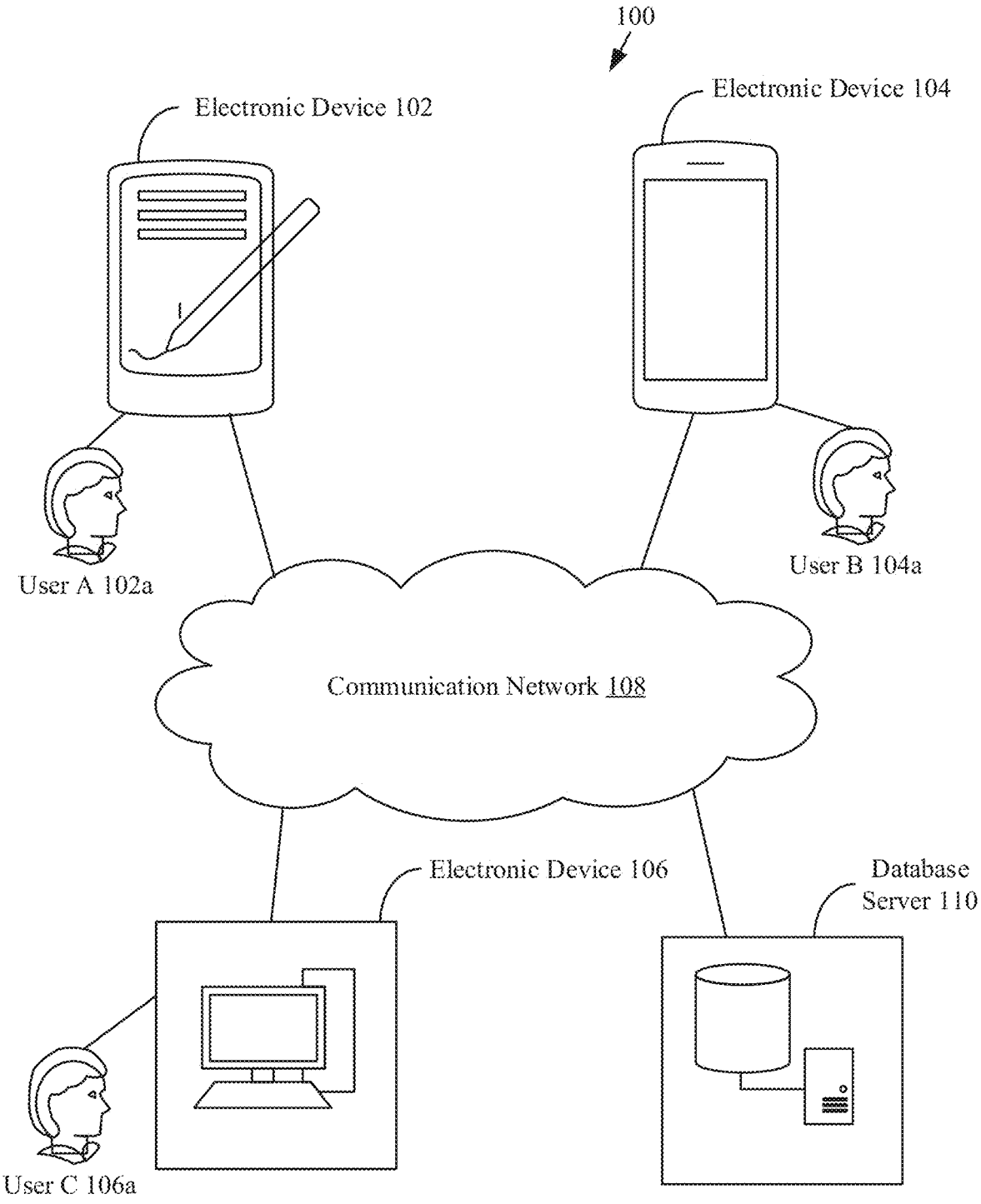

100
Electronic Device 102
Electronic Device 104
User A 102a
User B 104a
Communication Network 108
Electronic Device 106
Database Server 110
User C 106a

FIG. 1

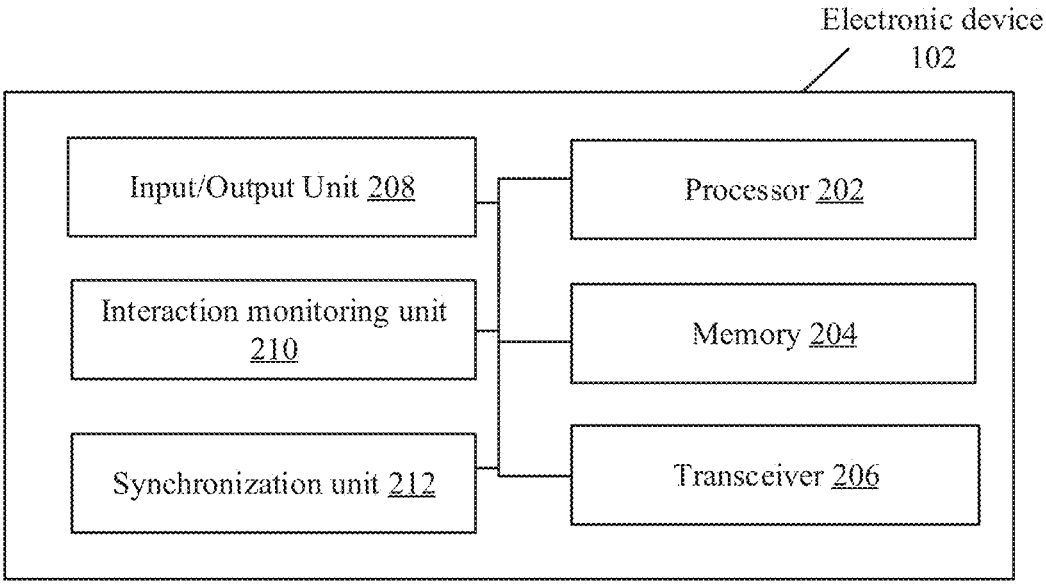

Electronic device
102
Input/Output Unit 208
Processor 202
Interaction monitoring unit
210
Memory 204
Synchronization unit 212
Transceiver 206

FIG. 2

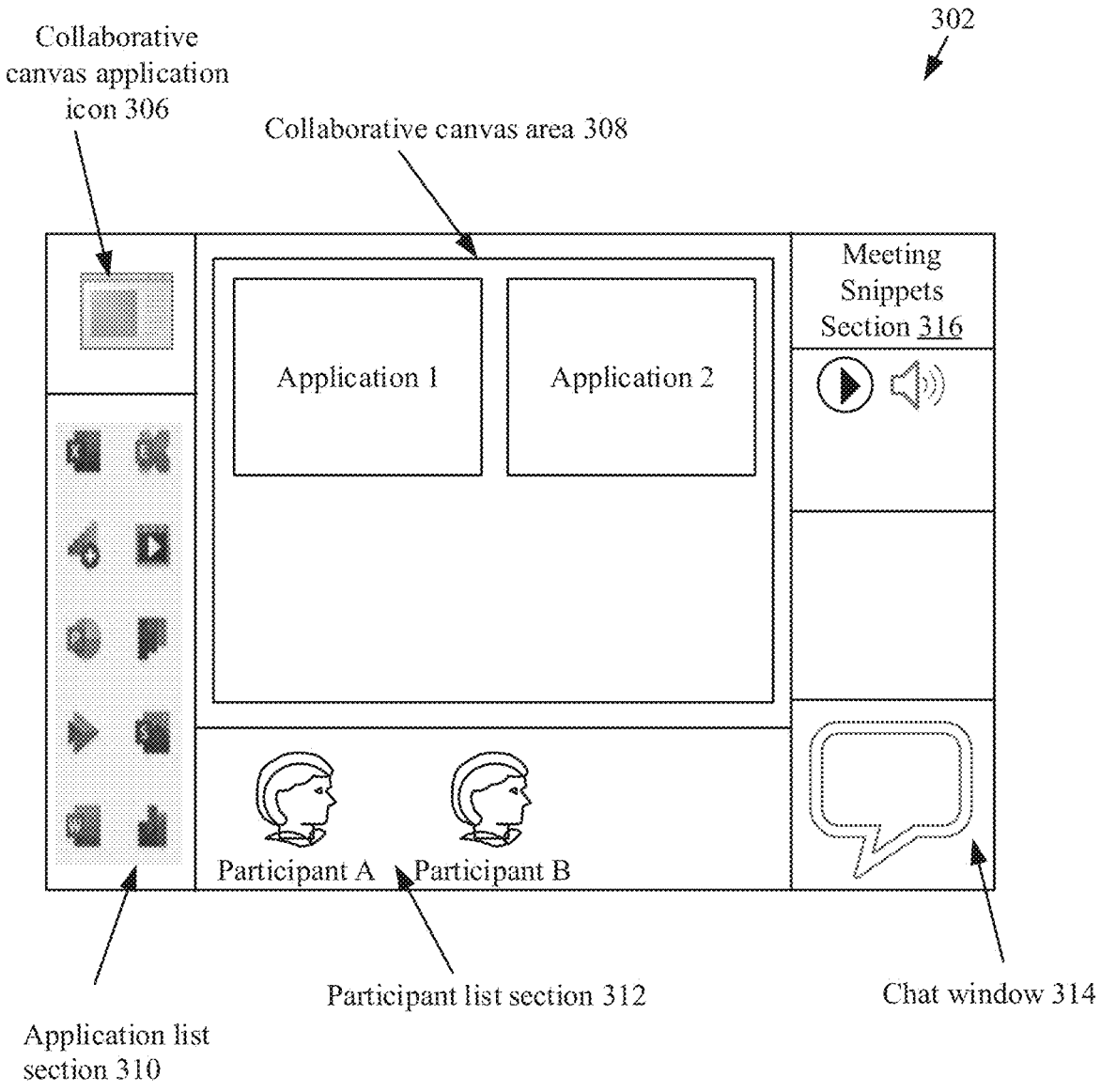

302
Collaborative canvas application icon 306
Collaborative canvas area 308
Application 1
Application 2
Meeting Snippets Section 316
Participant A
Participant B
Application list section 310
Participant list section 312
Chat window 314

FIG. 3A

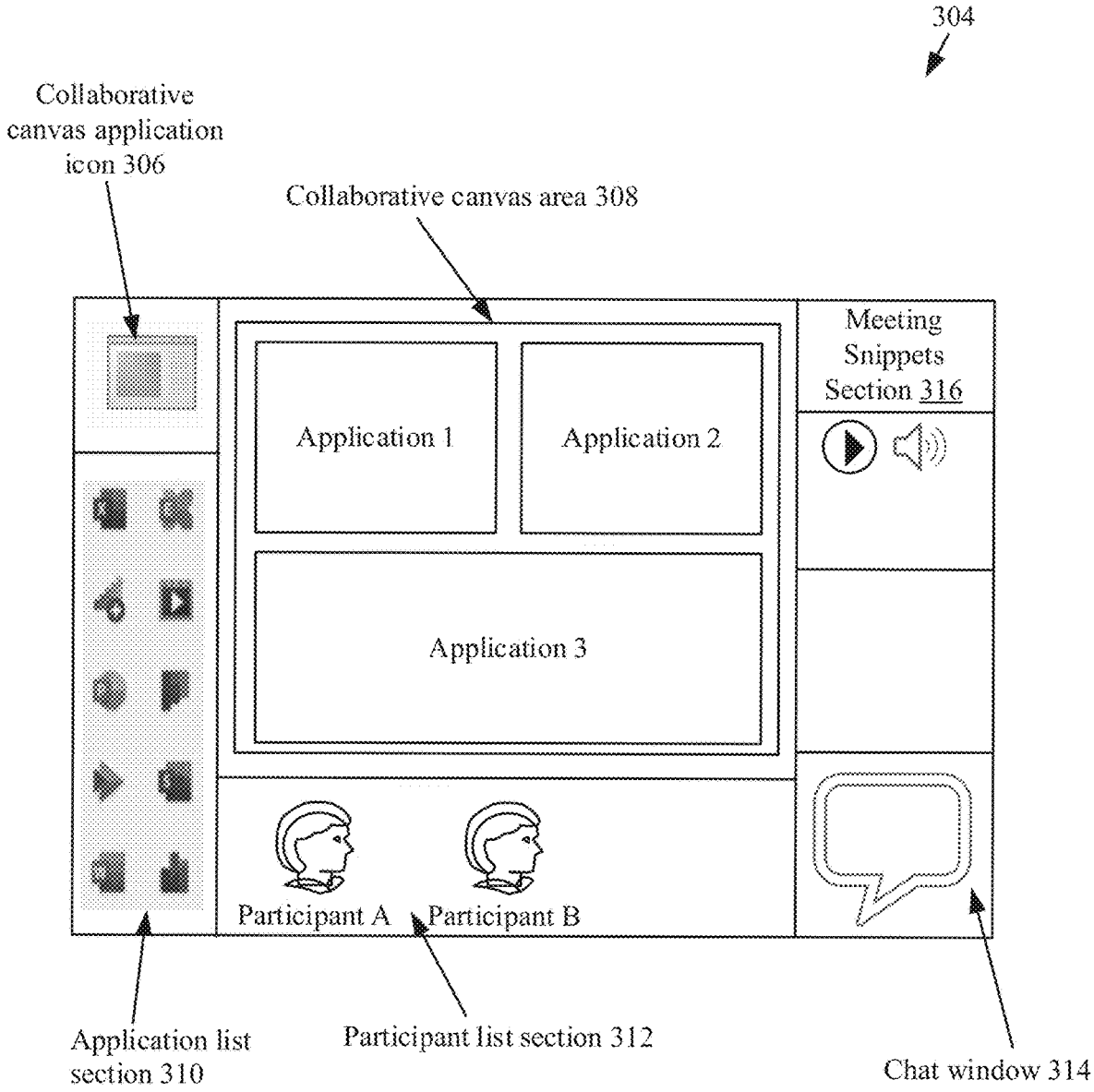

304
Collaborative canvas application icon 306
Collaborative canvas area 308
Application 1
Application 2
Application 3
Meeting Snippets Section 316
Participant A
Participant B
Application list section 310
Participant list section 312
Chat window 314

FIG. 3B

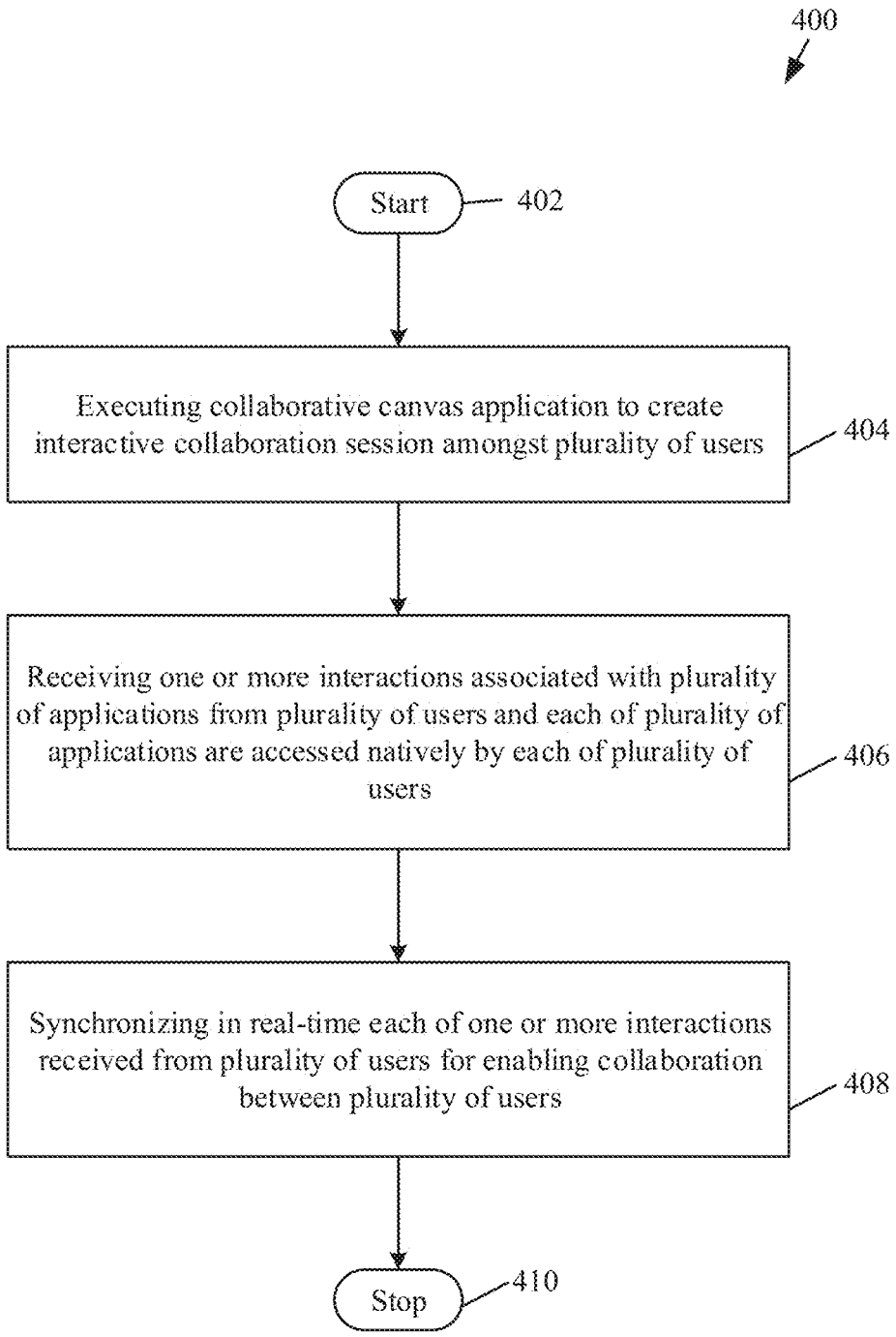

400
Start
402
Executing collaborative canvas application to create interactive collaboration session amongst plurality of users
404
Receiving one or more interactions associated with plurality of applications from plurality of users and each of plurality of applications are accessed natively by each of plurality of users
406
Synchronizing in real-time each of one or more interactions received from plurality of users for enabling collaboration between plurality of users
408
Stop
410

FIG. 4

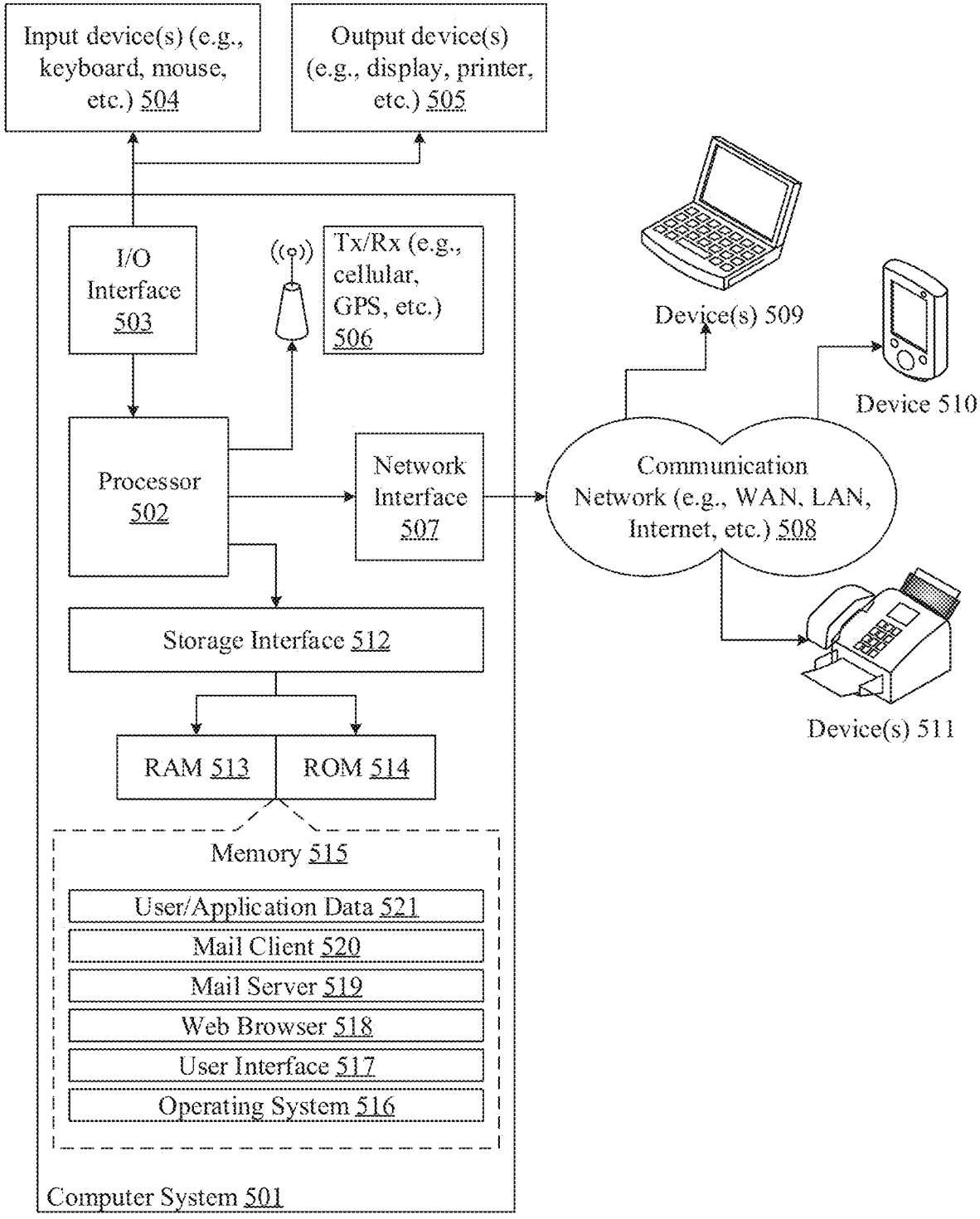


FIG. 5 Example Computer System

ENABLING COLLABORATION BETWEEN USERS

CROSS-REFERENCE TO RELATED APPLICATIONS/INCORPORATION BY REFERENCE

[0001] This application makes reference to, claims priority to, and claims benefit from U.S. Provisional Application Ser. No. 63/028,123, which was filed on May 21, 2020.

[0002] The above referenced application is hereby incorporated herein by reference in its entirety.

TECHNICAL FIELD

[0003] The presently disclosed exemplary embodiments are related, in general, to a web-based collaborative environment shared by a plurality of users. More particularly, the presently disclosed exemplary embodiments are related to a method and a system for synchronizing in real-time each of one or more interactions received from the plurality of users for enabling collaboration between the plurality of users.

BACKGROUND

[0004] There may be many situations where different users need to collaborate and work together in a coordinated fashion. As an example, users at different locations may need to collaborate to generate a report or presentation. The generation of the report or presentation may involve use of many different software applications concurrently. For example, a text editor may be used to generate text for the report while a graphics program may be used to generate graphics and a photo editing program may be used to generate or manipulate images. All of these applications need to work in parallel in a shared workspace, however, the plurality of users cannot access each of the plurality of applications concurrently and cannot make edits to one or more files associated with such applications concurrently.

[0005] Screen sharing may be an alternative option for users for collaborative working. However, in remote screen sharing applications, firstly only one user can share and control the edits that may be made to an application and plurality of users cannot edit/control content concurrently. Additionally, even if control may be given to other user for editing, even then the content being accessed is via remote sharing and not natively. Thus, users do not access files and applications natively i.e. applications or files installed and/or stored on the device itself, and thus synchronization between devices needs to be optimal. One problem frequently encountered in collaborative systems may be maintaining synchronization between the shared workspace at each of the client devices. Lack of synchronization may cause conflicts between users. For example, if synchronization is not maintained, a user may attempt to edit a document that has been deleted by another user. Therefore, it is necessary to maintain synchronization in real time or near real time between client devices and the shared workspace.

[0006] A major technical problem in the aforementioned conventional approaches is that the files are not accessed natively and are accessed via a storage server or cloud server thereby making synchronization in real-time amongst plurality of users very important. In addition to the above, if there are network issues then quality and richness of experience while collaboration is minimal thereby leading to a poor collaborative effort. Thus, conventional collaboration software fails to facilitate collaboration between users.

[0007] Further limitations and disadvantages of conventional and traditional approaches will become apparent to one of skill in the art, through comparison of described systems with some aspects of the present disclosure, as set forth in the remainder of the present application and with reference to the drawings.

SUMMARY

[0008] A method and a system for synchronizing in real-time each of one or more interactions received from the plurality of users for enabling collaboration between the plurality of users is provided substantially as shown in, and/or described in connection with, at least one of the figures, as set forth more completely in the claims.

[0009] These and other features and advantages of the present disclosure may be appreciated from a review of the following detailed description of the present disclosure, along with the accompanying figures in which like reference numerals refer to like parts throughout.

[0010] The foregoing summary is illustrative only and is not intended to be in any way limiting. In addition to the illustrative aspects, exemplary embodiments, and features described above, further aspects, exemplary embodiments, and features will become apparent by reference to the drawings and the following detailed description. Further, it is to be understood that the following detailed description are exemplary and explanatory only and are not restrictive of the invention, as claimed.

BRIEF DESCRIPTION OF DRAWINGS

[0011] FIG. **1** is a block diagram that illustrates a system environment for synchronizing in real-time each of one or more interactions received from the plurality of users for enabling collaboration between the plurality of users, in accordance with at least one exemplary embodiment;

[0012] FIG. **2** is a block diagram that illustrates an electronic device configured for enabling collaboration between users, in accordance with at least one exemplary embodiment;

[0013] FIGS. **3**A and **3**B are diagrams that collectively illustrate an exemplary scenario of implementation of the collaborative canvas application to enable collaboration between participants in a video conferencing tool, in accordance with at least one exemplary embodiment;

[0014] FIG. **4** is a flowchart that illustrates a method for enabling collaboration between users, in accordance with at least one exemplary embodiment; and

[0015] FIG. **5** is a block diagram of an exemplary computer system for implementing collaboration between users, in accordance with various exemplary embodiments of the present disclosure.

DETAILED DESCRIPTION

[0016] The illustrated embodiments provide a method and a system for enabling collaboration between users. The method may be implemented by a collaborative canvas application executing on an electronic device including one or more processors. The method may include creating an interactive collaboration session amongst a plurality of users. The method may include receiving one or more interactions associated with a plurality of applications from

the plurality of users. In an exemplary embodiment, the plurality of applications may be initiated within the interactive collaboration session. In an exemplary embodiment, each of the plurality of applications are accessed natively by each of the plurality of users. In an exemplary embodiment, the native access to applications corresponds to a user accessing applications or files installed and/or stored on the electronic device. Further, the method may include synchronizing in real-time each of the one or more interactions received from the plurality of users for enabling collaboration between the plurality of users.

[0017] FIG. **1** is a block diagram that illustrates a system environment **100** for synchronizing in real-time each of one or more interactions received from the plurality of users for enabling collaboration between the plurality of users, in accordance with at least one exemplary embodiment. Referring to FIG. **1**, the system environment **100** may include a plurality of electronic devices, such as **102**, **104** and **106** associated with a plurality of users, such as User A **102***a*, User B **104***a*, and User C **106***a*, a communication network **108**, and a database server **110**. Each of the electronic devices **102**, **104**, and **106** associated with the plurality of users, such as User A **102***a*, User B **104***a*, and User C **106***a*, may be communicatively coupled with each other via the communication network **108**.

[0018] The plurality of electronic devices, such as electronic device **102**, **104** and **106** may refer to a computing device used by a user who may collaboratively work with remaining users. The plurality of electronic devices, such as electronic device **102**, **104** and **106** may comprise of one or more processors and one or more memories. The one or more memories may include computer readable code that may be executable by the one or more processors to perform predetermined operations. In an exemplary embodiment, the plurality of electronic devices, such as electronic device **102**, **104** and **106** may present a user-interface to the user for performing one or more interactions on the electronic device. Examples of the plurality of electronic devices, such as electronic device **102**, **104** and **106** may include, but are not limited to, a personal computer, a laptop, a personal digital assistant (PDA), a mobile device, a tablet, or any other computing device.

[0019] The plurality of users, such as User A **102***a*, User B **104***a*, and User C **106***a* may be utilizing the electronic device **102**, the electronic device **104** and the electronic device **106**, respectively as shown in FIG. **1**. The plurality of users, such as User A **102***a*, User B **104***a*, and User C **106***a* may interact with the plurality of electronic devices, such as electronic device **102**, **104** and **106** by performing one or more interactions on the user-interface presented to each of the respective users of the associated electronic device.

[0020] In an exemplary embodiment, the communication network **108** may include a communication medium through which each of the electronic devices, such as **102**, **104** and **106** associated with the plurality of users may communicate with each other. Such a communication may be performed, in accordance with various wired and wireless communication protocols. Examples of such wired and wireless communication protocols include, but are not limited to, Transmission Control Protocol and Internet Protocol (TCP/IP), User Datagram Protocol (UDP), Hypertext Transfer Protocol (HTTP), File Transfer Protocol (FTP), ZigBee, EDGE, infrared (IR), IEEE 802.11, 802.16, 2G, 3G, 4G, 5G, 6G cellular communication protocols, and/or Bluetooth (BT) communication protocols. The communication network **108** may include, but is not limited to, the Internet, a cloud network, a Wireless Fidelity (Wi-Fi) network, a Wireless Local Area Network (WLAN), a Local Area Network (LAN), a telephone line (POTS), and/or a Metropolitan Area Network (MAN).

[0021] In an exemplary embodiment, the plurality of electronic devices, such as electronic device **102**, **104** and **106** may include a database server **110**. In an exemplary embodiment, the database server **110** may refer to a computing device that may be configured to store files associated with one or more applications installed on the electronic device. In an exemplary embodiment, the plurality of electronic devices, such as electronic device **102**, **104** and **106** may communicate with the database server **110** using one or more protocols such as, but not limited to, Open Database Connectivity (ODBC) protocol and Java Database Connectivity (JDBC) protocol. In an exemplary embodiment, the database server **110** may include a special purpose operating system specifically configured to perform one or more database operations on one or more files associated with the plurality of applications initiated within the interactive collaboration session. Examples of database operations may include, but are not limited to, Select, Insert, Update, and Delete. In an exemplary embodiment, the database server may include hardware that may be configured to perform one or more predetermined operations. In an exemplary embodiment, the database server **110** may be realized through various technologies such as, but not limited to, Microsoft® SQL Server, Oracle®, IBM DB2®, Microsoft Access®, PostgreSQL®, MySQL® and SQLite®, and the like.

[0022] A person having ordinary skill in the art will appreciate that the scope of the disclosure is not limited to realizing the electronic device and the database server as separate entities. In an exemplary embodiment, the database server may be realized as an application program installed on and/or running on the electronic device without departing from the scope of the disclosure.

[0023] In operation, the plurality of electronic devices, such as electronic device **102**, **104** and **106** may be configured to initiate and execute a collaborative canvas application. The plurality of electronic devices, such as electronic device **102**, **104** and **106** may be configured to create an interactive collaboration session amongst the plurality of users. In an exemplary scenario, a User A **102***a*, a User B **104***a*, and a User C **106***a* may be utilizing the electronic device **102**, the electronic device **104** and the electronic device **106**, respectively as shown in FIG. **1**. At least one of the User **102***a*, User B **104***a*, and User C **106***a* may click on an icon associated with the collaborative canvas application. In an exemplary embodiment, the User **102***a*, the User B **104***a*, and the User C **106***a* may perform a touch operation on an icon associated with the collaborative canvas application. Once the collaborative canvas application may be initiated then each of the electronic device **102**, electronic device **104** and electronic device **106** create an interactive collaboration session amongst the User A **102***a*, User B **104***a*, and User C **106***a*.

[0024] After the interactive collaboration session has been created, the plurality of electronic devices, such as electronic device **102**, **104** and **106** may be configured to receive one or more interactions associated with a plurality of applications from the plurality of users. In an exemplary embodi-

ment, the one or more interactions may comprise events performed by the plurality of users by using the electronic device or one or more device peripherals attached to the electronic device. In an exemplary embodiment, the events comprise at least one of a mouse click event, a scrolling event, a typing event, or a hover event.

[0025] For example, after the interactive collaboration session has been created amongst the electronic device **102**, the electronic device **104** and the electronic device **106**, of the User A, the User B and the User C, respectively, then the electronic device **102** of User A may initiate a plurality of applications (e.g. Confluence® and Jira®) within the interactive collaboration session. For example, the User A may initiate Confluence® application and Jira® application concurrently and may further start making edits to the applications that have been opened within the interactive collaboration session.

[0026] In an exemplary embodiment, each of the plurality of applications may be accessed natively by each of the plurality of users. The native access to applications corresponds to user accessing applications or files installed and/or stored on the electronic device. For example, continuing the same example given above, the User A may initiate Confluence® application and Jira® application concurrently and the files associated with these applications may be stored on the electronic device **102** and the applications Confluence® application and Jira® application are also installed on the electronic device **102**. Thus, the User A is accessing local content that may be present on the electronic device **102** and may be making edits or changes to the files of the applications that are installed on the electronic device **102**.

[0027] An example of the plurality of users accessing the plurality of applications natively can be explained as follows. The User A and the User B create an interactive collaboration session. Further, the User A is interacting with Confluence® application and Jira® application concurrently that is installed on the electronic device **102** and the files associated with these applications may be stored on the electronic device **102**. The User B is interacting with Confluence® application and Photoshop® application concurrently that is installed on electronic device **104** and the files associated with these applications may be stored on the electronic device **104**.

[0028] Further, the plurality of electronic devices, such as electronic device **102**, **104** and **106** may be configured to synchronizing in real-time, each of the one or more interactions received from the plurality of users for enabling collaboration between the plurality of users. Now, each of the plurality of users may perform one or more interactions associated with the plurality of applications concurrently. In an exemplary embodiment, the one or more interactions may comprise events performed by the plurality of users by using the electronic device. In an exemplary embodiment, the events comprise at least one of a mouse click event, a scrolling event, a typing event, or a hover event.

[0029] Now, in an exemplary embodiment, the User A **102***a* is interacting with Confluence® application and Jira® application concurrently and the files associated with these applications may be stored on the electronic device **102** and the Confluence® application and Jira® application are also installed on the electronic device **102**. Similarly, the User B **104***a* may initiate Confluence® application and Photoshop® application concurrently and the files associated with these applications may be stored on the electronic device **104** and the Confluence® application and Photoshop® application are also installed on the electronic device **104**. Now, as the User A **102***a* and the User B **104***a* have created the interactive collaboration session and the plurality of applications have been initiated in the interactive collaboration session hence the User A **102***a* and the User B **104***a* may interact with the plurality of applications concurrently i.e. the User A **102***a* and the User B **104***a* may interact and make changes or edits to any of these applications: Confluence® application, Jira® application and Photoshop® application concurrently via the interactive collaboration session.

[0030] In an exemplary embodiment, a User A **102***a* may not need to necessarily open/initiate each and every application within the interactive collaboration session. Only applications initiated within the interactive collaboration session may be utilized for collaboration between the plurality of users, such as User A **102***a*, User B **104***a*, and User C **106***a*. In an exemplary embodiment, a User B **104***a* may choose to initiate an application that may not be within the interactive collaboration session so that the interactions performed by the user on such an application are not synchronized in real-time between the plurality of users, such as User A **102***a*, User B **104***a*, and User C **106***a*. In an exemplary embodiment, when an application is initiated, a pop-up dialog box may be utilized to confirm from the User B **104***a* when the User B **104***a* wants to initiate the application within the interactive collaboration session or not. In another exemplary embodiment, a drag and drop feature may initiate an application within the interactive collaboration session. For example, the graphical user interface of the interactive collaboration session may include a section that displays each of the plurality of applications that are being synchronized in real-time with the interactions performed by the plurality of users, such as User A **102***a*, User B **104***a*, and User C **106***a*. If a User C **106***a* drags an application icon within such a section, then the respective application may be initiated within interactive collaboration session.

[0031] In accordance with various embodiments, each user from the plurality of users, such as User A **102***a*, User B **104***a*, and User C **106***a* may access content that is installed locally or natively and still make changes or interact with the content and then the electronic device may synchronize in real-time, each of the interactions received from the plurality of users for enabling collaboration between the plurality of users, such as User A **102***a*, User B **104***a*, and User C **106***a*. In an exemplary embodiment, the collaborative canvas application may be integrated within at least one of video conferencing tools, and online meeting tools.

[0032] FIG. **2** is a block diagram that illustrates an electronic device, such as **102** configured for enabling collaboration between users, in accordance with at least one exemplary embodiment.

[0033] In an exemplary embodiment, the electronic device **102** may include a processor **202**, a memory **204**, a transceiver **206**, an input/output unit **208**, an interaction monitoring unit **210**, and a synchronization unit **212**. The processor **202** may be communicatively coupled to the memory **204**, the transceiver **206**, the input/output unit **208**, the interaction monitoring unit **210**, and the synchronization unit **212**. The transceiver **206** may be communicatively coupled to the communication network **108**.

[0034] The processor **202** comprises suitable logic, circuitry, interfaces, and/or code that may be configured to execute a set of instructions stored in the memory **204**. The

processor **202** may be implemented based on several processor technologies known in the art. The processor **202** works in coordination with the transceiver **206**, the input/output unit **208**, the interaction monitoring unit **210**, and the synchronization unit **212** for enabling collaboration between plurality of users. Examples of the processor **202** include, but not limited to, an X86-based processor, a Reduced Instruction Set Computing (RISC) processor, an Application-Specific Integrated Circuit (ASIC) processor, a Complex Instruction Set Computing (CISC) processor, and/or other processor.

[0035] The memory **204** comprises suitable logic, circuitry, interfaces, and/or code that may be configured to store the set of instructions, which are executed by the processor **202**. In an exemplary embodiment, the memory **204** may be configured to store one or more programs, routines, or scripts that are executed in coordination with the processor **202**. The memory **204** may be implemented based on a Random-Access Memory (RAM), a Read-Only Memory (ROM), a Hard Disk Drive (HDD), a storage server, and/or a Secure Digital (SD) card.

[0036] The transceiver **206** comprises of suitable logic, circuitry, interfaces, and/or code that may be configured to receive one or more interactions associated with a plurality of applications from the plurality of users, via the communication network **108**. The transceiver **206** may be further configured to transmit and receive content during creation of the interactive collaboration session. The transceiver **206** may implement one or more known technologies to support wired or wireless communication with the communication network **108**. In an exemplary embodiment, the transceiver **206** may include, but is not limited to, an antenna, a radio frequency (RF) transceiver, one or more amplifiers, a tuner, one or more oscillators, a digital signal processor, a Universal Serial Bus (USB) device, a coder-decoder (CODEC) chipset, a subscriber identity module (SIM) card, and/or a local buffer. The transceiver **206** may communicate via wireless communication with networks, such as the Internet, an Intranet and/or a wireless network, such as a cellular telephone network, a wireless local area network (LAN) and/or a metropolitan area network (MAN). The wireless communication may use any of a plurality of communication standards, protocols and technologies, such as: Global System for Mobile Communications (GSM), Enhanced Data GSM Environment (EDGE), wideband code division multiple access (W-CDMA), code division multiple access (CDMA), time division multiple access (TDMA), Bluetooth, Wireless Fidelity (Wi-Fi) (e.g., IEEE 802.11a, IEEE 802.11b, IEEE 802.11g and/or IEEE 802.11n), voice over Internet Protocol (VoIP), Wi-MAX, a protocol for email, instant messaging, and/or Short Message Service (SMS).

[0037] The input/output unit **208** comprises suitable logic, circuitry, interfaces, and/or code that may be configured to provide one or more inputs that may correspond to one or more interactions to the electronic device for interactive collaboration amongst the plurality of users. The input/output unit **208** comprises of various input and output devices that are configured to communicate with the processor **202**. Examples of the input devices include, but are not limited to, a keyboard, a mouse, a joystick, a touch screen, a microphone, a camera, and/or a docking station. Examples of the output devices include, but are not limited to, a display screen and/or a speaker. The display screen may be configured to display synchronized real-time interactions received from the plurality of users within the collaborative canvas application for enabling collaboration between the plurality of users.

[0038] The interaction monitoring unit **210** comprises suitable logic, circuitry, interfaces, and/or code that may be configured to monitor one or more interactions performed by a user of the electronic device, such as electronic device **102**. In an exemplary embodiment, the monitored one or more interactions may be associated with the plurality of applications that have been initiated within the interactive collaboration session. Further, such monitored one or more interactions may be transmitted to the remaining electronic devices, such as electronic device **104** and electronic device **106**, via the transceiver **206**.

[0039] The synchronization unit **212** comprises suitable logic, circuitry, interfaces, and/or code that may be configured to synchronize in real-time each of the one or more interactions received from the plurality of users for enabling collaboration between the plurality of users.

[0040] In operation, when a plurality of users need to collaborate then any one of the plurality of users may initiate execution of a collaborative canvas application via the processor **202**. In response to initiation of the collaborative canvas application, the processor **202** may be configured to create an interactive collaboration session amongst the plurality of users. The data transfer between the plurality of electronic devices during the interactive collaboration session may be performed by the transceiver **206**, via the communication network **108**.

[0041] After the interactive collaboration session may be created, the transceiver **206** may be configured to receive one or more interactions associated with a plurality of applications from the plurality of users, via the communication network **108**. In an exemplary embodiment, the plurality of applications may be initiated within the interactive collaboration session and each of the plurality of applications may be accessed natively by each of the plurality of users. In an exemplary embodiment, the native access to applications corresponds to user accessing applications or files installed and/or stored on the electronic device **102**.

[0042] Further, the interaction monitoring unit **210** may be configured to monitor one or more interactions performed by a user of the electronic device **102**. In an exemplary embodiment, the monitored one or more interactions may be associated with the plurality of applications that have been initiated within the interactive collaboration session. Further, such monitored one or more interactions may be transmitted to the remaining electronic devices, such as electronic device **104** and electronic device **106**, via the transceiver **206**. In an exemplary embodiment, each of the plurality of users may interact with the plurality of applications concurrently and the transceiver of each respective electronic device may be configured to receive information regarding the one or more interactions performed by the plurality of users.

[0043] In an exemplary embodiment, the one or more interactions may comprise events performed by the plurality of users by using the electronic device **102** or one or more device peripherals attached to the electronic device **102**. In an exemplary embodiment, the events may comprise at least one of a mouse click event, a scrolling event, a typing event, or a hover event.

[0044] Further, the synchronization unit **212** may be configured to synchronize in real-time each of the one or more interactions received from the plurality of users for enabling collaboration between the plurality of users.

[0045] A person skilled in the art will understand that the scope of the disclosure should not be limited to enabling collaboration between users based on the aforementioned factors and using the aforementioned techniques. Further, the examples provided are for illustrative purposes and should not be construed to limit the scope of the disclosure.

[0046] FIGS. **3**A and **3**B are diagrams that collectively illustrate an exemplary scenario of implementation of the collaborative canvas application to enable collaboration between participants in a video conferencing tool, in accordance with at least one exemplary embodiment. FIGS. **3**A and **3**B have been explained in conjunction with the elements of FIG. **1**.

[0047] In an exemplary scenario two participants, for example, participant A and participant B may utilize electronic device **102** and electronic device **104**, respectively, to collaborate utilizing a video conferencing tool. The collaborative canvas application is integrated within the video conferencing tool by the processor **202**. In an exemplary embodiment, the integration of the collaborative canvas application within the video conferencing tool may be performed by state of the art application integration tools, such as, but not limited to, Celigo®, Cloud Elements®, IBM Integration Designer®, and the like. Such integration tools ensure that the electronic device provides the user with the capability to integrate the collaborative canvas application within the video conferencing tool. In an exemplary embodiment, the collaborative canvas application and the video conferencing tool may continue to work independent of each other.

[0048] FIG. **3**A shows an exemplary graphical user interface **302** of the video conferencing tool that is displayed to participant A and participant B on electronic device **102** and electronic device **104**, respectively when the interactive collaboration session amongst the participant A and participant B is created.

[0049] As shown in FIG. **3**A, the graphical user interface illustrates a collaborative canvas application icon **306**, a collaborative canvas area **308**, an application list section **310**, a participant list section **312**, a chat window **314**, and a meeting snippets section **316**. The collaborative canvas application icon **306** may be utilized to initiate execution of the collaborative canvas application that is integrated with the electronic device. For example, the participant A may click on the collaborative canvas application icon **306** to create the interactive collaboration session amongst the participant A and participant B.

[0050] The collaborative canvas area **308** may be the area where the plurality of users i.e. participant A and participant B are able to collaboratively work and interact with a plurality of applications concurrently. The collaborative canvas area **308** may be more like an interactive white boarding solution that may help participants in a video conference/audio-visual meeting to share with each other and concurrently work across applications. In an exemplary embodiment, interactions such as key typing, movement of mouse cursors, and the like of each of the plurality of participants may be viewed by each other via the collaborative canvas area **308**.

[0051] The application list section **310** may display a plurality of applications that may be installed natively on each of the respective electronic devices. In an exemplary embodiment, the participant may choose to initiate one or more applications displayed in the application list section **310** within the interactive collaboration session that may be created when the participant clicks on the collaborative canvas application icon **306**. In an exemplary embodiment, the participant may choose not to initiate one or more applications displayed in the application list section **310** within the interactive collaboration session. When an application may be opened within the collaborative canvas area **308**, the participant A and the participant B may concurrently interact with the files associated with the application.

[0052] The participant list section **312** displays the details of participants that are currently working collaboratively within the video conferencing tool. In an exemplary embodiment, metadata about each of the participants may be displayed in the participant list section **312**. In an exemplary embodiment, such metadata may comprise image of the participant, name of the participant, organization name of the participant, designation name of the participant and the like.

[0053] Further, the chat window **314** may enable the plurality of participants that have joined the video conferencing tool to have conversations with each other and discuss about meeting agenda and any other relevant information.

[0054] Further, each of the electronic devices of the participant A and the participant B who have joined the video conference via the video conferencing tool may generate a plurality of meeting snippets based on the identification of the trigger event and such meeting snippets may be shared within the meeting snippets section **316**. Each of the plurality of participants may provide feedback about the plurality of meeting snippets. In an exemplary embodiment, identifying a trigger event in real-time may be initiated by at least one participant of the video conference. In an exemplary embodiment, the trigger event may be indicative of at least a reference to meeting metadata associated with the meeting. In an exemplary embodiment, the video conference may be recorded for a predetermined duration to generate the plurality of meeting snippets. In an exemplary embodiment, the meeting metadata associated with the meeting or video conference may comprise an agenda of the meeting, one or more topics to be discussed during the meeting, a time duration of the meeting, a schedule of the meeting, meeting notes carried forwarded from previous meetings, and/or the like.

[0055] Based on the participant A clicking on the collaborative canvas application icon **306** and the collaborative canvas area **308** being displayed on both electronic device **102** and electronic device **104**, an interactive collaboration session may be established among the participant A and the participant B. Further, the participant A may initiate the application 1 and the application 2 in the interactive collaboration session. The application 1 and application 2 are installed natively or locally on the electronic device **102** of the participant A. In an exemplary embodiment, native access to applications corresponds to user accessing applications or files installed and/or stored on the electronic device. FIG. **3**A illustrates the collaborative canvas area **308** displaying the application 1 and application 2 that have been initiated by participant A.

[0056] After the application 1 and the application 2 are initiated in the interactive collaboration session, the participant A may perform one or more interactions associated with files of the application 1 and the application 2 concurrently. In an exemplary embodiment, the one or more interactions comprises events performed by the participant A by using the electronic device **102** or one or more device peripherals attached to the electronic device **102**. In an exemplary embodiment, the events comprise at least one of a mouse click event, a scrolling event, a typing event, or a hover event.

[0057] The interaction monitoring unit **210** may be configured to monitor such interactions and such interactions are synchronized in real-time by the synchronization unit **212** to display on the collaborative canvas area **308** open on the electronic device **104** of the Participant B. FIG. **3**A illustrates the collaborative canvas area **308** displaying the application 1 and the application 2 that have been initiated by the participant A and any changes/edits/interactions which are made by the participant A to any of the files associated with the application 1 and the application 2 may be viewed by the Participant B in real-time within the collaborative canvas area **308**.

[0058] Similarly, the Participant B may initiate the application 3 natively within the collaborative canvas area **308** of the electronic device **104** and start performing one or more interactions on one or more files associated with the application 3. For example, the participant B may open a Microsoft Word® document that is stored locally on the electronic device **104** but open it within the interactive collaboration session. Further, the participant B may interact with the Microsoft Word® document. For example, the participant B may perform a typing event (such as, writing a sample software code) in the Microsoft Word® document.

[0059] Once the participant B opens the Microsoft Word® document in the collaborative canvas area **308** of electronic device **104** within the interactive collaboration session, then the collaborative canvas area **308** initiated on the participant A's electronic device **102** may also be updated to display files of the application 3 that is being used for collaboration i.e. Microsoft Word® document. FIG. **3**B **304** shows the updated collaborative canvas area **308** that may be depicted on both the electronic device **102** and the electronic device **104** for each of the respective Participant A and Participant B.

[0060] Further, interactions performed by the Participant B that are associated with the application 3 may be also viewed in real-time by the Participant A. Additionally, Participant A may concurrently perform interactions on the application 1 and the application 2 that have been opened natively from the electronic device **102** and also perform interactions on the application 3 that has been initiated via the electronic device **104**. Similarly, the participant B may concurrently interact with the application 3 that has been initiated natively from the electronic device **104** and also interact with the application 1, and the application 2 via the collaborative canvas application opened in the electronic device **104**. Such collaboration may be possible via the collaborative canvas application. When the Participant A may be performing interactions associated with the application 1 and the application 2, then the Participant B will be able to view the changes in real-time because of the real-time synchronization.

[0061] Based on the description above, the Participant A and the Participant B may concurrently interact with the application 1, the application 2, and the application 3 and may also view the interactions performed by each of the participants in real-time because of the real-time synchronization.

[0062] By integrating the collaborative canvas application into video conferencing tools a collaborative experience may be provided that may be defined by a framework by monitoring interactions at each electronic device in real-time around web based content. This provides a way for participants of an interactive collaboration session to interact with web-based content by rendering content natively with ability to collaborate along with the other participants over it. Such framework and experience makes the traditional screen share experience obsolete which depends on largely a one-to-many broadcasting methodology of content.

[0063] FIG. **4** is a flowchart that illustrates a method **400** for enabling collaboration between users, in accordance with at least one exemplary embodiment. The method starts at **402** and proceeds to **404**.

[0064] At **404**, an electronic device may be configured for executing a collaborative canvas application to create an interactive collaboration session amongst a plurality of users. At step **406**, the electronic device may be configured for receiving one or more interactions associated with plurality of applications from plurality of users and each of plurality of applications are accessed natively by each of plurality of users. At step **408**, the electronic device may be configured for synchronizing in real-time each of one or more interactions received from plurality of users for enabling collaboration between plurality of users. Control passes to end operation **410**.

[0065] FIG. **5** is a block diagram of an exemplary computer system for implementing collaboration between users, in accordance with various exemplary embodiments of the present disclosure. The exemplary computer system **501** may comprise a central processing unit ("CPU" or "processor") **502**, an I/O interface **503**, an input device **504**, an output device **505**, a transceiver **506**, a network interface **507**, a communication network **508**, devices, such as **509**, **510** and **511**, storage interface **512**, one or more memory devices, such as RAM **513**, ROM **514**, and memory device **515**.

[0066] Variations of computer system **501** may be used for implementing collaboration between users. The computer system **501** may comprise a central processing unit ("CPU" or "processor") **502**. Processor **502** may comprise at least one data processor for executing program components for executing user- or system-generated requests. A user may include a person, a person using a device such as those included in this disclosure, or such a device itself. The processor **502** may include specialized processing units such as integrated system (bus) controllers, memory management control units, floating point units, graphics processing units, digital signal processing units, etc. The processor **502** may include a microprocessor, such as AMD Athlon, Duron or Opteron, ARM's application, embedded or secure processors, IBM PowerPC, Intel's Core, Itanium, Xeon, Celeron or other line of processors, etc. The processor **502** may be implemented using mainframe, distributed processor, multi-core, parallel, grid, or other architectures. Some exemplary embodiments may utilize embedded technologies like appli-

cation-specific integrated circuits (ASICs), digital signal processors (DSPs), Field Programmable Gate Arrays (FPGAs), etc.

[0067] Processor **502** may be disposed in communication with one or more input/output (I/O) devices via I/O interface **503**. The I/O interface **503** may employ communication protocols/methods such as, without limitation, audio, analog, digital, monoaural, RCA, stereo, IEEE-1394, serial bus, universal serial bus (USB), infrared, PS/2, BNC, coaxial, component, composite, digital visual interface (DVI), high-definition multimedia interface (HDMI), RF antennas, S-Video, VGA, IEEE 802.n/b/g/n/x, Bluetooth, cellular (e.g., code-division multiple access (CDMA), high-speed packet access (HSPA+), global system for mobile communications (GSM), long-term evolution (LTE), WiMax, or the like), etc.

[0068] Using the I/O interface **503**, the computer system **501** may communicate with one or more I/O devices. For example, the input device **504** may be an antenna, keyboard, mouse, joystick, (infrared) remote control, camera, card reader, fax machine, dongle, biometric reader, microphone, touch screen, touchpad, trackball, sensor (e.g., accelerometer, light sensor, GPS, gyroscope, proximity sensor, or the like), stylus, scanner, storage device, transceiver, video device/source, visors, etc. Output device **505** may be a printer, fax machine, video display (e.g., cathode ray tube (CRT), liquid crystal display (LCD), light-emitting diode (LED), plasma, or the like), audio speaker, etc. In some exemplary embodiments, a transceiver **506** may be disposed in connection with the processor **502**. The transceiver may facilitate various types of wireless transmission or reception. For example, the transceiver may include an antenna operatively connected to a transceiver chip (e.g., Texas Instruments WiLink WL1283, Broadcom BCM4750IUB8, Infineon Technologies X-Gold 618-PMB9800, or the like), providing IEEE 802.11a/b/g/n, Bluetooth, FM, global positioning system (GPS), 2G/3G HSDPA/HSUPA communications, etc.

[0069] In some exemplary embodiments, the processor **502** may be disposed in communication with a communication network **508** via a network interface **507**. The network interface **507** may communicate with the communication network **508**. The network interface may employ connection protocols including, without limitation, direct connect, Ethernet (e.g., twisted pair 10/100/1000 Base T), transmission control protocol/internet protocol (TCP/IP), token ring, IEEE 802.11a/b/g/n/x, etc. The communication network **508** may include, without limitation, a direct interconnection, local area network (LAN), wide area network (WAN), wireless network (e.g., using Wireless Application Protocol), the Internet, etc. Using the network interface **507** and the communication network **508**, the computer system **501** may communicate with devices **509**, **510**, and **511**. These devices may include, without limitation, personal computer(s), server(s), fax machines, printers, scanners, various mobile devices such as cellular telephones, smartphones (e.g., Apple iPhone®, Blackberry®, Android®-based phones, etc.), tablet computers, eBook readers (Amazon Kindle®, Nook, etc.), laptop computers, notebooks, gaming consoles (Microsoft Xbox®, Nintendo DS®, Sony PlayStation®, etc.), or the like. In some exemplary embodiments, the computer system **1101** may itself embody one or more of these devices.

[0070] In some exemplary embodiments, the processor **502** may be disposed in communication with one or more memory devices (e.g., RAM **513**, ROM **514**, etc.) via a storage interface **512**. The storage interface may connect to memory devices including, without limitation, memory drives, removable disc drives, etc., employing connection protocols such as serial advanced technology attachment (SATA), integrated drive electronics (IDE), IEEE-1394, universal serial bus (USB), fiber channel, small computer systems interface (SCSI), etc. The memory drives may further include a drum, magnetic disc drive, magneto-optical drive, optical drive, redundant array of independent discs (RAID), solid-state memory devices, solid-state drives, etc.

[0071] The memory devices may store a collection of program or database components, including, without limitation, an operating system **516**, user interface application **517**, web browser **518**, mail server **519**, mail client **520**, user/application data **521** (e.g., any data variables or data records discussed in this disclosure), etc. The operating system **516** may facilitate resource management and operation of the computer system **501**. Examples of operating systems include, without limitation, Apple Macintosh OS X, UNIX, Unix-like system distributions (e.g., Berkeley Software Distribution (BSD), FreeBSD, NetBSD, OpenBSD, etc.), Linux distributions (e.g., Red Hat, Ubuntu, Kubuntu, etc.), IBM OS/2, Microsoft Windows (XP, Vista/7/8, etc.), Apple iOS, Google Android, Blackberry OS, or the like. User interface **517** may facilitate display, execution, interaction, manipulation, or operation of program components through textual or graphical facilities. For example, user interfaces may provide computer interaction interface elements on a display system operatively connected to the computer system **501**, such as cursors, icons, check boxes, menus, scrollers, windows, widgets, etc. Graphical user interfaces (GUIs) may be employed, including, without limitation, Apple Macintosh operating systems' Aqua, IBM OS/2, Microsoft Windows (e.g., Aero, Metro, etc.), Unix X-Windows, web interface libraries (e.g., ActiveX, Java, Javascript, AJAX, HTML, Adobe Flash, etc.), or the like.

[0072] In some exemplary embodiments, the computer system **501** may implement a web browser **1118** stored program component. The web browser may be a hypertext viewing application, such as Microsoft Internet Explorer, Google Chrome, Mozilla Firefox, Apple Safari, etc. Secure web browsing may be provided using HTTPS (secure hypertext transport protocol), secure sockets layer (SSL), Transport Layer Security (TLS), etc. Web browsers may utilize facilities such as AJAX, DHTML, Adobe Flash, JavaScript, Java, application programming interfaces (APIs), etc. In some exemplary embodiments, the computer system **501** may implement a mail server **519** stored program component. The mail server may be an Internet mail server such as Microsoft Exchange, or the like. The mail server may utilize facilities such as ASP, ActiveX, ANSI C++/C#, Microsoft .NET, CGI scripts, Java, JavaScript, PERL, PHP, Python, WebObjects, etc. The mail server may utilize communication protocols such as internet message access protocol (IMAP), messaging application programming interface (MAPI), Microsoft Exchange, post office protocol (POP), simple mail transfer protocol (SMTP), or the like. In some exemplary embodiments, the computer system **401** may implement a mail client **520** stored program component. The

mail client may be a mail viewing application, such as Apple Mail, Microsoft Entourage, Microsoft Outlook, Mozilla Thunderbird, etc.

[0073] In some exemplary embodiments, computer system **501** may store user/application data **1121**, such as the data, variables, records, etc. as described in this disclosure. Such databases may be implemented as fault-tolerant, relational, scalable, secure databases such as Oracle or Sybase. Alternatively, such databases may be implemented using standardized data structures, such as an array, hash, linked list, struct, structured text file (e.g., XML), table, or as object-oriented databases (e.g., using ObjectStore, Poet, Zope, etc.). Such databases may be consolidated or distributed, sometimes among the various computer systems discussed above in this disclosure. It is to be understood that the structure and operation of the any computer or database component may be combined, consolidated, or distributed in any working combination.

[0074] Furthermore, one or more computer-readable storage media may be utilized in implementing exemplary embodiments consistent with the present invention. A computer-readable storage medium refers to any type of physical memory on which information or data readable by a processor may be stored. Thus, a computer-readable storage medium may store instructions for execution by one or more processors, including instructions for causing the processor (s) to perform operations or stages consistent with the exemplary embodiments described herein. The term "computer-readable medium" should be understood to include tangible items and exclude carrier waves and transient signals, i.e., non-transitory. Examples include Random Access Memory (RAM), Read-Only Memory (ROM), volatile memory, nonvolatile memory, hard drives, Compact Disc (CD) ROMs, Digital Video Disc (DVDs), flash drives, disks, and any other known physical storage media.

[0075] Various exemplary embodiments of the disclosure encompass numerous advantages including methods and systems for enabling collaboration between users. In an exemplary embodiment, the methods and systems may render content via the interactive collaboration session natively thereby improving quality and richness of experience while maximizing the collaboration. Secondly, as content may be rendered natively and plurality of users may interact with plurality of applications concurrently hence a better and efficient system for collaboration is implemented. Additionally, only the synchronization of interactions received from the plurality of users is performed rather synchronizing complete applications that are hosted on a third party or cloud server. This reduces the bandwidth requirement and the synchronization of interactions amongst the plurality of the applications is maintained in real time and there is no lag. Thus, the efficacy of system while enabling collaboration amongst plurality of uses is improved.

[0076] In contrast to the conventional approach of screen sharing, the disclosure enables plurality of users to interact with plurality of applications concurrently. Thus, the technical problems of real-time synchronization and the ability to concurrently interact with plurality of applications and across such plurality of applications is solved by implementing operations for creating, by a collaborative canvas application executing on an electronic device, an interactive collaboration session amongst a plurality of users; receiving, by the electronic device, one or more interactions associated with a plurality of applications from the plurality of users, wherein the plurality of applications are initiated within the interactive collaboration session, and wherein each of the plurality of applications are accessed natively by each of the plurality of users; and synchronizing in real-time, by the electronic device, each of the one or more interactions received from the plurality of users for enabling collaboration between the plurality of users.

[0077] The disclosure overcomes the aforementioned shortcomings of lag in synchronization by ensuring that each of the plurality of applications are accessed natively by each of the plurality of users when the interactive collaboration session is initiated. As a result, the method provides for efficient and accurate ways for lag free real-time synchronization of each of the one or more interactions received from the plurality of users for enabling collaboration between the plurality of users.

[0078] Thus, the claimed operations as discussed above are not routine, conventional, or well understood in the art, as the claimed operation enable the following solutions to the existing problems in conventional technologies.

[0079] The present disclosure may be realized in hardware, or a combination of hardware and software. The present disclosure may be realized in a centralized fashion, in at least one computer system, or in a distributed fashion, where different elements may be spread across several interconnected computer systems. A computer system or other apparatus adapted for carrying out the methods described herein may be suited. A combination of hardware and software may be a general-purpose computer system with a computer program that, when loaded and executed, may control the computer system such that it carries out the methods described herein. The present disclosure may be realized in hardware that comprises a portion of an integrated circuit that also performs other functions.

[0080] A person with ordinary skills in the art will appreciate that the systems, modules, and sub-modules have been illustrated and explained to serve as examples and should not be considered limiting in any manner. It will be further appreciated that the variants of the above disclosed system elements, modules, and other features and functions, or alternatives thereof, may be combined to create other different systems or applications.

[0081] Those skilled in the art will appreciate that any of the aforementioned operations and/or system modules may be suitably replaced, reordered, or removed, and additional operations and/or system modules may be inserted, depending on the needs of a particular application. In addition, the systems of the aforementioned exemplary embodiments may be implemented using a wide variety of suitable processes and system modules, and are not limited to any particular computer hardware, software, middleware, firmware, microcode, and the like. The claims can encompass exemplary embodiments for hardware and software, or a combination thereof.

[0082] While the present disclosure has been described with reference to certain exemplary embodiments, it will be understood by those skilled in the art that various changes may be made and equivalents may be substituted without departing from the scope of the present disclosure. In addition, many modifications may be made to adapt a particular situation or material to the teachings of the present disclosure without departing from its scope. Therefore, it is intended that the present disclosure not be limited to the

particular exemplary embodiment disclosed, but that the present disclosure will include all exemplary embodiments falling within the scope of the appended claims.

What is claimed is:

1. A method, comprising:

creating, by a collaborative canvas application executing on an electronic device, an interactive collaboration session amongst a plurality of users;

receiving, by the electronic device, one or more interactions associated with a plurality of applications from the plurality of users, wherein the plurality of applications are initiated within the interactive collaboration session, and wherein each of the plurality of applications are accessed natively by each of the plurality of users; and

synchronizing in real-time, by the electronic device, each of the one or more interactions received from the plurality of users for enabling collaboration between the plurality of users.

2. The method of claim **1**, further comprising integrating the collaborative canvas application within at least one of video conferencing tools, and online meeting tools.

3. The method of claim **1**, wherein each of the plurality of users interact with the plurality of applications concurrently.

4. The method of claim **1**, wherein the native access to applications corresponds to user accessing applications or files installed and/or stored on the electronic device.

5. The method of claim **1**, wherein the one or more interactions comprises events performed by the plurality of users by using the electronic device or one or more device peripherals attached to the electronic device, wherein the events comprise at least one of a mouse click event, a scrolling event, a typing event, or a hover event.

6. An electronic device, comprising:

a hardware processor; and

a memory communicatively coupled to the hardware processor, wherein the memory stores processor instructions, which, on execution, causes the hardware processor to:

create by a collaborative canvas application that executes on the electronic device, an interactive collaboration session amongst a plurality of users;

receive one or more interactions associated with a plurality of applications from the plurality of users, wherein the plurality of applications are initiated within the interactive collaboration session, and wherein each of the plurality of applications are accessed natively by each of the plurality of users; and

synchronize in real-time each of the one or more interactions received from the plurality of users to collaborate between the plurality of users.

7. The electronic device of claim **6**, wherein the hardware processor is further configured to integrate the collaborative canvas application within at least one of video conferencing tools, and online meeting tools.

8. The electronic device of claim **6**, wherein each of the plurality of users interact with the plurality of applications concurrently.

9. The electronic device of claim **6**, wherein the native access to applications corresponds to user accessing applications or files installed and/or stored on the electronic device.

10. The electronic device of claim **6**, wherein the one or more interactions comprises events performed by the plurality of users by using the electronic device or one or more device peripherals attached to the electronic device, wherein the events comprise at least one of a mouse click event, a scroll event, a typing event, or a hover event.

11. A non-transitory computer readable medium having stored thereon, computer executable instructions, which when executed by at least one hardware processor in an electronic device, causes the electronic device to perform operations, the operations comprising:

creating an interactive collaboration session amongst a plurality of users;

receiving one or more interactions associated with a plurality of applications from the plurality of users, wherein the plurality of applications are initiated within the interactive collaboration session, and wherein each of the plurality of applications are accessed natively by each of the plurality of users; and

synchronizing in real-time each of the one or more interactions received from the plurality of users for enabling collaboration between the plurality of users.

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