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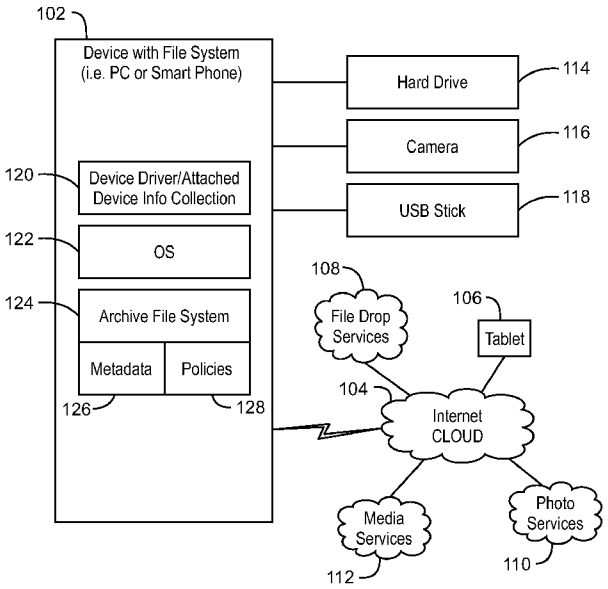
Declarations under Rule 4.17:

— *as to the identity of the inventor (Rule 4.17(i))*

[Continued on next page]

(54) **Title**: ARCHIVE FILE



100
FIG. 1

(57) **Abstract**: A method for automatically archiving files determines an operating system is being requested to copy a file to an archive location. The method also includes determining whether a copy of the file is permitted based on a predefined policy. The method further includes copying the file to the archive location if the copy of the file is permitted. Additionally, the method includes tracking archive metadata describing the copy of the file to the archive location.

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— *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*

Published:

— *with international search report (Art. 21(3))*

ARCHIVE FILE

BACKGROUND

[0001] Archiving systems are used to store and track historical data. Current archiving solutions generally rely on computer applications installed on a computer to archive files. The archive itself may be a disk drive, or other type of memory, and is typically external to the local device running an archiving application.

BRIEF DESCRIPTION OF THE DRAWINGS

[0002] Certain exemplary embodiments are described in the following detailed description and in reference to the drawings, in which:

[0003] Fig. 1 is a block diagram of an example active archiving file system.

[0004] Fig. 2 is a block diagram of a device using an example active archive system.

[0005] Fig. 3 is a process flow diagram of a method for actively arching files.

[0006] Fig. 4 is a block diagram of an example interface for an application using metadata.

[0007] Fig. 5 is a block diagram of an example of a tangible, non-transitory, computer-readable medium that stores code configured to operate an active archiving system.

DETAILED DESCRIPTION

[0008] Typically, an archive application backs up a file to an archive. Archiving applications may use a single archive bit on the files to be archived, and the application may take action based on whether the archive bit is set. For example, if the archive bit is not set, the application may decide to archive the file. After backing up the file to the archive, the application may set the archive bit. Additionally, these applications may use a separate database to track archive data. Accordingly, these applications can be expensive to install and maintain. Also, these applications often lock a user into a specific archive format, which may limit the flexibility of the computer system, and limit the ability of the archive system to adapt over time.

[0009] Examples of the present techniques provide an archiving system that takes an active role in ensuring whether files are archived (or not). Rather than relying on a separate application and database, an active archiving system can

provide file metadata that shows with specificity the location of the last copy, in contrast to current systems that can merely describe whether a file has been archived. This active archiving system may also include predefined policies for archiving files with specificity. An example system is described in greater detail with respect to Fig. 1.

[0010] Fig. 1 is a block diagram of an example active archiving file system 100. The system 100 includes a computing device 102, in communication with an Internet cloud 104. The computing device 102 may be any of various computing devices, such as a desktop computer, laptop, smart phone, tablet, and the like. The Internet cloud 104 enables network communication with other devices, such as a smart phone or tablet 106. The Internet cloud 104 also enables communication with various cloud services, such as file drop services 108, photo services 110, and social media services 112. File drop services 108 provide file storage that can be accessed over the Internet cloud 104, instead of a single computing device. Photo services 110 may provide storage, printing, and viewing services for amateur or professional photographers. Social media services 112 enable their users to maintain personal social networks over which they may share experiences, photos, games, and so on with friends and family.

[0011] The computing device 102 may have various peripherals attached. Peripherals may be devices external to the computing device 102, such as an external hard drive 114, a camera 116, a universal serial bus (USB) stick 118, and the like. The USB stick 118 is a storage device connectable to the computing device 102 using a USB port. Each of the peripheral devices may provide an archive for files local to the computing device 102. The peripheral devices communicate with the computing device 102 using device drivers 120.

[0012] The computing device 102 also includes an operating system 122 and an active archive manager 124. The active archive manager 124 communicates with the operating system 122 to manage the archiving of files local to the computing device 102. For example, every time a file is copied to an external location, the active archive manager 124 updates metadata 126 with information about the archive location. In one example, a photo may be copied to the USB stick 118, an external device that is physically attached to the computing device 102. The active archive manager 124 communicates with the operating system 122 to retrieve details about the USB stick 118, such as a device identifier, file size, file type, and so on.

The active archive manager 124 updates the metadata 126 of the photo file with these details. In another example, the file may be uploaded to a cloud service, such as photo services 110. In such an example, the active archive manager 124 interacts with the operating system to determine photo service, details and update the metadata 126 of the photo file with a note indicating the file is archived to a photo upload service, the uniform resource location of the photo service, and a timestamp of when the file is uploaded. Of course, metadata 126 may also include information about a file copied to an external archive, such as port number, volume, the application used to copy the file to the archive, and so on.

[0013] The policies 128 may be used to define archive actions and preferences. An example policy may specify files that are to be automatically archived. Such a policy may specify when and where files are archived. The policies 128 may also limit where files may be archived or prevent files from being archived. Another example policy 128 may schedule the active archive manager 124 to archive all files from a predefined "photos" folder to the photo service 110. Such a policy may also specify that the active archive manager re-check the files uploaded to photo service 110 every 72 hours. Another example policy may specify a main archive and a backup archive in cases when the main archive location is unavailable. Additional examples of policies include, preventing reads of external archives without specifying the destination metadata; preventing a write to external archives without specifying the source metadata; and, actively arching a specific file whenever the file is updated with a write. In example systems, such policies 128 may also be turned on or off.

[0014] Fig. 2 is a block diagram of a device 200 using an example active archive system 202. The device 200 includes a port 204, such as a USB port for a physically attached storage device. The system includes a data mover application 206 that transfers files to the device from, and transfer files to, a network-based archive 208. The network-based archive 208 may include URLs accessible over one or more networks, such as the Internet cloud, local area networks, and the like. The system 202 includes a logging and policy application 210, a transaction log file 212, and a file repository 214. The application 210 enforces the policies set forth in a policy management API or configuration file 216. The application 210 logs all archive transactions in the transaction log file 212, which contains the metadata 126. The file repository 214 may include local copies of actively archived files. The device 200 also includes an operating system 216 that interacts with the active archiving system

202 during standard file inputs and outputs (I/O) 218. An active archiving system (AAS) application program interface (API) 220 enables applications, such as the application 210 to identify the location and other metadata regarding external archives 204, 208. Additionally, the API 220 allows access to physical devices, such as the USB stick 118, Further, the API 220 may be used at an application layer to access protocol and port information as well. This allows the application 210 to update the metadata 126 accordingly.

[0015] Fig. 3 is a process flow diagram of a method 300 for actively arching files. The method 300 is performed by the logging application 210, and begins at block 302, where a file copy to an external archive 204, 208. For example, a user issues a command to copy the file from the file repository 214 to external archive 204 using the operating system 216. Alternatively, the data mover application may attempt to transfer a file from the repository 214 to an external archive 208.

[0016] At block 304, the application 210 is triggered via standard file I/O 218 when the operating system 216 attempts to write to the external archive 208. At block 306, the application 210 may compare the I/O request with the policy management settings to determine if the copy is permitted. If the copy is permitted, at block 308, the application 210 queries the metadata for the external archive 208, using the active archiving system API 220. At block 310, the metadata 126 is updated.

[0017] Current file systems may not provide much useful information about archiving files. If a file is archived, there are no mechanisms to track when or where the file is copied. Rather, this functionality is typically pushed up to application levels, where the application is tasked with identifying information about archived files. In contrast, example active archive file systems automatically record metadata about archived files, and provide this metadata independent of an application. In other words, separate applications and their associated databases are not needed, and the user can simply reference the active archive file system for information about archive timestamps and locations. However, the active archive file system does lend itself to having application integration, where an application could retrieve metadata 126 about files in the file repository 214. For example, applications that display file and directory information on a computer may be updated to display archive locations, identify archived files, or display any other metadata 128 tracked for the file.

[0018] Fig. 4 is a block diagram of an example interface 400 for an application using metadata 128. The interface 400 displays file and directory information for an example computing device 102. In addition to typical information, such as file name 402, and timestamp 404, the interface includes an archive location 406 and archive timestamp 408. The interface 400 also includes a status bar 410 describing the number of archived files displayed.

[0019] It is to be understood that the process network traffic diagram of Fig. 4 is not intended to indicate that the elements of the method 400 are to be executed in any particular order, or that all of the elements of the method 400 are to be included in every case. Further, any number of additional elements not shown in Fig. 4 can be included within the method 400, depending on the details of the specific implementation.

[0020] Fig. 5 is a block diagram of an example of a tangible, non-transitory, computer-readable medium that stores code configured to operate an active archiving system. The computer-readable medium is referred to by the reference number 500. The computer-readable medium 500 can include RAM, a hard disk drive, an array of hard disk drives, an optical drive, an array of optical drives, a non-volatile memory, a flash drive, a digital versatile disk (DVD), or a compact disk (CD), among others. The computer-readable medium 500 can be accessed by a controller 502 over a computer bus 504. Further, the computer-readable medium 500 may include an active archive manager 506 to perform the methods and provide the systems described herein. The various software components discussed herein may be stored on the computer-readable medium 500.

[0021] Advantageously, examples of the present techniques provide an active archiving system that has the ability and responsibility to track file archive metadata whenever a file is copied to an external, potentially networked, location. Further, this system provides information to the user about file copy locations, time stamps, etc. This provides a better understanding of the location of file archives. Additionally, example systems may help track and initiate file archiving, freeing the user from installing a separate application and database perform these functions.

[0022] While the present techniques may be susceptible to various modifications and alternative forms, the exemplary examples discussed above have been shown only by way of example. It is to be understood that the technique is not intended to be limited to the particular examples disclosed herein.

CLAIMS

What is claimed is:

1. A method for archiving files, comprising:

determining an operating system is being requested to copy a file to an archive location;

determining whether a copy of the file is permitted based on a predefined policy;

copying the file to the archive location if the copy of the file is permitted; and

tracking archive metadata describing the copy of the file to the archive location.

2. The method of claim 1, comprising preventing the copy of the file if not permitted.

3. The method of claim 1, displaying the archive metadata in association with the file.

4. The method of claim 1, the archive metadata specifying when the copy occurs and the archive location.

5. The method of claim 1, the archive location comprising storage physically attached to a port of a computing device comprising the file.

6. The method of claim 1, the archive location comprising a network uniform resource locator.

7. The method of claim 1, the archive location comprising a cloud service.

8. A computing system, comprising:

a processor; and

a memory comprising code executed to cause the processor to:

determine an operating system is being requested to copy a file to an archive location;

determine whether a copy of the file is permitted based on a predefined policy;

copy the file to the archive location if the copy of the file is permitted;

track archive metadata describing the copy of the file to the archive location;

prevent the copy of the file if not permitted; and

display the archive metadata in association with the file.

9. The computing system of claim 8, the archive metadata specifying when the copy occurs, the archive location, and a number of files displayed in a directory window that are archived.

10. The computing system of claim 8, the archive location comprising storage physically attached to a port of a computing device comprising the file.

11. The computing system of claim 8, the archive location comprising a network uniform resource locator.

12. The computing system of claim 8, the archive location comprising an application for a cloud service.

13. A tangible, non-transitory, computer-readable medium comprising instructions that direct a processor to:

determine an operating system is being requested to copy a file to an archive location;

determine whether a copy of the file is permitted based on a predefined policy;

copy the file to the archive location if the copy of the file is permitted;

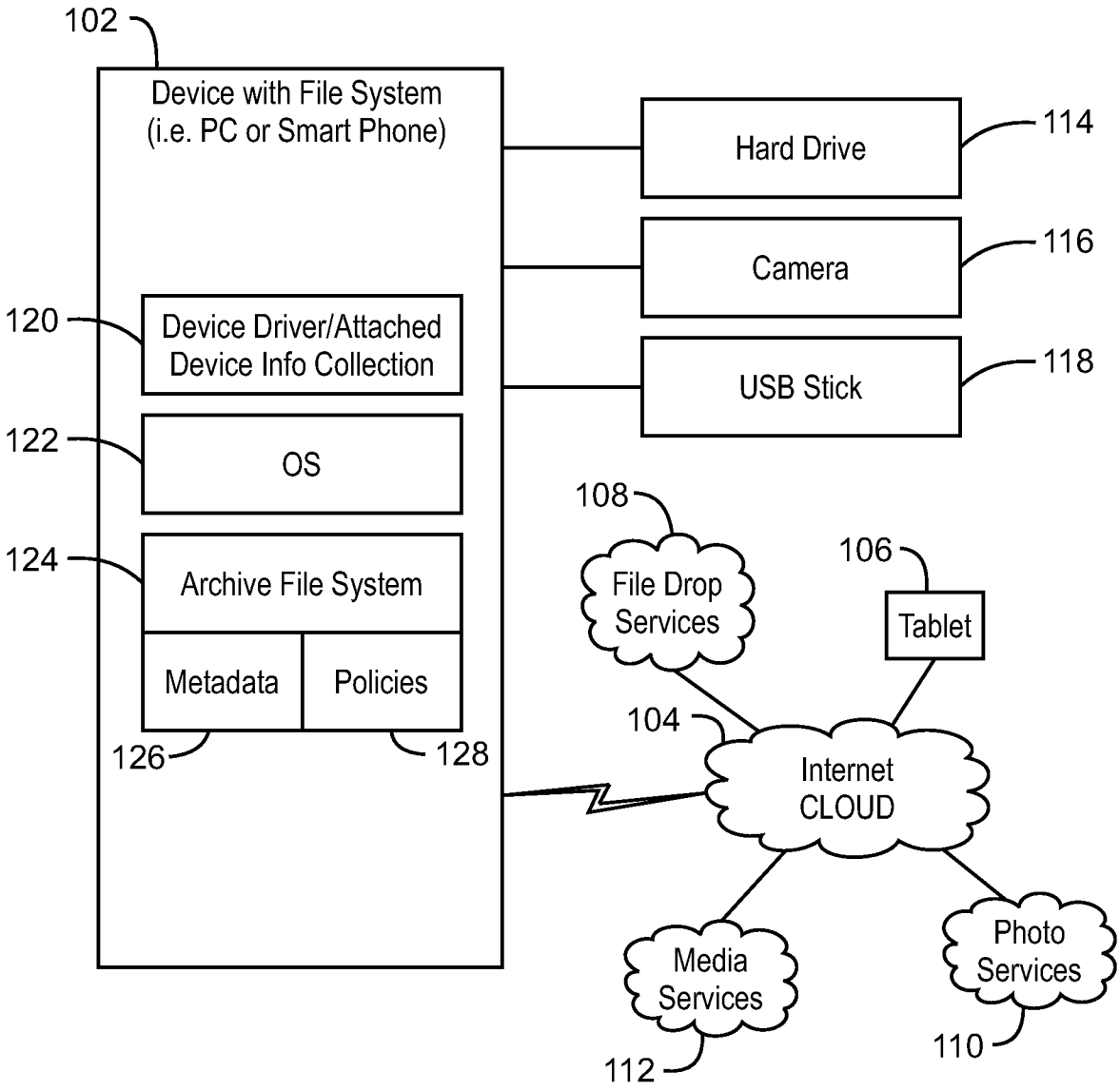
track archive metadata describing the copy of the file to the archive location;

prevent the copy of the file if not permitted; and

display the archive metadata in association with the file.

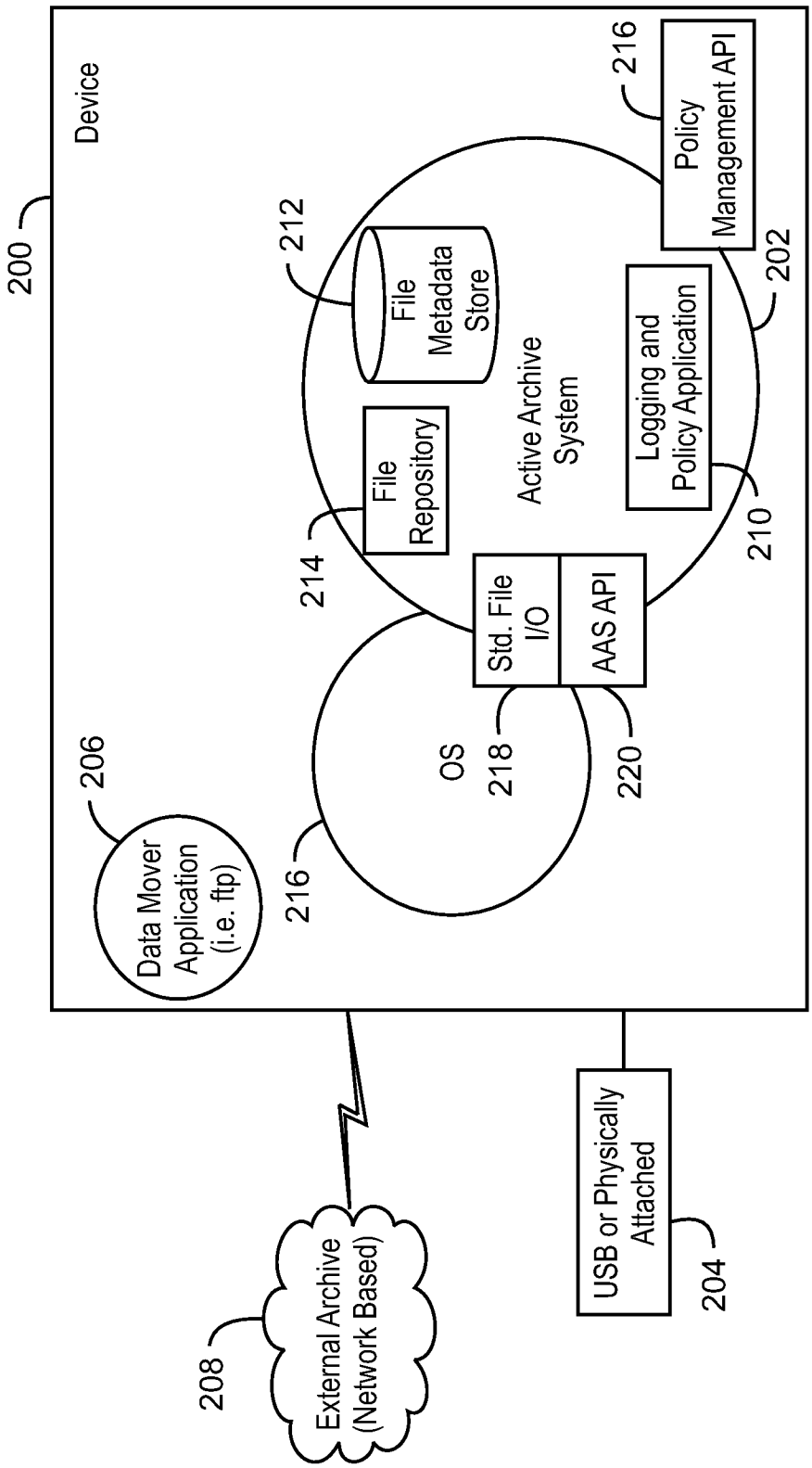
14. The tangible, non-transitory, computer-readable medium system of claim 13, the archive metadata specifying when the copy occurs, the archive location, and a number of files displayed in a directory window that are archived.

15. The tangible, non-transitory, computer-readable medium of claim 13, the archive location comprising storage physically attached to a port of a computing device comprising the file.

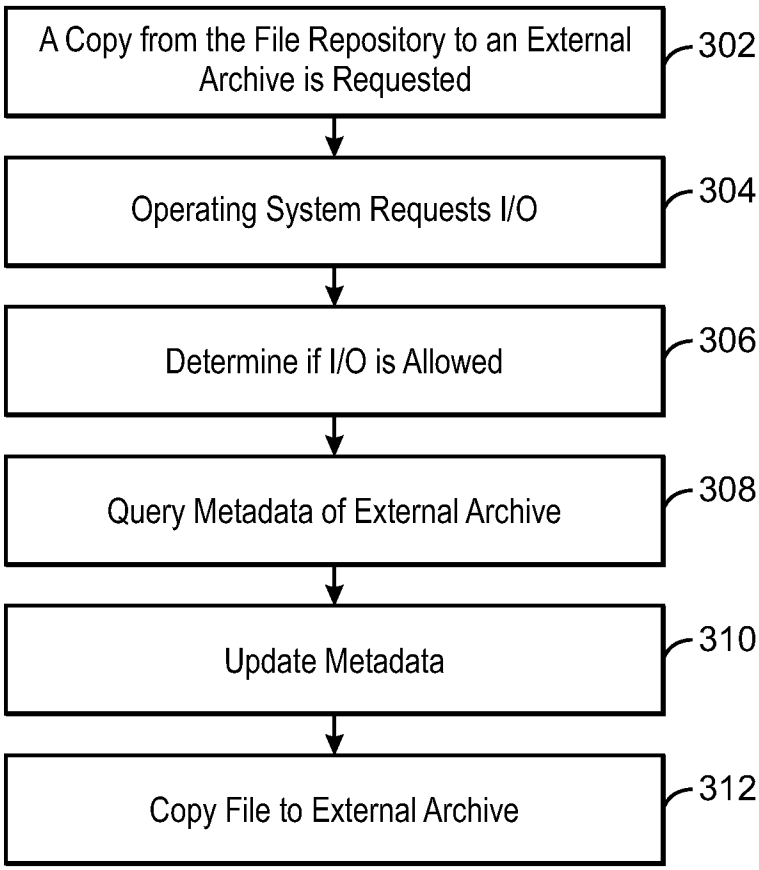

102
Device with File System
(i.e. PC or Smart Phone)
Hard Drive
114
Camera
116
USB Stick
118
120
Device Driver/Attached
Device Info Collection
122
OS
124
Archive File System
Metadata
Policies
126
128
108
File Drop
Services
106
Tablet
104
Internet
CLOUD
Media
Services
112
Photo
Services
110

100

FIG. 1

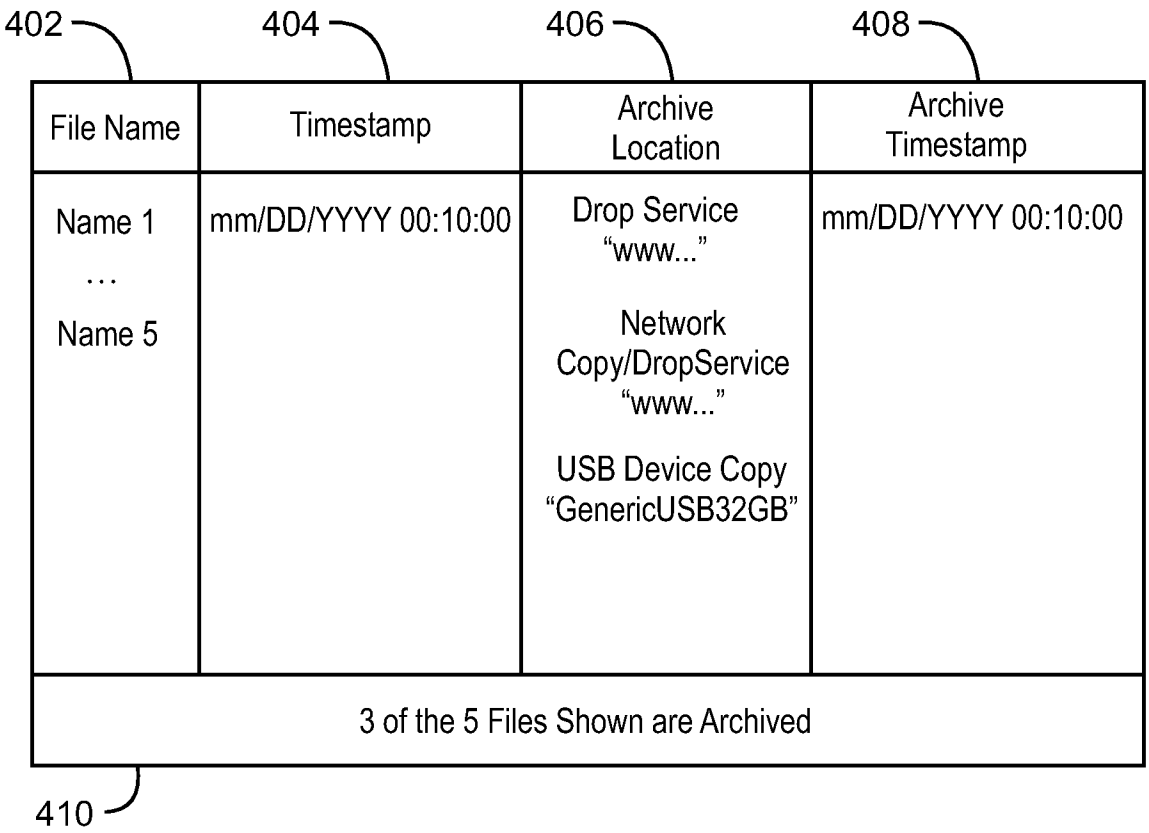

Device
200
Policy Management API
216
File Metadata Store
212
Active Archive System
202
Logging and Policy Application
210
File Repository
214
Std. File I/O
AAS API
OS
218
220
216
Data Mover Application (i.e. ftp)
206
External Archive (Network Based)
208
USB or Physically Attached
204

200
FIG. 2


A Copy from the File Repository to an External Archive is Requested
302
Operating System Requests I/O
304
Determine if I/O is Allowed
306
Query Metadata of External Archive
308
Update Metadata
310
Copy File to External Archive
312

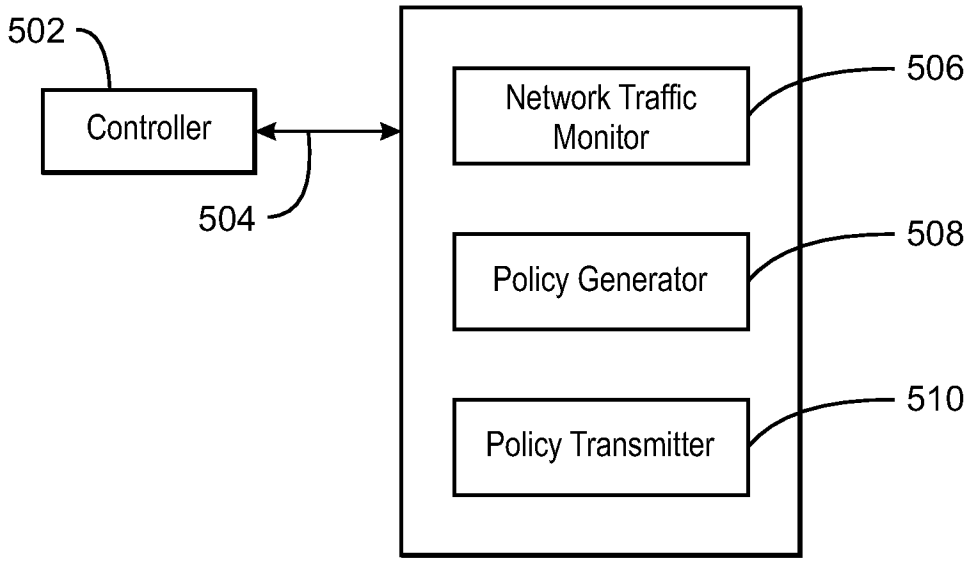
300

FIG. 3


402
404
406
408
File Name
Timestamp
Archive Location
Archive Timestamp
Name 1
...
Name 5
mm/DD/YYYY 00:10:00
Drop Service "www..."
Network Copy/DropService "www..."
USB Device Copy "GenericUSB32GB"
mm/DD/YYYY 00:10:00
3 of the 5 Files Shown are Archived
410

400

FIG. 4


502
Controller
504
Network Traffic Monitor
506
Policy Generator
508
Policy Transmitter
510

500

FIG. 5

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2014/046082

A. CLASSIFICATION OF SUBJECT MATTER

G06F 17/30(2006.01)i

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
G06F 17/30; G06F 12/16; G06F 7/00; G06F 12/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Korean utility models and applications for utility models
Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
eKOMPASS(KIPO internal) & Keywords: file archiving, archive location, copy, permit, policy, metadata, and similar terms.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 8,326,805 B1 (AROUS, ANTHONY et al.) 04 December 2012 See column 3, lines 57-61; column 4, lines 9-28; column 6, lines 31-35 and 59-63; column 9, line 22 - column 11, line 4; claim 8; and figure 2.	1-15
A	US 8,589,439 B2 (COLDICOTT, PETER A. et al.) 19 November 2013 See column 1, lines 12-14; column 2, lines 56-64; column 6, lines 4-39; column 7, lines 19-29; and figures 3 and 5.	1-15
A	US 2012-0084524 A1 (GOKHALE, PARAG et al.) 05 April 2012 See paragraphs [0006]-[0007], [0018]-[0019], and [0028]-[0039]; and figures 2 and 4A-4C.	1-15
A	US 2013-0110787 A1 (GARIMELLA, NEETA et al.) 02 May 2013 See paragraphs [0041]-[0042] and [0045]; and figures 4-5.	1-15
A	US 7,577,689 B1 (MASINTER, LARRY et al.) 18 August 2009 See column 3, line 21 - column 4, line 43; column 5, lines 39-55; column 7, line 25 - column 8, line 4; and figures 1 and 6.	1-15

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
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"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents,such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
11 February 2015 (11.02.2015)	**12 February 2015 (12.02.2015)**

Name and mailing address of the ISA/KR
International Application Division
Korean Intellectual Property Office
189 Cheongsa-ro, Seo-gu, Daejeon Metropolitan City, 302-701,
Republic of Korea
Facsimile No. ++82 42 472 3473

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2014/046082

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 8326805 B1	04/12/2012	None	
US 8589439 B2	19/11/2013	KR 10-2011-0063325 A US 2011-0137871 A1	10/06/2011 09/06/2011
US 2012-0084524 A1	05/04/2012	WO 2012-045023 A2 WO 2012-045023 A3	05/04/2012 21/06/2012
US 2013-0110787 A1	02/05/2013	None	
US 7577689 B1	18/08/2009	None	