of the content update. In one embodiment, the indicate operation **712** provides information to the user indicating how many updates are available. Other information about the updates (e.g., user who made the updates, timestamp, etc.) also may be indicated.

[0059] A third determination module **714** determines whether the authoring application has received instructions from the first user (either explicitly or implicitly) to view and/or instantiate the content updates. For example, the third determination module **714** can determine whether the user has selected a view option (e.g., via a button, menu, or other interface tool) of the authoring application. In another embodiment, the third determination module **714** may determine the user has selected an auto-instantiate option. If the third determination module **714** determines the authoring application has not received such instructions from the first user, then the second synchronization process **700** cycles back to the receive operation **704** and begins again.

[0060] If the third determination module **714** determines the authoring application has received instructions from the first user, then an instantiate operation **716** displays the content updates to the first user. For example, in one embodiment, the instantiate operation **716** can merge the available content updates into the first user's copy of the document. In another embodiment, the instantiate operation **716** can annotate the first user's copy of the document to indicate which content has changed. Additional annotations can indicate which users made which changes. In one embodiment, the instantiate operation **716** performs conflict resolution between the user copy and the updates. The second synchronization process **700** completes and ends at a stop module **718**.

[0061] FIGS. **10-12** provide greater detail in how synchronization between the user copy and the master copy of the document is implemented by a user computing device. FIG. **10** is a schematic block diagram of an authoring system **800** including a storage device **820** on which a master copy of a document to be authored is to be stored. The authoring system **800** also includes at least one user computing device **810** communicatively coupled to the storage device **820**.

[0062] The user computing device **810** includes an authoring application **812** configured to provide an authoring environment in which a user can create and/or manipulate a document to be authored. The user computing device **810** also includes a cache **814**, a layer object ("LO") **816**, and a synchronization manager ("sync manager") **818**. The cache **814** stores a user copy of the document to be authored. The cache **814** also stores the metadata, including lock and presence metadata, associated with the document. Updates to the content and metadata of the document also can be stored in the cache **814**.

[0063] The layer object **816** provides an interface between the authoring application **812** and the cache **814**. The layer object **816** also provides an interface between the authoring application **812** and the sync manager **818**. The sync manager **818** communicates with the storage device **820** and provides an interface between the storage device **820** and the cache **814**. For example, the sync manager **818** can send updates to and obtain updates from the storage device **820** and the cache **814**.

[0064] In general, an authoring environment having features that are examples of inventive aspects in accordance with the principles of the disclosure can be implemented on a user computing device (e.g., a personal computer, a server computer, a notebook computer, a PDA, a Smartphone, or any other such computing device). A non-limiting embodiment of a user computing system **900** configured to implement an authoring environment is described herein with reference to FIG. **11**.

[0065] In FIG. **11**, the exemplary computing system **900** for implementing the principles of the disclosure includes a user computing device, such as user computing device **910**. In a basic configuration, the user computing device **910** typically includes at least one processing unit **915** for executing applications and programs stored in system memory **920**. Depending on the exact configuration and type of computing device **910**, the system memory **920** may include, but is not limited to, RAM, ROM, EEPROM, flash memory, CD-ROM, digital versatile disks (DVD) or other optical storage devices, magnetic cassettes, magnetic tape, magnetic disk storage or other magnetic storage devices, or other memory technology.

[0066] System memory **920** typically stores an operating system **922**, such as the WINDOWS® operating systems from MICROSOFT CORPORATION of Redmond, Wash., suitable for controlling the operation of the computing device **910**. System memory **920** also may include a document cache **926** in which a user copy **927** of a document can be stored. Metadata **929** of the document also can be stored within the user cache **926**.

[0067] The system memory **920** also may store one or more software applications, such as authoring applications **924** for creating and editing documents. One non-limiting example of an authoring application **924** suitable for authoring documents in accordance with the principles of the present disclosure is MICROSOFT® OFFICE WORD authoring software from MICROSOFT CORPORATION of Redmond, Wash. Other non-limiting examples of authoring applications include POWERPOINT® presentation software and VISIO® drawing and diagramming software, both also from MICROSOFT CORPORATION of Redmond, Wash.

[0068] Computing device **910** also may have input device (s) **930**, such as a keyboard, mouse, pen, voice input device, touch input device, etc., for entering and manipulating data. Output device(s) **935**, such as a display screen, speakers, printer, etc., also may be included. These output devices **935** are well known in the art and need not be discussed at length herein.

[0069] The computing device **910** also may contain communication connections **940** that allow the device **910** to communicate with other computing devices, for example, the storage device **820** of FIG. **10**, over a network in a distributed computing environment (e.g., an intranet or the Internet). By way of example, and not limitation, communication device media **940** includes wired media such as a wired network or direct-wired connection, and wireless media, such as acoustic, RF, infrared and other wireless media.

[0070] FIG. **12** is a schematic block diagram of an authoring system **1000** illustrating the synchronization cycle implemented by the authoring application on the user computing device. The authoring system **1000** includes a storage device **1020** on which the document to be authored is to be stored and a user computing device **1010**. The user computing device **1010** includes an authoring application **1012**, a cache **1014**, a layer object **1016**, and a sync manager **1018**. The cache **1014** of the user computing device **1010** is configured to store a base copy **1013** of the document to be authored, a working copy **1015**, an upload copy **1017**, and a download copy **1019**. The cache **1014** also is configured to store metadata **1011** of the document.