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| | |
|---|---|
| Application Number | |
| Filing Date | |
| First Named Inventor | Joshua Johnson |
| Title | DATA STORAGE DEVICE WITH CONFIGURABLE POLICY-BASED STORAGE DEVICE BEHAVIOR |
| Art Unit | |
| Examiner Name | |
| Attorney Docket Number | 980.0023c2 |

**SIGNATURE of Applicant or Patent Practitioner**

| | | | |
|---|---|---|---|
| Signature | /David J. Setter/ | Date (Optional) | |
| Name | David J. Setter | Registration Number | 78758 |
| Title (if Applicant is a juristic entity) | | | |
| Applicant Name (if Applicant is a juristic entity) | | | |

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| Application Number | Filing Date |
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OR

☐ I hereby appoint Practitioner(s) named in the attached list (form PTO/AIA/82C) as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the patent application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above. (Note: Complete form PTO/AIA/82C.)

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I am the Applicant (if the Applicant is a juristic entity, list the Applicant name in the box):

Gaea LLC

☐ Inventor or Joint Inventor (title not required below)

☐ Legal Representative of a Deceased or Legally Incapacitated Inventor (title not required below)

☑ Assignee or Person to Whom the Inventor is Under an Obligation to Assign (provide signer's title if applicant is a juristic entity)

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**SIGNATURE of Applicant for Patent**

The undersigned (whose title is supplied below) is authorized to act on behalf of the applicant (e.g., where the applicant is a juristic entity).

| | | | |
|---|---|---|---|
| Signature | Curtis H. Bruner | Date (Optional) | 2/4/2017 |
| Name | Curtis H. Bruner | | |
| Title | Member, Gaea LLC | | |

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# Electronic Patent Application Fee Transmittal

| | |
|---|---|
| **Application Number:** | |
| **Filing Date:** | |
| **Title of Invention:** | DATA STORAGE DEVICE WITH CONFIGURABLE POLICY-BASED STORAGE DEVICE BEHAVIOR |
| **First Named Inventor/Applicant Name:** | Joshua Johnson |
| **Filer:** | David J Setter/Melissa Eichten |
| **Attorney Docket Number:** | 980.0023c2 |

Filed as Small Entity

**Filing Fees for Utility under 35 USC 111(a)**

| Description | Fee Code | Quantity | Amount | Sub-Total in USD($) |
|---|---|---|---|---|
| **Basic Filing:** | | | | |
| UTILITY FILING FEE (ELECTRONIC FILING) | 4011 | 1 | 80 | 80 |
| UTILITY SEARCH FEE | 2111 | 1 | 350 | 350 |
| UTILITY EXAMINATION FEE | 2311 | 1 | 400 | 400 |
| **Pages:** | | | | |
| **Claims:** | | | | |
| CLAIMS IN EXCESS OF 20 | 2202 | 16 | 50 | 800 |
| INDEPENDENT CLAIMS IN EXCESS OF 3 | 2201 | 3 | 240 | 720 |
| **Miscellaneous-Filing:** | | | | |

| Description | Fee Code | Quantity | Amount | Sub-Total in USD($) |
|---|---|---|---|---|
| **Petition:** | | | | |
| **Patent-Appeals-and-Interference:** | | | | |
| **Post-Allowance-and-Post-Issuance:** | | | | |
| **Extension-of-Time:** | | | | |
| **Miscellaneous:** | | | | |
| | | **Total in USD ($)** | | **2350** |

| Electronic Acknowledgement Receipt | |
|---|---|
| **EFS ID:** | 45429935 |
| **Application Number:** | 17716275 |
| **International Application Number:** | |
| **Confirmation Number:** | 7982 |
| **Title of Invention:** | DATA STORAGE DEVICE WITH CONFIGURABLE POLICY-BASED STORAGE DEVICE BEHAVIOR |
| **First Named Inventor/Applicant Name:** | Joshua Johnson |
| **Customer Number:** | 76444 |
| **Filer:** | David J Setter/Melissa Eichten |
| **Filer Authorized By:** | David J Setter |
| **Attorney Docket Number:** | 980.0023c2 |
| **Receipt Date:** | 08-APR-2022 |
| **Filing Date:** | |
| **Time Stamp:** | 13:12:14 |
| **Application Type:** | Utility under 35 USC 111(a) |

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| RAM confirmation Number | E202248D12284007 |
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## File Listing:

| Document Number | Document Description | File Name | File Size(Bytes)/ Message Digest | Multi Part /.zip | Pages (if appl.) |
|---|---|---|---|---|---|
| 1 | | 980-0023c2_Application.pdf | 293195<br>9f18bc82b6fd1d0c980ebf91f931aa5913ed0efe | yes | 56 |
| | **Multipart Description/PDF files in .zip description** | | | | |
| | **Document Description** | | **Start** | **End** | |
| | Specification | | 1 | 47 | |
| | Claims | | 48 | 55 | |
| | Abstract | | 56 | 56 | |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 2 | Drawings-only black and white line drawings | 980-0023c2_Drawings.pdf | 211652<br>892a60aa87976acea0c3894c116f5d695b606f23 | no | 32 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 3 | Application Data Sheet | 980-0023c2_ADS.pdf | 1256715<br>3bcd91fb8ac267c713f7f6a73a44a372b92d99e5 | no | 11 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 4 | Oath or Declaration filed | 980-0023c2_Declarations.pdf | 350754<br>3f123f9d56095d078de1e1181ba6ada3111c0cf2 | no | 5 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 5 | Power of Attorney | 980-0023c2_POA.pdf | 375876<br>cfc9262b4693a08e2d5934d7c77fb345f3525c9c | no | 2 |

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| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 6 | Fee Worksheet (SB06) | fee-info.pdf | 48398<br>f01843f5379af1e4412754aabb721c8c474644e2 | no | 2 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
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**New International Application Filed with the USPTO as a Receiving Office**

**If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.**

# DATA STORAGE DEVICE WITH CONFIGURABLE POLICY-BASED STORAGE DEVICE BEHAVIOR

## RELATED APPLICATIONS

**[0001]** The present application is a continuation of and claims priority to pending U.S. Application No. 16/990,433, filed August 11, 2020 which is a continuation of and claims priority to U.S. Application No. 15/804,772, filed on November 6, 2019, now U.S. Patent 10,776,023; which claims priority to U.S. Provisional Patent Application Nos. 62/418,510, 62/418,561, 62/418,687, 62/418,693, 62/418,696, 62/418,717, 62/418,724, 62/418,730, 62/418,742, 62/418,759, 62/418,764, 62/418,768, 62/418,773, 62/418,775, 62/418,780, 62/418,785, all filed on November 7, 2016, and to U.S. Provisional Patent Application 62/448,826, filed January 20, 2017, and which are all hereby incorporated by reference in their entirety.

## TECHNICAL FIELD

**[0002]** Aspects of the disclosure are related to data storage devices and in particular to data storage devices with configurable policy-based read and write behavior.

## TECHNICAL BACKGROUND

**[0003]** Data storage devices come in a wide variety of technologies and configurations such as solid-state drives, hard disk drives, floppy disk drives, and the like. Each of these data storage devices is based around some type of storage medium. For example, solid-state drives are based around integrated circuit memory devices, typically NOR Flash or NAND devices. Hard disk drives and floppy disk drives are typically based around one or more magnetically coated disks. Each of these devices (DRAM, NAND, magnetic disks) has imperfections. In order to deal with these imperfections, and still have a functional and performant device, all of these devices have trade-off decisions made that affect storage space, reliability, speed, etc.

**[0004]** These trade-off decisions have largely been made by the manufacturer at the time of design and/or manufacture to improve consistency of their product. Consequently, end users have very little to no influence over what trade-offs are made.

OVERVIEW

**[0005]** In an embodiment, an apparatus comprises a storage device and a device controller operatively coupled with the storage device is provided. The device controller comprises a memory that stores an application. The application stored on the memory comprises instructions. When executed, the instruction direct the device controller to receive a storage request comprising content. The device controller retrieves a storage device policy from the memory that indicates a set of storage locations on the storage device. The device controller selects one of the storage locations on the storage device based on the storage device policy. The device controller stores the content on the storage device at the selected storage location. The device controller records storage information for the content that indicates the selected location on the memory.

BRIEF DESCRIPTION OF THE DRAWINGS

**[0006]** Many aspects of the disclosure can be better understood with reference to the following drawings. While several implementations are described in connection with these drawings, the disclosure is not limited to the implementations disclosed herein. On the contrary, the intent is to cover all alternatives, modifications, and equivalents.

**[0007]** Figure 1A illustrates a hard disk drive.

**[0008]** Figure 1B illustrates solid state drive.

**[0009]** Figure 2A illustrates a disk mapping from a hard disk drive.

**[0010]** Figure 2B illustrates multiple recording patterns on a hard disk.

**[0011]** Figure 3 illustrates a storage array according to an implementation.

**[0012]** Figure 4A illustrates a data storage arrangement according to an implementation.

**[0013]** Figure 4B illustrates a data storage arrangement according to an implementation.

**[0014]** Figure 4C illustrates a data storage arrangement according to an implementation.

**[0015]** Figure 4D illustrates a data storage arrangement according to an implementation.

**[0016]** Figure 4E illustrates a data storage arrangement according to an implementation.

**[0017]** Figure 5 illustrates a storage array according to an implementation.

**[0018]** Figure 6 illustrates a hard disk drive according to an implementation.

**[0019]** Figure 7A illustrates a collection of libraries according to an implementation.

**[0020]** Figure 7B illustrates a collection of libraries according to an implementation.

**[0021]** Figure 8A illustrates a write process employed by a storage device in an implementation.

**[0022]** Figure 8B illustrates a write process employed by a storage device in an implementation.

**[0023]** Figure 8C illustrates an operational sequence in an implementation of a policy-based write.

**[0024]** Figure 8D illustrates a read process employed by a storage device in an implementation.

**[0025]** Figure 8E illustrates an operational sequence in an implementation of a policy-based read.

**[0026]** Figure 9A illustrates a write process employed by a storage device in an implementation.

**[0027]** Figure 9B illustrates an operational sequence in an implementation of a policy-based write.

**[0028]** Figure 9C illustrates a read process employed by a storage device in an implementation.

**[0029]** Figure 9D illustrates an operational sequence in an implementation of a policy-based read.

**[0030]** Figure 10A illustrates a write process employed by a storage device in an implementation.

**[0031]** Figure 10B illustrates an operational sequence in an implementation of a policy-based write.

**[0032]** Figure 10C illustrates a read process employed by a storage device in an implementation.

**[0033]** Figure 10D illustrates an operational sequence in an implementation of a policy-based read.

**[0034]** Figure 11A illustrates a write process employed by a storage device in an implementation.

**[0035]** Figure 11B illustrates an operational sequence in an implementation of a policy-based write.

**[0036]** Figure 11C illustrates a read process employed by a storage device in an implementation.

**[0037]** Figure 11D illustrates an operational sequence in an implementation of a policy-based read.

**[0038]** Figure 12 illustrates a computing system suitable for implementing the policy based storage disclosed herein, including any of the architectures, processes, operational scenarios, and operational sequences illustrated in the Figures and discussed below in the Technical Disclosure.

DETAILED DESCRIPTION

**[0039]** In the examples below, storage devices are discussed which allow customization of a storage device policy, thus directing how the storage device operates. This storage device policy may cover many or all aspects of operation, for example, controlling margin of error, allowing the user to make trade-offs between reliability of storage and volume of storage. Additionally, the storage device policy may cover details of the write or read processes, allowing a user to customize the operation of the storage device. Further, the storage device policy may control where content is stored within the storage device (layout), granting the user further control over the read/write process.

**[0040]** User, as used herein, refers to more than just a human user. Rather, user refers to any type of entity that can interact with the devices described herein. User could include, but is not limited to, a human user, a network machine, or an artificial intelligence-based machine, for example.

**[0041]** From a technical perspective, currently available solutions for data storage allow only extremely minimal configuration of read/write policies within a storage device. Nor do they allow users to direct the read/write process within the storage device.

**[0042]** In a first example, Fig. 1A illustrates drive 100, which is illustrated here as a hard disk drive including a storage media 110 having a magnetic surface. In this example, drive 100 includes case 105, which physically supports the storage media 110, the device controller 130, a memory 135, interface connectors 125, and connector 120.

**[0043]** In an implementation, drive 100 includes storage media 110 having a magnetic surface including a plurality of zones or recording locations, a read/write transducer associated

with the magnetic surface for reading and writing data in tracks in the plurality of zones, a actuator arm configured to support and position read/write transducer at a plurality of locations above the magnetic surface, and device controller 130 coupled to a memory 135.

**[0044]** In an implementation, device controller 130 is significantly more than a traditional hard disk controller. A traditional hard disk controller is a device that must be attached to a host controller and is only capable of responding to host controller commands. Device controller 130 includes all the functionality of a traditional hard disk controller, with additional functionality allowing it to run additional code and/or applications. This additional functionality may exist due to additional processing hardware in the hard disk controller. Device controller 130 may be in the form of a hard disk controller linked with a separate processor chip. Alternatively, device controller 130 could be in the form of a computing system, such as that described in Fig. 12. When device controller is represented by the computing system described in Fig. 12, it should be noted that the storage system 1203 may be represented by memory 135. In other words, while there may be a storage system 1203 within device controller 130 and an additional memory 135, this is not necessary – the memory 135 may already be represented within Fig. 12 as storage system 1203. In an implementation, device controller 130 may be in the form of a computing system as described in Fig. 12 with a learning algorithm or artificial intelligence (AI) loaded thereon. In either case, device controller is configured at least to handle the operations that a traditional hard disk controller handles, i.e. it is configured to control the actuator arm and read/write transducer (or other hardware as needed) to read and write data on storage media 110.

**[0045]** Device controller 130 is connected to interface connector 125 such that Device controller can communicate in any manner a storage device and/or storage server may communicate including, for example via login (telnet, ssh, etc.), via file sharing service (NFS, SAMBA, FTP, etc.), via an Object Storage API (S3, SWIFT, etc.) or via any other protocol or service that can be run over the interface. The interface connector 125, could be for example, an Ethernet connector configured to communicate over an Ethernet network. In an implementation, the connector and network could work with Ethernet, Infiniband, Fibre Channel, Omni-Path, or any other network technology. Further, device controller 130 may be loaded with any selection of firmware or software. In an implementation, an operating system, and/or virtual machine hosting layer, such as Linux, Windows, etc., is loaded on the device controller 130, allowing a user to load any software of their choosing on the device controller 130.

**[0046]** In addition to interface connector 125, drive 100 also includes a connector 120 which may include power connectors to power drive 100 or other communication connectors. While this is shown as a separate connector from interface connector 125, it should be understood that the functionality of interface connector 125 and connector 120 can be combined in one physical connector or separated into a plurality of connectors.

**[0047]** Turning to Fig. 1B, drive 100 utilizes solid-state storage media according to an implementation. It should be noted that, while some of the hardware presented in Figs. 1A and 1B differs, the applicability to the concepts presented herein remains consistent across the drives shown. Consequently, drive 100 is shown in both Fig. 1A and Fig. 1B. Drive 100 is relevant to the discussion herein regardless of whether the storage media 110 is magnetic disk as shown in Fig. 1A, or solid-state memory 145-148 as shown in Fig. 1B, or some other type of storage media 110 not explicitly shown herein.

**[0048]** In an implementation, drive 100 optionally includes a case 105, which physically supports printed-circuit board 140, interface connector 125 and connector 120. Solid-state memory 145-148, as well as the device controller 130 and memory 135, are mounted on the printed-circuit board 140. In Fig. 1B, solid-state memory 145-149 are shown as four memory elements. This disclosure is not limited to four elements and could be any number of physical elements in any arrangement (i.e. busses, hierarchical, etc.).

**[0049]** Printed-circuit board 140 is also connected to interface connector 125 and connector 120. Interface connector 125 is structured to allow drive 100 to connect to a network fabric, such as through a cable and/or backplane. In an implementation, the interface connector may be in the form of an RJ45, QSFP, or CXP connector, to which copper wiring or optical fiber optic cable can connect, for example. It should be understood that any form of physical connector can be used that allows drive 100 to connect to a network. The interface connector may comprise a wireless module, such as a Wifi, Zigbee, etc. module through which the device controller 130 can connect to a network. In this way, the interface connector can connect to a network. The interface connector 125 is electrically and communicatively connected to the device controller 130, which is connected to memory 135. As in Fig. 1A, the device controller can be in the form of a computing system, such as that presented in Fig. 12. As the computing system presented in Fig. 12 already includes a storage system 1203, this can represent the same element as memory 135.

**[0050]** In addition to interface connector 125, drive 100 also includes a connector 120 which may include power connectors to power drive 100 or other communication connectors. As in Fig. 1A, while this is shown as a separate connector from interface connector 125, it should be understood that the functionality of interface connector 125 and connector 120 can be combined in one physical connector or separated into a plurality of connectors.

**[0051]** Figure 2A illustrates magnetic storage media 110 within drive 100 of figure 1A. In this example implementation, storage media 110 includes a physical disk upon which a magnetic surface resides. Content is written to, and read from storage media 110. The disk (storage media 110) spins. At the same time, an actuator moves the read/write head between the inner and outer edges of the disk. Content can be read and recorded in any pattern around the disk (i.e. circumferential, spiral, sinusoidal, etc.).

**[0052]** While Fig. 2A was drawn to show the general function of storage media 110, in an implementation in which storage media 110 is a magnetic disk, it should be understood that storage media 110 can be implemented in any form of media, such as the solid-state media shown in Fig. 2A and the result of the present disclosure would be the same. Whatever media may be used for storage media 110 allows content to be stored on storage media 110 in such a way that it can be retrieved at a later time.

**[0053]** Fig. 2B shows an expanded view of storage media 110 in the form of a magnetic disk. Recording patterns 255, 260 and 265 show partial samples of recorded tracks of content on storage media 110. All of the recording patterns 255, 260 and 265 are shown in a roughly spiral or circular pattern around the storage media 110. Recording pattern 255 is recorded in a tight spiral around the storage media 110. The recording pattern could scribe circles around storage media 110 rather than spirals. According to an implementation, the content could be recorded in any pattern.

**[0054]** The recording pattern 255 is shown with recording path that records very close the other recording paths. Recording pattern 260 shows paths that are significantly farther apart. Storage media 110 utilizes a magnetic surface for recording content. Depending on the size of the recording head, that content will take some amount of physical space. If two recording paths are recorded too close together, then the paths may interfere with each other, causing the content in one or both of the recording paths to become corrupted. Recording pattern 260, for example, will have a much lower likelihood of the recording paths interfering with each other to

compromise the content on either of the paths. Recording pattern 255 creates a much higher likelihood of compromised content due to the recording paths being too close together. However, recording pattern 255 can store more content than will recording pattern 260 in a similar area. The amount of content stored corresponds directly to the density of recording paths utilized (Assuming the same read/write methodology, etc.) Thus, the path scribed by recording pattern 255 allows significantly more content to be stored. This creates a trade-off decision when deciding how to store content on storage media 110. One can choose to keep recording paths very tight in order to accommodate more content at the risk that the content will be compromised, or one could alternately choose to decrease the amount of content to be stored while also decreasing the chance of corruption of the content.

**[0055]** In an implementation, instead of varying the density of recording paths, the frequency of recorded bits along the paths may be varied. Similar to the concepts discussed above, if the frequency of the recording (i.e. bits per physical length, such as bits per inch) may be varied. By increasing the number of bits per inch that are recorded, storage capacity in increased, but data integrity may be degraded. In a further implementation, both of these variables may be adjusted to increase or decrease recording density. Regardless of the recording method chosen, the device controller 130 can utilize the storage device policy to make these trade-offs.

**[0056]** Historically, this trade-off decision has been made by drive manufacturers based on their own set of priorities. Priorities differ among different users, though. For example, a home user, such as an individual using a hard drive on a personal computer may have only one copy of content stored on the hard drive. For such a user, content integrity is very valuable, so the user would likely prefer that the possibility of content corruption be limited as much as possible. On the other hand, as an example, the owner of a large bank of hard drives that support cloud storage, may be much less concerned about the integrity of the content, and much more concerned with the amount of content able to be stored. This may be due to redundancies in the cloud storage system that allow the user to compensate for compromised content more easily. The space available to store data is of high concern to such a user, though, due to the large amount of data storage needed.

**[0057]** In addition to the possibility of recording paths interfering with each other, storage space competes with the possibility of imperfections in storage media 110. Imperfections in the

magnetic coating, or other imperfections in storage media 110 can make it impossible to store content on certain areas of storage media 110. This may mean that a sector is entirely unusable, and the sector can just be eliminated from the mapping of storage media 110. Alternatively, there could be areas of storage media 110 that have minor imperfections that may be dealt with differently. Recording pattern 265 shows an implementation that allows for imperfections in storage media 110. By scanning storage media 110, device controller 130 can identify areas of storage media 110 with imperfections. In an implementation, device controller 130 can then select recording paths such as recording pattern 265 that avoid imperfections in storage media 110. It should be noted that device controller 130 requires more detailed mapping records or storage information than may be required for a simple path of storage, such as recording pattern 255 or recording pattern 260. Nevertheless, device controller 130 can improve storage capacity and reduce content corruption by having the flexibility to avoid areas of imperfection.

**[0058]** In an implementation, device controller 130 can choose to record content less densely (such as in recording pattern 260) in areas with potential imperfections, while recording content more densely (such as in recording pattern 255) in areas without imperfections. These trade-off decisions can all be made by device controller 130, which can be customized by an end user prior to data being stored, or at the time the data is stored. Furthermore, it may perform different or alternate procedures even on the same storage media surface.

**[0059]** While the recording process differs for different types of storage media, the concept applies to all types of storage media. For example, if the solid-state memory from Fig. 1B is utilized, the recording paths discussed may be inapplicable. The idea of imperfections within the storage media still applies, though. In solid-state memory devices, such as solid-state memory 145-148 in Fig. 1B, certain blocks of memory, or certain cells may be imperfect. Historically, solid state drives had to set aside a significant amount of over-provisioned storage blocks to use in place of imperfect cells or blocks. In an implementation these over-provisioned storage blocks can be customized and adjusted prior to, or at the time the data is stored to more accurately reflect a user's trade-off choices.

**[0060]** As another example of a trade-off decision, Error-Correcting Code (ECC) requirements can be changed. ECC requirements can be heightened for important content, and can be softened for less important content.

**[0061]** It should be understood that any type of storage media 110 may have its own trade-off choices depending on the particular storage media 110. Regardless of the particular trade-off choices available to be made, the discussion herein facilitates handling these trade-off choices.

**[0062]** Fig. 3 shows a storage array 300. In an implementation, multiple storage drives, such as drives 310-321 are connected together in an array to create a large amount of available storage. Such an array may be used for cloud storage support, for example. While each of the drives 310-321 in Fig. 3 is shown as a disk drive such as drive 100 shown in Fig. 1A, these drives could be any combination of drives, such as hard disk drives, solid-state drives, etc. Similarly, while 12 drives 310-321 are shown, the storage array 300 could include any number of drives. The drives 310-321 are connected to a user device 305. User device 305 could be any type of network device with a network connection. Historically an array such as the storage array shown in Fig. 3 would require a storage controller in the place of user device 305. Since historically the device controller 130 only worked with a compatible storage controller, a storage controller was required to manage read/write data for the drives 310-321. In this disclosure, the device controller 130 includes capabilities beyond the historical abilities of physically managing the disk read/write process to include the ability to execute code and perform operations that were formerly the purview of the host and host controller. Therefore, each of the drives 310-321 can function independently of user device 305. Thus, each of drives 310-321 can independently connect to a network or networks, and operate as an independent network device.

**[0063]** Additionally, since each of drives 310-321 includes interface connectors and is configured to communicate directly through a communications capable link, the connection between user device 305 and each of drives 310-321 (and between each of drives 310-321) is a communications connection, not an interface limited to a storage only protocol. This allows for standard network communication to occur between all devices. The device controller 130 can be configured to interact with any network and interact with one or many devices over one or many protocols.

**[0064]** By having the device controller 130 function independently, storage array 300 gains many operational advantages. In an implementation, by enabling the device controller to function independently and communicate over a network, the need for a storage controller is

eliminated. Further, drives 310-321 are enabled to have independent storage policies that can maximize efficiency of each node as is required/desired for the aggregate array.

**[0065]** For example, if one drive, such as drive 310 is configured to store medical records, the device controller in drive 310 can be configured to optimize reliability for medical record storage. This might include recording content less densely, in order to reduce content corruption. It might also include storage information identifying the drive as non-rewriteable, so the data will not be overwritten and erased in the future. Similarly, the device controller might require password authorization in order to retrieve the content from the drive, or the drive could encode all content stored on the drive to protect privacy.

**[0066]** In another implementation, a drive, such as drive 311, could be configured as a drive to store on-line temporal video data. In this case, the drive may be configured to store data very densely, as there may be little concern over content corruption. Similarly, the drive 311 may be configured with little to no security for short-lived, redundant or cached data. The device controller could further be configured to differentiate between short-lived, redundant or cached data, and online shopping financial content, such as credit card data, etc. In this case, the online cached images or video data may be recorded with little to no security, while the online shopping financial data may be recorded with a high level of security. Again, this functionality can be customized to fit the needs and values of the user, and can be applied prior to or on-demand as the data is read from or written to the device. These different data types may be separated by drive, such as drives 311, 312, 313, etc., or the data may be interspersed within the same drive. In either case, the storage device policy can cause the content to be stored according to the correct trade-off choices.

**[0067]** Each of the drives 310-321 may additionally have differing recording properties. For example, if drive 313 is older than drive 314, it may have an older recording head, which doesn't allow data to be stored as densely as drive 314. The storage device policy can manage these varying properties.

**[0068]** Figs. 4A and 4B illustrate data storage arrangements. Historically, when a user device 305 writes data to a drive, the user device 305 provides the drive the LBA (Logical Block Address) of where to write the content. The drive then maps the LBA to a PBA (Physical Block Address). The device controller 130, according to an implementation, is capable of managing significantly more storage information. This storage information may contain, for example, an

object identifier, the size of the content stored, a location in which the content was stored, encoding information (including an encryption key, etc.), among many other elements. As discussed above, the location where the object is stored may include a simple start location, or it may be more complex, such as a starting point together with angle information, or even a complete mapping of the path of the content storage.

**[0069]** Fig. 4B illustrates that in an implementation, the storage information is stored in the device controller. As in Fig. 4A, the storage information may include a number of elements, particularly when, as disclosed herein, the device controller is customizable to allow the user to make trade-off decisions about the storage of content.

**[0070]** Fig. 4C illustrates the storage information stored within the device controller including an entry for overwrite protection. This selection could be made for the entire drive 100, for individual tracks or sectors or regions, or individually by object or read/write request for example.

**[0071]** Fig. 4D illustrates that in an implementation, the storage information stored in device controller 130 may also include a pointer to a location storing full storage information for content stored within storage media 110. This pointer information may be consistent for the entire drive 100, or may be made by sector, track, region, or object. In an implementation, the remaining storage information (other than object identifier and pointer) may not be stored in the device controller 130. The pointer may additionally be in any form, for example a network address that will not function when a hard drive is removed from a particular context (i.e. the network, an internet address, etc.).

**[0072]** Fig. 4E illustrates that any of the storage information may be stored as a header on the content stored within the storage media 110. It should be understood that any of the descriptions herein that describe storing storage information in the memory 135 or the device controller 130 are interchangeable – i.e. any of these descriptions applies equally well if the storage information is stored in memory within the device controller 130, memory 135 external to the device controller 130, or on the media with the data within the storage media 110. While Fig. 4E shows the storage information stored as a header on the content, the storage information can be stored in any location on the media with the content.

**[0073]** Fig. 5 illustrates a storage array 500. In an implementation, multiple storage drives, such as drives 310-321 are connected together in an array to create a large pool of

available storage. Such an array may be used for cloud storage support, for example. While each of the drives 310-321 in Fig. 3 is shown as a disk drive such as drive 100 shown in Fig. 1A, these drives could be any combination of drives, such as hard disk drives, solid-state drives, etc. Similarly, while 12 drives 310-321 are shown, the storage array 300 could include any number of drives. The drives 310-321 are connected to a user device 305 and a key device 505. User device 305 and key device 505 could each be any type of network device or virtual node with a network connection. Historically an array such as the storage array shown in Fig. 3 would require a storage controller in the place of user device 305 or key device 505. Since historically the device controller 130 worked externally as a response-only device, a storage controller was required to manage the reading/writing of data for the drives 310-321. In this disclosure, the device controller 130 includes capabilities beyond the historical abilities of physically managing the disk read/write process to include the ability to operate autonomously and/or interactively with other devices on the network. Therefore, each of the drives 310-321 can function independently of user device 305 or key device 505. Thus, each of drives 310-321 can independently log in to a network, or operate as any other independent network device.

**[0074]** Additionally, since each of drives 310-321 can be configured to communicate directly through a communications link, the connection between user device 305 and key device 505 and each of drives 310-321 (and between each of drives 310-321) is a network connection. This allows for network communication to occur between and among the devices. The device controller 130 can be configured to interact with any network.

**[0075]** Storage array 500 provides many benefits due to the fact that each of drives 310-321 can independently operate and interact, as outlined with reference to Fig. 3. Additionally, key device 505 provides a location to store storage information (i.e. meta-data) in a remote location, optionally a secured location, from the device controller 130, which provides many advantages.

**[0076]** Historically, a storage controller, such as user device 305 managed the operation of drive 310. User device 305 directed the hard disk controller in drive 310 to write content to an LBA, and drive 310 wrote the content to the PBA that mapped to the LBA identified.

**[0077]** On a hard drive with a magnetic disk such as storage media 110, there are many reasons that this is done. For example, the translation on the drive may be to obfuscate the

defects on the device and/or various recording technologies (e.g. Shingled Magnetic Recording), or to write the content quickly.

**[0078]** On a hard drive with solid-state media, such as solid-state memory 145-148, this is done to prevent overuse of a particular address (wear-leveling), avoid bad blocks (media defects), and/or enable faster writing, for example.

**[0079]** The hard drive then keeps track of various mappings to enable reading of the correct PBA when a specific LBA is requested by the host computer system.

**[0080]** In an embodiment, the device controller 130 simplifies both the need for the host computer system to keep track of the physical defects, etc. and the list of block addresses for each file or object. Additionally, the device controller 130 enables the storage device to maximize the storage capacity and/or performance of the storage device based on policy.

**[0081]** This is implemented by providing the host computer system with alternate methodologies to maintain location information about files/objects:

**[0082]** When a host computer system wishes write a file/object to a storage device, the user device 305 provides the data to the drive 100. The device controller 130 stores the data where it deems best, based on the application of one or more polices. This decision may be based on (but not limited to) size of the data, existing state of the storage media, the location of the actuator arm on the media (in the case of hard disk drives), what locations have already been written, the recording technology implemented (e.g. Shingled Magnetic Recording, 3D NAND, etc.), wear leveling, alternate write activity on adjacent blocks, desired reliability level, etc.

**[0083]** After selecting the location the storage device may write the data to the media and subsequently or coincidentally store the location information, and/or return the location information to the requestor of the operation. This location data could additionally or alternately be written to a key device 505. If, for example, this location information is stored only in a key device 505, additional security for the data can be achieved. The location data may be represented in any number of ways (e.g. polar coordinates, cartesian coordinates, PBA, cylinder/track/sector, etc.). It may or may not include the size/length, reliability requirements, slope, and/or any additional information such as encryption key and/or encoding scheme.

**[0084]** It should be understood that the data recorded to the user device 305 or the key device 505 need not be limited to only the location of the data stored. The data could also include size of the content, encoding or encryption details of the content, etc.

**[0085]** The user device 305 or key device 505 then stores the location associated with the data that was written for future use (e.g. reading the data at a later time.)

**[0086]** Figure 6 illustrates a drive 600 according to an implementation, which is illustrated here as a drive 600 including a storage media 110 having a magnetic surface. In this example, drive 600 includes case 105, which physically supports a storage media 110, a device controller 130, a programmable logic device 605, a memory 135, interface connectors 125, and connector 120.

**[0087]** In an implementation, drive 600 includes storage media 110 having a magnetic surface including a plurality of zones or recording locations, a read/write transducer associated with the magnetic surface for reading and writing data in tracks in the plurality of zones, an actuator arm configured to support and position read/write transducer at a plurality of locations above the magnetic surface, and device controller 130 coupled a memory 135.

**[0088]** In an implementation, device controller 130 is significantly more than a traditional hard disk controller. A traditional hard disk controller is merely device that must be attached to a host controller and is only capable of responding to commands. Device controller 130 includes all the functionality of a traditional hard disk controller, with the additional ability to run code and/or applications. Device controller 130 may be in the form of a hard disk controller linked with processor chip. In an implementation, device controller 130 could be in the form of a computing system, such as that described in Fig. 12. When device controller is represented by the computing system described in Fig. 12, it should be noted that the storage system 1203 may be represented by memory 135. In other words, while there may be a storage system 1203 within device controller 130 and an additional memory 135, this is not necessary – the memory 135 may already be represented within Fig. 12 as storage system 1203. In either case, device controller is configured at least to handle the operations that a traditional hard disk controller handles, i.e. it is configured to control the actuator arm and read/write transducer to read and write data on storage media 110.

**[0089]** Programmable logic device 605 is inserted directly into the data and/or control path of drive 600. The programmable logic device 605 can be programmed by a user of the drive 600 for any operational need that is desired. In an embodiment, this could be used for custom encryption through hardware. Alternatively, this could be used as a regular expression engine to search for words, phrases, pictures etc. that meet certain criteria. The programmable

logic device 605 could be used broadly for the entire drive 600, or could be used on a per-request basis, such that different requests to read or write content could use different programmable logic configurations. For example, a write of a text file may use programmable logic for compression, while a write of a picture may use programmable logic for facial recognition. In an implementation, the programmable logic device 605 may include a learning algorithm or artificial intelligence that can act of the signals passing through drive 100. The programmable logic device 605 may be incorporated into drive 600 as a programmable chip built into the drive 600, or as a socket assembled into the drive 600 which can later accept a programmable chip (after manufacture) for example.

**[0090]** While programmable logic device 605 is shown connected between interface connector 125 and device controller 130, programmable logic device 605 could also be located (and electrically and/or communicatively connected) elsewhere within the drive 600 to have the same effect. For example, programmable logic device 605 may be connected to device controller 130, and the hardware and/or software in device controller 130 will automatically route some or all of the signals through programmable logic device 605. In an implementation, programmable logic device 605 could be connected to a pre-amplifier (not shown) that is in turn connected to device controller 130.

**[0091]** Device controller 130 is connected to interface connector 125 (through programmable logic device 605 according to an implementation) such that device controller 130 can communicate in any manner that a network server device can communicate, for example via login (telnet, ssh, etc.), via file sharing service (NFS, SAMBA, FTP, etc.), via an Object Storage API (S3, SWIFT, etc.) or via any other protocol or service that can be run over a network. Further, device controller 130 may be loaded with any selection of firmware or software. In an implementation, an operating system hosting layer or an operating system, such as Linux, Windows, etc., is loaded on the device controller 130, allowing a user to load any software of their choosing on the device controller 130.

**[0092]** Fig. 7A illustrates a storage device policy according to an implementation. The device controller 130 as discussed herein allows multiple opportunities for the device firmware to adopt and implement flexible operational parameters. Historically, hard drives, both hard disk drives and solid-state drives, have included a single, immutable binary file of device firmware. This firmware, as discussed above, allowed only minimal customization by the user, and

therefore was inefficient, or mis-matched to the operational environment for many users. With device controller 130 as discussed herein, this inflexibility is removed. The device controller 130 can allow selection of parameters that modify device operation, such as command timeout, read retry count, device format block size, background task controls, cache control parameters, etc. The device controller 130 allows a collection of cooperating libraries or execution elements running on one or more processors with varying capabilities.

**[0093]** The storage device policy can be stored (and modified or updated) on the device controller 130. Alternatively (or additionally) the storage device policy can be stored at a remote location to the device controller 130 and queried by the device controller 130 as needed to implement the storage device policy.

**[0094]** Collection of libraries 700 shows an example of the cooperating libraries that may be included within device controller 130. Layout library 705 can instruct the device controller 130 how to determine what layout to use for content storage. For example, layout library 705 may include algorithms that take into account the type of content to be written to the storage media 110 to determine how densely to record content onto the storage media 110. Defect avoidance library 710 can include algorithms to determine how to deal with defects within the storage media 110. As discussed above with reference to Fig. 4, this could include recording content on custom paths, or altering density of recorded content based on quality of the storage media 110 in certain tracks or sectors. Read/write control library 715 can contain instructions or algorithms directing device controller 130 on how to track write protection for recorded content, for example. Read/write control library can also contain instructions around encoding of content, including where to hold encryption keys, etc. Servo library 720 can contain entries to control the operation of the physical drive elements. Device supplied library 725 may include other elements of firmware or control relevant to the drive itself, which may be unique to a certain manufacturer or drive. The examples above are mere examples, and each of these libraries may contain any variety of static values, single functions or algorithms or collections of functions or algorithms as well as the ability to obtain parameters prior to, or at, run-time from a source on the network. Similarly, the device controller may access more than just the libraries shown in Fig. 7A, or might not access all of the displayed libraries.

**[0095]** In this collection of libraries, calls to and from one layer of the software made to a function in another layer of the software can be linked at the time the layer is loaded in the

system. This method of linking at a late time allows for customized code or library entries to be deployed in the device controller 130. This collection of libraries 700 subsumes much of what has traditionally been device firmware on a hard disk controller.

**[0096]** Fig. 7B illustrates an updated collection of libraries 750 in which the defect avoidance library 710 has been completely replaced by replacement defect avoidance library 760, and a new user supplied library 780 has been added. The approach described herein allows operational characteristics of the device controller 130, i.e. the firmware, to be defined to allow for wholesale replacement of an entire layer or layers of the cooperating libraries by the user of the device. It should be noted, that layers here can refer to anything from a static value, to a single function or algorithm, to a collection of algorithms. The user supplied libraries do not even need to be written in a source language that matches the device-supplied collection of libraries 700 – they only need to satisfy the calling convention requirements of the interface software on the device controller 130.

**[0097]** In many cases, a user will not want to replace libraries in their entirety. In such cases, the device controller 130 can accept source code or partially compiled code that can be further compiled or interpreted by the device controller 130 and incorporated into the existing collection of libraries 700.

**[0098]** For example, in traditional firmware, the Read retry features of the device may be a collection of algorithmic options, in different permutations, with a different set of parameters, with some of those parameters being supplied by the user of the device.

| Retry Profile | Phase1 | Phase2 | Phase 3 | Phase 4 | ... |
|---|---|---|---|---|---|
| Fast | 1_Rev_Retry() | Y_Val_Avg () w/ 2 Rev | Avg_Val() w/ 10 Rev | N/A | N/A |
| Heroic | 1_Rev_Retry() | Avg_Val() w/ 50 Rev | Avg_Val() w/ 100 Rev | Y_Val_Avg. w/ 100 Rev. | "Super" recover algorithm |

**[0099]** In the collection of libraries 700, the same algorithms may be present in a callable form, but the user of the device can write a code snippet or script that would define the ordering of the functions tried, and the associated parameters passed to those functions, e.g.

```
Define: read_retry(timeout, max_rev) is
 call 1_Rev_Retry
   if %ret == good_read then goto done
   call Y_Val_Avg(10_rev)
   if %ret == good_read then goto done
   call Y_Val_Avg(max_rev - 10_rev)
   if %ret == good_read then goto done
   call Avg_Val (max_rev)
   If %ret == good_read then goto done
   call Super_Recover(timeout)
   If %ret == good_read then goto done
   Set global ERR_CODE = cant_read;
  :done
end read_retry;
```

**[00100]** Historically, the user of the device would be to select one of the choices in the table above, for example the user could choose “Fast” or “Heroic” as a MODE PAGE setting through a MODE SELECT COMMAND, a SET FEATURES setting, or equivalent. The user historically is severely restricted in the number of options available.

**[00101]** Utilizing the collection of libraries 700 enables the user almost unlimited control of how the device performs the “read_retry” operation. The user can make an algorithmic specification of the desired behavior. The device controller 130 allows, at the user's discretion, the ability to supply an algorithm, or collection of algorithms that extend and control the operation of the device. Another way of thinking of this as that the device controller 130 supplies a “toolkit” and it is up to the user to construct the product behavior they are after by “programming” or “scripting” the behavior themselves. The user can choose to intercept calls between the software layers and make algorithmic transformations, or they may simply replace or extend any function call with one supplied by the user to modify default behavior.

**[00102]** Additionally, the user supplied algorithm, "script", "byte-code", or "binary" does not necessarily need to be transferred to the device to be utilized. In an implementation, the device controller 130 would allow for the user to insert a "callback" into the collection of libraries 700 wherein the collection of libraries 700 has the ability to make a call to an algorithm or function in another location to obtain the user specified behavior or needed information. The "callback" inserted into the collection of libraries 700 could take many forms; for example, it could be as simple as a pointer to a function in memory, or as complex as a URL that is itself a function call that executes on a remote system. Further, the "callback" does not need to be written in the same language, have a similar CPU instruction set, or be on the device itself. In an implementation, a user selects some of the supplied algorithms within the collection of libraries 700, and provides an entirely new library of defect avoidance algorithms and rules.

**[00103]** Fig. 8A illustrates a method of writing content 801 according to an implementation. A user sends a request to store content in step 815. As discussed above, a user herein is not limited to a human user, but can rather include any user or network device capable of sending a request to the device controller 130. At a minimum, this request comprises content to be stored. In an implementation, the user may include information such as an identification code, encoding information, or data protection information, for example.

**[00104]** In step 820, the device controller 130 uses a storage device policy, such as that described in Figs. 7A and 7B, to determine where to store the content. This determination can relate partially to the content being stored, and partially to the storage media 110. For example, if the content contains an indication of priority level, such as information indicating that certain content is highly critical, the device controller 130, based on the storage device policy, may determine that the content should be stored on the storage media 110 at a low density, so the likelihood of data corruption will be minimal. Similarly, the storage device policy may also have an algorithm to determine how to avoid defects, and the storage device policy may instruct the device controller 130 to avoid storing highly critical content in sectors that have defects. Depending on what libraries exist in the device controller 130, and what the libraries control, many factors could be considered when deciding where and how to store the content.

**[00105]** In step 840, the device controller can write the content to the storage media 110 as determined in step 820. In addition to writing the actual content, in step 845 the device controller can also store a record of the write (the storage information) in memory 135 or to

some non-volatile memory, such as storage media 110. In an implementation, this information can include a unique identifier for the content. This may be an object identifier supplied by the user, or created by the device controller 130, for example. The storage information may also include information relating to encoding, write protection, location, size, etc. Some or all of this information may also, or alternatively, be returned to the user when the write is complete, again based on policy in force at the time of the request.

**[00106]** Fig. 8B illustrates a method of writing content 801 according to an implementation. In step 805, the device controller receives a storage device policy. Receiving a storage device policy here can mean receiving an update to a storage device policy already in place. The storage device policy can be part of an overall collection of libraries 700 that create the framework for device controller 130 to operate.

**[00107]** In step 810, these newly selected and newly supplied algorithms and rules are used to update the storage device policy on the device controller 130. In an embodiment, calls to and from one layer of the storage device policy made to a function in another layer of the storage device policy can be linked at the time the layer is loaded in the system. This method of linking at a late time allows for customized code or library entries to be deployed in the device controller 130.

**[00108]** A user sends a request to store content in step 815. At a minimum, this request comprises content to be stored. In an implementation, the user may include information such as an identification code, encoding information, or data protection information, for example.

**[00109]** In step 820, the device controller 130 uses the storage device policy to determine where to store the content. This determination can relate partially to the content being stored, and partially to the storage media 110. For example, if the content contains an indication of priority level, such as information indicating that certain content is highly critical, the device controller 130, based on the storage device policy, may determine that the content should be stored on the storage media 110 at a low density, so the likelihood of data corruption will be minimal. Similarly, the storage device policy may also have an algorithm to determine how to avoid defects, and the storage device policy may instruct the device controller 130 to avoid storing highly critical content in sectors that have defects. Depending on what libraries exist in the device controller 130, and what the libraries control, many factors could be considered when deciding where and how to store the content.

**[00110]** In an implementation, in step 825, the device controller 130 will not have enough information in the storage device policy, and the device controller may reach back out to a network machine, or to a policy server, to request further information. For instance, the collection of libraries 700 may include a rule or algorithm that controls how to store certain content, but the user may not have selected that rule or algorithm or a replacement rule or algorithm. The device controller 130 may send a request to the user prompting the selection of a rule or algorithm or to set values for the generic rule or algorithm.

**[00111]** When the user supplies the needed information, the device controller 130 can update the storage device policy in step 830, as above in step 810, or can use the information temporally to complete the operation. When the storage device has the needed information, the device controller 130 can also update the determination of where and how to store the content in step 835

**[00112]** In step 840, the device controller can write the content to the storage media 110 as determined in step 820 and/or step 835. In addition to writing the actual content, in step 845 the device controller can also store a record of the write (the storage information) in memory 135 or to some non-volatile memory, such as storage media 110. In an implementation, this information can include a unique identifier for the content. This may be an object identifier supplied by the user, or created by the device controller 130. The record may also include information relating to encoding, write protection, location, size, etc. Some or all of this information may also be returned to the user when the write is complete, again based on policy in force at the time of the request.

**[00113]** Fig. 8C illustrates an operational sequence of a policy-based write according to an implementation. The device controller receives a storage device policy from a user device 305. Receiving a storage device policy here can mean receiving an update to a storage device policy already in place. The storage device policy can be part of an overall collection of libraries 700 that create the framework for device controller 130 to operate. In an implementation, a user device 305 provides values for some of the supplied algorithms within the collection of libraries 700, and provides some entirely new rules.

**[00114]** These algorithms and rules are used to update the storage device policy on the device controller 130. In an embodiment, calls to and from one layer of the storage device policy made to a function in another layer of the storage device policy can be linked at the time

the layer is loaded in the system and can remain in force permanently or temporally. This method of linking at a late time allows for customized code or library entries to be deployed in the device controller 130.

**[00115]** A second user device 855 then sends a request to the device controller 130 to store content. At a minimum, this request comprises content to be stored. In an implementation, the device controller 130 needs little information beyond the content itself, but the user may still include information such as an identification code, encoding information, of data protection information, for example. This request can come from the second user device 855 for many reasons. For example, both user device 305 and second user device 855 may be part of the same network, and both user devices may have access to the device controller 130 through the network connection. Alternatively, user device 305 may have been disconnected from the network and replaced by the second user device 855 at some point in time after the storage device policy update and before the storage request. In another implementation, the drive 100 may have been disconnected from the network at some point after the storage device policy was updated. Drive 100 may have been connected to a new network that does not include user device 305. Since the customized storage device policy resides on the device controller 130, the storage device policy can move with the drive 100 to the new location.

**[00116]** The device controller 130 uses the storage device policy to determine where and how to store the content from the second user device 855. This determination can relate partially to the content being stored, and partially to the storage media 110. For example, if the content contains an indication of priority level, such as information indicating that certain content is highly critical, the device controller 130, based on the storage device policy, may determine that the content should be stored on the storage media 110 at a low density, so the likelihood of data corruption will be minimal. Similarly, the storage device policy may also have an algorithm to determine how to avoid defects, and the storage device policy may instruct the device controller 130 to avoid storing highly critical content in sectors that have defects. Depending on what libraries exist in the device controller 130, and what the libraries control, many factors could be considered when deciding where and how to store the content.

**[00117]** In an implementation, the device controller 130 may not have enough information in the storage device policy, and the device controller may reach back out to the requesting network machine or another network resource to request further information. For instance, the

collection of libraries 700 may include a rule or algorithm that controls how to store certain content, but the user may not have selected that rule or algorithm or a replacement rule or algorithm. The device controller 130 may send a request to the user prompting the selection of a rule or algorithm or to set values for the generic rule or algorithm.

**[00118]** When the requested information is supplied, the device controller 130 can update the storage device policy. In an implementation, some of the storage device policy defined by the user device 305 may have write protections, such that the second user device 855 does not have authority to change the storage device policy. After the storage device policy is updated, the device controller 130 can also update the determination of where and how to store the content.

**[00119]** The device controller 130 can write the content to the storage media as determined above. In addition to writing the actual content, the device controller 130 can also store a record of the write (the storage information) in memory 135. In an implementation, this information can include a unique identifier for the content. This may be an object identifier supplied by the second user device 855, or created by the device controller 130. The record may also include information relating to encoding, write protection, location, size, etc. Some or all of this information may also be returned to the second user device 855 when the write is complete.

**[00120]** Fig. 8D illustrates a method of reading content 850 according to an implementation. In step 860, the device controller receives a storage device policy. Receiving a storage device policy here can mean receiving an update to a storage device policy already in place. The storage device policy can be part of an overall collection of libraries 700 that create the framework for device controller 130 to operate. In an implementation, a user selects some of the supplied algorithms within the collection of libraries 700, and provides an entirely new library of defect avoidance algorithms and rules.

**[00121]** In step 865, these newly selected and newly supplied algorithms and rules are used to update the storage device policy on the device controller 130. In an embodiment, calls to and from one layer of the storage device policy made to a function in another layer of the storage device policy can be linked at the time the layer is loaded in the system. This method of linking at a late time allows for customized code or library entries to be deployed in the device controller 130.

**[00122]** A user sends a request to store content in step 870. At a minimum, this request comprises content to be stored. In an implementation, the user may include information such as an identification code, encoding information, of data protection information, or other storage information, for example. The device controller 130 uses the storage device policy to determine where and how to store the content. This determination can relate partially to the content being stored, and partially to the storage media 110. For example, if the content contains an indication of priority level, such as information indicating that certain content is highly critical, the device controller 130, based on the storage device policy, may determine that the content should be stored on the storage media 110 at a low density, so the likelihood of data corruption will be minimal. Similarly, the storage device policy may also have an algorithm to determine how to avoid defects, and the storage device policy may instruct the device controller 130 to avoid storing highly critical content in sectors that have defects. Depending on what libraries exist in the device controller 130, and what the libraries control, many factors could be considered when deciding where and how to store the content.

**[00123]** In step 875, the device controller can write the content to the storage media as determined. In addition to writing the actual content the device controller 130 can also store a record of the write (the storage information) in memory 135. In an implementation, this information can include a unique identifier for the content. This may be an object identifier supplied by the user, or created by the device controller 130. The record may also include information relating to encoding, write protection, location, size, etc. Some or all of this information may also be returned to the user when the write is complete. In an implementation, some or all of the storage information is provided by the user as part of the request to store content in step 870.

**[00124]** In step 880, the device controller 130 receives a content request. This request includes at least a content or object identifier to identify the requested content. This request may further include some or all of the information provided to the user after the write of the content was completed in step 875.

**[00125]** In an implementation, in step 885, the device controller 130 will not have enough information in the storage device policy to complete the content retrieval, and the device controller may reach back out to the requesting network machine to request further information. For instance, the collection of libraries 700 may include a rule or algorithm that controls how to

protect certain content, but the user may not have selected that rule or algorithm or a replacement rule or algorithm. The device controller 130 may send a request to the user prompting the user to select a rule or algorithm or to set values for the generic rule or algorithm.

**[00126]** When the user supplies the requested information, the device controller 130 can update the storage device policy in step 890, as above in step 865.

**[00127]** In step 893, the device controller 130 retrieves the requested content according to the storage device policy that has been defined. In step 895, the device controller 130 sends the content back to the user.

**[00128]** Fig. 8E illustrates an operational sequence of a policy-based write according to an implementation. The device controller receives a storage device policy from a user device 305. Receiving a storage device policy here can mean receiving an update to a storage device policy already in place. The storage device policy can be part of an overall collection of libraries 700 that create the framework for device controller 130 to operate. In an implementation, a user device 305 provides values for some of the supplied algorithms within the collection of libraries 700, and provides some entirely new rules.

**[00129]** These algorithms and rules are used to update the storage device policy on the device controller 130. In an embodiment, calls to and from one layer of the storage device policy made to a function in another layer of the storage device policy can be linked at the time the layer is loaded in the system. This method of linking at a late time allows for customized code or library entries to be deployed in the device controller 130.

**[00130]** The user device 305 then sends a request to the device controller 130 to store content. At a minimum, this request comprises content to be stored. In an implementation, the device controller 130 needs little information beyond the content itself, but the user may still include information such as an identification code, encoding information, of data protection information, for example.

**[00131]** The device controller 130 uses the storage device policy to determine where and how to store the content from the second user device 855. This determination can relate partially to the content being stored, and partially to the storage media 110. For example, if the content contains an indication of priority level, such as information indicating that certain content is highly critical, the device controller 130, based on the storage device policy, may determine that the content should be stored on the storage media 110 at a low density, so the likelihood of data

corruption will be minimal. Similarly, the storage device policy may also have an algorithm to determine how to avoid defects, and the storage device policy may instruct the device controller 130 to avoid storing highly critical content in sectors that have defects. Depending on what libraries exist in the device controller 130, and what the libraries control, many factors could be considered when deciding where to store the content.

**[00132]** The device controller 130 writes the content to the storage media as determined above. In addition to writing the actual content, the device controller 130 can also store a record of the write (the storage information) in memory 135. In an implementation, this information can include a unique identifier for the content. This may be an object identifier supplied by the second user device 855, or created by the device controller 130. The record may also include information relating to encoding, write protection, location, size, etc. Some or all of this information may also be returned to the second user device 855 when the write is complete.

**[00133]** At some point, a second user device 855 sends a content request to device controller 130. This request includes at least a content or object identifier to identify the requested content. This request may further include some or all of the information provided to the user device 305 after the write of the content was completed.

**[00134]** This request can come from the second user device 855 for many reasons. For example, both user device 305 and second user device 855 may be part of the same network, and both user devices may have access to the device controller 130 through the network connection. Alternatively, user device 305 may have been disconnected from the network and replaced by the second user device 855 at some point in time after the storage device policy update and before the storage request. In another implementation, the drive 100 may have been disconnected from the network at some point after the storage device policy was updated. Drive 100 may have been connected to a new network that does not include user device 305. Since the customized storage device policy resides on the device controller 130, the storage device policy can move with the drive 100 to the new location.

**[00135]** In an implementation, the device controller 130 will not have enough information in the storage device policy, and the device controller may reach back out to the requesting network machine to request further information. For instance, the collection of libraries 700 may include a rule or algorithm that controls how to store certain content, but the user may not have selected that rule or algorithm or a replacement rule or algorithm. The device controller 130 may

send a request to the second user device 855 prompting the second user device 855 to select a rule or algorithm or to set values for the generic rule or algorithm. The storage device policy set by the user device 305 may include protections that restrict later updates to the storage device policy. The second user device 855 may therefore have limited or no option to change the storage device policy.

**[00136]** When the second user device 855 supplies the requested information, the device controller 130 can update the storage device policy. The device controller 130 retrieves the requested content according to the storage device policy that has been defined. The device controller 130 then sends the content back to the second user device 855.

**[00137]** Fig. 9A illustrates a method of writing content 900 according to an implementation. In step 905, the device controller receives a storage device policy. Receiving a storage device policy here can mean receiving an update to a storage device policy already in place. The storage device policy can be part of an overall collection of libraries 700 that create the framework for device controller 130 to operate. In an implementation, a user selects some of the supplied algorithms within the collection of libraries 700.

**[00138]** In step 910, these newly selected and newly supplied algorithms and rules are used to update the storage device policy on the device controller 130. In an embodiment, calls to and from one layer of the storage device policy made to a function in another layer of the storage device policy can be linked at the time the layer is loaded in the system. This method of linking at a late time allows for customized code or library entries to be deployed in the device controller 130.

**[00139]** A user sends a request to store content in step 915. At a minimum, this request comprises content to be stored. In an implementation, the user may include information such as an identification code, encoding information, of data protection information, for example.

**[00140]** In step 920, the device controller 130 uses the storage device policy to determine where and how to store the content. This determination can relate partially to the content being stored, and partially to the storage media 110. For example, if the content contains an indication of priority level, such as information indicating that certain content is highly critical, the device controller 130, based on the storage device policy, may determine that the content should be stored on the storage media 110 at a low density, so the likelihood of data corruption will be minimal. Similarly, the storage device policy may also have an algorithm to determine how to

avoid defects, and the storage device policy may instruct the device controller 130 to avoid storing highly critical content in sectors that have defects. Depending on what libraries exist in the device controller 130, and what the libraries control, many factors could be considered when deciding where and how to store the content.

**[00141]** In an implementation, in step 925, the device controller 130 will determine that the location identified by the device controller 130 to write to content already has content that is write protected. Note that this information (write protection) is stored within the drive 100, and consequently will not lose write protection status is drive 100 is removed from connection with user device 305, for example.

**[00142]** In step 930, the device controller 130 does not complete the write operation, and in step 935, an error is returned to user device 305. In an embodiment, rather than return an error, the device controller 130 could identify another location that is not write protected, and complete the write operation.

**[00143]** According to an implementation, drive 100 may be configured so that all data stored thereon is write protected, in which case the device controller 130 may simply write content sequentially through the drive, maintaining a pointer to the next location to write content. In this case, when the pointer reaches the end of the available space on the storage media 110, any additional requests to write will be returned as errors. Alternatively, this behavior may be limited to a portion of the storage media 110, or may be decided on a per-block or per object basis, for example.

**[00144]** Fig. 9B illustrates an operational sequence of a policy-based write according to an implementation. The device controller receives a storage device policy from a user device 305. Receiving a storage device policy here can mean receiving an update to a storage device policy already in place. The storage device policy can be part of an overall collection of libraries 700 that create the framework for device controller 130 to operate. In an implementation, a user device 305 provides values for some of the supplied algorithms within the collection of libraries 700, and provides some entirely new rules.

**[00145]** These algorithms and rules are used to update the storage device policy on the device controller 130. In an embodiment, calls to and from one layer of the storage device policy made to a function in another layer of the storage device policy can be linked at the time

the layer is loaded in the system. This method of linking at a late time allows for customized code or library entries to be deployed in the device controller 130.

**[00146]** A second user device 855 then sends a request to the device controller 130 to store content. At a minimum, this request comprises content to be stored. In an implementation, the device controller 130 needs little information beyond the content itself, but the user may still include information such as an identification code, encoding information, or data protection information, for example. This request can come from the second user device 855 for many reasons. For example, both user device 305 and second user device 855 may be part of the same network, and both user devices may have access to the device controller 130 through the network connection. Alternatively, user device 305 may have been disconnected from the network and replaced by the second user device 855 at some point in time after the storage device policy update and before the storage request. In another implementation, the drive 100 may have been disconnected from the network at some point after the storage device policy was updated. Drive 100 may have been connected to a new network that does not include user device 305. Since the customized storage device policy resides on the device controller 130, the storage device policy can move with the drive 100 to the new location.

**[00147]** The device controller 130 uses the storage device policy to identify where and how to store the content from the second user device 855. This determination can relate partially to the content being stored, and partially to the storage media 110. For example, if the content contains an indication of priority level, such as information indicating that certain content is highly critical, the device controller 130, based on the storage device policy, may determine that the content should be stored on the storage media 110 at a low density, so the likelihood of data corruption will be minimal. Similarly, the storage device policy may also have an algorithm to determine how to avoid defects, and the storage device policy may instruct the device controller 130 to avoid storing highly critical content in sectors that have defects. Depending on what libraries exist in the device controller 130, and what the libraries control, many factors could be considered when deciding where and how to store the content.

**[00148]** In an implementation, the device controller 130 will determine that the location identified by the device controller 130 already contains content that is write protected. Consequently, the device controller 130 will not store that content. A notification of an error will then be returned to the second user device 855. According to an implementation, drive 100

may be configured so that all data stored thereon is write protected, in which case the device controller 130 may simply write content sequentially through the drive, maintaining a pointer to the next location to write content. In this case, when the pointer reaches the end of the available space on the storage media 110, any additional requests to write will be returned as errors. Alternatively, this behavior may be limited to a portion of the storage media 110, or may be decided on a per-block or per object basis, for example.

**[00149]** Fig. 9C illustrates a method of reading content 950 according to an implementation. In step 955, the device controller receives a storage device policy. Receiving a storage device policy here can mean receiving an update to a storage device policy already in place. The storage device policy can be part of an overall collection of libraries 700 that create the framework for device controller 130 to operate. In an implementation, a user selects some of the supplied algorithms within the collection of libraries 700, and provides an entirely new library of defect avoidance algorithms and rules.

**[00150]** In step 960, these newly selected and newly supplied algorithms and rules are used to update the storage device policy on the device controller 130. In an embodiment, calls to and from one layer of the storage device policy made to a function in another layer of the storage device policy can be linked at the time the layer is loaded in the system. This method of linking at a late time allows for customized code or library entries to be deployed in the device controller 130.

**[00151]** A user sends a request to store content in step 965. At a minimum, this request comprises content to be stored. In an implementation, the user may include information such as an identification code, encoding information, of data protection information, for example. The device controller 130 uses the storage device policy to determine where and how to store the content. In an implementation, this determination includes a determination that the content should be stored as write-protected (or write-once) such that is will not be deleted later or overwritten. This determination could be based on an entire drive 100 being designated as a write-protected drive, or as certain sectors or tracks or regions being pre-designated as write protected. Alternatively, an individual object may be designated as write-protected as it is stored.

**[00152]** Any determination of where or how to store the content can relate partially to the content being stored, and partially to the storage media 110. For example, if the content contains

an indication of priority level, such as information indicating that certain content is highly critical, the device controller 130, based on the storage device policy, may determine that the content should be stored on the storage media 110 at a low density, so the likelihood of data corruption will be minimal. Similarly, the storage device policy may also have an algorithm to determine how to avoid defects, and the storage device policy may instruct the device controller 130 to avoid storing highly critical content in sectors that have defects. Depending on what libraries exist in the device controller 130, and what the libraries control, many factors could be considered when deciding where and how to store the content.

**[00153]** In step 970, the device controller can write the content to the storage media as determined, including an indication of write protection. In addition to writing the actual content the device controller 130 can also store a record of the write (the storage information) in memory 135 or to some non-volatile media, such as storage media 110. In an implementation, this information can include a unique identifier for the content. This may be an object identifier supplied by the user, or created by the device controller 130. The record may also include information relating to encoding, write protection, location, size, etc. Some or all of this information may also be returned to the user when the write is complete.

**[00154]** In step 975, the device controller 130 receives a content request. This request includes at least a content or object identifier to identify the requested content. This request may further include some or all of the information provided to the user after the write of the content was completed in step 970.

**[00155]** In step 980, the device controller 130 retrieves the requested content according to the storage device policy that has been defined. In step 985, the device controller 130 sends the content back to the user.

**[00156]** Fig. 9D illustrates an operational sequence of a policy-based write according to an implementation. The device controller receives a storage device policy from a user device 305. Receiving a storage device policy here can mean receiving an update to a storage device policy already in place. The storage device policy can be part of an overall collection of libraries 700 that create the framework for device controller 130 to operate. In an implementation, a user device 305 provides values for some of the supplied algorithms within the collection of libraries 700, and provides some entirely new rules.

**[00157]** These algorithms and rules are used to update the storage device policy on the device controller 130. In an embodiment, calls to and from one layer of the storage device policy made to a function in another layer of the storage device policy can be linked at the time the layer is loaded in the system. This method of linking at a late time allows for customized code or library entries to be deployed in the device controller 130.

**[00158]** The user device 305 then sends a request to the device controller 130 to store content. At a minimum, this request comprises content to be stored. In an implementation, the device controller 130 needs little information beyond the content itself, but the user may still include information such as an identification code, encoding information, of data protection information, for example. In an implementation, the content is sent with a specific instruction that the content be written and write protected so that the content cannot be overwritten in the future.

**[00159]** The device controller 130 uses the storage device policy to determine where and how to store the content from the user device 305. In an implementation, this determination includes a determination that the content will be written and write protected. This determination may be due to the specific instruction of write protection for the content delivered, or due to an overarching policy that all content (or some portion of content) stored on drive 100 should be written and write protected.

**[00160]** The device controller 130 writes the content to the storage media as determined above. In addition to writing the actual content, the device controller 130 can also store a record of the write (the storage information) in memory 135, including an indication of write protection. In an implementation, this information can include a unique identifier for the content. This may be an object identifier supplied by the user device 305, or created by the device controller 130. The record may also include information relating to encoding, write protection, location, size, etc. Some or all of this information may also be returned to the second user device 855 when the write is complete.

**[00161]** At some point, a second user device 855 sends a content request to device controller 130. This request includes at least a content or object identifier to identify the requested content. This request may further include some or all of the information provided to the user device 305 after the write of the content was completed.

**[00162]** This request can come from the second user device 855 for many reasons. For example, both user device 305 and second user device 855 may be part of the same network, and both user devices may have access to the device controller 130 through the network connection. Alternatively, user device 305 may have been disconnected from the network and replaced by the second user device 855 at some point in time after the storage device policy update and before the storage request. In another implementation, the drive 100 may have been disconnected from the network at some point after the storage device policy was updated. Drive 100 may have been connected to a new network that does not include user device 305. Since the customized storage device policy resides on the device controller 130, the storage device policy can move with the drive 100 to the new location.

**[00163]** The device controller 130 retrieves the requested content according to the storage device policy that has been defined. The device controller 130 then sends the content back to the second user device 855.

**[00164]** Fig. 10A illustrates a method of writing content 1000 according to an implementation. In step 1005, the device controller receives a storage device policy. Receiving a storage device policy here can mean receiving an update to a storage device policy already in place. The storage device policy can be part of an overall collection of libraries 700 that create the framework for device controller 130 to operate. In an implementation, a user selects some of the supplied algorithms within the collection of libraries 700.

**[00165]** In step 1010, these newly selected and newly supplied algorithms and rules are used to update the storage device policy on the device controller 130. In an embodiment, calls to and from one layer of the storage device policy made to a function in another layer of the storage device policy can be linked at the time the layer is loaded in the system. This method of linking at a late time allows for customized code or library entries to be deployed in the device controller 130.

**[00166]** A user sends a request to store content in step 1015. At a minimum, this request comprises content to be stored. In an implementation, the user may include information such as an identification code, encoding information, of data protection information, for example.

**[00167]** In step 1020, the device controller 130 uses the storage device policy to determine where and how to store the content. This determination can relate partially to the content being stored, and partially to the storage media 110. For example, if the content contains an indication

of priority level, such as information indicating that certain content is highly critical, the device controller 130, based on the storage device policy, may determine that the content should be stored on the storage media 110 at a low density, so the likelihood of data corruption will be minimal. Similarly, the storage device policy may also have an algorithm to determine how to avoid defects, and the storage device policy may instruct the device controller 130 to avoid storing highly critical content in sectors that have defects. Depending on what libraries exist in the device controller 130, and what the libraries control, many factors could be considered when deciding where and how to store the content.

**[00168]** In an implementation, this determination will include a determination of where storage information will be stored. For example, the storage information may be stored on the memory 135 on drive 100. Alternately, the storage information may be returned to the user device 305 that requested the content storage. The storage information could also be sent to a separate device, such as key device 505 for storage. In an implementation, when the storage information is sent to key device 505, the device controller 130 may determine not to store the information on memory 135. In step 1025, an indication of the location of the storage information is stored in memory 135, or inserted into a header 625 stored with the content on storage media 110.

**[00169]** In step 1030, the device controller 130 completes the write operation, and in step 1035, storage information for the content is written to memory 135. The storage information written to memory may not include all of the storage information. For example, the storage information written to memory 135 may include only an object identifier and a pointer to the storage location of the rest of the storage information. In this way, if the drive 100 is physically removed from its initial location, or for some reason key device 505 is removed, the content stored on storage media 110 can remain secure.

**[00170]** According to an implementation, drive 100 may be configured so that all data stored thereon has storage information stored in key device 505, thus requiring drive 100 to communicate with the key device 505 prior to retrieving any content. According to an implementation, content objects within drive 100 may be treated individually, such that certain objects have associated storage information stored on a key device 505, while others may not.

**[00171]** Fig. 10B illustrates an operational sequence of a policy-based write according to an implementation. The device controller receives a storage device policy from a user device

305. Receiving a storage device policy here can mean receiving an update to a storage device policy already in place. The storage device policy can be part of an overall collection of libraries 700 that create the framework for device controller 130 to operate. In an implementation, a user device 305 provides values for some of the supplied algorithms within the collection of libraries 700, and provides some entirely new rules.

**[00172]** These algorithms and rules are used to update the storage device policy on the device controller 130. In an embodiment, calls to and from one layer of the storage device policy made to a function in another layer of the storage device policy can be linked at the time the layer is loaded in the system. This method of linking at a late time allows for customized code or library entries to be deployed in the device controller 130.

**[00173]** A user device 305 then sends a request to the device controller 130 to store content. At a minimum, this request comprises content to be stored. In an implementation, the device controller 130 needs little information beyond the content itself, but the user may still include information such as an identification code, encoding information, of data protection information, for example.

**[00174]** The device controller 130 uses the storage device policy to identify where and how to store the content from the user device 305. This determination may include a determination on where to store storage information. This may be due to an overarching policy that all content stored on the drive 100 should store storage information on key device 505, for example. In an implementation, prior to recording the content to the storage media 110, the device controller reaches out to the key device 505 to request a location pointer for the storage information for the content to be stored (i.e. some indication of where the storage information will be stored). This pointer is returned to the device controller, which inserts the pointer into a header 625 that is inserted into the content to be stored. The content, with the header 625 is then recorded on storage media 110. In an implementation, the location pointer for indicating the location of the storage information (which in turn indicates how to read the stored content) can be provided by the device controller 130 to the key device 505. The key device 505 can then store the storage information at the location indicated by the location pointer.

**[00175]** Fig. 10C illustrates a method of reading content 1050 according to an implementation. In step 1045, the device controller receives a storage device policy. Receiving a storage device policy here can mean receiving an update to a storage device policy already in

place. The storage device policy can be part of an overall collection of libraries 700 that create the framework for device controller 130 to operate. In an implementation, a user selects some of the supplied algorithms within the collection of libraries 700.

**[00176]** In step 1055, these newly selected and newly supplied algorithms and rules are used to update the storage device policy on the device controller 130. In an embodiment, calls to and from one layer of the storage device policy made to a function in another layer of the storage device policy can be linked at the time the layer is loaded in the system. This method of linking at a late time allows for customized code or library entries to be deployed in the device controller 130.

**[00177]** A user sends a request to store content in step 1060. At a minimum, this request comprises content to be stored. In an implementation, the user may include information such as an identification code, encoding information, of data protection information, for example. The device controller 130 uses the storage device policy to determine where and how to store the content. In an implementation, this determination includes a determination that the storage information for the content should be stored as externally to the drive 100 such that is may have additional security. This determination could be based on an entire drive 100 being designated to do so, or as certain sectors or tracks or regions being pre-designated as such. Alternatively, an individual object may be designated to be so treated. According to an implementation, this designation can be flexible, and change over time.

**[00178]** Any determination of where or how to store the content can relate partially to the content being stored, and partially to the storage media 110. For example, if the content contains an indication of priority level, such as information indicating that certain content is highly critical, the device controller 130, based on the storage device policy, may determine that the content should be stored on the storage media 110 at a low density, so the likelihood of data corruption will be minimal. Similarly, the storage device policy may also have an algorithm to determine how to avoid defects, and the storage device policy may instruct the device controller 130 to avoid storing highly critical content in sectors that have defects. Depending on what libraries exist in the device controller 130, and what the libraries control, many factors could be considered when deciding where and how to store the content.

**[00179]** In step 1065, The device controller 130 can insert an indication of where the storage information will be stored for the content to be stored.

**[00180]** In step 1070, the device controller can write the content to the storage media as determined, including an indication of a location of storage information. In addition to writing the actual content the device controller 130 can also store a record of the write (the storage information) in memory 135. In an implementation, the storage information stored on memory 135 is only a subset of the storage memory, for instance only including an object identifier, and a location of the full storage information.

**[00181]** In step 1075, the device controller 130 receives a content request. This request includes at least a content or object identifier to identify the requested content. This request may further include some or all of the information provided to the user after the write of the content was completed in step 1070.

**[00182]** In step 1080, the device controller 130 reaches out to the location identified by the pointer (for example the key device 505) for the storage information to determine the storage information. This storage information may include track, sector, or region information indicating where the content is stored on storage media 110. In an implementation, the storage information may include detailed location information, such as polar or cartesian coordinates, slope, derivative or other information identifying the specific location of the content storage. In an implementation, the content could be irretrievable without this specific storage information. In step 1085, the device controller 130 receives the storage information from the key device 505.

**[00183]** In step 1090, the device controller 130 uses the storage information received from key device 505, together with the storage device policy to retrieve the requested information. In step 1095, the device controller 130 returns the content to the requester.

**[00184]** Fig. 10D illustrates an operational sequence of a policy-based write according to an implementation. The device controller receives a storage device policy from a user device 305. Receiving a storage device policy here can mean receiving an update to a storage device policy already in place. The storage device policy can be part of an overall collection of libraries 700 that create the framework for device controller 130 to operate. In an implementation, a user device 305 provides values for some of the supplied algorithms within the collection of libraries 700, and provides some entirely new rules.

**[00185]** These algorithms and rules are used to update the storage device policy on the device controller 130. In an embodiment, calls to and from one layer of the storage device policy made to a function in another layer of the storage device policy can be linked at the time

the layer is loaded in the system. This method of linking at a late time allows for customized code or library entries to be deployed in the device controller 130.

**[00186]** A user device 305 then sends a request to the device controller 130 to store content. At a minimum, this request comprises content to be stored. In an implementation, the device controller 130 needs little information beyond the content itself, but the user may still include information such as an identification code, encoding information, of data protection information, for example.

**[00187]** The device controller 130 uses the storage device policy to identify where and how to store the content from the user device 305. This determination may include a determination on where to store storage information. This may be due to an overarching policy that all content stored on the drive 100 should store storage information on key device 505, for example. In an implementation, prior to recording the content to the storage media 110, the device controller 130 determines that storage device information will be stored on a key device 505. This location is inserted into a header 625 that is inserted into the content to be stored. The content, with the header 625 is then recorded on storage media 110.

**[00188]** At some point, user device 305 sends a content request to device controller 130. This request includes at least a content or object identifier to identify the requested content. This request may further include some or all of the information provided to the user device 305 after the write of the content was completed.

**[00189]** The device controller reaches out to the key device 505 to retrieve the storage information. It should be understood that the key device 505 may include security protections to ensure that only authorized users can retrieve the storage information. The key device 505 sends the storage information back to the device controller 130, and the device controller uses the storage information, together with the storage device policy, to retrieve the requested content. The device controller 130 then sends the content back to the second user device 855.

**[00190]** Fig. 11A illustrates a method of writing content 1100 according to an implementation. In step 1105, the device controller receives a storage device policy. Receiving a storage device policy here can mean receiving an update to a storage device policy already in place. The storage device policy can be part of an overall collection of libraries 700 that create the framework for device controller 130 to operate. In an implementation, a user selects some of

the supplied algorithms within the collection of libraries 700, and provides an entirely new library of defect avoidance algorithms and rules.

**[00191]** In step 1110, these newly selected and newly supplied algorithms and rules are used to update the storage device policy on the device controller 130. In an embodiment, calls to and from one layer of the storage device policy made to a function in another layer of the storage device policy can be linked at the time the layer is loaded in the system. This method of linking at a late time allows for customized code or library entries to be deployed in the device controller 130. The storage device policy may be defined such that each object that is stored on storage media 110 may be handled independently, i.e. with its own distinct storage policy. In this way, one object can be stored with user preferences for increased data security, while another may be stored utilizing preferences for increased storage space, and still another may emphasize redundancy.

**[00192]** A user sends a request to store content in step 1115. At a minimum, this request comprises content to be stored. In an implementation, the user may include information such as an identification code, encoding information, of data protection information, for example.

**[00193]** In step 1120, the device controller 130 uses the storage device policy to determine where and how to store the content. This determination can relate partially to the content being stored, and partially to the storage media 110. For example, if the content contains an indication of priority level, such as information indicating that certain content is highly critical, the device controller 130, based on the storage device policy, may determine that the content should be stored on the storage media 110 at a low density, so the likelihood of data corruption will be minimal. Similarly, the storage device policy may also have an algorithm to determine how to avoid defects, and the storage device policy may instruct the device controller 130 to avoid storing highly critical content in sectors that have defects. Depending on what libraries exist in the device controller 130, and what the libraries control, many factors could be considered when deciding where and how to store the content.

**[00194]** In step 1125, the device controller 130 will store the content how and where determined. The device controller 130 may further store storage information, indicate write-protection, etc.

**[00195]** In step 1130, the device controller 130 receives a second request to store content, comprising a content to be stored. The device controller, in step 1135 uses the storage device

policy to determine where and how to store the content. In an implementation, the device controller 130 determines to store the content in this second request differently that the device controller 130 stored the first content. In step 1140, the hard drive stores the second content differently than it stored the first content,

**[00196]** Fig. 11B illustrates an operational sequence of a policy-based write according to an implementation. The device controller receives a storage device policy from a user device 305. Receiving a storage device policy here can mean receiving an update to a storage device policy already in place. The storage device policy can be part of an overall collection of libraries 700 that create the framework for device controller 130 to operate. In an implementation, a user device 305 provides values for some of the supplied algorithms within the collection of libraries 700, and provides some entirely new rules.

**[00197]** These algorithms and rules are used to update the storage device policy on the device controller 130. In an embodiment, calls to and from one layer of the storage device policy made to a function in another layer of the storage device policy can be linked at the time the layer is loaded in the system. This method of linking at a late time allows for customized code or library entries to be deployed in the device controller 130.

**[00198]** A second user device 855 then sends a request to the device controller 130 to store content. At a minimum, this request comprises content to be stored. In an implementation, the device controller 130 needs little information beyond the content itself, but the user may still include information such as an identification code, encoding information, of data protection information, for example. This request can come from the second user device 855 for many reasons. For example, both user device 305 and second user device 855 may be part of the same network, and both user devices may have access to the device controller 130 through the network connection. Alternatively, user device 305 may have been disconnected from the network and replaced by the second user device 855 at some point in time after the storage device policy update and before the storage request. In another implementation, the drive 100 may have been disconnected from the network at some point after the storage device policy was updated. Drive 100 may have been connected to a new network that does not include user device 305. Since the customized storage device policy resides on the device controller 130, the storage device policy can move with the drive 100 to the new location.

**[00199]** The device controller 130 uses the storage device policy to identify where and how to store the content from the second user device 855. This determination can relate partially to the content being stored, and partially to the storage media 110. For example, if the content contains an indication of priority level, such as information indicating that certain content is highly critical, the device controller 130, based on the storage device policy, may determine that the content should be stored on the storage media 110 at a low density, so the likelihood of data corruption will be minimal. Similarly, the storage device policy may also have an algorithm to determine how to avoid defects, and the storage device policy may instruct the device controller 130 to avoid storing highly critical content in sectors that have defects. Depending on what libraries exist in the device controller 130, and what the libraries control, many factors could be considered when deciding where and how to store the content.

**[00200]** The device controller 130 will store the content in accordance with the determination of where and how to store the content.

**[00201]** At some point, the device controller 130 receives a second request to store content, comprising at least the content to be stored. This request may come from a device distinct from the second user device 855, such as the user device 305. It should be noted that the second request may also be received from an entirely distinct device that did not participate in defining the storage device policy. As above, the device controller 130 determines where and how to store the second content. According to the storage device policy, this may be distinct from how the first content was stored. The storage device policy may define that certain sectors or regions be stored in certain ways, or may leave flexibility that each individual object can be stored with its own policy determinations. The device controller 130 can then store the content according to the storage device policy.

**[00202]** Fig. 11C illustrates a method of reading content 1150 according to an implementation. In step 1155, the device controller receives a storage device policy. Receiving a storage device policy here can mean receiving an update to a storage device policy already in place. The storage device policy can be part of an overall collection of libraries 700 that create the framework for device controller 130 to operate. In an implementation, a user selects some of the supplied algorithms within the collection of libraries 700, and provides an entirely new library of defect avoidance algorithms and rules.

**[00203]** In step 1160, these newly selected and newly supplied algorithms and rules are used to update the storage device policy on the device controller 130. In an embodiment, calls to and from one layer of the storage device policy made to a function in another layer of the storage device policy can be linked at the time the layer is loaded in the system. This method of linking at a late time allows for customized code or library entries to be deployed in the device controller 130.

**[00204]** A user sends a request to retrieve content in step 1165. At a minimum, this request comprises a content identifier. In step 1170, the device controller can retrieve the requested content in accordance with the storage device policy, and in step 1175, the device controller returns the content to the user.

**[00205]** In step 1180, the device controller 130 receives a second request for content, comprising at least a second content identifier. In an implementation, this second content may be stored according to different storage device policy rules that was the first content. Consequently, the device controller 130 will use different storage device policy rules to retrieve the second content in step 1185. The device controller 130 can then return the content to the requesting user in step 1190. It is of note that the content stored on storage media 110 can be independently written according to storage device policy at any level – i.e. each individual object may have different value trade-offs within the same drive 100.

**[00206]** Fig. 11D illustrates an operational sequence of a policy-based write according to an implementation. The device controller receives a storage device policy from a user device 305. Receiving a storage device policy here can mean receiving an update to a storage device policy already in place. The storage device policy can be part of an overall collection of libraries 700 that create the framework for device controller 130 to operate. In an implementation, a user device 305 provides values for some of the supplied algorithms within the collection of libraries 700, and provides some entirely new rules.

**[00207]** These algorithms and rules are used to update the storage device policy on the device controller 130. In an embodiment, calls to and from one layer of the storage device policy made to a function in another layer of the storage device policy can be linked at the time the layer is loaded in the system. This method of linking at a late time allows for customized code or library entries to be deployed in the device controller 130.

**[00208]** The user device 305 then sends a request to the device controller 130 to retrieve content. At a minimum, this request comprises a content identifier. In an implementation, the device controller 130 needs little information beyond the content identifier itself, but the user may still include any of the storage information provided by the device controller when the content was stored in storage media 110.

**[00209]** The device controller 130 uses the storage device policy to retrieve the content from the storage media 110. The device controller then returns that content to the user device 305.

**[00210]** A second user device 855 then sends a request to the device controller 130 to retrieve content. At a minimum, this request comprises a content identifier. The storage device policy may indicate distinct rules for this content than was used to store the first content. Consequently, the device controller 130 may use different storage device policy rules to retrieve the second requested content than it used to retrieve the first requested content. After retrieving the content, the device controller 130 returns the content to the second user device 855.

**[00211]** Referring to Figure 12, computing system 1202 may comprise a micro-processor and other circuitry that retrieves and executes software 1205 from storage system 1203. Computing system 1202 may be implemented within a single processing device, but may also be distributed across multiple processing devices or sub-systems that cooperate in executing program instructions. Examples of computing system 1202 include general purpose central processing units, application specific processors, and logic devices, as well as any other type of processing device, combinations, or variations thereof.

**[00212]** Storage system 1203 may comprise any computer readable storage media readable by computing system 1202 and capable of storing software 1205. Storage system 1203 may include volatile and nonvolatile, removable and non-removable media implemented in any method or technology for storage of information, such as computer readable instructions, data structures, program modules, or other data. Examples of storage media include random access memory, read only memory, magnetic disks, optical disks, flash memory, virtual memory and non-virtual memory, magnetic cassettes, magnetic tape, magnetic disk storage or other magnetic storage devices, or other suitable storage media, except for propagated signals. In no case is the computer readable storage media a propagated signal.

**[00213]** In addition to computer readable storage media, in some implementations storage system 1203 may also include computer readable communication media over which at least some of software 1205 may be communicated internally or externally. Storage system 1203 may be implemented as a single storage device, but may also be implemented across multiple storage devices or sub-systems co-located or distributed relative to each other. Storage system 1203 may comprise additional elements, such as a controller, capable of communicating with computing system 1202 or possibly other systems.

**[00214]** Software 1205 may be implemented in program instructions and among other functions may, when executed by computing system 1202, direct computing system 1202 to operate as described with respect to the various operational scenarios, sequences, and processes illustrated herein. For example, software 1205 may include program instructions for implementing and updating storage device policies.

**[00215]** In particular, the program instructions may include various components or modules that cooperate or otherwise interact to carry out the various processes and operational scenarios described herein. The various components or modules may be embodied in compiled or interpreted instructions, or in some other variation or combination of instructions. The various components or modules may be executed in a synchronous or asynchronous manner, serially or in parallel, in a single threaded environment or multi-threaded, or in accordance with any other suitable execution paradigm, variation, or combination thereof. Software 1205 may include additional processes, programs, or components, such as operating system software, virtual machine software, or other application software, in addition to or that include storage process 1206. Software 1205 may also comprise firmware or some other form of machine-readable processing instructions executable by computing system 1202.

**[00216]** In general, software 1205 may, when loaded into computing system 1202 and executed, transform a suitable apparatus, system, or device (of which computing system 1201 is representative) overall from a general-purpose computing system into a special-purpose computing system enhance calendars of interest. Indeed, encoding software 1205 on storage system 1203 may transform the physical structure of storage system 1203. The specific transformation of the physical structure may depend on various factors in different implementations of this description. Examples of such factors may include, but are not limited to, the technology used to implement the storage media of storage system 1203 and whether the

computer-storage media are characterized as primary or secondary storage, as well as other factors.

**[00217]** For example, if the computer readable storage media are implemented as semiconductor-based memory, software 1205 may transform the physical state of the semiconductor memory when the program instructions are encoded therein, such as by transforming the state of transistors, capacitors, or other discrete circuit elements constituting the semiconductor memory. A similar transformation may occur with respect to magnetic or optical media. Other transformations of physical media are possible without departing from the scope of the present description, with the foregoing examples provided only to facilitate the present discussion.

**[00218]** Communication interface system 1207 may include communication connections and devices that allow for communication with other computing systems (not shown) over communication networks (not shown). Examples of connections and devices that together allow for inter-system communication may include network interface cards, antennas, power amplifiers, RF circuitry, transceivers, and other communication circuitry. The connections and devices may communicate over communication media to exchange communications with other computing systems or networks of systems, such as metal, glass, air, or any other suitable communication media. The aforementioned media, connections, and devices are well known and need not be discussed at length here.

**[00219]** User interface system 1209 is optional and may include a keyboard, a mouse, a voice input device, a touch input device for receiving a touch gesture from a user, a motion input device for detecting non-touch gestures and other motions by a user, and other comparable input devices and associated processing elements capable of receiving user input from a user. Output devices such as a display, speakers, haptic devices, and other types of output devices may also be included in user interface system 1209. In some cases, the input and output devices may be combined in a single device, such as a display capable of displaying images and receiving touch gestures. The aforementioned user input and output devices are well known in the art and need not be discussed at length here.

**[00220]** Communication between computing system 1201 and other computing systems (not shown), may occur over a communication network or networks and in accordance with various communication protocols, combinations of protocols, or variations thereof. Examples

include intranets, internets, the Internet, local area networks, wide area networks, wireless networks, wired networks, virtual networks, software defined networks, data center buses, computing backplanes, or any other type of network, combination of network, or variation thereof. The aforementioned communication networks and protocols are well known and need not be discussed at length here. However, some communication protocols that may be used include, but are not limited to, the Internet protocol (IP, IPv4, IPv6, etc.), the transfer control protocol (TCP), and the user datagram protocol (UDP), as well as any other suitable communication protocol, variation, or combination thereof.

The included descriptions and figures depict specific embodiments to teach those skilled in the art how to make and use the best mode. By way of example, many of the implementations discussed described a magnetic hard disk drive. The discussion should also be ready to include other types of storage, such solid-state drives. For the purpose of teaching inventive principles, some conventional aspects have been simplified or omitted. Those skilled in the art will appreciate variations from these embodiments that fall within the scope of the invention. Those skilled in the art will also appreciate that the features described above may be combined in various ways to form multiple embodiments. As a result, the invention is not limited to the specific embodiments described above, but only by the claims and their equivalents.

CLAIMS

What is claimed is:

1. An apparatus comprising:

a storage device;

a device controller operatively coupled with the storage device, comprising a memory;

an application stored on the memory and comprising instructions that, when executed, direct the device controller to at least:

receive a storage request to store content on the storage device;

retrieve a storage device policy from the memory that indicates a set of storage locations on the storage device;

select one of the storage locations on the storage device based on the storage device policy;

store the content on the storage device at the selected storage location; and

record storage information for the content that indicates the selected location on the memory.

2. The apparatus of claim 1 wherein the storage device comprises a magnetic disk and the selected storage location comprises a location on the magnetic disk.

3. The apparatus of claim 1 wherein the storage device comprises a Solid-State Drive (SSD) and the selected storage location comprises a set of memory blocks on the SSD.

4. The apparatus of claim 1 wherein the instructions that, when executed, further direct the device controller to:

scan the storage device and identify defective regions on the storage device; and

select the one of the storage locations to avoid the identified defective regions on the storage device.

5. The apparatus of claim 1 wherein the instructions that, when executed, further direct the device controller to:

determine a size of the content; and

select the one of the storage locations on the storage device based on the size of the content.

6. The apparatus of claim 1 wherein the instructions that, when executed, further direct the device controller to:

determine a location of an actuator arm of the storage device; and

select the one of the storage locations on the storage device based on the location of the actuator arm of the storage device.

7. The apparatus of claim 1 wherein the instructions that, when executed, further direct the device controller to:

determine alternate write activity on adjacent blocks of the storage device; and

select the one of the storage locations on the storage device based on the alternate write activity on adjacent blocks of the storage device.

8. The apparatus of claim 1 wherein the instructions that, when executed, further direct the device controller to:

subsequent to storing the content on the storage device at the selected storage location, transfer the location information to a requester that transferred the storage request to the device controller.

9. An apparatus comprising:

a storage device;

a device controller operatively coupled with the storage device, comprising a memory;

an application stored on the memory and comprising instructions that, when executed, direct the device controller to at least:

receive a storage request to store content on the storage device;

retrieve a storage device policy from the memory that indicates a set of storage locations on the storage device;

select one of the storage locations on the storage device based on the storage device policy;

store the content on the storage device at the selected storage location;

record storage information for the content that indicates the selected location on the memory;

receive a content request comprising a content identifier for the content;

in response to the content request, retrieve the storage information for the content;

retrieve the content from the storage device based on the storage information; and

transfer the content.

10. The apparatus of claim 9 wherein the storage request comprises a priority level for the content.

11. The apparatus of claim 10 wherein the instructions that, when executed, further direct the device controller to:

determine the priority level for the content based on the storage request; and

select the one of the storage locations on the storage device based on the priority level of the content.

12. The apparatus of claim 9 wherein the storage request comprises an identification code for the content, encoding information for the content, and data protection information for the content.

13. The apparatus of claim 12 wherein the instructions that, when executed, further direct the device controller to:

encode the content according to the encoding information of the storage request; and

select the one of the storage locations on the storage device and store the encoded content on the storage device at the selected storage location; and

record the storage information for the content that comprises the selected location, the identification code for the content, the encoding information for the content, and the data protection information for the content on the memory.

14. The apparatus of claim 9 wherein the instructions that, when executed, further direct the device controller to:

determine the storage request is incomplete;

in response to determining the storage request is incomplete, transfer a request for a storage device policy update;

receive the storage device policy update; and

update the storage device policy.

15. The apparatus of claim 9 wherein the storage information comprises the selected location for the content, an identification code for the content, a size of the content, encoding information for the content, and an encryption key for the content.

16. An apparatus comprising:

a storage device;

a device controller operatively coupled with the storage device, comprising a memory;

an application stored on the memory and comprising instructions that, when executed, direct the device controller to at least:

receive a storage request to store content on the storage device;

retrieve a storage device policy from the memory that indicates a set of storage locations on the storage device and a recording method for writing the content to the storage device;

select one of the storage locations on the storage device based on the storage device policy;

store the content on the storage device at the selected storage location using the recording method; and

record storage information for the content that indicates the selected location on the memory.

17. The apparatus of claim 16 wherein the storage device comprises a magnetic disk and the recording method comprises a recording path density.

18. The apparatus of claim 16 wherein the storage device comprises a magnetic disk and the recording method comprises a recording bit frequency.

19. The apparatus of claim 16 wherein the storage device comprises a magnetic disk and the recording method comprises a recording path pattern.

20. The apparatus of claim 16 wherein the instructions that, when executed, further direct the device controller to:

determine a priority level for the content based on the storage request;

select the one of the storage locations on the storage device based on the priority level of the content;

determine a recording path density, recording bit frequency, and recording path pattern for the content based on the content priority level; and

store the content on the storage device at the selected storage location using the selected recording path density, recoding bit frequency, and recording path pattern.

21. An apparatus comprising:

a storage device;

a device controller operatively coupled with the storage device, comprising a memory;

an application stored on the memory and comprising instructions that, when executed direct the device controller to at least:

receive a storage request to store content on the storage device;

retrieve a storage device policy from the memory that indicates a set of storage locations on the storage device and a recording method for writing the content to the storage device;

select one of the storage locations on the storage device based on the storage device policy;

store the content on the storage device at the selected storage location; and

record storage information for the content that indicates the selected location on the memory;

receive a content request comprising a content identifier for the content;

in response to the content request, retrieve the storage information for the content;

retrieve the content from the storage device based on the storage information; and

transfer the content.

22. The apparatus of claim 21 wherein the content comprises medical records.

23. The apparatus of claim 21 wherein the content comprises on-line temporal video data.

24. The apparatus of claim 21 wherein the content comprises image data.

25. The apparatus of claim 21 wherein the content comprises online shopping financial data.

26. An apparatus comprising:

a storage device;

a device controller operatively coupled with the storage device and comprising a memory, the device controller configured to receive content to be stored on the storage device;

a programmable processor configured to implement a storage device policy that indicates a set of storage locations on the storage device;

the programmable processor communicatively coupled with the device controller wherein the content received by the device controller is processed by the programmable processor; and

an application stored on the memory and comprising instructions that, when executed, direct the device controller to select one of the storage locations and store the content at the selected storage location on the storage device after the content has been processed by the programmable processor.

27. The apparatus of claim 26 wherein the instructions that, when executed, further direct the device controller to:

determine a content type for the content; and

select the one of the storage locations on the storage device based on the content type.

28. The apparatus of claim 26 wherein the instructions that, when executed, further direct the device controller to:

determine other ones of the storage locations that have already been written; and

select the one of the storage locations on the storage device based on the other ones of the storage locations that have already been written.

29. The apparatus of claim 26 wherein:

the selected storage location comprises a start location on the storage device; and wherein:

the instructions that, when executed, further direct the device controller to:

store the content using the start location at the selected storage location on the storage device.

30. The apparatus of claim 26 wherein:

the selected storage location comprises a start location and angle information on the storage device; and wherein:

the instructions that, when executed, further direct the device controller to:

store the content using the start location and the angle information at the selected storage location on the storage device.

31. The apparatus of claim 26 wherein:

the selected storage location comprises a complete mapping of a recording path on the storage device; and wherein:

the instructions that, when executed, further direct the device controller to:

store the content using the complete recording path at the selected storage location on the storage device.

32. An apparatus comprising:

a storage device;

a device controller operatively coupled with the storage device, comprising a memory;

an application stored on the memory and comprising instructions that, when executed, direct the device controller to at least:

receive a storage request to store a first content and a second content on the storage device;

retrieve a storage device policy from the memory that indicates a set of storage locations on the storage device;

select a first one of the storage locations based on the content type of the first content and select a second one of the storage locations based on the content type of the second content; and

store the first content at the first selected storage location on the storage device and store the second content at the second selected storage location on the storage device.

33. The apparatus of claim 32 wherein the storage device comprises a storage array comprising multiple storage devices connected together to form the storage array.

34. The apparatus of claim 32 wherein the storage device comprises a storage array comprising multiple Solid-State Drives (SSDs) and multiple hard disk drives connected together to form the storage array.

35. The apparatus of claim 32 wherein the storage device comprises a storage array for cloud storage support.

36. The apparatus of claim 32 wherein:

the storage device comprises a storage array comprising multiple storage devices connected together to form the storage array; and wherein:

the instructions that, when executed, further direct the device controller to:

select the first one of the storage locations on a first one of the multiple storage devices of the storage array based on the content type of the first content and select the second one of the storage locations on a second one of the multiple storage devices of the storage array based on the content type of the second content.

ABSTRACT

An apparatus comprises a storage device and a device controller operatively coupled with the storage device. The device controller comprises a memory that stores an application. The application stored on the memory comprises instructions. When executed, the instruction direct the device controller to receive a storage request comprising content. The device controller retrieves a storage device policy from the memory that indicates a set of storage locations on the storage device. The device controller selects one of the storage locations on the storage device based on the storage device policy. The device controller stores the content on the storage device at the selected storage location. The device controller records storage information for the content that indicates the selected location on the memory.

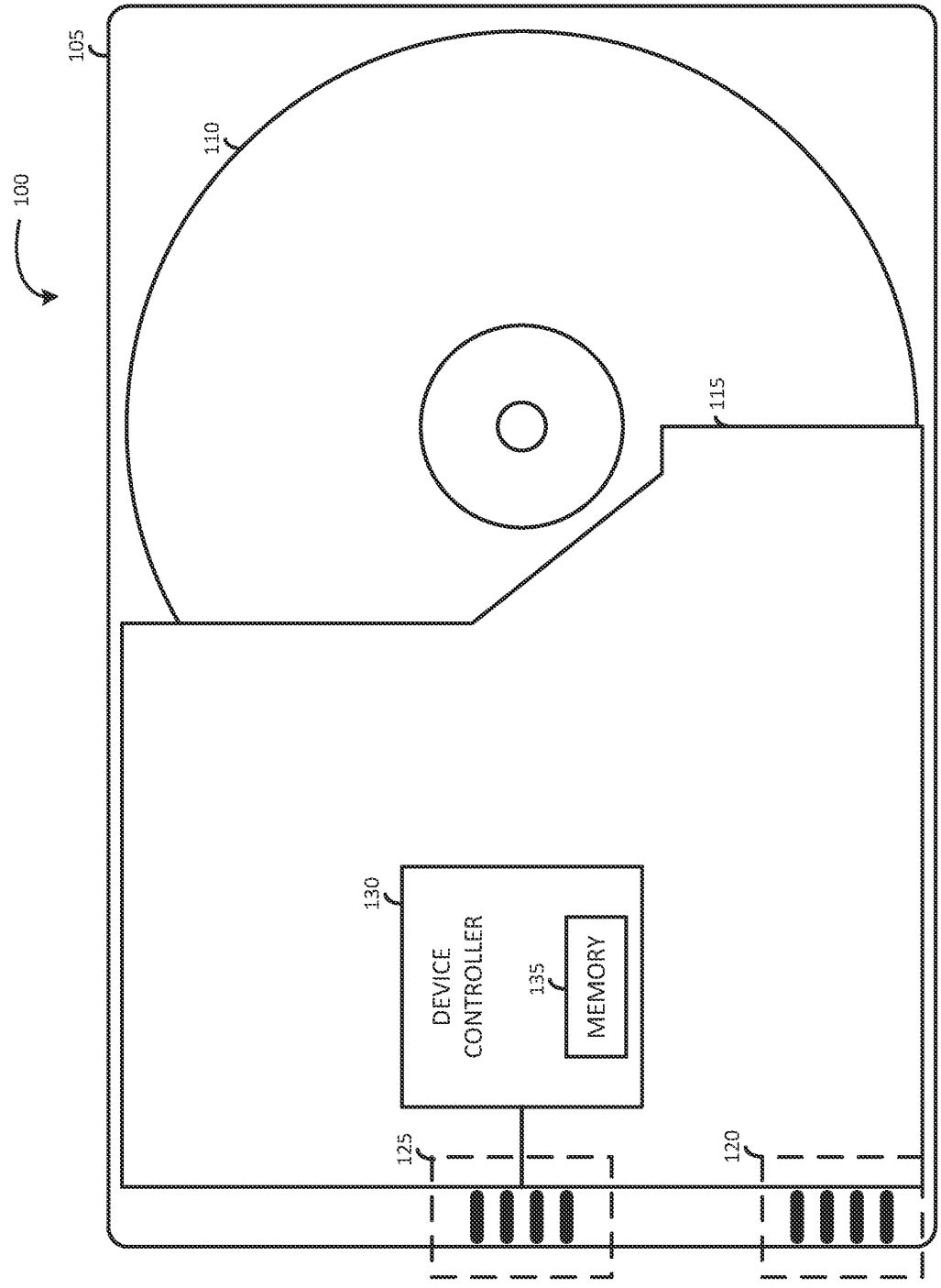



FIG. 1A

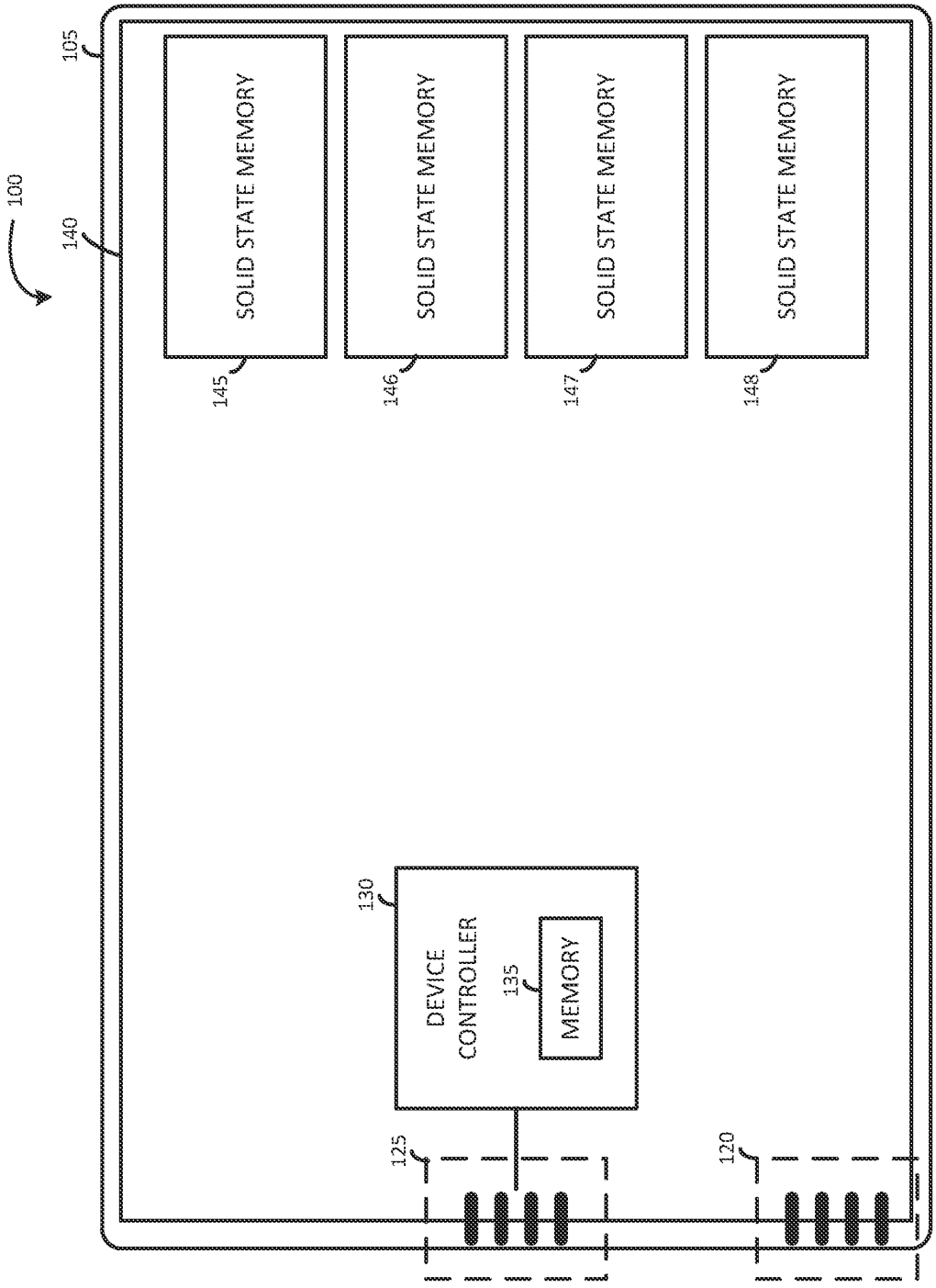

100
105
140
SOLID STATE MEMORY
145
SOLID STATE MEMORY
146
SOLID STATE MEMORY
147
SOLID STATE MEMORY
148
130
DEVICE CONTROLLER
135
MEMORY
125
120

FIG. 1B

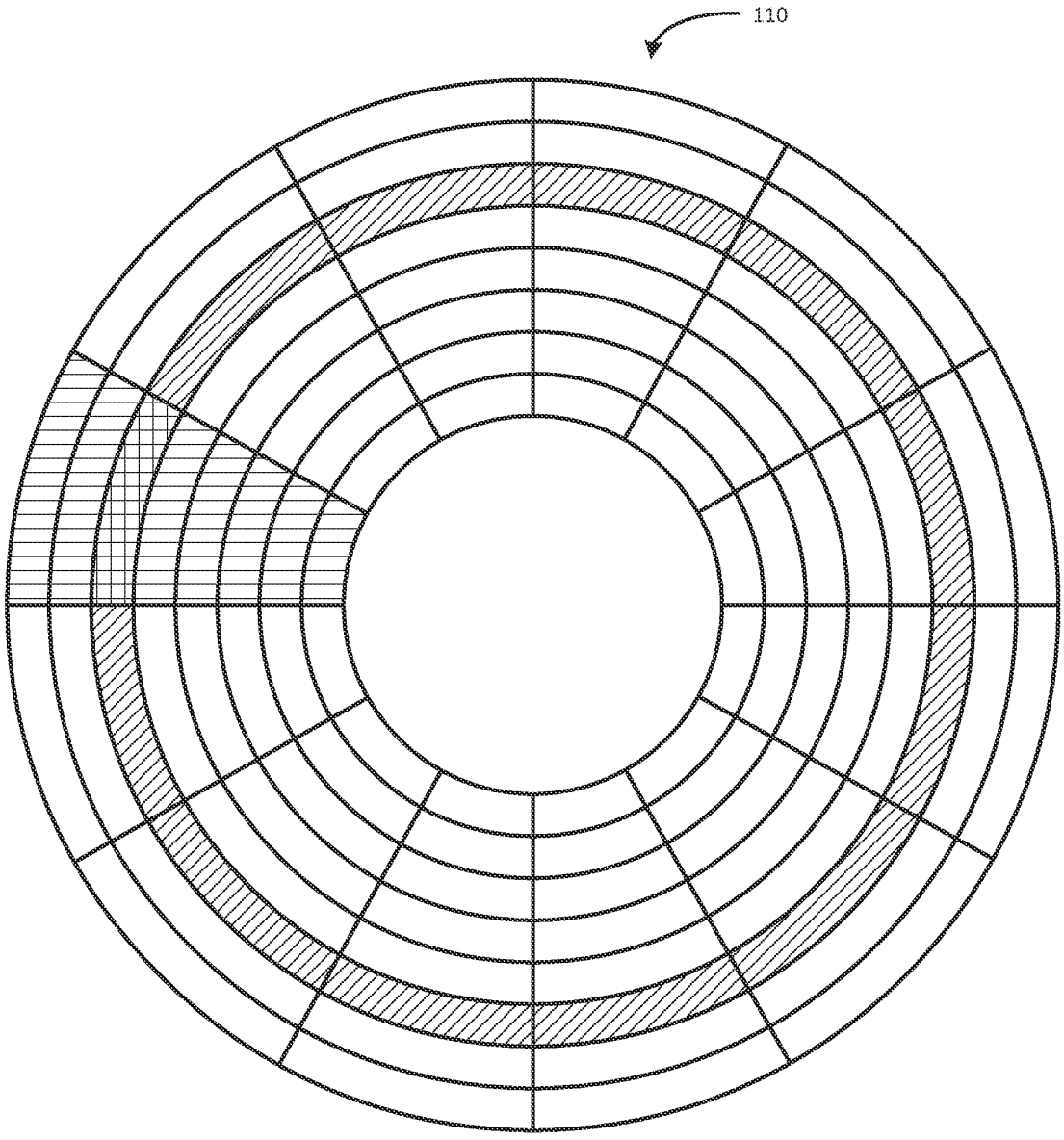



FIG. 2A

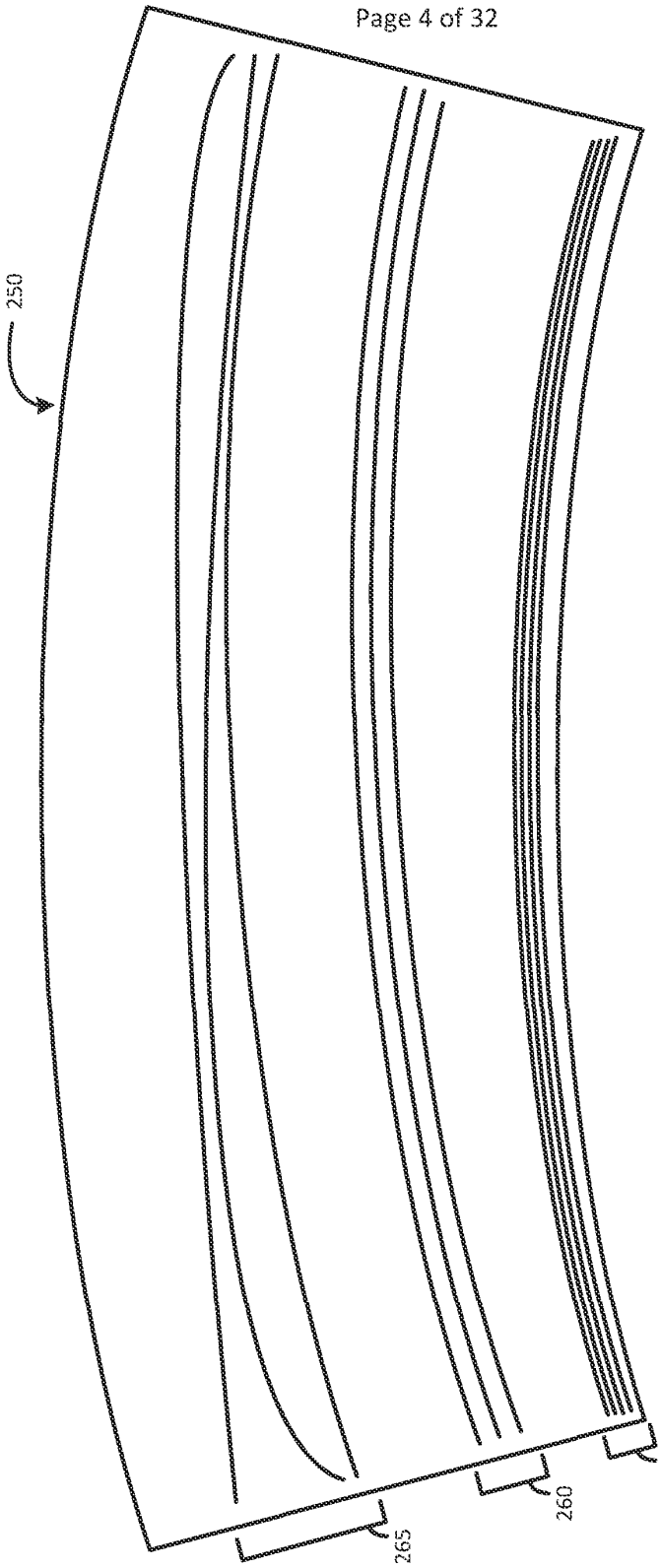



FIG. 2B

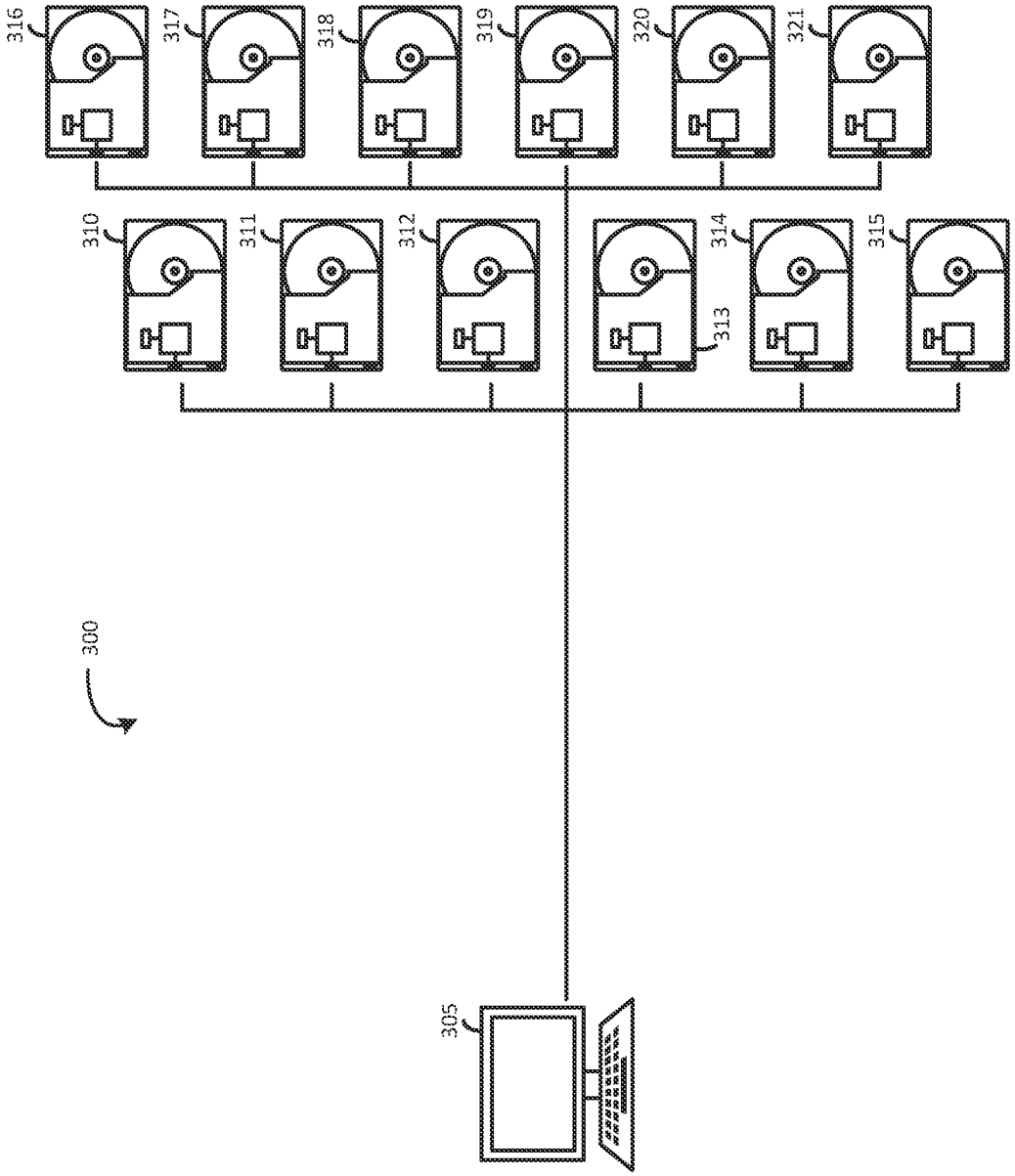



FIG. 3

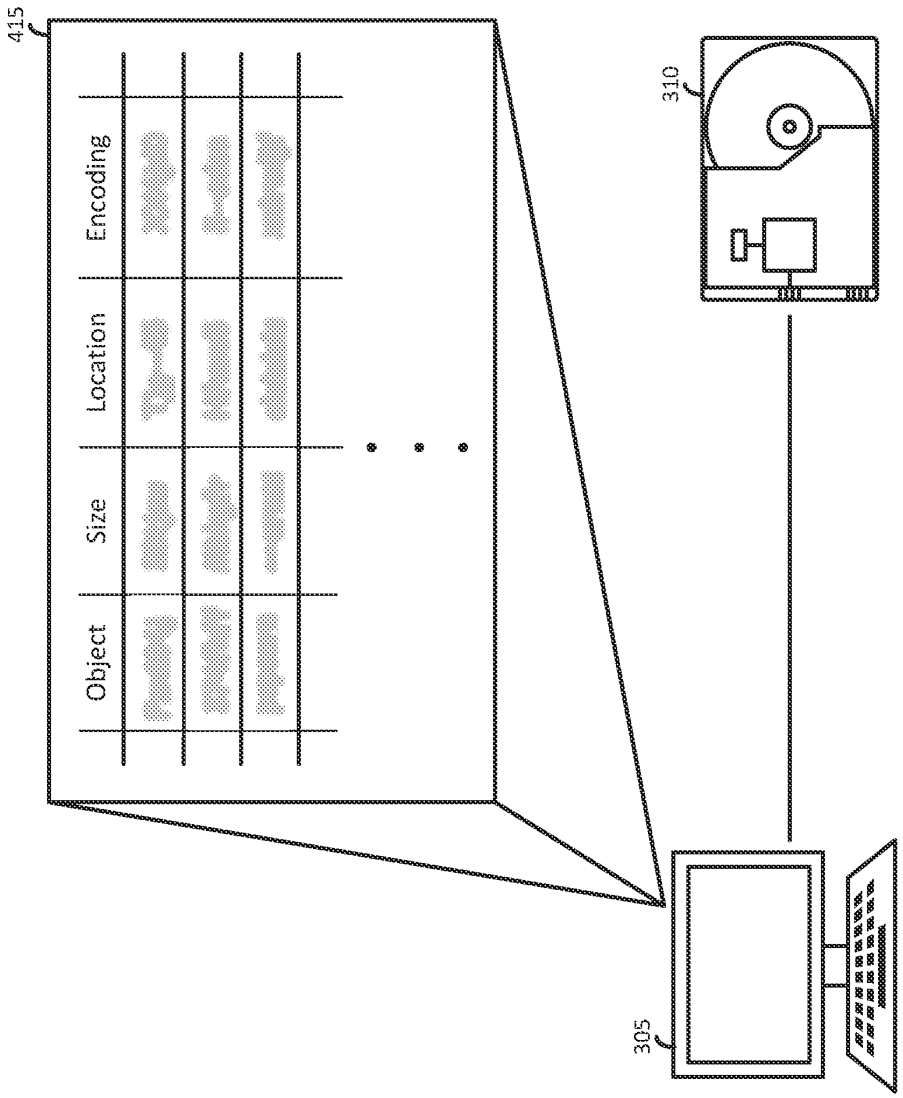



FIG. 4A

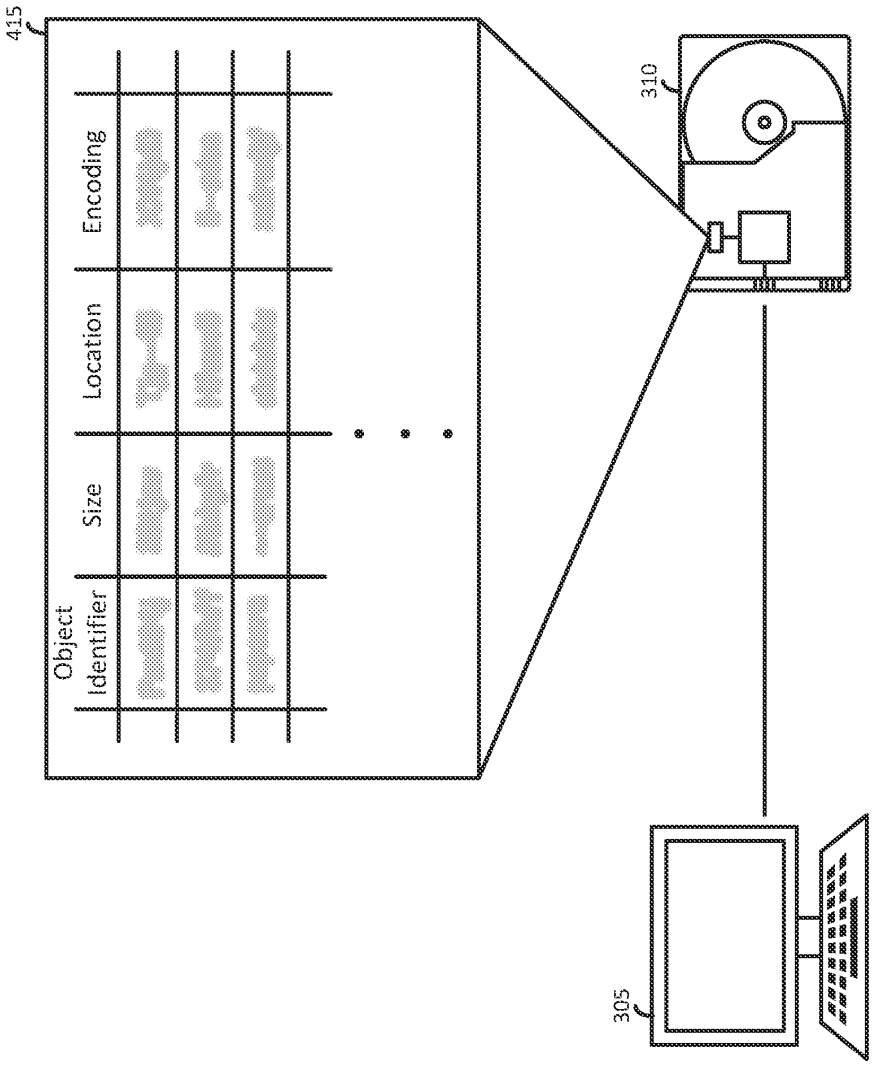



FIG. 4B

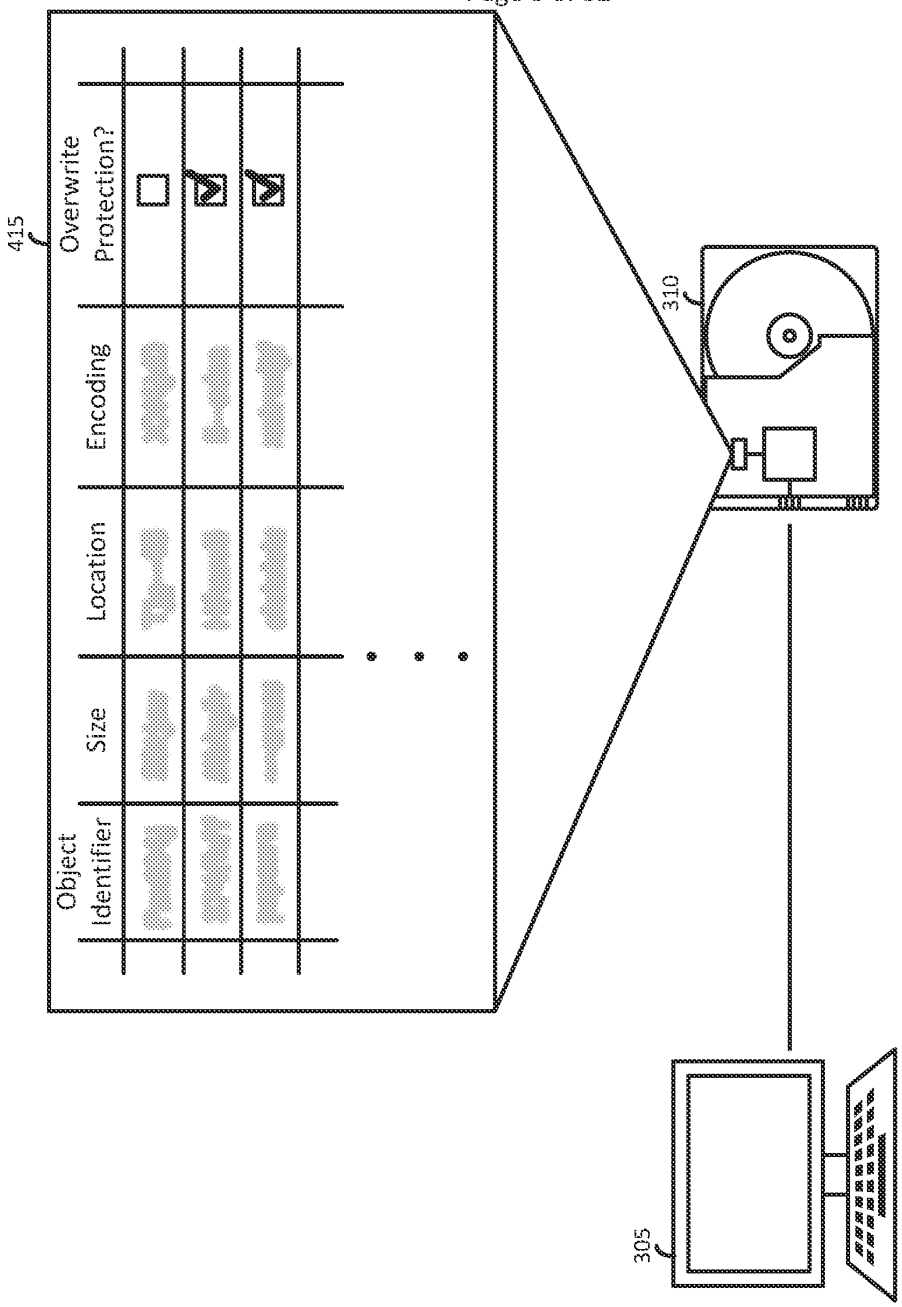

415
Object Identifier
Size
Location
Encoding
Overwrite Protection?
310
305

FIG. 4C

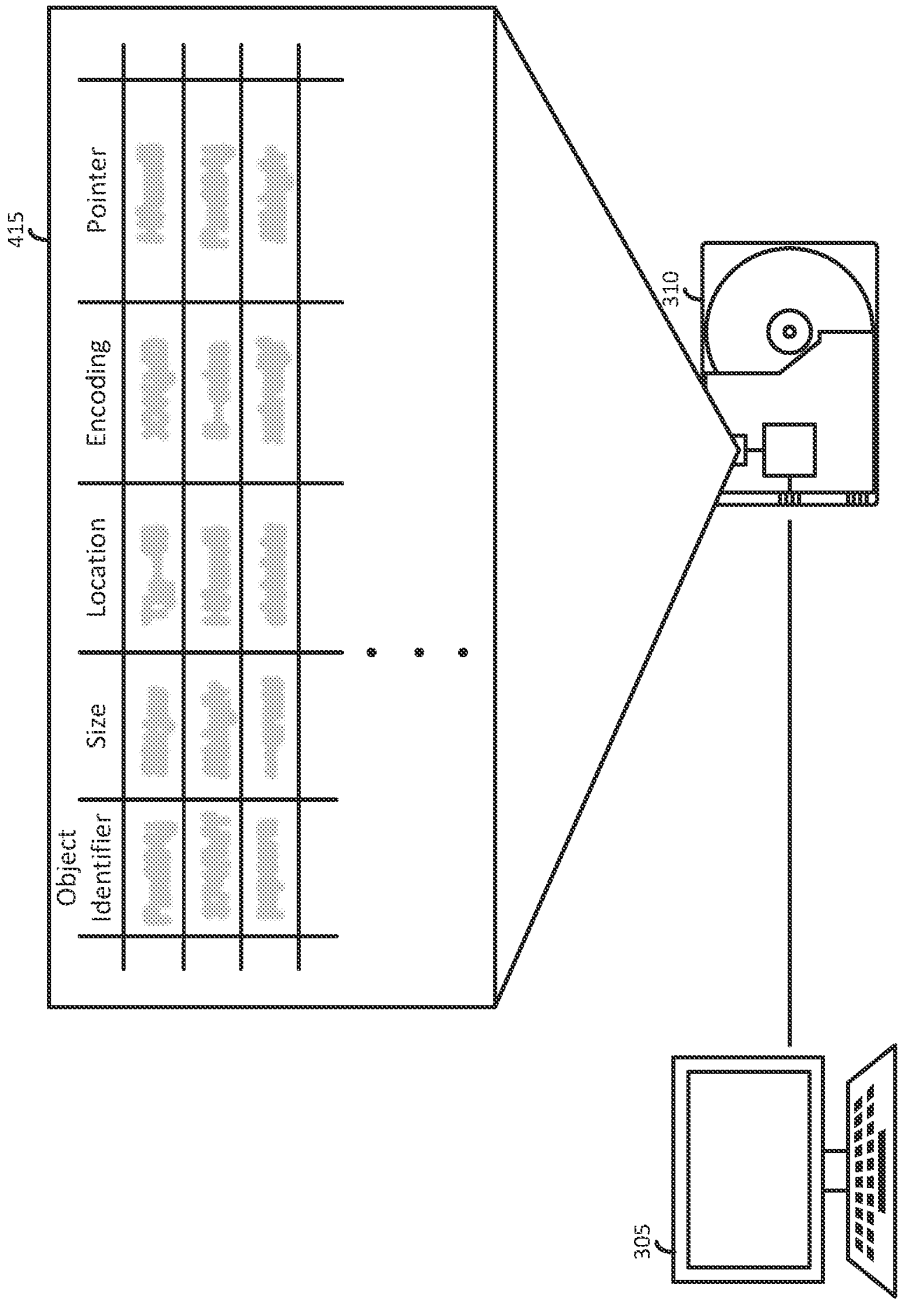

415
Object Identifier
Size
Location
Encoding
Pointer
310
305

FIG. 4D

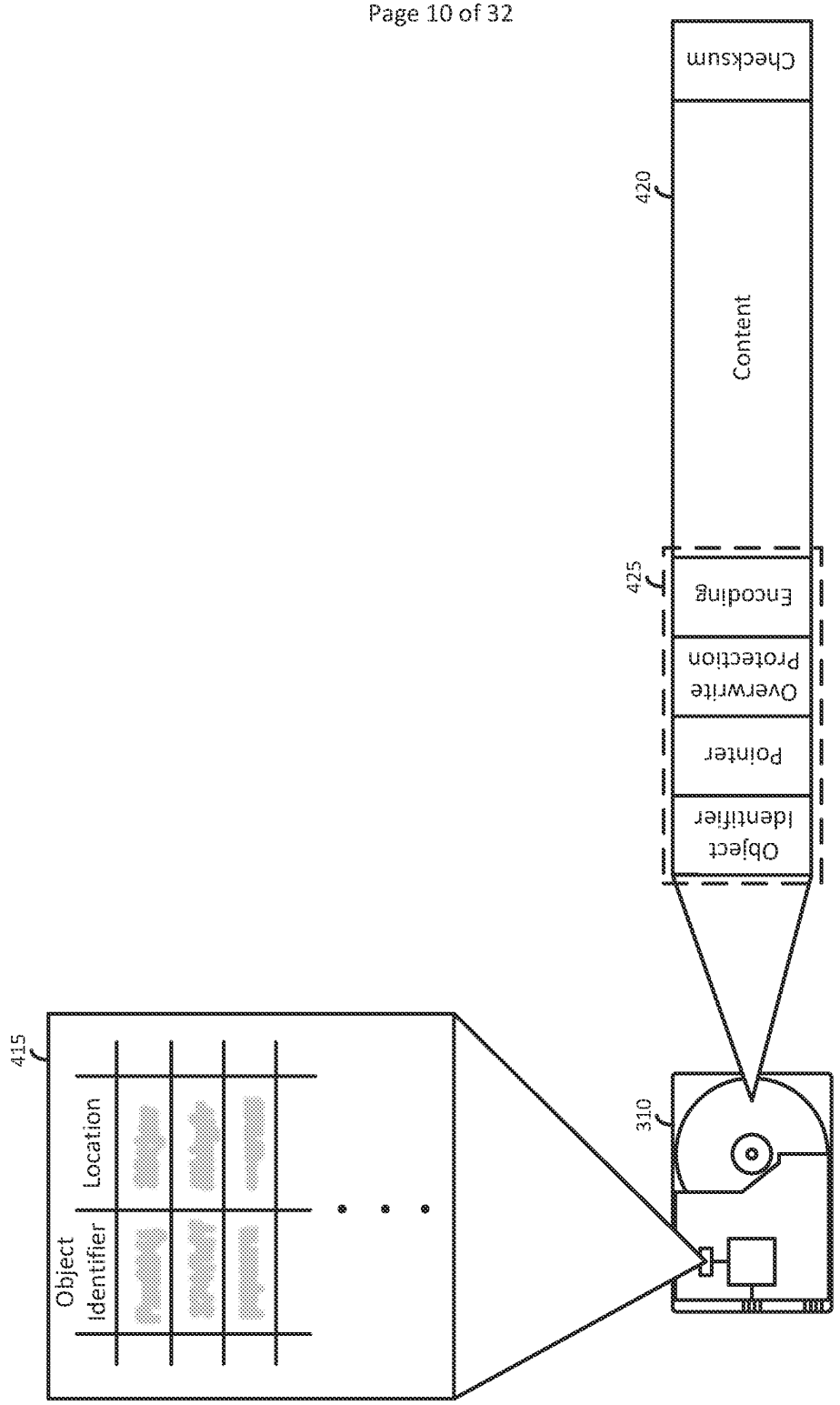

415
Object identifier
Location
310
425
Object identifier
Pointer
Overwrite Protection
Encoding
420
Content
Checksum

FIG. 4E

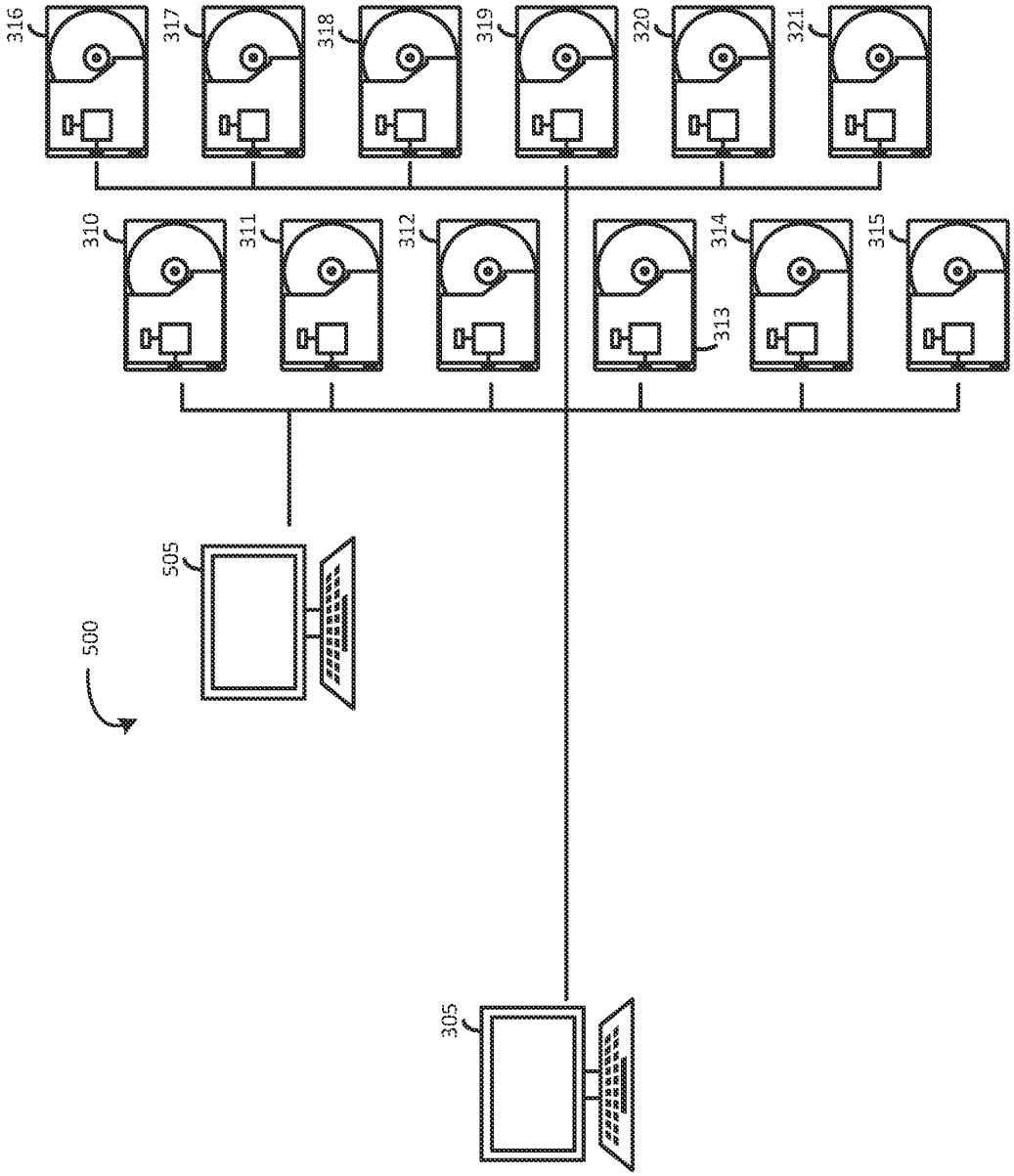



FIG. 5

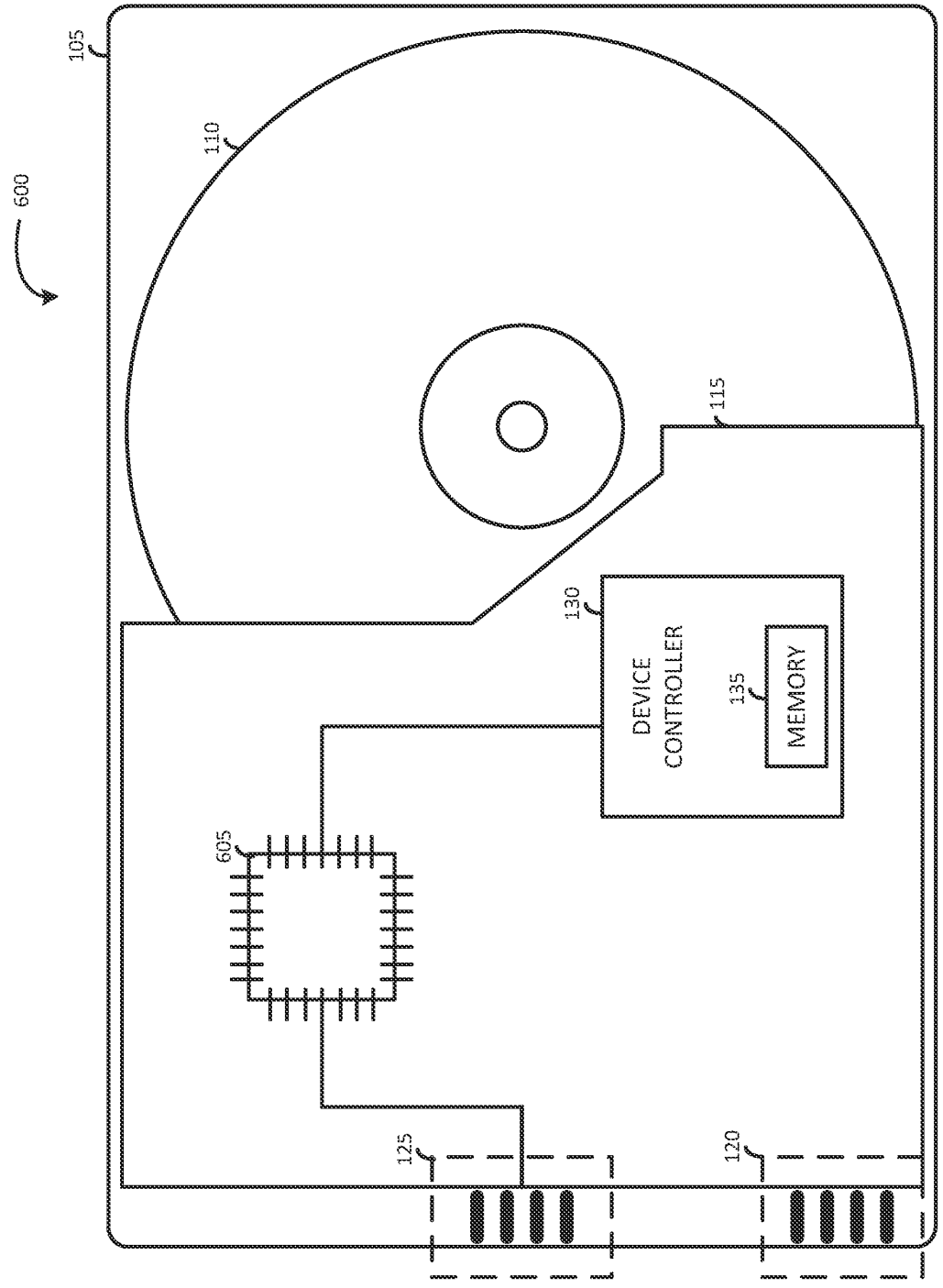



FIG. 6

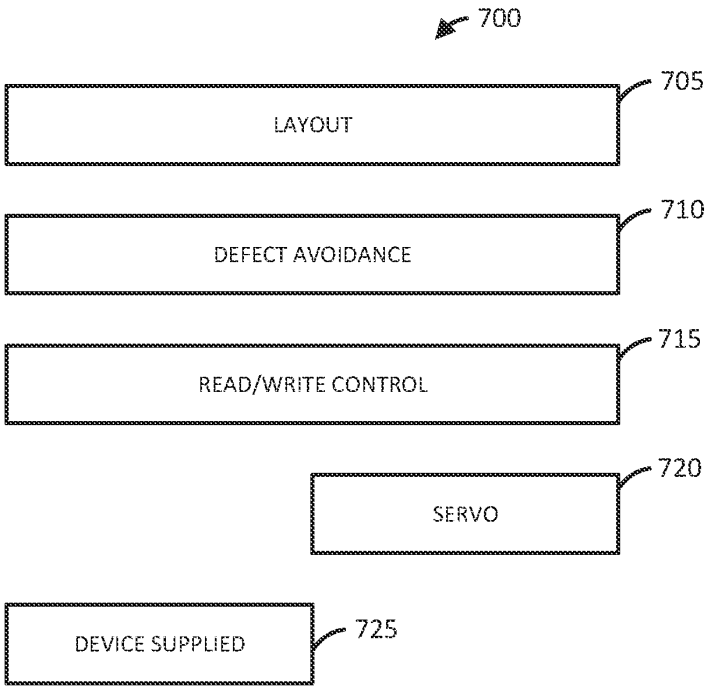

700
705
LAYOUT
710
DEFECT AVOIDANCE
715
READ/WRITE CONTROL
720
SERVO
DEVICE SUPPLIED
725

FIG. 7A

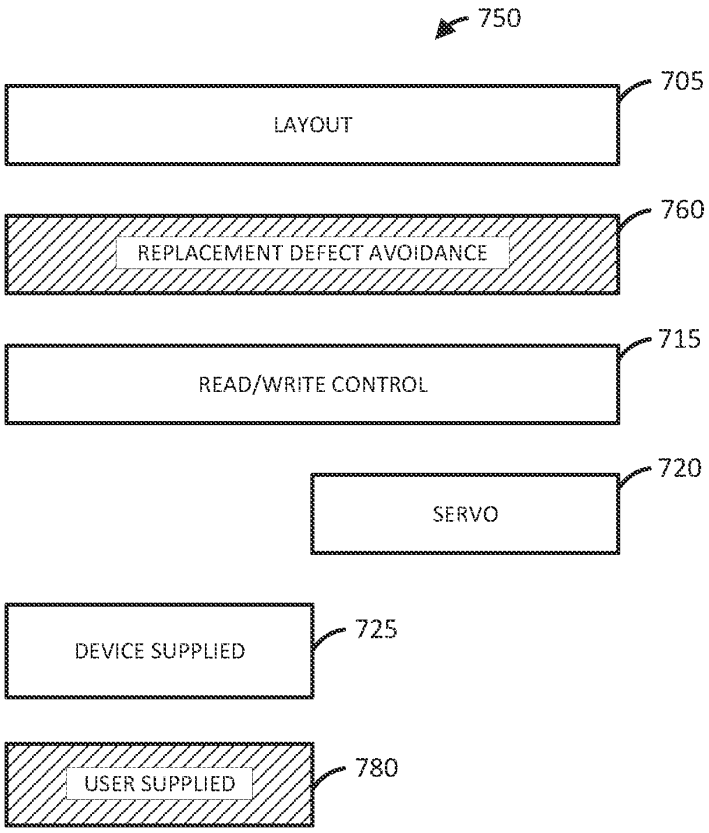

750
705
LAYOUT
760
REPLACEMENT DEFECT AVOIDANCE
715
READ/WRITE CONTROL
720
SERVO
725
DEVICE SUPPLIED
780
USER SUPPLIED

FIG. 7B

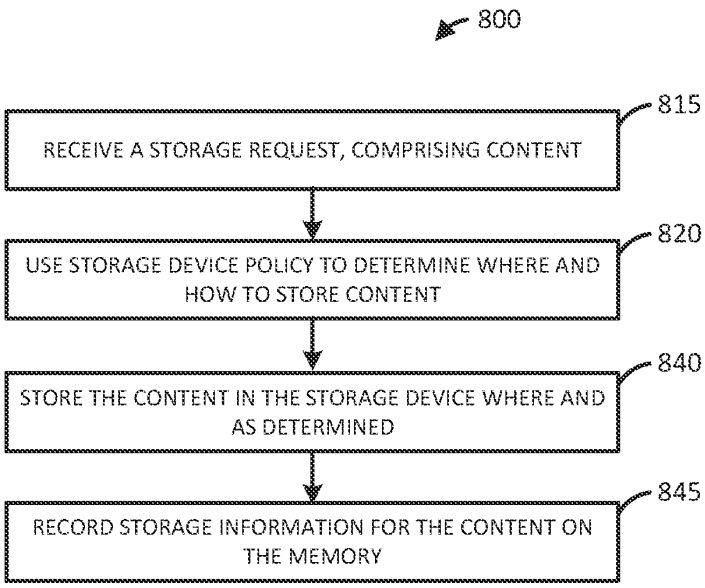

800
815
RECEIVE A STORAGE REQUEST, COMPRISING CONTENT
820
USE STORAGE DEVICE POLICY TO DETERMINE WHERE AND HOW TO STORE CONTENT
840
STORE THE CONTENT IN THE STORAGE DEVICE WHERE AND AS DETERMINED
845
RECORD STORAGE INFORMATION FOR THE CONTENT ON THE MEMORY

FIG. 8A

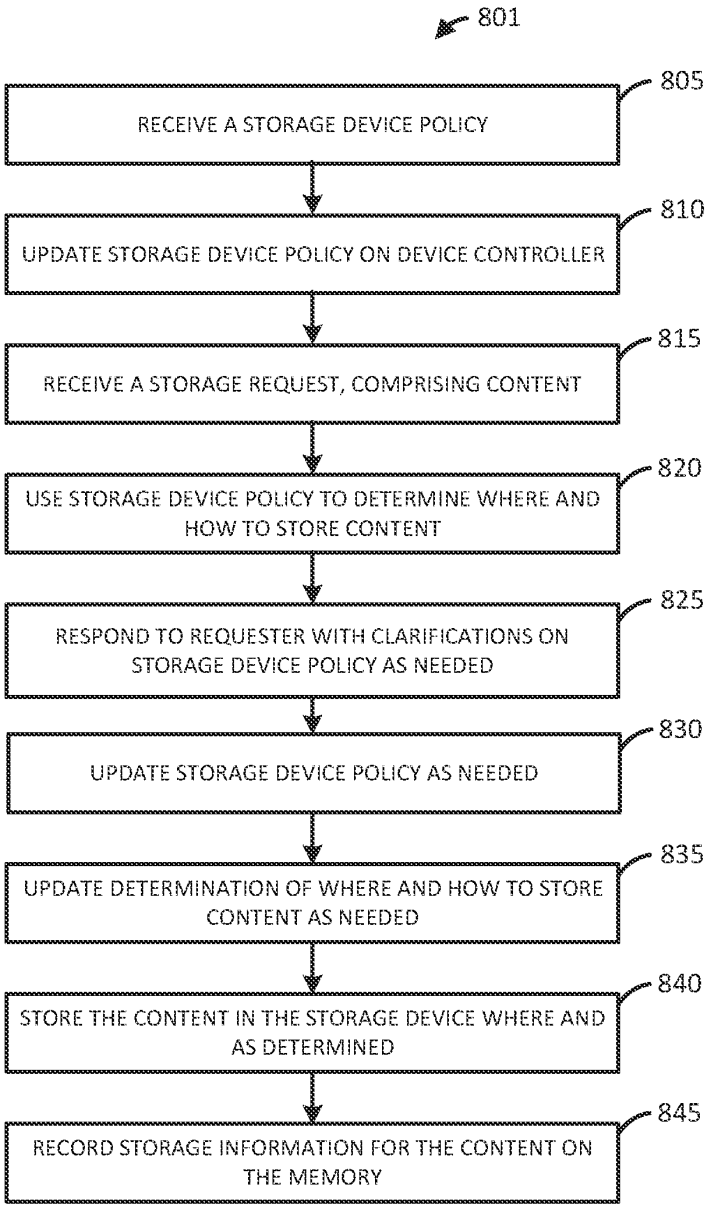

801
805
RECEIVE A STORAGE DEVICE POLICY
810
UPDATE STORAGE DEVICE POLICY ON DEVICE CONTROLLER
815
RECEIVE A STORAGE REQUEST, COMPRISING CONTENT
820
USE STORAGE DEVICE POLICY TO DETERMINE WHERE AND HOW TO STORE CONTENT
825
RESPOND TO REQUESTER WITH CLARIFICATIONS ON STORAGE DEVICE POLICY AS NEEDED
830
UPDATE STORAGE DEVICE POLICY AS NEEDED
835
UPDATE DETERMINATION OF WHERE AND HOW TO STORE CONTENT AS NEEDED
840
STORE THE CONTENT IN THE STORAGE DEVICE WHERE AND AS DETERMINED
845
RECORD STORAGE INFORMATION FOR THE CONTENT ON THE MEMORY

FIG. 8B

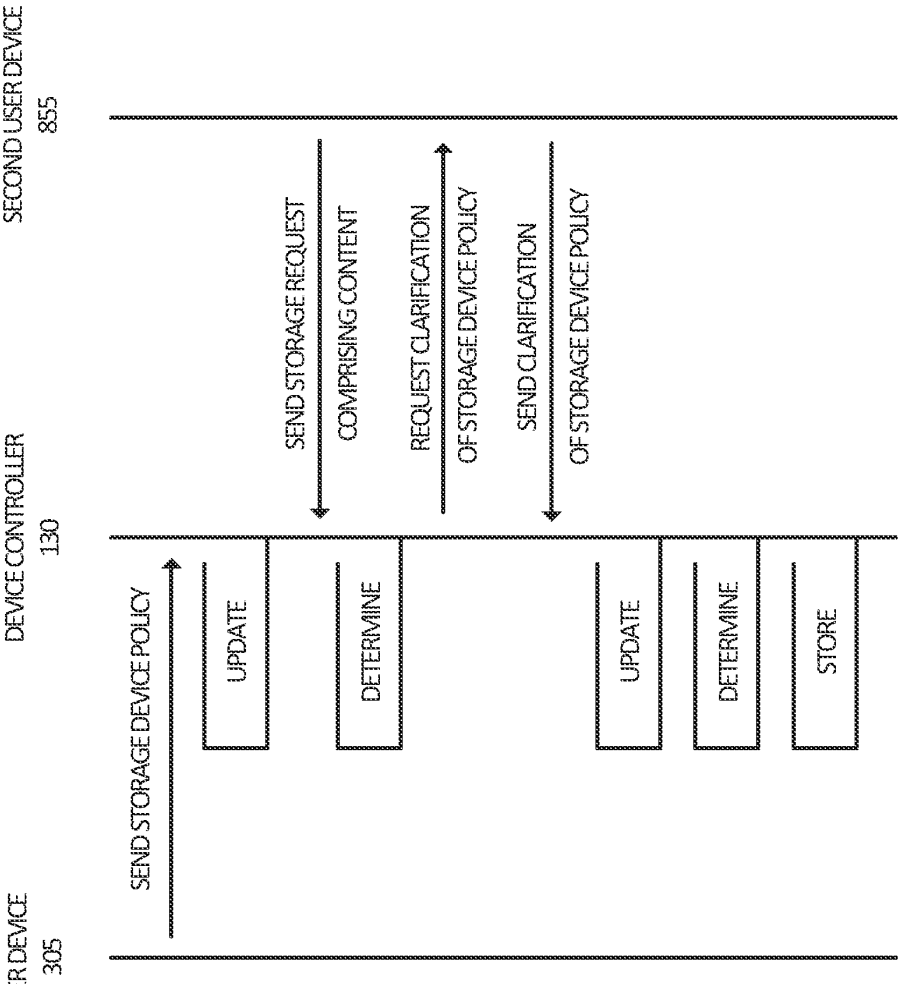

USER DEVICE
305
DEVICE CONTROLLER
130
SECOND USER DEVICE
855
SEND STORAGE DEVICE POLICY
UPDATE
DETERMINE
SEND STORAGE REQUEST
COMPRISING CONTENT
REQUEST CLARIFICATION
OF STORAGE DEVICE POLICY
SEND CLARIFICATION
OF STORAGE DEVICE POLICY
UPDATE
DETERMINE
STORE

FIG. 8C

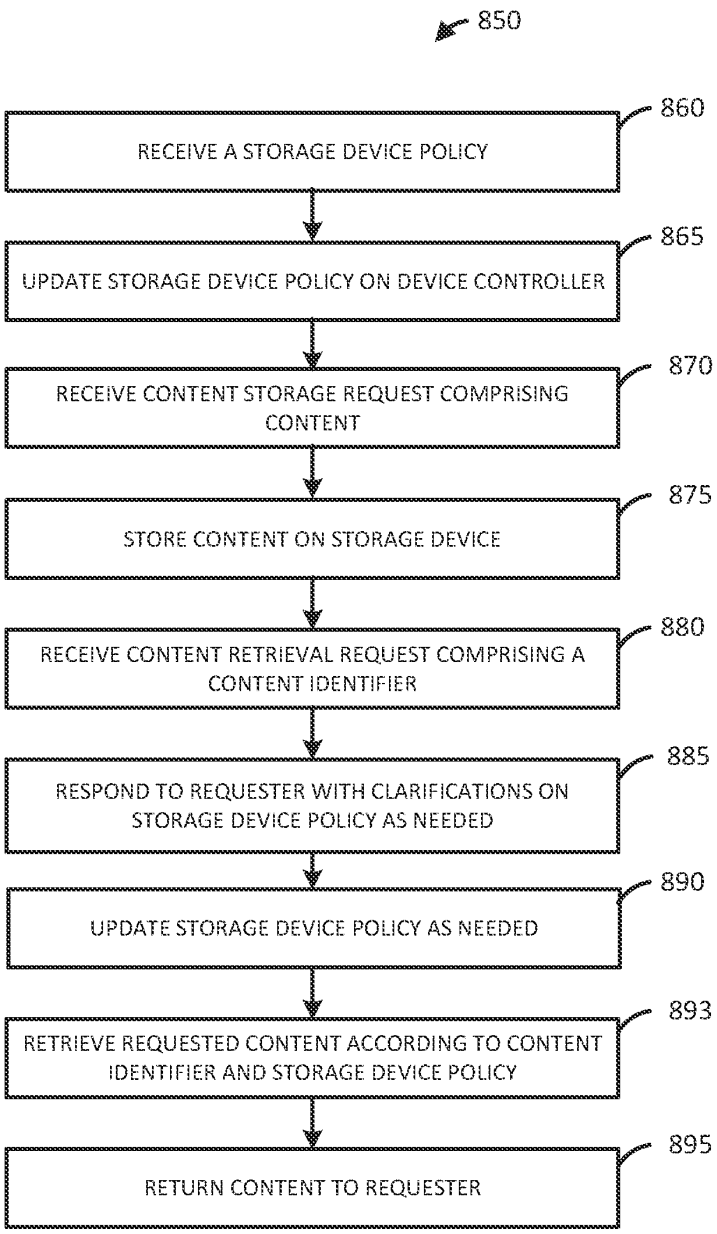

850
860
RECEIVE A STORAGE DEVICE POLICY
865
UPDATE STORAGE DEVICE POLICY ON DEVICE CONTROLLER
870
RECEIVE CONTENT STORAGE REQUEST COMPRISING CONTENT
875
STORE CONTENT ON STORAGE DEVICE
880
RECEIVE CONTENT RETRIEVAL REQUEST COMPRISING A CONTENT IDENTIFIER
885
RESPOND TO REQUESTER WITH CLARIFICATIONS ON STORAGE DEVICE POLICY AS NEEDED
890
UPDATE STORAGE DEVICE POLICY AS NEEDED
893
RETRIEVE REQUESTED CONTENT ACCORDING TO CONTENT IDENTIFIER AND STORAGE DEVICE POLICY
895
RETURN CONTENT TO REQUESTER

FIG. 8D

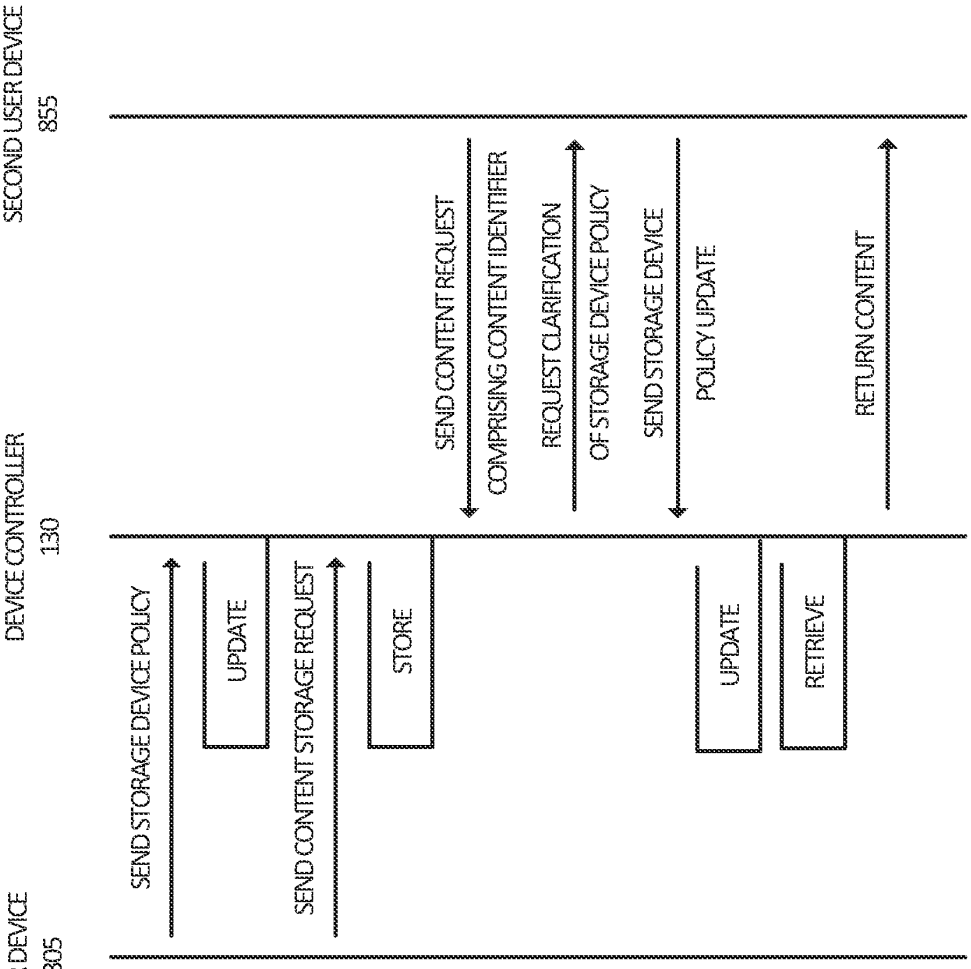

USER DEVICE
305
DEVICE CONTROLLER
130
SECOND USER DEVICE
855
SEND STORAGE DEVICE POLICY
UPDATE
SEND CONTENT STORAGE REQUEST
STORE
SEND CONTENT REQUEST
COMPRISING CONTENT IDENTIFIER
REQUEST CLARIFICATION
OF STORAGE DEVICE POLICY
SEND STORAGE DEVICE
POLICY UPDATE
RETURN CONTENT
UPDATE
RETRIEVE

FIG. 8E

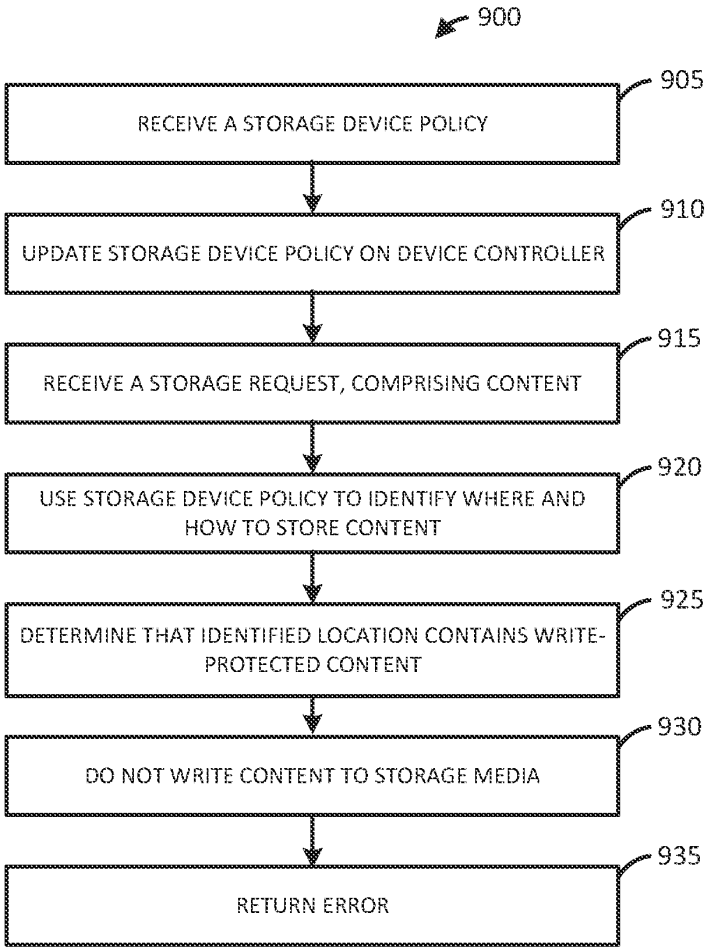

900
905
RECEIVE A STORAGE DEVICE POLICY
910
UPDATE STORAGE DEVICE POLICY ON DEVICE CONTROLLER
915
RECEIVE A STORAGE REQUEST, COMPRISING CONTENT
920
USE STORAGE DEVICE POLICY TO IDENTIFY WHERE AND HOW TO STORE CONTENT
925
DETERMINE THAT IDENTIFIED LOCATION CONTAINS WRITE-PROTECTED CONTENT
930
DO NOT WRITE CONTENT TO STORAGE MEDIA
935
RETURN ERROR

FIG. 9A

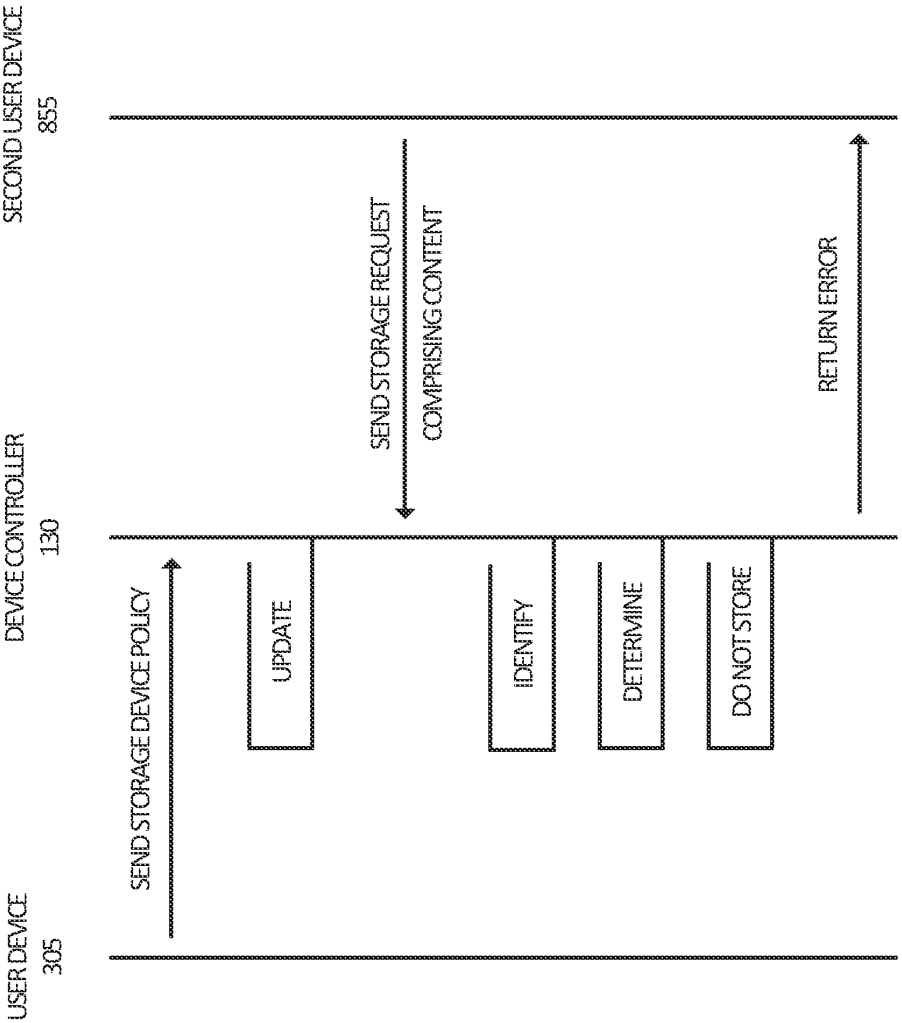

USER DEVICE
305
DEVICE CONTROLLER
130
SECOND USER DEVICE
855
SEND STORAGE DEVICE POLICY
UPDATE
SEND STORAGE REQUEST
COMPRISING CONTENT
IDENTIFY
DETERMINE
DO NOT STORE
RETURN ERROR

FIG. 9B

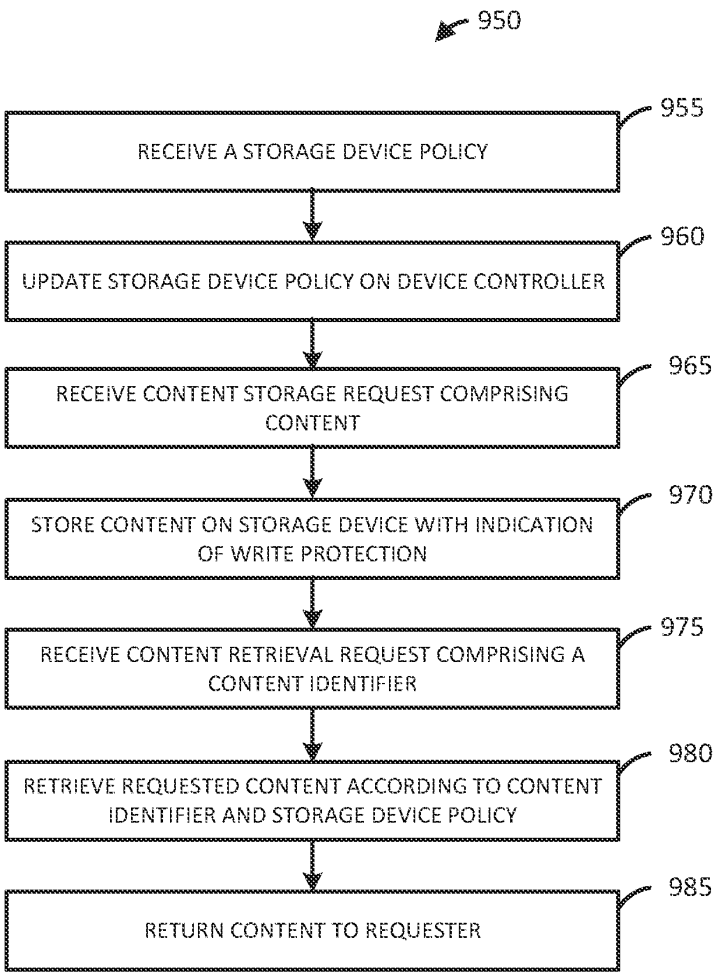

950
RECEIVE A STORAGE DEVICE POLICY
955
UPDATE STORAGE DEVICE POLICY ON DEVICE CONTROLLER
960
RECEIVE CONTENT STORAGE REQUEST COMPRISING CONTENT
965
STORE CONTENT ON STORAGE DEVICE WITH INDICATION OF WRITE PROTECTION
970
RECEIVE CONTENT RETRIEVAL REQUEST COMPRISING A CONTENT IDENTIFIER
975
RETRIEVE REQUESTED CONTENT ACCORDING TO CONTENT IDENTIFIER AND STORAGE DEVICE POLICY
980
RETURN CONTENT TO REQUESTER
985

FIG. 9C

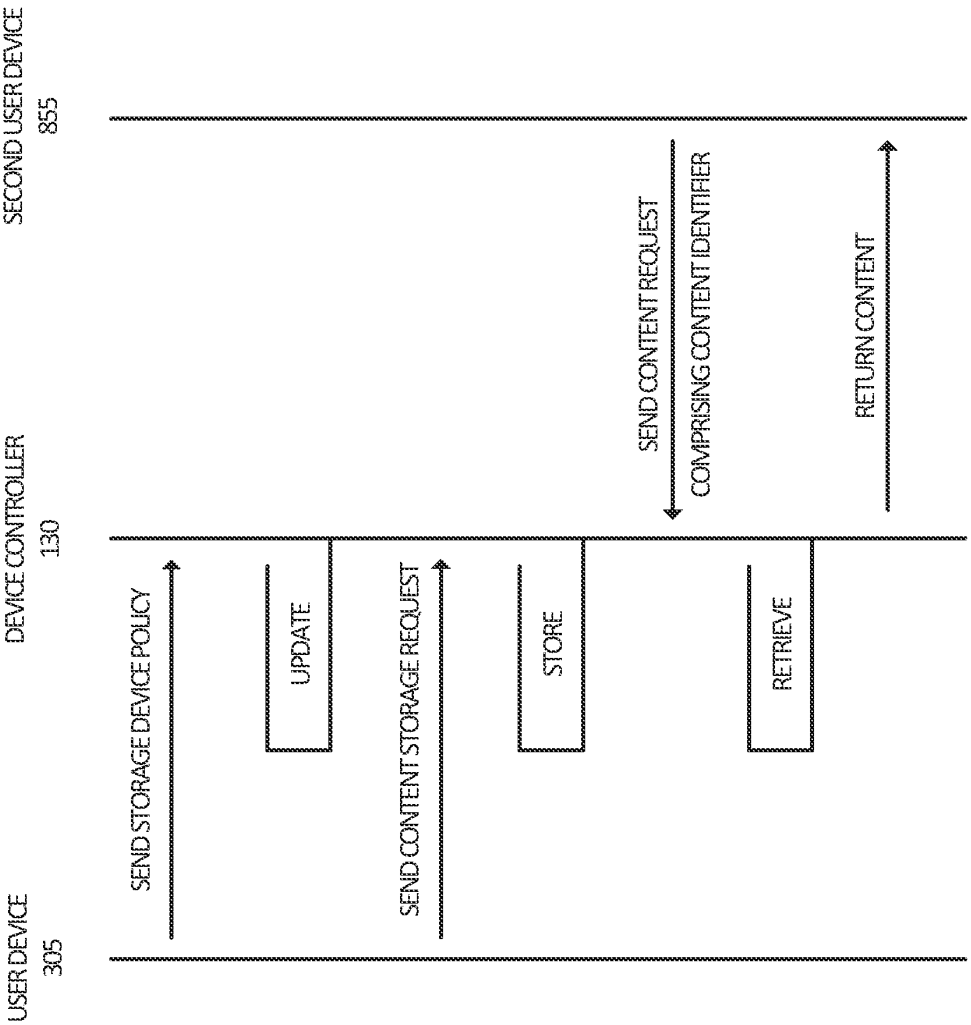

USER DEVICE
305
DEVICE CONTROLLER
130
SECOND USER DEVICE
855
SEND STORAGE DEVICE POLICY
UPDATE
SEND CONTENT STORAGE REQUEST
STORE
SEND CONTENT REQUEST
COMPRISING CONTENT IDENTIFIER
RETRIEVE
RETURN CONTENT

FIG. 9D

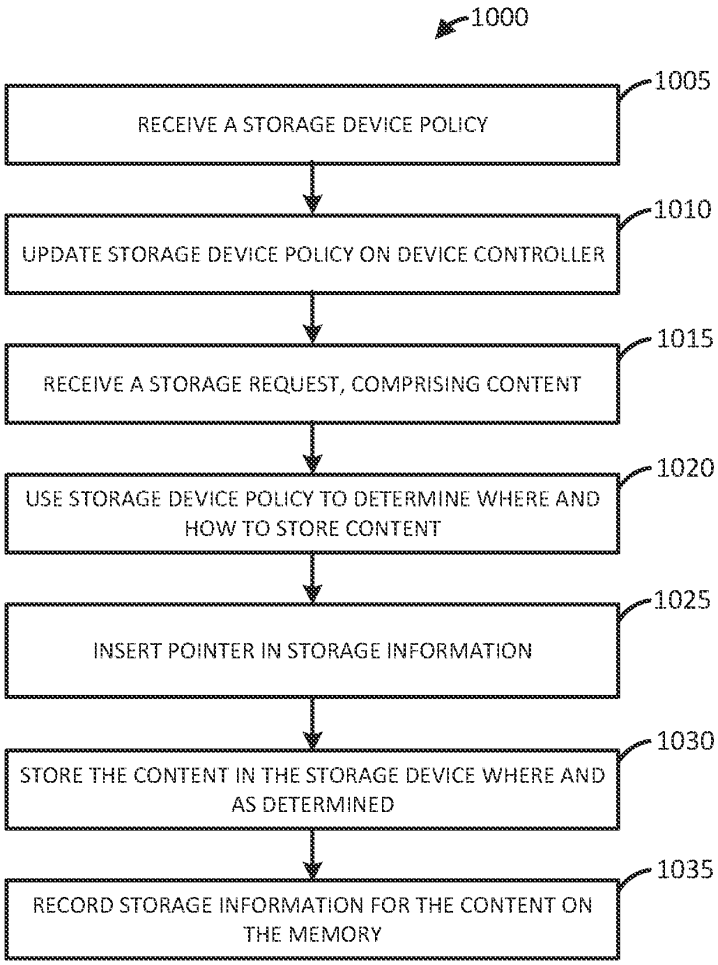

1000
RECEIVE A STORAGE DEVICE POLICY
1005
UPDATE STORAGE DEVICE POLICY ON DEVICE CONTROLLER
1010
RECEIVE A STORAGE REQUEST, COMPRISING CONTENT
1015
USE STORAGE DEVICE POLICY TO DETERMINE WHERE AND HOW TO STORE CONTENT
1020
INSERT POINTER IN STORAGE INFORMATION
1025
STORE THE CONTENT IN THE STORAGE DEVICE WHERE AND AS DETERMINED
1030
RECORD STORAGE INFORMATION FOR THE CONTENT ON THE MEMORY
1035

FIG. 10A

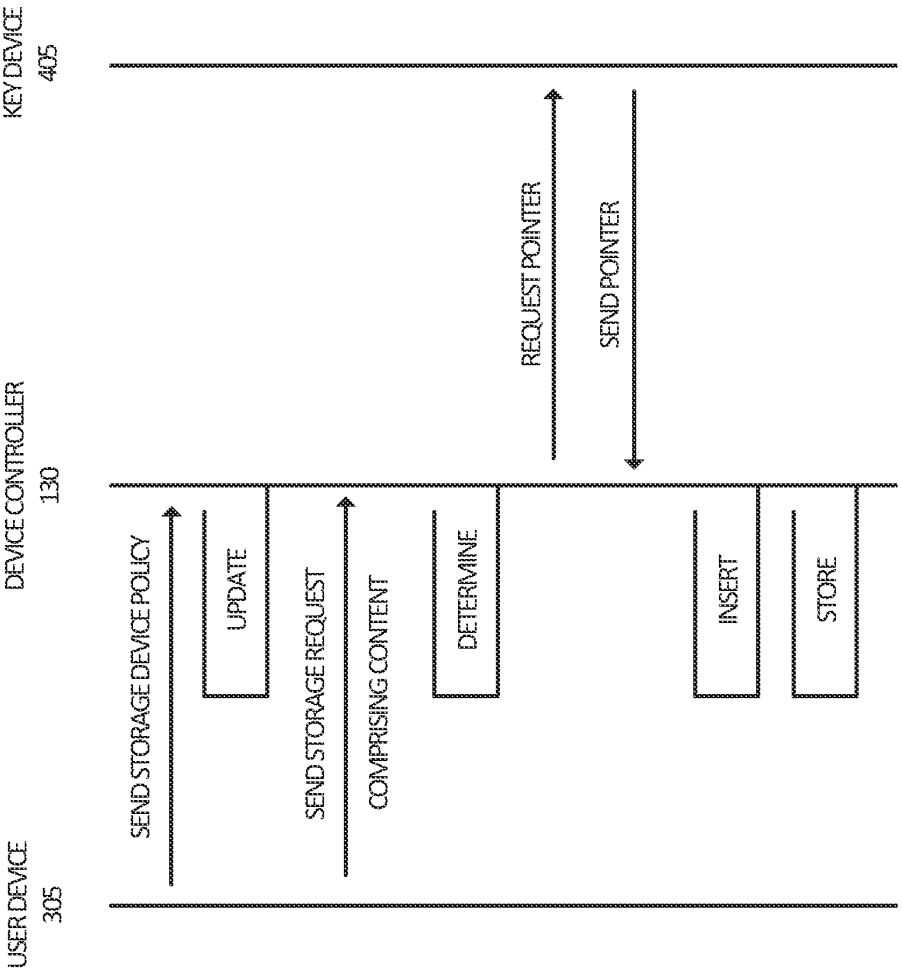

USER DEVICE
305
DEVICE CONTROLLER
130
KEY DEVICE
405
SEND STORAGE DEVICE POLICY
UPDATE
SEND STORAGE REQUEST
COMPRISING CONTENT
DETERMINE
REQUEST POINTER
SEND POINTER
INSERT
STORE

FIG. 10B

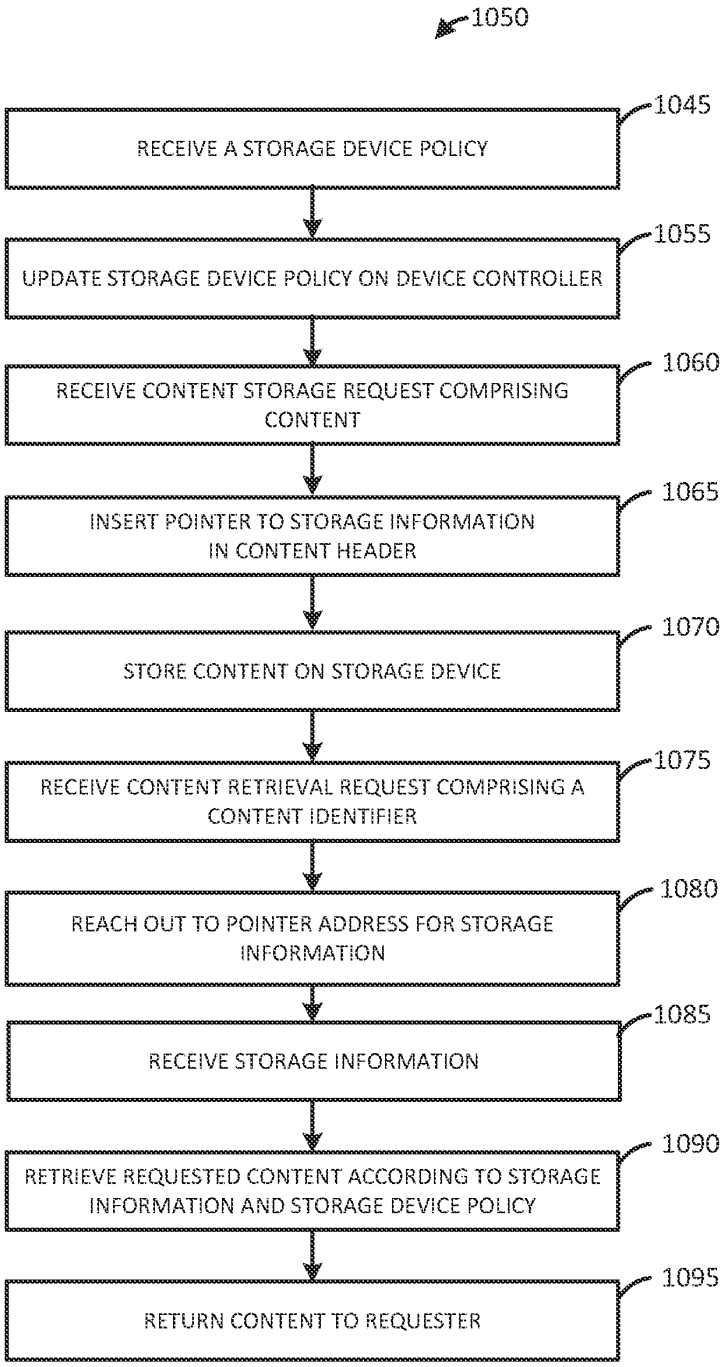

1050
RECEIVE A STORAGE DEVICE POLICY
1045
UPDATE STORAGE DEVICE POLICY ON DEVICE CONTROLLER
1055
RECEIVE CONTENT STORAGE REQUEST COMPRISING CONTENT
1060
INSERT POINTER TO STORAGE INFORMATION IN CONTENT HEADER
1065
STORE CONTENT ON STORAGE DEVICE
1070
RECEIVE CONTENT RETRIEVAL REQUEST COMPRISING A CONTENT IDENTIFIER
1075
REACH OUT TO POINTER ADDRESS FOR STORAGE INFORMATION
1080
RECEIVE STORAGE INFORMATION
1085
RETRIEVE REQUESTED CONTENT ACCORDING TO STORAGE INFORMATION AND STORAGE DEVICE POLICY
1090
RETURN CONTENT TO REQUESTER
1095

FIG. 10C

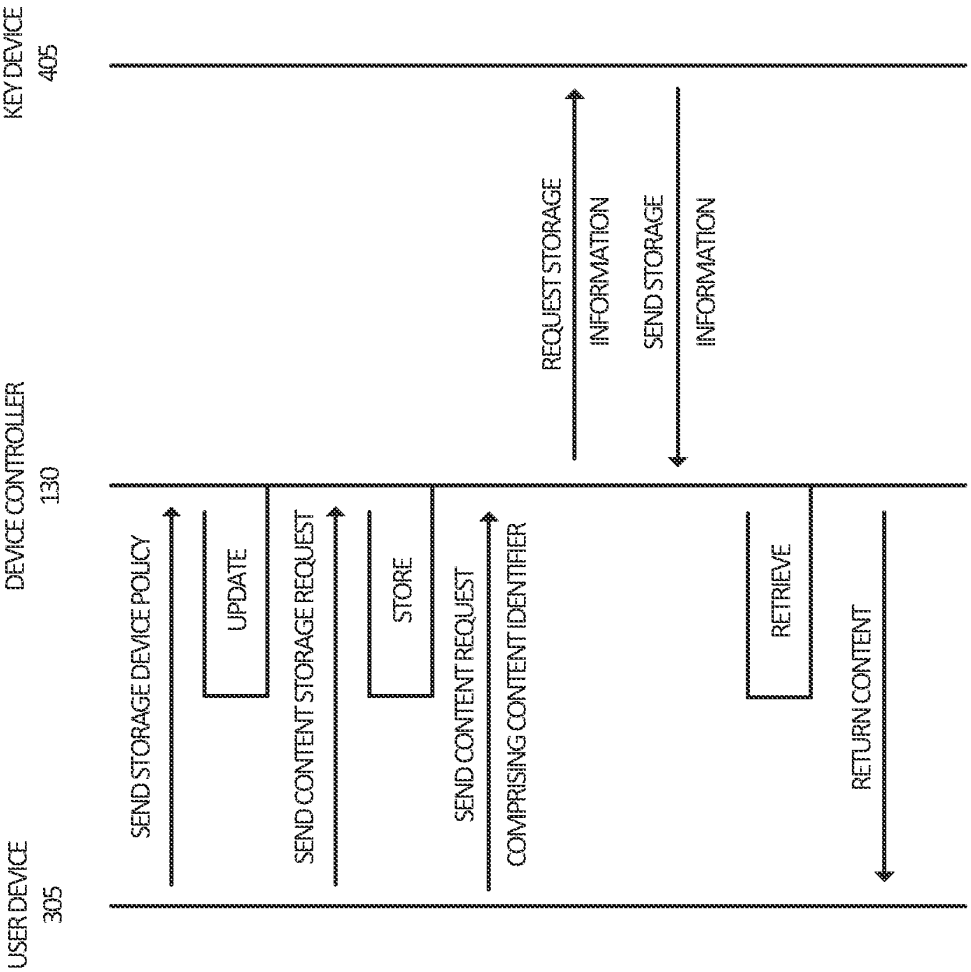

USER DEVICE
305
DEVICE CONTROLLER
130
KEY DEVICE
405
SEND STORAGE DEVICE POLICY
UPDATE
SEND CONTENT STORAGE REQUEST
STORE
SEND CONTENT REQUEST
COMPRISING CONTENT IDENTIFIER
REQUEST STORAGE
INFORMATION
SEND STORAGE
INFORMATION
RETRIEVE
RETURN CONTENT

FIG. 10D

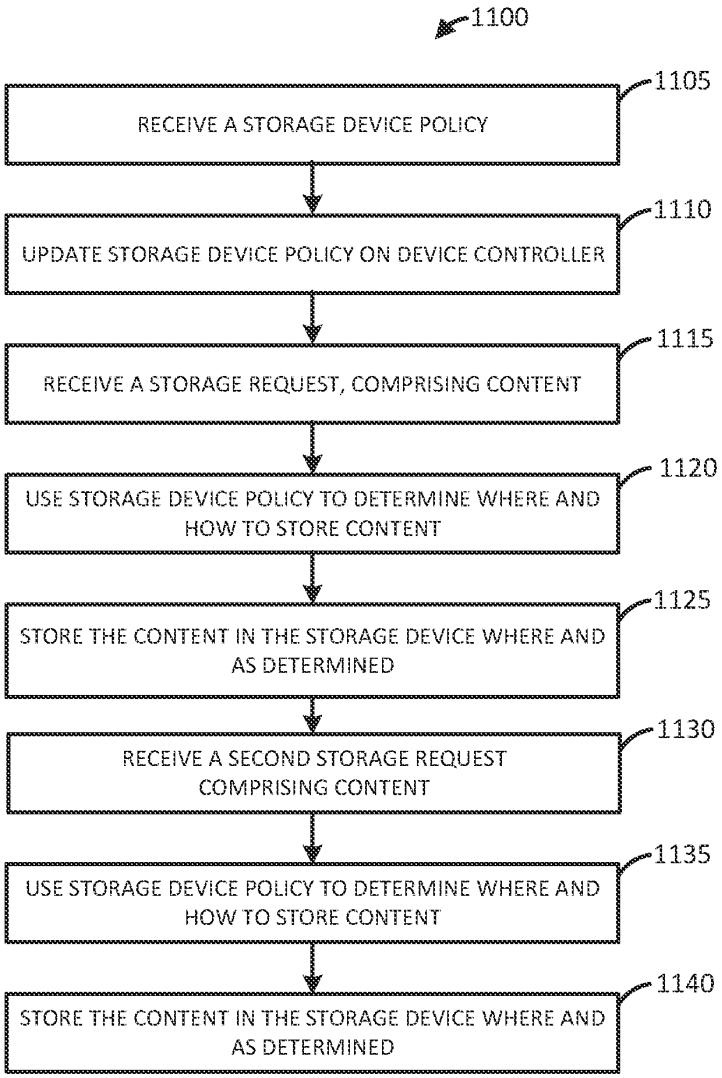

1100
1105
RECEIVE A STORAGE DEVICE POLICY
1110
UPDATE STORAGE DEVICE POLICY ON DEVICE CONTROLLER
1115
RECEIVE A STORAGE REQUEST, COMPRISING CONTENT
1120
USE STORAGE DEVICE POLICY TO DETERMINE WHERE AND HOW TO STORE CONTENT
1125
STORE THE CONTENT IN THE STORAGE DEVICE WHERE AND AS DETERMINED
1130
RECEIVE A SECOND STORAGE REQUEST COMPRISING CONTENT
1135
USE STORAGE DEVICE POLICY TO DETERMINE WHERE AND HOW TO STORE CONTENT
1140
STORE THE CONTENT IN THE STORAGE DEVICE WHERE AND AS DETERMINED

FIG. 11A

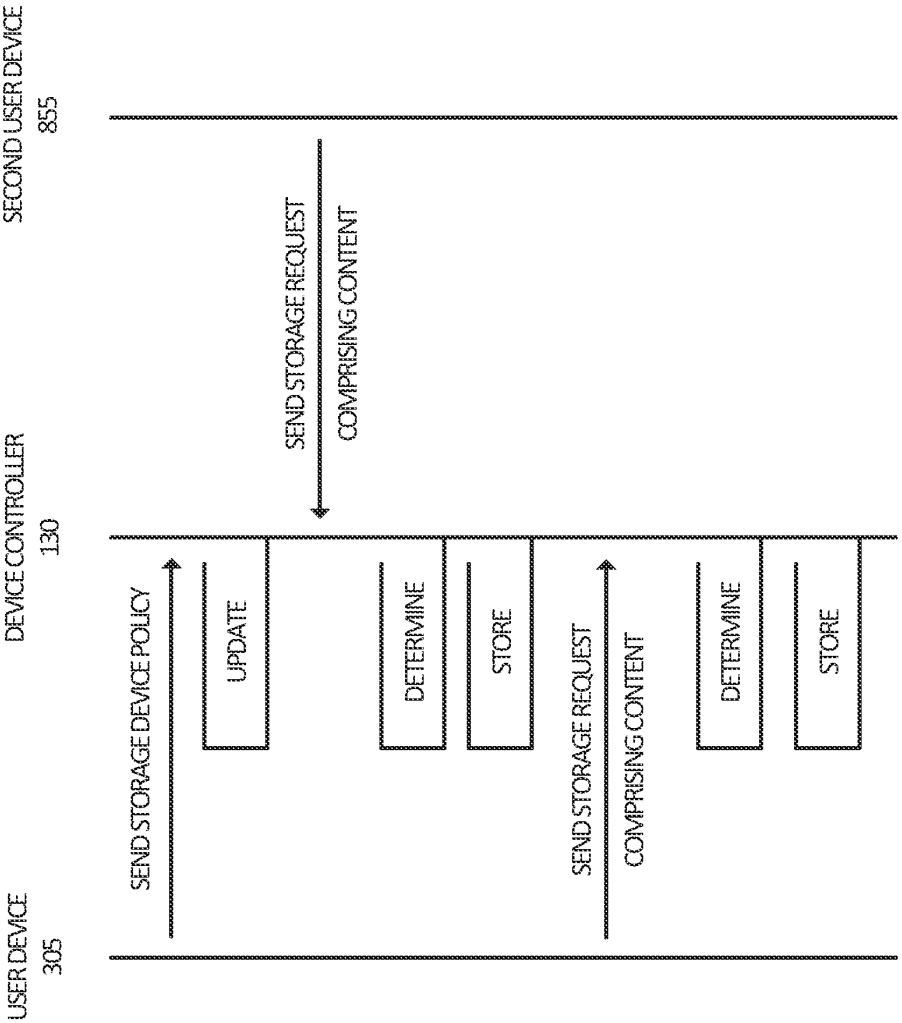

USER DEVICE
305
DEVICE CONTROLLER
130
SECOND USER DEVICE
855
SEND STORAGE DEVICE POLICY
UPDATE
SEND STORAGE REQUEST
COMPRISING CONTENT
DETERMINE
STORE
SEND STORAGE REQUEST
COMPRISING CONTENT
DETERMINE
STORE

FIG. 11B

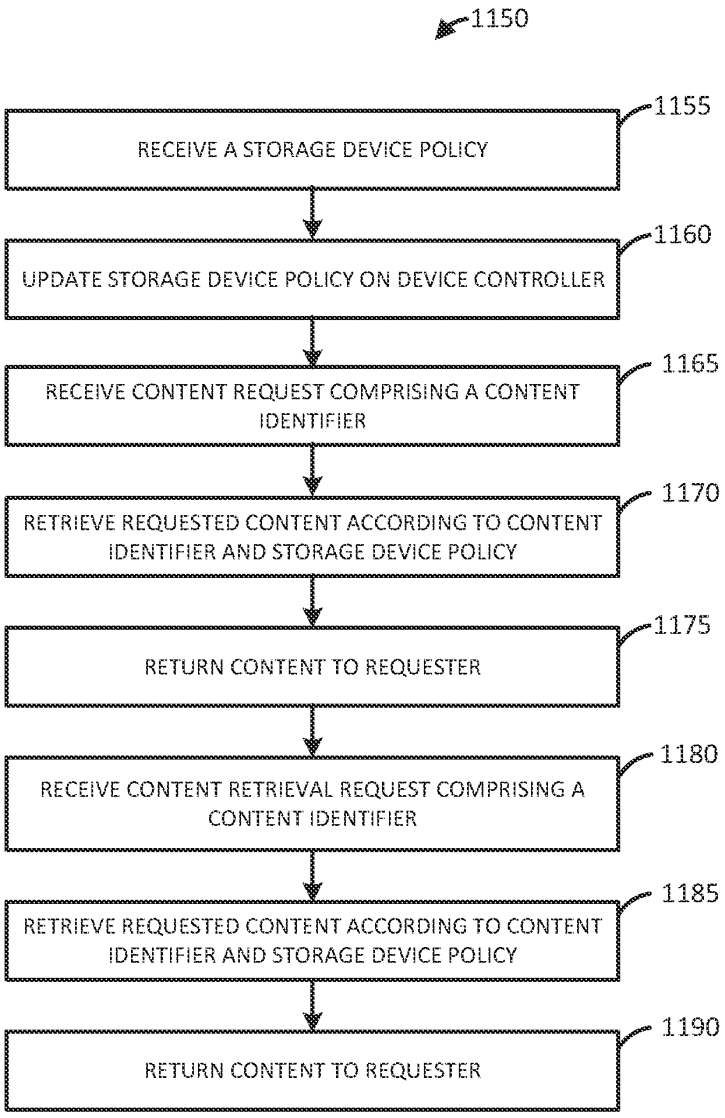

1150
RECEIVE A STORAGE DEVICE POLICY
1155
UPDATE STORAGE DEVICE POLICY ON DEVICE CONTROLLER
1160
RECEIVE CONTENT REQUEST COMPRISING A CONTENT IDENTIFIER
1165
RETRIEVE REQUESTED CONTENT ACCORDING TO CONTENT IDENTIFIER AND STORAGE DEVICE POLICY
1170
RETURN CONTENT TO REQUESTER
1175
RECEIVE CONTENT RETRIEVAL REQUEST COMPRISING A CONTENT IDENTIFIER
1180
RETRIEVE REQUESTED CONTENT ACCORDING TO CONTENT IDENTIFIER AND STORAGE DEVICE POLICY
1185
RETURN CONTENT TO REQUESTER
1190

FIG. 11C

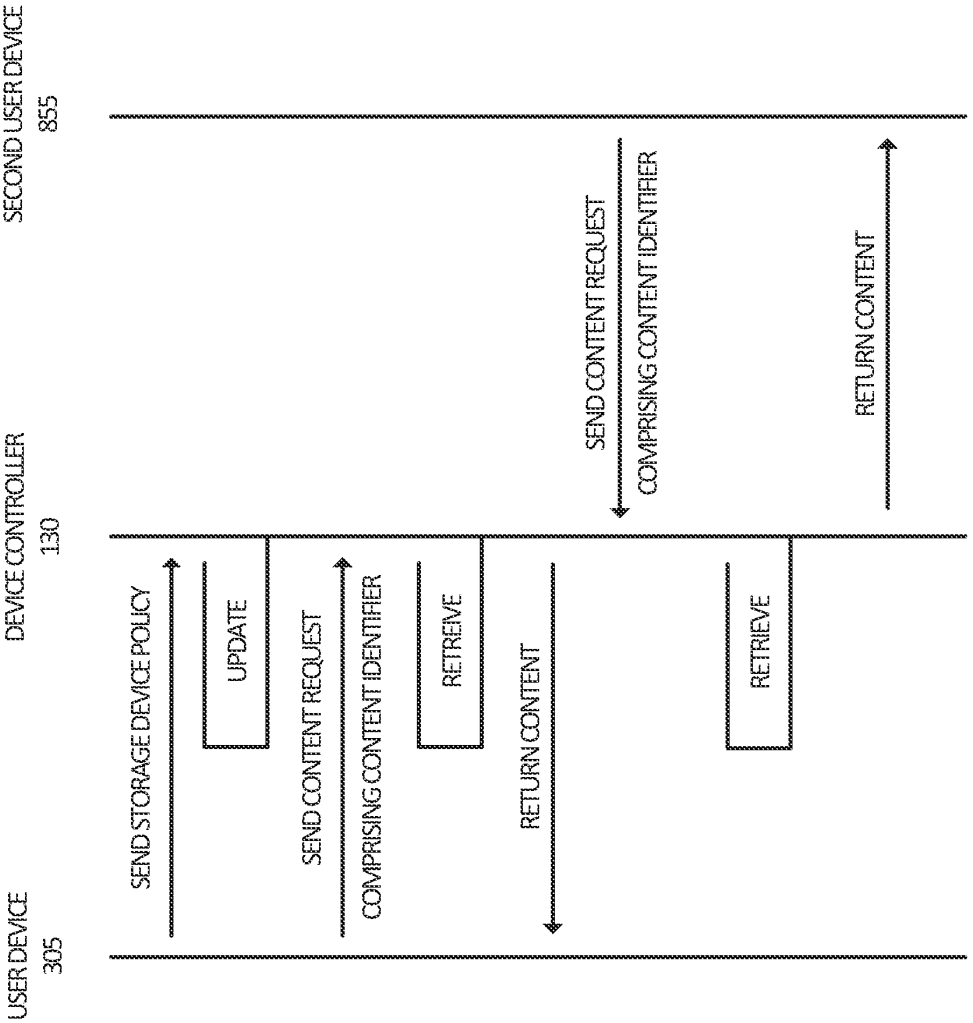

USER DEVICE
305
DEVICE CONTROLLER
130
SECOND USER DEVICE
855
SEND STORAGE DEVICE POLICY
UPDATE
SEND CONTENT REQUEST
COMPRISING CONTENT IDENTIFIER
RETRIEVE
RETURN CONTENT
SEND CONTENT REQUEST
COMPRISING CONTENT IDENTIFIER
RETRIEVE
RETURN CONTENT

FIG. 11D

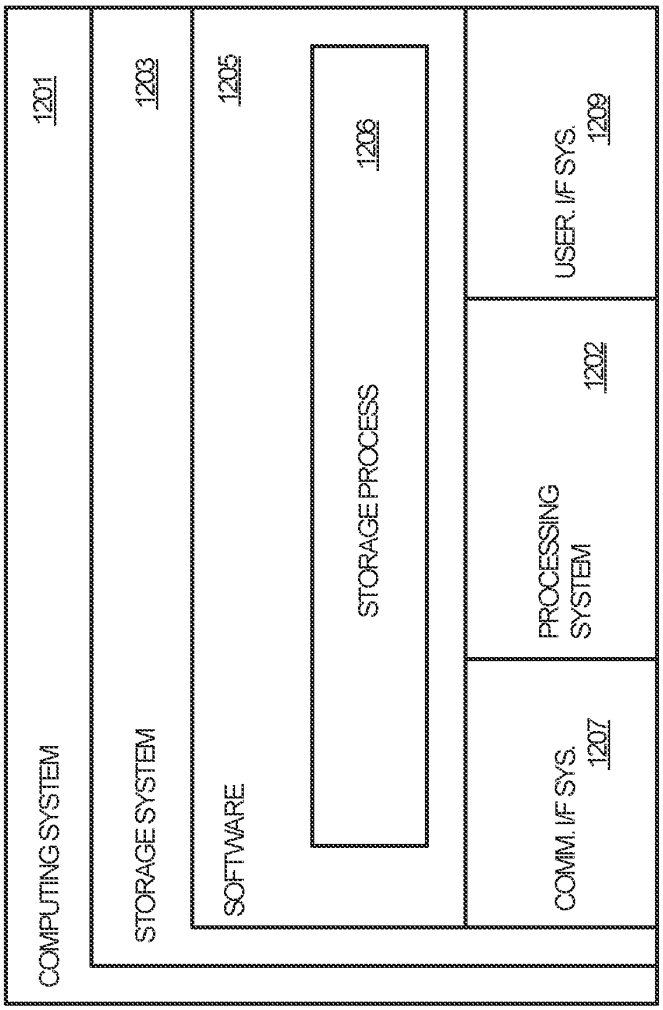

COMPUTING SYSTEM
1201
STORAGE SYSTEM
1203
SOFTWARE
1205
STORAGE PROCESS
1206
COMM. I/F SYS.
1207
PROCESSING SYSTEM
1202
USER. I/F SYS.
1209

FIG. 12

PTO/AIA/14 (02-18)
Approved for use through 11/30/2020. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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| Application Data Sheet 37 CFR 1.76 | Attorney Docket Number | 980.0023C2 |
|---|---|---|
| | Application Number | |
| Title of Invention | DATA STORAGE DEVICE WITH CONFIGURABLE POLICY-BASED STORAGE DEVICE BEHAVIOR | |

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.
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## Secrecy Order 37 CFR 5.2:

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

## Inventor Information:

**Inventor 1** Remove

**Legal Name**

| Prefix | Given Name | Middle Name | Family Name | Suffix |
|---|---|---|---|---|
| | Joshua | | Johnson | |

**Residence Information (Select One)** ● US Residency Non US Residency Active US Military Service

| City | Frederick | State/Province | CO | Country of Residence | US |
|---|---|---|---|---|---|

**Mailing Address of Inventor:**

| | |
|---|---|
| Address 1 | c/o Gaea LLC |
| Address 2 | 8374 Greenwood Drive |

| City | Niwot | State/Province | CO |
|---|---|---|---|
| Postal Code | 80503 | Country | US |

**Inventor 2** Remove

**Legal Name**

| Prefix | Given Name | Middle Name | Family Name | Suffix |
|---|---|---|---|---|
| | Curt | | Bruner | |

**Residence Information (Select One)** ◉ US Residency Non US Residency Active US Military Service

| City | Niwot | State/Province | CO | Country of Residence | US |
|---|---|---|---|---|---|

**Mailing Address of Inventor:**

| | |
|---|---|
| Address 1 | c/o Gaea LLC |
| Address 2 | 8374 Greenwood Drive |

| City | Niwot | State/Province | CO |
|---|---|---|---|
| Postal Code | 80503 | Country | US |

**Inventor 3** Remove

**Legal Name**

| Prefix | Given Name | Middle Name | Family Name | Suffix |
|---|---|---|---|---|
| | Jeffrey | | Reh | |

**Residence Information (Select One)** ◉ US Residency Non US Residency Active US Military Service

PTO/AIA/14 (02-18)
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| Application Data Sheet 37 CFR 1.76 | Attorney Docket Number | 980.0023C2 |
|---|---|---|
| | Application Number | |
| Title of Invention | DATA STORAGE DEVICE WITH CONFIGURABLE POLICY-BASED STORAGE DEVICE BEHAVIOR | |

| City | Niwot | State/Province | CO | Country of Residence | US |
|---|---|---|---|---|---|

**Mailing Address of Inventor:**

| | |
|---|---|
| Address 1 | c/o Gaea LLC |
| Address 2 | 8374 Greenwood Drive |

| City | Niwot | State/Province | CO |
|---|---|---|---|
| Postal Code | 80503 | Country | US |

Inventor 4 — Remove

**Legal Name**

| Prefix | Given Name | Middle Name | Family Name | Suffix |
|---|---|---|---|---|
| | Christopher | | Squires | |

**Residence Information (Select One)** ◉ US Residency ○ Non US Residency ○ Active US Military Service

| City | Boulder | State/Province | CO | Country of Residence | US |
|---|---|---|---|---|---|

**Mailing Address of Inventor:**

| | |
|---|---|
| Address 1 | c/o Gaea LLC |
| Address 2 | 8374 Greenwood Drive |

| City | Niwot | State/Province | CO |
|---|---|---|---|
| Postal Code | 80503 | Country | US |

Inventor 5 — Remove

**Legal Name**

| Prefix | Given Name | Middle Name | Family Name | Suffix |
|---|---|---|---|---|
| | Brian | | Wilson | |

**Residence Information (Select One)** ◉ US Residency ○ Non US Residency ○ Active US Military Service

| City | Zumbro Falls | State/Province | MN | Country of Residence | US |
|---|---|---|---|---|---|

**Mailing Address of Inventor:**

| | |
|---|---|
| Address 1 | c/o Gaea LLC |
| Address 2 | 8374 Greenwood Drive |

| City | Niwot | State/Province | CO |
|---|---|---|---|
| Postal Code | 80503 | Country | US |

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the **Add** button. Add

## Correspondence Information:

**Enter either Customer Number or complete the Correspondence Information section below.**
**For further information see 37 CFR 1.33(a).**

☐ **An Address is being provided for the correspondence Information of this application.**

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| Application Data Sheet 37 CFR 1.76 | Attorney Docket Number | 980.0023C2 |
|---|---|---|
| | Application Number | |
| Title of Invention | DATA STORAGE DEVICE WITH CONFIGURABLE POLICY-BASED STORAGE DEVICE BEHAVIOR | |

| | | | |
|---|---|---|---|
| **Customer Number** | 76444 | | |
| **Email Address** | | Add Email | Remove Email |

## Application Information:

| | | | |
|---|---|---|---|
| **Title of the Invention** | DATA STORAGE DEVICE WITH CONFIGURABLE POLICY-BASED STORAGE DEVICE BEHAVIOR | | |
| **Attorney Docket Number** | 980.0023C2 | **Small Entity Status Claimed** | ☒ |
| **Application Type** | Nonprovisional | | |
| **Subject Matter** | Utility | | |
| **Total Number of Drawing Sheets (if any)** | 32 | **Suggested Figure for Publication (if any)** | |

## Filing By Reference:

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

| Application number of the previously filed application | Filing date (YYYY-MM-DD) | Intellectual Property Authority or Country |
|---|---|---|
| | | |

## Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

☐ **Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

## Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32).
Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

| | | | |
|---|---|---|---|
| Please Select One: | ● Customer Number | US Patent Practitioner | ○ Limited Recognition (37 CFR 11.9) |
| Customer Number | 76444 | | |

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| Application Data Sheet 37 CFR 1.76 | Attorney Docket Number | 980.0023C2 |
|---|---|---|
| | Application Number | |
| Title of Invention | DATA STORAGE DEVICE WITH CONFIGURABLE POLICY-BASED STORAGE DEVICE BEHAVIOR | |

## Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim information in the Application Data Sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.
When referring to the current application, please leave the "Application Number" field blank.

| | | | |
|---|---|---|---|
| Prior Application Status | Pending | | Remove |
| Application Number | Continuity Type | Prior Application Number | Filing or 371(c) Date (YYYY-MM-DD) |
| | Continuation of | 15804772 | 2017-11-06 |
| Prior Application Status | Expired | | Remove |
| Application Number | Continuity Type | Prior Application Number | Filing or 371(c) Date (YYYY-MM-DD) |
| 15804772 | Claims benefit of provisional | 62418510 | 2016-11-07 |
| Prior Application Status | Expired | | Remove |
| Application Number | Continuity Type | Prior Application Number | Filing or 371(c) Date (YYYY-MM-DD) |
| 15804772 | Claims benefit of provisional | 62418561 | 2016-11-07 |
| Prior Application Status | Expired | | Remove |
| Application Number | Continuity Type | Prior Application Number | Filing or 371(c) Date (YYYY-MM-DD) |
| 15804772 | Claims benefit of provisional | 62418687 | 2016-11-07 |
| Prior Application Status | Expired | | Remove |
| Application Number | Continuity Type | Prior Application Number | Filing or 371(c) Date (YYYY-MM-DD) |
| 15804772 | Claims benefit of provisional | 62418693 | 2016-11-07 |
| Prior Application Status | Expired | | Remove |
| Application Number | Continuity Type | Prior Application Number | Filing or 371(c) Date (YYYY-MM-DD) |
| 15804772 | Claims benefit of provisional | 62418696 | 2016-11-07 |
| Prior Application Status | Expired | | Remove |
| Application Number | Continuity Type | Prior Application Number | Filing or 371(c) Date (YYYY-MM-DD) |
| 15804772 | Claims benefit of provisional | 62418717 | 2016-11-07 |
| Prior Application Status | Expired | | Remove |
| Application Number | Continuity Type | Prior Application Number | Filing or 371(c) Date (YYYY-MM-DD) |
| 15804772 | Claims benefit of provisional | 62418724 | 2016-11-07 |

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| Application Data Sheet 37 CFR 1.76 | Attorney Docket Number | 980.0023C2 |
|---|---|---|
| | Application Number | |
| Title of Invention | DATA STORAGE DEVICE WITH CONFIGURABLE POLICY-BASED STORAGE DEVICE BEHAVIOR | |

| Prior Application Status | Expired | | Remove |
|---|---|---|---|
| Application Number | Continuity Type | Prior Application Number | Filing or 371(c) Date (YYYY-MM-DD) |
| 15804772 | Claims benefit of provisional | 62418730 | 2016-11-07 |
| Prior Application Status | Expired | | Remove |
| Application Number | Continuity Type | Prior Application Number | Filing or 371(c) Date (YYYY-MM-DD) |
| 15804772 | Claims benefit of provisional | 62418742 | 2016-11-07 |
| Prior Application Status | Expired | | Remove |
| Application Number | Continuity Type | Prior Application Number | Filing or 371(c) Date (YYYY-MM-DD) |
| 15804772 | Claims benefit of provisional | 62418759 | 2016-11-07 |
| Prior Application Status | Expired | | Remove |
| Application Number | Continuity Type | Prior Application Number | Filing or 371(c) Date (YYYY-MM-DD) |
| 15804772 | Claims benefit of provisional | 62418764 | 2016-11-07 |
| Prior Application Status | Expired | | Remove |
| Application Number | Continuity Type | Prior Application Number | Filing or 371(c) Date (YYYY-MM-DD) |
| 15804772 | Claims benefit of provisional | 62418768 | 2016-11-07 |
| Prior Application Status | Expired | | Remove |
| Application Number | Continuity Type | Prior Application Number | Filing or 371(c) Date (YYYY-MM-DD) |
| 15804772 | Claims benefit of provisional | 62418773 | 2016-11-07 |
| Prior Application Status | Expired | | Remove |
| Application Number | Continuity Type | Prior Application Number | Filing or 371(c) Date (YYYY-MM-DD) |
| 15804772 | Claims benefit of provisional | 62418775 | 2016-11-07 |
| Prior Application Status | Expired | | Remove |
| Application Number | Continuity Type | Prior Application Number | Filing or 371(c) Date (YYYY-MM-DD) |
| 15804772 | Claims benefit of provisional | 62418780 | 2016-11-07 |
| Prior Application Status | Expired | | Remove |
| Application Number | Continuity Type | Prior Application Number | Filing or 371(c) Date (YYYY-MM-DD) |
| 15804772 | Claims benefit of provisional | 62418785 | 2016-11-07 |

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| Application Data Sheet 37 CFR 1.76 | Attorney Docket Number | 980.0023C2 |
|---|---|---|
| | Application Number | |
| Title of Invention | DATA STORAGE DEVICE WITH CONFIGURABLE POLICY-BASED STORAGE DEVICE BEHAVIOR | |

| Prior Application Status | Expired | | Remove |
|---|---|---|---|
| Application Number | Continuity Type | Prior Application Number | Filing or 371(c) Date (YYYY-MM-DD) |
| 15804772 | Claims benefit of provisional | 62448826 | 2017-01-20 |
| Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button. | | | Add |

## Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)[i] the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

| | | | Remove |
|---|---|---|---|
| Application Number | Country[i] | Filing Date (YYYY-MM-DD) | Access Code[i] (if applicable) |
| | | | |
| Additional Foreign Priority Data may be generated within this form by selecting the **Add** button. | | | Add |

## Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.
NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

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| Application Data Sheet 37 CFR 1.76 | Attorney Docket Number | 980.0023C2 |
|---|---|---|
| | Application Number | |
| Title of Invention | DATA STORAGE DEVICE WITH CONFIGURABLE POLICY-BASED STORAGE DEVICE BEHAVIOR | |

## Authorization or Opt-Out of Authorization to Permit Access:

When this Application Data Sheet is properly signed and filed with the application, applicant has provided written authority to permit a participating foreign intellectual property (IP) office access to the instant application-as-filed (see paragraph A in subsection 1 below) and the European Patent Office (EPO) access to any search results from the instant application (see paragraph B in subsection 1 below).

Should applicant choose not to provide an authorization identified in subsection 1 below, applicant **must opt-out** of the authorization by checking the corresponding box A or B or both in subsection 2 below.

**NOTE**: This section of the Application Data Sheet is **ONLY** reviewed and processed with the **INITIAL** filing of an application. After the initial filing of an application, an Application Data Sheet cannot be used to provide or rescind authorization for access by a foreign IP office(s). Instead, Form PTO/SB/39 or PTO/SB/69 must be used as appropriate.

**1. Authorization to Permit Access by a Foreign Intellectual Property Office(s)**

**A. Priority Document Exchange (PDX)** - Unless box A in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the State Intellectual Property Office of the People's Republic of China (SIPO), the World Intellectual Property Organization (WIPO), and any other foreign intellectual property office participating with the USPTO in a bilateral or multilateral priority document exchange agreement in which a foreign application claiming priority to the instant patent application is filed, access to: (1) the instant patent application-as-filed and its related bibliographic data, (2) any foreign or domestic application to which priority or benefit is claimed by the instant application and its related bibliographic data, and (3) the date of filing of this Authorization. See 37 CFR 1.14(h)(1).

**B. Search Results from U.S. Application to EPO** - Unless box B in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the EPO access to the bibliographic data and search results from the instant patent application when a European patent application claiming priority to the instant patent application is filed. See 37 CFR 1.14(h)(2).

The applicant is reminded that the EPO's Rule 141(1) EPC (European Patent Convention) requires applicants to submit a copy of search results from the instant application without delay in a European patent application that claims priority to the instant application.

**2. Opt-Out of Authorizations to Permit Access by a Foreign Intellectual Property Office(s)**

☐ A. Applicant **DOES NOT** authorize the USPTO to permit a participating foreign IP office access to the instant application-as-filed. If this box is checked, the USPTO will not be providing a participating foreign IP office with any documents and information identified in subsection 1A above.

☐ B. Applicant **DOES NOT** authorize the USPTO to transmit to the EPO any search results from the instant patent application. If this box is checked, the USPTO will not be providing the EPO with search results from the instant application.

**NOTE:** Once the application has published or is otherwise publicly available, the USPTO may provide access to the application in accordance with 37 CFR 1.14.

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| Application Data Sheet 37 CFR 1.76 | Attorney Docket Number | 980.0023C2 |
|---|---|---|
| | Application Number | |
| Title of Invention | DATA STORAGE DEVICE WITH CONFIGURABLE POLICY-BASED STORAGE DEVICE BEHAVIOR | |

## Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

**Applicant 1** Remove

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

Clear

| ● Assignee | Legal Representative under 35 U.S.C. 117 | Joint Inventor |
|---|---|---|
| Person to whom the inventor is obligated to assign. | Person who shows sufficient proprietary interest | |

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor:

If the Applicant is an Organization check here. ☒

| Organization Name | Gaea LLC | | |
|---|---|---|---|
| **Mailing Address Information For Applicant:** | | | |
| **Address 1** | 8374 Greenwood Drive | | |
| Address 2 | | | |
| **City** | Niwot | **State/Province** | CO |
| **Country** | US | Postal Code | 80503 |
| Phone Number | | Fax Number | |
| Email Address | | | |

Additional Applicant Data may be generated within this form by selecting the Add button. Add

## Assignee Information including Non-Applicant Assignee Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

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| **Application Data Sheet 37 CFR 1.76** | Attorney Docket Number | 980.0023C2 |
|---|---|---|
| | Application Number | |
| Title of Invention | DATA STORAGE DEVICE WITH CONFIGURABLE POLICY-BASED STORAGE DEVICE BEHAVIOR | |

**Assignee 1**

Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication. An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.

Remove

If the Assignee or Non-Applicant Assignee is an Organization check here. ☒

| Organization Name | |
|---|---|

**Mailing Address Information For Assignee including Non-Applicant Assignee:**

| **Address 1** | | | |
|---|---|---|---|
| Address 2 | | | |
| **City** | | **State/Province** | |
| **Country** i | | Postal Code | |
| Phone Number | | Fax Number | |
| Email Address | | | |

Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button. Add

## Signature:

Remove

**NOTE:** This Application Data Sheet must be signed in accordance with 37 CFR 1.33(b). **However, if this Application Data Sheet is submitted with the INITIAL filing of the application and either box A or B is not checked in subsection 2 of the "Authorization or Opt-Out of Authorization to Permit Access" section, then this form must also be signed in accordance with 37 CFR 1.14(c).**

This Application Data Sheet **must** be signed by a patent practitioner if one or more of the applicants is a **juristic entity** (e.g., corporation or association). If the applicant is two or more joint inventors, this form must be signed by a patent practitioner, **all** joint inventors who are the applicant, or one or more joint inventor-applicants who have been given power of attorney (e.g., see USPTO Form PTO/AIA/81) on behalf of **all** joint inventor-applicants.

See 37 CFR 1.4(d) for the manner of making signatures and certifications.

| **Signature** | /David J. Setter/ | | | Date (YYYY-MM-DD) | 2022-04-07 |
|---|---|---|---|---|---|
| First Name | David J. | Last Name | Setter | Registration Number | 78758 |

Additional Signature may be generated within this form by selecting the Add button. Add

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| **Application Data Sheet 37 CFR 1.76** | Attorney Docket Number | 980.0023C2 |
|---|---|---|
| | Application Number | |
| Title of Invention | DATA STORAGE DEVICE WITH CONFIGURABLE POLICY-BASED STORAGE DEVICE BEHAVIOR | |

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

# Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1 The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3 A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent CooperationTreaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

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# DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

| | |
|---|---|
| **Title of Invention** | DATA STORAGE DEVICE WITH CONFIGURABLE POLICY-BASED STORAGE DEVICE BEHAVIOR<br>Docket # 980.0023 |

As the below named inventor, I hereby declare that:

This declaration is directed to:

☐ The attached application, or

☒ United States application or PCT international application number 15/804,772 filed on 11/06/2017.

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

## WARNING:

Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

LEGAL NAME OF INVENTOR

Inventor: Joshua Johnson Date (Optional): 2/1/2018

Signature: Joshua Johnson

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.

This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 1 minute to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

*If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.*

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# DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

| | |
|---|---|
| **Title of Invention** | DATA STORAGE DEVICE WITH CONFIGURABLE POLICY-BASED STORAGE DEVICE BEHAVIOR<br>Docket # 980.0023 |

As the below named inventor, I hereby declare that:

This declaration is directed to:

☐ The attached application, or

☒ United States application or PCT international application number 15/804,772 filed on 11/06/2017.

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

## WARNING:

Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

LEGAL NAME OF INVENTOR

Inventor: Curt Bruner Date (Optional): 1/31/2018

Signature: Curt Bruner

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.

This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 1 minute to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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# DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

| | |
|---|---|
| **Title of Invention** | DATA STORAGE DEVICE WITH CONFIGURABLE POLICY-BASED STORAGE DEVICE BEHAVIOR<br>Docket # 980.0023 |

As the below named inventor, I hereby declare that:

This declaration is directed to:

☐ The attached application, or

☒ United States application or PCT international application number 15/804,772 filed on 11/06/2017.

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

## WARNING:

Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

LEGAL NAME OF INVENTOR

Inventor: Jeffrey Reh Date (Optional): 4/3/2018

Signature: Jeffrey A. Reh

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.

This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 1 minute to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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# DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

| | |
|---|---|
| **Title of Invention** | DATA STORAGE DEVICE WITH CONFIGURABLE POLICY-BASED STORAGE DEVICE BEHAVIOR<br>Docket # 980.0023 |

As the below named inventor, I hereby declare that:

This declaration is directed to:

☐ The attached application, or

☒ United States application or PCT international application number 15/804,772 filed on 11/06/2017.

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

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LEGAL NAME OF INVENTOR

Inventor: Christopher Squires Date (Optional): 2/20/2018

Signature: Christopher Squires

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.

This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 1 minute to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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DocuSign Envelope ID: 4C9C24EB-0107-4AB0-BD0C-94940AB05917

PTO/AIA/01 (06-12)
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# DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

| | |
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| **Title of Invention** | DATA STORAGE DEVICE WITH CONFIGURABLE POLICY-BASED STORAGE DEVICE BEHAVIOR<br>Docket # 980.0023 |

As the below named inventor, I hereby declare that:

This declaration is directed to:

☐ The attached application, or

☒ United States application or PCT international application number 15/804,772 filed on 11/06/2017.

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LEGAL NAME OF INVENTOR

Inventor: Brian Wilson Date (Optional): 2/5/2018

Signature: Brian Wilson

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.

This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 1 minute to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

*If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.*

DocCode – SCORE

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Application Number: 17716275 Document Date: 04/08/2022

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Since this was an electronic submission, there is no physical artifact folder, no artifact folder is recorded in PALM, and no paper documents or physical media exist. The TIFF images in the IFW record were created from the original documents that are stored in SCORE.

- Drawing

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Form Revision Date: March 1, 2019

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www.uspto.gov

| APPLICATION NUMBER | FILING or 371(c) DATE | GRP ART UNIT | FIL FEE REC'D | ATTY.DOCKET.NO | TOT CLAIMS | IND CLAIMS |
|---|---|---|---|---|---|---|
| 17/716,275 | 04/08/2022 | 2139 | 2350 | 980.0023C2 | 36 | 6 |

**CONFIRMATION NO. 7982**

**FILING RECEIPT**

76444
Setter Roche LLP
1860 Blake Street
Suite 100
Denver, CO 80202

OC000000133140522

Date Mailed: 04/13/2022

Receipt is acknowledged of this non-provisional utility patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF FIRST INVENTOR, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection.

**Please verify the accuracy of the data presented on this receipt.** If an error is noted on this Filing Receipt, please submit a written request for a corrected Filing Receipt, including a properly marked-up ADS showing the changes with strike-through for deletions and underlining for additions. If you received a "Notice to File Missing Parts" or other Notice requiring a response for this application, please submit any request for correction to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections provided that the request is grantable.

**Inventor(s)**

Joshua Johnson, Frederick, CO;
Curt Bruner, Niwot, CO;
Jeffrey Reh, Niwot, CO;
Christopher Squires, Boulder, CO;
Brian Wilson, Zumbro Falls, MN;

**Applicant(s)**

Gaea LLC, Niwot, CO;

**Power of Attorney:** The patent practitioners associated with Customer Number 76444

**Domestic Priority data as claimed by applicant**

This application is a CON of 15/804,772 11/06/2017 PAT 10776023
which claims benefit of 62/418,510 11/07/2016
and claims benefit of 62/418,561 11/07/2016
and claims benefit of 62/418,687 11/07/2016
and claims benefit of 62/418,693 11/07/2016
and claims benefit of 62/418,696 11/07/2016
and claims benefit of 62/418,717 11/07/2016
and claims benefit of 62/418,724 11/07/2016
and claims benefit of 62/418,730 11/07/2016
and claims benefit of 62/418,742 11/07/2016
and claims benefit of 62/418,759 11/07/2016
and claims benefit of 62/418,764 11/07/2016

and claims benefit of 62/418,768 11/07/2016
and claims benefit of 62/418,773 11/07/2016
and claims benefit of 62/418,775 11/07/2016
and claims benefit of 62/418,780 11/07/2016
and claims benefit of 62/418,785 11/07/2016
and claims benefit of 62/448,826 01/20/2017

**Foreign Applications** for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.) - None.
*Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.*

**Permission to Access Application via Priority Document Exchange:** Yes

**Permission to Access Search Results:** Yes

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

**If Required, Foreign Filing License Granted:** 04/12/2022

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 17/716,275**

**Projected Publication Date:** 07/21/2022

**Non-Publication Request:** No

**Early Publication Request:** No
**** SMALL ENTITY ****
**Title**

DATA STORAGE DEVICE WITH CONFIGURABLE POLICY-BASED STORAGE DEVICE BEHAVIOR

**Preliminary Class**

711

**Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications:** No

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Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ

in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

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## Title 35, United States Code, Section 184

## Title 37, Code of Federal Regulations, 5.11 & 5.15

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## PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 17/716,275

### APPLICATION AS FILED - PART I

| FOR | (Column 1) NUMBER FILED | (Column 2) NUMBER EXTRA | SMALL ENTITY RATE($) | SMALL ENTITY FEE($) | OR | OTHER THAN SMALL ENTITY RATE($) | OTHER THAN SMALL ENTITY FEE($) |
|---|---|---|---|---|---|---|---|
| BASIC FEE (37 CFR 1.16(a), (b), or (c)) | N/A | N/A | N/A | 80 | | N/A | |
| SEARCH FEE (37 CFR 1.16(k), (i), or (m)) | N/A | N/A | N/A | 350 | | N/A | |
| EXAMINATION FEE (37 CFR 1.16(o), (p), or (q)) | N/A | N/A | N/A | 400 | | N/A | |
| TOTAL CLAIMS (37 CFR 1.16(i)) | 36 minus 20 = | * 16 | x 50 = | 800 | OR | | |
| INDEPENDENT CLAIMS (37 CFR 1.16(h)) | 6 minus 3 = | * 3 | x 240 = | 720 | | | |
| APPLICATION SIZE FEE (37 CFR 1.16(s)) | If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s). | | | 0.00 | | | |
| MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j)) | | | | 0.00 | | | |
| * If the difference in column 1 is less than zero, enter "0" in column 2. | | | TOTAL | 2350 | | TOTAL | |

### APPLICATION AS AMENDED - PART II

| | | (Column 1) CLAIMS REMAINING AFTER AMENDMENT | | (Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR | (Column 3) PRESENT EXTRA | SMALL ENTITY RATE($) | SMALL ENTITY ADDITIONAL FEE($) | OR | OTHER THAN SMALL ENTITY RATE($) | OTHER THAN SMALL ENTITY ADDITIONAL FEE($) |
|---|---|---|---|---|---|---|---|---|---|---|
| AMENDMENT A | Total (37 CFR 1.16(i)) | * | Minus | ** | = | x = | | OR | x = | |
| | Independent (37 CFR 1.16(h)) | * | Minus | *** | = | x = | | OR | x = | |
| | Application Size Fee (37 CFR 1.16(s)) | | | | | | | | | |
| | FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j)) | | | | | | | OR | | |
| | | | | | | TOTAL ADD'L FEE | | OR | TOTAL ADD'L FEE | |

| | | (Column 1) CLAIMS REMAINING AFTER AMENDMENT | | (Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR | (Column 3) PRESENT EXTRA | RATE($) | ADDITIONAL FEE($) | OR | RATE($) | ADDITIONAL FEE($) |
|---|---|---|---|---|---|---|---|---|---|---|
| AMENDMENT B | Total (37 CFR 1.16(i)) | * | Minus | ** | = | x = | | OR | x = | |
| | Independent (37 CFR 1.16(h)) | * | Minus | *** | = | x = | | OR | x = | |
| | Application Size Fee (37 CFR 1.16(s)) | | | | | | | | | |
| | FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j)) | | | | | | | OR | | |
| | | | | | | TOTAL ADD'L FEE | | OR | TOTAL ADD'L FEE | |

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.

PTO/SB/08a (02-18)
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**INFORMATION DISCLOSURE STATEMENT BY APPLICANT**
**( Not for submission under 37 CFR 1.99)**

| | |
|---|---|
| Application Number | 17716275 |
| Filing Date | 2022-04-08 |
| First Named Inventor | Joshua Johnson |
| Art Unit | |
| Examiner Name | |
| Attorney Docket Number | 980.0023c2 |

**U.S.PATENTS** Remove

| Examiner Initial* | Cite No | Patent Number | Kind Code[1] | Issue Date | Name of Patentee or Applicant of cited Document | Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear |
|---|---|---|---|---|---|---|
| | 1 | 5596458 | A | 1997-01-21 | EMO, et al. | |
| | 2 | 6195218 | B1 | 2001-02-27 | GUTTMANN, et al. | |
| | 3 | 8151077 | B1 | 2012-04-03 | BAUER, et al. | |
| | 4 | 9280987 | B1 | 2016-03-08 | BAO, et al. | |
| | 5 | 9619429 | B1 | 2017-04-11 | WANG, et al. | |

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| Examiner Initial* | Cite No | Publication Number | Kind Code[1] | Publication Date | Name of Patentee or Applicant of cited Document | Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear |
|---|---|---|---|---|---|---|
| | 1 | 20020036852 | A1 | 2002-03-28 | LEOW, et al. | |

| INFORMATION DISCLOSURE STATEMENT BY APPLICANT ( Not for submission under 37 CFR 1.99) | | |
|---|---|---|
| | Application Number | 17716275 |
| | Filing Date | 2022-04-08 |
| | First Named Inventor | Joshua Johnson |
| | Art Unit | |
| | Examiner Name | |
| | Attorney Docket Number | 980.0023c2 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | 2 | 20040174627 | A1 | 2004-09-09 | KIM, et al. | |
| | 3 | 20060061356 | A1 | 2006-03-23 | MAKIFUCHI, et al. | |
| | 4 | 20100218177 | A1 | 2010-08-26 | MIURA | |
| | 5 | 20140172930 | A1 | 2014-06-19 | MOLARO, et al. | |
| | 6 | 20150052167 | A1 | 2015-02-19 | OLSTER, et al. | |
| | 7 | 20160313943 | A1 | 2016-10-27 | HASHIMOTO, et al. | |
| | 8 | 20180121136 | | 2018-05-03 | ISHIYAMA | |
| | 9 | 20180260154 | A1 | 2018-09-13 | DRONAMRAJU, et al. | |
| | 10 | 20180349035 | A1 | 2018-12-06 | ELLIS, et al. | |
| | 11 | 20210182190 | A1 | 2021-01-27 | Gao et al. | |
| | 12 | 20200278793 | A1 | 2020-09-03 | Jiang et al. | |

| INFORMATION DISCLOSURE STATEMENT BY APPLICANT ( Not for submission under 37 CFR 1.99) | | |
|---|---|---|
| | Application Number | 17716275 |
| | Filing Date | 2022-04-08 |
| | First Named Inventor | Joshua Johnson |
| | Art Unit | |
| | Examiner Name | |
| | Attorney Docket Number | 980.0023c2 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | 13 | 20170091120 | A1 | 2017-03-30 | Gopal et al. | |
| | 14 | 20100100680 | A1 | 2010-04-22 | Koseki | |

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| Examiner Initial* | Cite No | Foreign Document Number[3] | Country Code[2] | Kind Code[4] | Publication Date | Name of Patentee or Applicant of cited Document | Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear | T[5] |
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[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

| INFORMATION DISCLOSURE STATEMENT BY APPLICANT ( Not for submission under 37 CFR 1.99) | | |
|---|---|---|
| | Application Number | 17716275 |
| | Filing Date | 2022-04-08 |
| | First Named Inventor | Joshua Johnson |
| | Art Unit | |
| | Examiner Name | |
| | Attorney Docket Number | 980.0023c2 |

**CERTIFICATION STATEMENT**

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

**OR**

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

✓ A certification statement is not submitted herewith.

**SIGNATURE**

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

| Signature | /Stephen S. Roche/ | Date (YYYY-MM-DD) | 2022-06-29 |
|---|---|---|---|
| Name/Print | Stephen S. Roche | Registration Number | 52176 |

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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|---|---|
| **EFS ID:** | 46080101 |
| **Application Number:** | 17716275 |
| **International Application Number:** | |
| **Confirmation Number:** | 7982 |
| **Title of Invention:** | DATA STORAGE DEVICE WITH CONFIGURABLE POLICY-BASED STORAGE DEVICE BEHAVIOR |
| **First Named Inventor/Applicant Name:** | Joshua Johnson |
| **Customer Number:** | 76444 |
| **Filer:** | Stephen S. Roche/Melissa Eichten |
| **Filer Authorized By:** | Stephen S. Roche |
| **Attorney Docket Number:** | 980.0023C2 |
| **Receipt Date:** | 30-JUN-2022 |
| **Filing Date:** | 08-APR-2022 |
| **Time Stamp:** | 15:02:30 |
| **Application Type:** | Utility under 35 USC 111(a) |

## Payment information:

| Submitted with Payment | no |
|---|---|

## File Listing:

| Document Number | Document Description | File Name | File Size(Bytes)/ Message Digest | Multi Part /.zip | Pages (if appl.) |
|---|---|---|---|---|---|
| 1 | Information Disclosure Statement (IDS) Form (SB08) | 980-0023c2_IDS.pdf | 1035611<br>9c4964bc7f8a28b5210cd4b21aeb6e56460a7a7c | no | 5 |

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| APPLICATION NUMBER | FILING OR 371(C) DATE | FIRST NAMED APPLICANT | ATTY. DOCKET NO./TITLE |
|---|---|---|---|
| 17/716,275 | 04/08/2022 | Joshua Johnson | 980.0023C2 |

**CONFIRMATION NO. 7982**

76444
Setter Roche LLP
1860 Blake Street
Suite 500
Denver, CO 80202

**PUBLICATION NOTICE**




**Title:**DATA STORAGE DEVICE WITH CONFIGURABLE POLICY-BASED STORAGE DEVICE BEHAVIOR

**Publication No.**US-2022-0229571-A1
**Publication Date:**07/21/2022

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The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

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Office of Data Managment, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

| Notice of References Cited | Application/Control No. 17/716,275 | Applicant(s)/Patent Under Reexamination Johnson et al. | |
|---|---|---|---|
| | Examiner JOHN A LANE | Art Unit 2139 | Page 1 of 1 |

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| * | | Document Number Country Code-Number-Kind Code | Date MM-YYYY | Name | CPC Classification | US Classification |
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| * | B | US-20170075909-A1 | 03-2017 | Goodson; Garth Richard | G06F16/1827 | 1/1 |
| * | C | US-9449007-B1 | 09-2016 | Wood; Douglas A. | G06F21/6227 | 1/1 |
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| * | | Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages) |
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| | X | |

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

| Search Notes | Application/Control No. | Applicant(s)/Patent Under Reexamination |
|---|---|---|
| | 17/716,275 | Johnson et al. |
| | Examiner | Art Unit |
| | JOHN A LANE | 2139 |

| CPC - Searched* | | |
|---|---|---|
| Symbol | Date | Examiner |
| g06f3/0632 OR g06f3/0604 OR g06f3/0658 OR g06f3/0673 OR g06f3/0674 OR g06f3/0676 OR g06f3/0679 OR g06f9/06 OR g06f9/3004 OR g06f3/061 | 02/13/2023 | JAL |

| CPC Combination Sets - Searched* | | |
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| Symbol | Date | Examiner |
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| US Classification - Searched* | | | |
|---|---|---|---|
| Class | Subclass | Date | Examiner |
| | | | |

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

| Search Notes | | |
|---|---|---|
| Search Notes | Date | Examiner |
| PE2E text search with and w/o limited classification search | 02/13/2023 | JAL |
| STIC search | 02/13/2023 | JAL |
| Multiple past STIC searches from parent applications 15/804,772 and 16/990,433 | 02/13/2023 | JAL |
| Multiple EAST searches | 02/13/2023 | JAL |

| Interference Search | | | |
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| US Class/CPC Symbol | US Subclass/CPC Group | Date | Examiner |
| | see above | 02/13/2023 | JAL |



Meta Platforms, Inc. and Samsung Electronics Co. Ltd. - Ex. 1002
Page 127

***Patent Search Results***

## Method for sharding disk partition allocated to tenant based on rules created for tenants in data storage unit by storage module involves Receiving tenant memory model, Generate UID, allocate disk partition, and create UID map to set rules

**Inventor**: Dutta, DGeorge, JUdupi, Y BZhang, K

**Assignee**: CISCO TECHNOLOGY INC (CISC)

**Publication info**: Dutta, D; George, J; Udupi, Y B; Zhang, K (Inventors). CISCO TECHNOLOGY INC (Assignee). US 11354039 B2 . (Published 07 Jun 2022). 2020076 (First update). 2022046 (Last update). Drawing available.

**Application number**: US 2020879612 A (20 May 2020)

**Publication number**: US 20200285396 A1 (10 September 2020)

**Priority number**: US 2020879612 A (20 May 2020)US 2019268397 A (05 February 2019)US 2015713851 A (15 May 2015)

**Priority applications**: US 2020879612 A (20 May 2020); US 2019268397 A (05 February 2019); US 2015713851 A (15 May 2015)

| Publication number | Kind | Publication date | Application number | Kind | Application date | Update code | Type |
|---|---|---|---|---|---|---|---|
| US 20200285396 | A1 | 20200910 | US 2020879612 | A | 20200520 | 2020076 | B |
| US 11354039 | B2 | 20220607 | US 2020879612 | A | 20200520 | 2022046 | E |

### Alerting

### Novelty

The method involves receiving (302) indications of subscription memory model for a tenant. An indication of policies to be applied to date of the tenant is received (304). The indication of a data storage module is received (306) for the tenant model. The unique identifier (UID) is generated (308)for data storage module. When automatic selection of data partition is selected, the disk partition is identified (310) and allocated for the tenant based on policies and subscription type. When the manual selection of partition is performed an indication of disk partition to be allocated for the tenant is received and allocate disk partition for the tenant indicated by the user. The map of UID is created (316) to allocate disk partition. The mapping of UID is created (318) to the tenant partition. The rules for the tenant specific data storage module is created (320) based on the policies.

### Description

INDEPENDENT CLAIMS are also included for the following:

1. non-transitory machine readable storage medium; and
2. an apparatus for sharding disk partition of tenants.

**Use**

Method for sharding disk partition allocated to tenant based on rules and policies created for tenants in data storage system by storage modules.

**Advantage**

The method enables distributed storage system to produce unique, per-tenant configurations for tenant data stored in a shared storage cluster. The differential behavior enabled for each tenant can provide the benefits of performance isolation between tenants and failure isolation between disk partitions. By enabling tenant-specific partitions per disk with a dedicated data storage module per tenant, a partition failure that occurs for a particular tenant can trigger a recovery process that impacts only that tenant during re-balancing and recreating replicas of data that is lost due to the failure. The disk shared by limited number of tenants minimize the risk of interruption by other tenants... administration host **10** receives an indication of policies to be applied to data of the tenant. The policies may be configured by the user via a user interface. Policies may include, for example, performance requirements, distribution requirements, replication factor, etc. preferred by the tenant. In some embodiments, any of the performance, distribution and/or replication requirements may be included in a subscription model rather than being configured separately. At **306**, administration host **10** receives an indication of a data storage module to be assigned to the tenant. The data storage module may be assigned to the tenant by the user via a user interface, and may be dedicated to that tenant. At **308**, a unique identifier (UID) may be generated for the data storage module assigned to the tenant.

## Method for reading and writing data to varying big data storage formats, involves looking up first variable in catalog using variable identifier, in which first variable includes location of first variable and first data storage format

**Inventor**: Arasan, RARGUEELLO, C PBose, SMeyer, M KPonnambalam, MRamasamy, GSeideman, J DTORKZAHRANI, MVarier, R R

**Assignee**: AMERICAN EXPRESS TRAVEL RELATED SERVICES (AMXA)

**Publication info**: Arasan, R; ARGUEELLO, C P; Bose, S; Meyer, M K; Ponnambalam, M; Ramasamy, G; Seideman, J D; TORKZAHRANI, M; Varier, R R (Inventors). AMERICAN EXPRESS TRAVEL RELATED SERVICES (Assignee). US 10943024 B2 . (Published 09 Mar 2021). 201924 (First update). 2021023 (Last update). Drawing available.

**Application number**: US 2018185706 A (09 November 2018)

**Publication number**: US 20190095638 A1 (28 March 2019)

**Priority number**: US 2018185706 A (09 November 2018)US 2015944979 A (18 November 2015)

**Priority applications:** US 2018185706 A (09 November 2018); US 2015944979 A (18 November 2015)

| Publication number | Kind | Publication date | Application number | Kind | Application date | Update code | Type |
|---|---|---|---|---|---|---|---|
| US 20190095638 | A1 | 20190328 | US 2018185706 | A | 20181109 | 201924 | B |
| US 10943024 | B2 | 20210309 | US 2018185706 | A | 20181109 | 2021023 | E |

**Alerting**

**Novelty**

The method processed by the processor involves receiving a request (502) having a first syntax at an access point for access to a first variable and parsing the request (504) to capture a variable identifier for the first variable from the request. The first variable in a catalog is looked up (506) using the variable identifier, in which the first variable includes a location of the first variable and a first data storage format. A query is generated (508) to access the first variable in which the query comprises a second syntax compatible with the first data storage format. The query is submitted (510) in the first data storage format to complete the request.

**Description**

INDEPENDENT CLAIMS are also included for the following:

1. a computer-based system; and
2. an article of manufacture including a non-transitory, tangible computer readable storage medium.

**Use**

Method for reading and writing data to varying big data storage formats.

**Advantage**

The method provides support access to a wide variety of data storage formats.

**Claims:**

... storage format; generating, by the processor, a query to access the first variable, wherein the query comprises a second syntax compatible with the first data storage format; and submitting, by the processor, the query in the first data storage format to complete the request. ... storage format; generating, by the processor, a query to access the first variable, wherein the query comprises a second syntax compatible with the first data storage format; and submitting, by the processor, the query in the first data storage format to complete the request.

## Personal cloud network

**Inventor**: Davidson, TroyClinton, UT, USPatent rights: US OnlyHuberman, JonRancho Santa Fe, CA, USPatent rights: US OnlyGruttadauria, Brian R.Sutton, MA, USPatent rights: US OnlyPoppitz, GaryRoy, UT, USPatent rights: US OnlyMillard, DennisRoy, UT, USPatent rights: US Only

**Assignee**: Davidson, TroyClinton, UT, USUS (Residence)Patent rights: US OnlyHuberman, JonRancho Santa Fe, CA, USUS (Residence)Patent rights: US OnlyGruttadauria, Brian R.Sutton, MA, USUS (Residence)Patent rights: US OnlyPoppitz, GaryRoy, UT, USUS (Residence)Patent rights: US OnlyMillard, DennisRoy, UT, USUS (Residence)Patent rights: US Only

**Publication info**: Davidson, Troy; Huberman, Jon; Gruttadauria, Brian R.; Poppitz, Gary; Millard, Dennis (Inventors). Davidson, Troy; Huberman, Jon; Gruttadauria, Brian R.; Poppitz, Gary; Millard, Dennis (Assignees). US 9729625 B1 . (Published 08 Aug 2017).

**Application number**: US 2010828093 (30 June 2010)

**Publication number**: US 9729625 B1 (08 August 2017)

**Priority number**: US 2010828093 (30 June 2010)

**Family table**: Complete family ID: 206148691 Simple family ID: 59410792

| Publication number | Kind | Publication date | Application number | Application date | Type |
|---|---|---|---|---|---|
| US 9729625 | B1 | 20170808 | US 2010828093 | 20100630 | B |


**Abstract (summary)**: A distributed storage space for individual users and their selected peers is provided. The personal cloud system allows an individual user to establish and maintain a shared data storage area on a network attached storage device connected to the individual user's private network and accessible to one or more network devices via a public network and the private network. The personal cloud system registers the shared data storage area with a central server and sends an invitation to one or more network peers to join the shared data storage area. The personal cloud system then monitors incoming data packets at the network attached storage device to identify requests from invited network peers to access the shared data storage area. Access is provided in accordance with predetermined access controls upon validation of the request.

**Specification**:
... secure distributed shared storage space for individual users and their selected peers over a public and private network infrastructure. Related Art Conventional network based data storage solutions typically require the resources of a large company to host network accessible storage space for individual users. Additionally, sharing files and data between individual users in typical conventional network implementations is either not allowed or is limited to ... invitation to one or more network peers to join the personal cloud. The personal cloud system then monitors incoming data packets at the network attached storage device to identify requests

from invited network peers to access the shared data storage area. Access is provided in accordance with predetermined access controls upon validation of the request. In one embodiment, the personal cloud system comprises a network attached storage ... coupled with the non-transitory computer readable medium for executing programmed modules stored therein. The system also includes a host module stored in the non-transitory computer readable medium on the network attached storage device and configured to initiate a shared data storage area on the network attached storage device. The system further includes a lookup server communicatively coupled ... and configured to receive requests for information related to shared data storage areas initiated by the host module, validate said requests and respond to said requests with shared data storage area access information. Additionally, the system includes a client module stored in a non-transitory computer readable medium on a network device communicatively coupled with the lookup server ... with the network attached storage device via a public network and said private network, wherein the client module is configured to provide a shared data storage area identifier and an access code to the lookup module, receive shared data storage area access information in response, and initiate a connection over a public network and said private network using said shared data storage area access information to gain access to the shared data storage area on the network attached storage device. In a further embodiment, the personal cloud system provides a shared data storage area by requesting an internet protocol address for the network attached storage device from a lookup server, receiving the internet protocol address for the network attached storage device in response to the request, determining a shared data storage area identifier, combining the shared data storage area identifier and the internet protocol address to generate a variable, sending said variable to the lookup server for registration of the shared data storage area; and monitoring incoming data packets from one or more network devices to identify requests to access the registered shared data storage area. Other features and advantages of the present invention will become more readily apparent to those of ordinary skill in the art after reviewing the ... a distributed shared storage space according to an embodiment of the present invention; FIG. 5 is a flow diagram illustrating an example process for managing access to a distributed shared storage space according to an embodiment of the present invention; FIG. 6 is a flow diagram illustrating an example process for connecting to a distributed shared ... **50** and provides the personal cloud name and access code and receives administrative information from the lookup server **50** that enables the client module to access the shared data storage area on the storage device **10**. The client module uses the administrative information (e.g., an internet protocol ("IP") address and a port number) to contact the storage device **10** and upon validation of the access request by the host module **17**, the client module is provided access to the shared data storage area. FIG. 2A is a block diagram illustrating an example host module **17** according to an embodiment of the present invention. In the illustrated embodiment, ... used by the network peer (e.g., from one or more network devices) to obtain the necessary administrative information to join the personal cloud and thereby access the shared data storage area. The daemon module **120** is configured to monitor the predetermined personal cloud port for requests to access the shared data storage area. In one embodiment, the daemon module **120** handles requests related to the shared data storage area by passing such requests to related modules in order to free up the daemon module **120** for handling additional requests and allowing specific modules to implement specific functions such ... storage device to establish a personal cloud shared data storage area on the storage device. In one embodiment, the register module **130** receives an initial request from a storage device and in response to the request the register module **130** sends the IP address of

the storage device back to the storage device. Subsequently, the register module **130** receives a registration request from the storage device. The registration request includes administrative information to implement the personal cloud shared data storage area. For example, the registration information may include a name for the personal cloud, the IP address of the storage device, and the port number on the storage device that the daemon module will monitor for incoming requests related to the shared data storage area. The register module **130** stores this administrative information in its data storage area **55** for use when responding to future lookup requests from network peers. Once the administrative is stored ... information related to the personal cloud and may also include the modify module **140** instructing the storage device to delete the actual data that is stored in the shared data storage area. With respect to transferring a personal cloud, this operation may include changing an IP address, email address or port number associated with the personal ... copying or moving the shared data storage area from one storage device to another storage device. For example, the modify module **140** may receive an instruction from the storage device to transfer the personal cloud shared data storage area to a new storage device. In such a case, the modify module **140** may update ... for the personal cloud and the modify module **140** may also instruct the old storage device to copy or move the actual data that is stored in the shared data storage area to the new storage device. The modify module **140** may also instruct the old storage device to delete the copied data that is stored in the shared data storage area after the copy transaction is successfully completed. As will be understood, moving the data implies that the data is both copied to the new ... the share lookup module **160** validates the lookup request and responds to the client module with administrative information that will allow the client module to access the shared data storage area on the network storage device. For example, the administrative information may include the IP address and a designated port number of the network storage ... administrative join information, the join module **170** uses the administrative join information to query the lookup server for the administrative access information needed to directly access the personal cloud shared data storage area. In response, the join module **170** receives the administrative access information from the lookup server. For example, the administrative access information from the lookup server may include the IP address of the storage device and the port number at the storage device that is being monitored for incoming requests related to the shared data storage area. The join module **170** may store the administrative join information and the administrative access information in a non-transitory data storage area for long term storage. Upon receiving the administrative access information, the join module **170** may be configured to use the administrative access information to automatically access the shared data storage area. The leave module **180** is configured to facilitate withdrawal of the client module from the personal cloud shared data storage area. In one embodiment, ... personal cloud is deleted from the database of registered personal clouds at the lookup server. Next, in step **235** the lookup sever may send an instruction to the data storage device to delete or save the actual data in the shared data storage area. Finally, in step **240** a confirmation email is sent to the ... join information to gain access to the personal cloud shared data storage area. FIG. 5 is a flow diagram illustrating an example process for managing access to a distributed shared storage space according to an embodiment of the present invention. In one embodiment, the process may be implemented by a host module such as previously described ... modified as shown in step **370**. For example, deleting a network peer member may include modifying the network peer member access permissions to deny access to the personal cloud data storage area. In this fashion, the network peer may be prevented from using the original administrative join information to rejoin the personal cloud.

Additionally, modifying a ... network address for the lookup server. Next, in step **405**, the client module receives an instruction to connect to the personal cloud shared data storage area. In response to the instruction, in step **410** the client module determines if the network device is currently connected to a personal cloud and if so, in step **415** ... such an embodiment, steps **410** and **415** can be eliminated such that the client module establishes a connection to the new personal cloud shared data storage area upon receiving the connect instruction regardless of the presence of any current personal cloud shared data storage area connections. FIG. 7 is a block diagram illustrating an example wireless communication ... antenna port for transmission. The baseband system **465** is also communicatively coupled with the central processing unit **485**. The central processing unit **485** has access to a data storage area **490**. The central processing unit **485** is preferably configured to execute instructions (i.e., computer programs or software) that can be stored in the data storage area **490**. Computer programs can also be received from the baseband processor **465** and stored in the data storage area **490** or executed upon receipt. Such computer programs, when executed, enable the wireless communication device **450** to perform the various functions of the present ... IEEE 696/S-100, and the like. Computer system **550** preferably includes a main memory **556** and may also include a secondary memory **558**. The main memory **556** provides storage of instructions and data for programs executing on the processor **552**. The main memory **556** is typically semiconductor-based memory such as dynamic random access memory ("DRAM") and/or static random access memory ("SRAM"). Other semiconductor-based memory types include, for example, synchronous dynamic random access memory ("SDRAM"), Rambus dynamic random access memory ("RDRAM"), ferroelectric random access memory ("FRAM"), and the like, including read only memory ("ROM"). The secondary memory **558** may optionally include a hard disk drive **560** and/or a removable storage drive **562** ... , for example a floppy disk drive, a magnetic tape drive, a compact disc ("CD") drive, a digital versatile disc ("DVD") drive, etc. The removable storage drive **562** reads from and/or writes to a removable storage medium **564** in a well-known manner. Removable storage medium **564** may be, for example, a floppy disk, magnetic tape, CD, DVD, etc. The removable storage medium **564** is preferably a computer readable medium having stored thereon computer executable code (i.e., software) and/or data. The computer software or data stored on the removable storage medium **564** is read into the computer system **550** as electrical communication signals **578**. In alternative embodiments, secondary memory **558** may include other similar means for allowing computer ... include an external hard disk drive or an external optical drive, or and external magneto-optical drive. Other examples of secondary memory **558** may include semiconductor-based memory such as programmable read-only memory ("PROM"), erasable programmable read-only memory ("EPROM"), electrically erasable read-only memory ("EEPROM"), or flash memory (block oriented memory similar to EEPROM). Also included are any other removable storage units **572** and interfaces **570**, which allow software and data to ... wireless data communication link, radio frequency ("RF") link, or infrared link, just to name a few. Computer executable code (i.e., computer programs or software) is stored in the main memory **556** and/or the secondary memory **558**. Computer programs can also be received via communication interface **574** and stored in the main memory **556** and/or the secondary memory **558**. Such computer programs, when executed, enable the computer system **550** to perform the various functions of the present ... storage medium including a network storage medium. An exemplary storage medium can be coupled to the processor such the processor can read information from, and write information to, the storage medium. In the alternative, the storage medium can be integral to the processor. The processor and the storage medium can also reside in an ASIC. ...

**Claims**:
... indicated in the request, providing an email to an email account associated with the shared data storage area, the email containing information pertaining to the request to modify the shared data storage area... of the shared data storage area, the administrative information being encrypted using the variable for the providing to the lookup server; identifying at least one request to modify the shared data storage area on a first device, the request indicating the variable; and based on validation of the variable as indicated in the request, permitting modification of ... to the lookup server for registration of the personal cloud storage with the lookup server, the registration at least in part establishing the personal cloud storage; identifying at least one request to modify personal cloud storage, the request comprising the variable; and based on validation of the variable from the request, permitting modification of the personal cloud storage... providing to the lookup server; encrypting and decrypting, using the variable, future communications between the personal cloud storage and lookup server; identifying at least one request to modify the personal cloud storage, the request to modify the personal cloud storage indicating the variable; based on validation of the variable as indicated in the request, modifying the personal cloud storage based on the at least one request to modify the personal cloud storage. 14. A first device, comprising: a processor; storage accessible to the processor and bearing instructions executable by the processor to: request, from a lookup server, an internet protocol (IP) address for personal cloud storage; ... generate a variable; provide the variable to the lookup server for registration of the personal cloud storage with the lookup server; identify at least one request to modify the personal cloud storage, the request to modify the personal cloud storage indicating the variable; and... based on validation of the variable as indicated in the request, permit modification of the personal cloud storage based at least in part on the request to modify the personal cloud storage.

## RETRIEVING DATA SEGMENTS FROM A DISPERSED STORAGE NETWORK

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**Publication info**: Volvovski, Ilya; Baptist, Andrew; Leggette, Wesley; Resch, Jason K. (Inventors). International Business Machines Corporation (Assignee). US 20170147218 A1 . (Published 25 May 2017).

**Application number**: US 2017426698 (07 February 2017)

**Publication number**: US 20170147218 A1 (25 May 2017)

**Priority number**: US 2017426698 (07 February 2017)

**Family table**: Complete family ID: 194077274 Simple family ID: 46318470

| Publication number | Kind | Publication date | Application number | Application date | Type |
|---|---|---|---|---|---|
| US 20170147218 | A1 | 20170525 | US 2017426698 | 20170207 | B |
| US 9927977 | B2 | 20180327 | US 2017426698 | 20170207 | |

**Abstract (summary):** A method includes generating a plurality of segment allocation tables (SATs) for pluralities of sets of encoded data slices. For a first SAT, the method further includes dispersed storage error encoding the first SAT to produce a first set of encoded SAT slices. The method further includes generating a first source name for the first plurality of sets of encoded data slices and the first SAT based on an object identifier associated with the data object. The method further includes generating, based on the first source name, a first plurality of sets of slices names for the first plurality of sets of encoded data slices and the first set of encoded SAT slices. The method further includes outputting, based on the first plurality of sets of slices names, the first plurality of sets of encoded data slices and the first set of encoded SAT slices to storage units.

**Specification:**

... one or more memory devices aligned with the needs of the various operational aspects of the computer's processing and communication functions. Generally, the immediacy of access dictates what type of memory device is used. For example, random access memory (RAM) memory can be accessed in any random order with a constant response time, thus it is typically used for cache memory and main memory. By contrast, memory device technologies that require physical movement such as magnetic disks, tapes, and optical discs, have a variable response time as the physical movement can take longer than the data transfer, thus they are typically ... redundancy overhead data, reduces the storage capacity of three independent discs by one third (e.g., n−1=capacity). RAID 6 can recover from a loss of two discs and requires a minimum of four discs with a storage capacity of n−2. While RAID addresses the memory device failure issue, it is not without its own failure issues that affect its ... of a disc failure increases, which increases the demand for maintenance. For example, when a disc fails, it needs to be manually replaced before another disc fails and the data stored in the RAID device is lost. To reduce the risk of data loss, data on a RAID device is typically copied on to one or ... segments is dispersed storage error encoded to produce a set of encoded data slices of a plurality of sets of encoded data slices that are stored within a dispersed storage network memory. A plurality of sets of slice names are generated that correspond to the plurality of sets of encoded data slices, wherein each slice name provides a virtual dispersed storage network memory address to access and associated encoded data slice within the dispersed storage network memory. The number of data segments of the plurality of data segments depends on a ... be appended to a first data segment of the plurality of data segments prior to the dispersed storage error encoding of the first data segment. Retrieving the data from the dispersed storage network requires a first operation to retrieve a set of encoded data slices associated with the first data segment to reproduce the first data segment and the ... public internet systems; and/or one or more local area networks (LAN) and/or wide area networks (WAN). The DSN memory **22** includes a plurality of distributed storage (DS) units **36** for storing data of the system. Each of the DS units **36** includes a processing module and memory and may be located at a geographically different site ... and/or **22** via the network **24**. In general, and with

respect to data storage, the system **10** supports three primary functions: distributed network data storage management, distributed data storage and retrieval, and data storage integrity verification. In accordance with these three primary functions, data can be distributedly stored in a plurality of physically different locations and subsequently retrieved in a reliable and secure manner regardless of failures of individual storage devices, failures of network equipment, the duration of storage, the amount of data being stored, attempts at hacking the data, etc. The DS managing unit **18** performs distributed network data storage management functions, which include establishing distributed data storage ... **18** determines a number of slices (e.g., the number that a data segment of a data file and/or data block is partitioned into for distributed storage) and a read threshold value (e.g., the minimum number of slices required to reconstruct the data segment). As another example, the DS managing unit **18** creates and stores, locally or within the DSN memory **22**, user profile information. The user profile information includes one or more of authentication information, permissions, and/or the security parameters. The security parameters may ... **22** needs more DS units **36** or that one or more of the DS units **36** needs updating. The second primary function (i.e., distributed data storage and retrieval) begins and ends with a user device **12**- **14**. For instance, if a second type of user device **14** has a data file **38** and/or data block **40** to store in the DSN memory **22**, it sends the data file **38** and/or data block **40** to the DS processing unit **16** via its interface **30**. As will ... the slice into a local physical address for storage. Accordingly, each DS unit **36** maintains a virtual to physical memory mapping to assist in the storage and retrieval of data. The first type of user device **12** performs a similar function to store data in the DSN memory **22** with the exception that it includes the DS processing. As such, the device **12** encodes and slices the data file and/or data block it ... DSN interface **32** and the network **24**. For a second type of user device **14** to retrieve a data file or data block from memory, it issues a read command via its interface **30** to the DS processing unit **16**. The DS processing unit **16** performs the DS processing **34** to identify the DS ... to at least 10 DS units for a 16/10 error coding scheme). Each of the DS units **36** receiving the slice read command, verifies the command, accesses its virtual to physical memory mapping, retrieves the requested slice, or slices, and transmits it to the DS processing unit **16**. Once the DS processing unit **16** has received a read threshold number ... a data file and/or data block. The storage integrity processing unit **20** performs the third primary function of data storage integrity verification. In general, the storage integrity processing unit **20** periodically retrieves slices **45**, and/or slice names, of a data file or data block of a user device to verify that one or more slices have not been corrupted or lost (e.g., the DS unit failed). The retrieval process mimics the read process previously described. If the storage integrity processing unit **20** ... determines that one or more slices is corrupted or lost, it rebuilds the corrupted or lost slice(s) in accordance with the error coding scheme. The storage integrity processing unit **20** stores the rebuilt slice, or slices, in the appropriate DS unit(s) **36** in a manner that mimics the write process previously described. FIG. 2 is a ... **56**, a peripheral component interconnect (PCI) interface **58**, an IO interface **60**, at least one IO device interface module **62**, a read only memory (ROM) basic input output system (BIOS) **64**, and one or more memory interface modules. The memory interface module(s) includes one or more of a ... an encryption algorithm, a slicing parameter, a compression algorithm, an integrity check method, caching settings, parallelism settings, and/or other parameters that may be used to access the DSN memory layer. The gateway module **78** uses the user information to assign a source name **35** to the data. For instance, the gateway module **78** determines ... system. When the error coded data slices of a data segment are ready to be outputted, the grid module **82** determines which of the DS storage units **36** will store the EC data slices based

on a dispersed storage memory mapping associated with the user's vault and/or DS storage unit attributes. The DS storage unit ... or greater than the number of pillars (e.g., X) so that no more than one error coded data slice of the same data segment is stored on the same DS storage unit **36**. Further note that EC data slices of the same pillar number but of different segments (e.g., EC data slice 1 of data ... outputs the encoded data slices 1 through X of each segment 1 through Y to the DS storage units **36**. Each of the DS storage units **36** stores its EC data slice(s) and maintains a local virtual DSN address to physical location table to convert the virtual DSN address of the EC data ... **16**, which authenticates the request. When the request is authentic, the DS processing unit **16** sends a read message to each of the DS storage units **36** storing slices of the data object being read. The slices are received via the DSnet interface **32** and processed by the storage module **84**, which ... where the determination is based on a computing system-wide predetermination, a table lookup, vault parameters associated with the user identification, the type of data, security requirements, available DSN memory, performance requirements, and/or other metadata. Once a positive determination is made, the pre-slice manipulator **75** manipulates the data segment **90**- **92** in accordance with the ... be based on a computing system-wide predetermination, parameters in the vault for this user, a table lookup, the user identification, the type of data, security requirements, available DSN memory, performance requirements, control unit directed, and/or other metadata. Note that the type of post-slice manipulation may include slice level compression, signatures, encryption, CRC, addressing, watermarking, tagging, ... in a local cache memory. The method continues at step **110** where the processing module determines whether to synchronize the directory metadata with directory information stored in the DSN memory. Such directory metadata stored in the local cache memory corresponds to directory information at a local level utilized by the processing module whereas the directory information stored in the DSN memory corresponds to directory information at a system wide level (e.g., utilized by additional processing modules). The determination may be based on one or more of ... number corresponding to a last revision number of the encoded directory slices from a viewpoint of the processing module (e.g., aligned with the directory metadata stored in the cache memory). The transaction number associates two or more steps associated with the storing of data slices. The transaction number may be utilized to facilitate data ... a requester is not authorized to write the slice to the DS unit. The method continues at step **116** where the processing module receives checked write response messages from the DSN memory. The method continues at step **118** where the processing module determines whether the checked write response messages are favorable based on checked write status ... information from the DSN memory when the processing module determines that the checked write response messages are not favorable. For example, the processing module sends read requests to the DSN memory, receives encoded directory slices, and dispersed storage error decodes the encoded directory slices to produce the directory information. The method continues at step **124** ... **120** of FIG. 6 where the processing module dispersed storage error encodes a portion of the directory metadata to produce encoded directory slices; sends checked write messages to the DSN memory that includes encoded directory slices, a transaction number, and revision information; receives checked write response messages; determines whether the checked write response messages are favorable; ... module determines an estimated time to completion to store the plurality of data segments. The determination may be based on one or more of a storage duration indicator associated with storing slices of a previous data segment, a number of data segments pending for storage, and an estimation algorithm. For example, the processing module determines the ... metadata to produce one or more sets of encoded directory

slices, and sending the one or more sets of encoded directory slices to the DSN memory for storage utilizing checked write messages that include encoded directory slices, a second transaction number associated with storing of the one or more sets of encoded directory slices, and revision information. The method continues at step **144** where the processing module determines whether the plurality of data segments have been stored in the DSN memory as a plurality of sets of encoded data slices. For example, the processing module determines that the plurality of data segments have been stored in the DSN memory when the processing module receives at least a write threshold number of favorable write response messages corresponding to each set of encoded data slices acknowledging ... of encoded data slices. The method repeats back to step **134** when the processing module determines that the plurality of data segments have not been stored in the DSN memory. The method continues to step **146** when the processing module determines that the plurality of data segments have been stored in the DSN memory. The method continues at step **146** where the processing module determines whether synchronization of the directory metadata with the directory information is complete. For ... continues to step **154** when the processing module determines to verify the directory metadata. The method continues at step **154** where the processing module sends read request messages to a dispersed storage network (DSN) memory with regards to directory information. For example, the processing module sends read request messages to dispersed storage (DS) units of the DSN memory to retrieve the directory information such that a DS unit sends the processing module an encoded data slice corresponding to a read request message in response. As another example, the processing module sends checked read request messages to DS units of the DSN memory, wherein the checked read request messages include an expected revision number to retrieve the directory information such that a DS unit sends the processing module an encoded data slice corresponding ... file dispersed storage network (DSN) address based on the vault ID, sending read requests messages with regards to encoded snapshot file slices to a DSN memory, receiving read response messages that include encoded snapshot file slices, and dispersed storage error decoding the encoded snapshot file slices to produce the snapshot file. The method ... The receiving may include receiving one or more of the data, a data identifier (ID), a data type indicator, a file size indicator, and a storage requirement. The method continues at step **244** where the processing module determines a data portion of the data and a data portion ID. The determination ... size indicator, an upload speed indicator, the system performance indicator, an estimated duration of an upload, a duration threshold, the data type indicator, and the storage requirement. For example, the processing module determines the data portion to include 500 MB when the file size indicator indicates 5 GB, the estimated duration ... in a dispersed storage network (DSN) memory. For example, the processing module sends write request messages that include the encoded data slices to the DSN memory and receives at least a write threshold number of favorable write response messages for each set of encoded data slices from the DSN memory. The method continues at step **250** where ... produces multiple sets of encoded directory slices. The method continues at step **254** where the processing module stores the encoded directory slices in the DSN memory. For example, processing module sends write request messages that include the encoded directory slices to the DSN memory and receives at least a write threshold number of favorable write response messages for each set of encoded directory slices from the DSN memory. The method continues at step **256** where ... as encoded directory slices in the DSN memory. For example, the processing module encodes the updated directory metadata to produce encoded directory slices, sends a write request message to the DSN memory that includes the encoded directory slices, and sends a commit transaction request message

to the DSN memory. FIG. 14A is a flowchart illustrating another example of storing data. The method begins with step **264** where a processing module (e.g., of a ... a plurality of sets of encoded directory metadata slices. The method continues at step **270** where the processing module transmits one or more data slice write requests to the DSN memory regarding storing the plurality of sets of encoded data slices, wherein the one or more data slice write requests includes a first transaction number. The transmitting the ... of a respective group of encoded data slices of the plurality of sets of encoded data slices and transmitting the set of data slice write requests to a set of dispersed storage (DS) units of the DSN memory. The group of encoded data slices may include one or more of a set of encoded data slices, a ... request includes the first transaction number regarding storage of the plurality of sets of encoded data slices and transmitting the set of data slice write requests to a set of dispersed storage (DS) units of the DSN memory, wherein a DS unit of the set of DS units is targeted to store a respective group of encoded ... of the plurality of sets of encoded data slices. The method continues at step **272** where the processing module transmits one or more directory metadata write requests to the DSN memory regarding storing the plurality of sets of encoded directory metadata slices, wherein the one or more directory metadata write requests include a second transaction number. The method continues at step **274** where the processing module transmits one or more commit requests to the DSN memory, when a favorable write response condition exists, for at least one of: the one or more data slice write requests and the one or more directory metadata write requests, to commit storage of at least one of: the plurality of sets of encoded data slices and the plurality of sets of encoded directory metadata slices, wherein the ... data and the DSN memory storage location to produce the updated directory metadata. The transmit slices module **286** facilitates transmitting one or more data slice write requests **302** to the DSN memory **22** regarding storing the plurality of sets of encoded data slices **294**, wherein the one or more data slice write requests **302** includes a first transaction number **304** and facilitates transmitting one or more directory metadata write requests **306** to the DSN memory **22** regarding storing the plurality of sets of encoded directory metadata slices **300**, wherein the one or more directory metadata write requests **306** includes a second transaction ... a respective group of encoded data slices of the plurality of sets of encoded data slices **294** and transmitting the set of data slice write requests to a set of dispersed storage (DS) units of the DSN memory **22**. The transmit slices module **286** is further operable to transmit the one or more data slice write ... the first transaction number **304** regarding storage of the plurality of sets of encoded data slices **294** and transmitting the set of data slice write requests to a set of dispersed storage (DS) units of the DSN memory **22**, wherein a DS unit **36** of the set of DS units is targeted to store a respective ... of encoded data slices of the plurality of sets of encoded data slices **294**. The transmit commit module **288** transmits one or more commit requests **310** to the DSN memory **22**, when a favorable write response condition exists (e.g., receiving a favorable write response condition indicator **314**), for at least one of: the one or more data slice write requests and the one or more directory metadata write requests, to commit storage of at least one of: the plurality of sets of encoded data slices **294** and the plurality of sets of encoded directory metadata slices **300** ... may include a data total length indicator corresponding to an amount of data stored in all regions associated with the data. The SAT may be stored in a local memory associated to enable access to a dispersed storage network (DSN) memory and/or as a SAT data segment in the DSN memory (e.g., as a set of encoded SAT slices). Note that a SAT vault source name is associated with the SAT when the SAT is stored in the DSN memory utilizing the SAT vault source name. At least one SAT associates data to one or more regions of contiguous data segments, wherein

each data segment of the one or more contiguous data segments is stored as a set of encoded data slices in a dispersed storage network (DSN) memory. For example, an initial store of a file stuff txt results in a first region stored in the DSN memory that includes four contiguous data segments of the initial data of stuff txt and one data segment corresponding to the SAT. Next, a second store of more data of the file stuff.txt results in a second region stored in the DSN memory that includes four more contiguous data segments of appended data of stuff.txt and an updated SAT data segment. The SAT vault source name enables access ... **334**. The slice index field **332** includes a slice index entry that may be utilized to produce a pillar number corresponding to a dispersed storage (DS) unit to store an associated encoded data slice. The vault source name field **334** includes a vault source name entry that includes a source name field **336** and ... (SAT) **320** and a plurality of consecutive segments 1-4 corresponding to initially storing data as a first region. In an example, the SAT **320** is stored in a dispersed storage network (DSN) memory at a vault source name address of AAA0. The SAT **320** includes a start segment vault source name field **322** with an ... the total length of 340 bytes as indicated by a total length entry of a total length field **328** of the SAT. Segment 1 is stored in the DSN memory at a vault source name address of AAA1 in accordance with the start segment vault source name AAA1 as indicated in the SAT. Segments 2-4 are stored in the DSN memory at vault source name addresses of AAA2-AAA4 in accordance with contiguous segment numbering. FIG. 16C is a diagram illustrating another example of data segmentation that ... segments 5-8 corresponding to a second storing data as a second region (e.g., data appended to a first region). In an example, the SAT is stored in a dispersed storage network (DSN) memory at a vault source name address of BBB0. The SAT includes two regions, wherein a first region includes a start segment vault ... the SAT. Segments 5-8 each contain 300 bytes in accordance with the total length of 1200 bytes as indicated in the SAT. Segment 5 is stored in the DSN memory at a vault source name address of BBB5 in accordance with the start segment vault source name BBB5 as indicated in the SAT. The segment number 5 is next sequentially after segment 4 of the first region as illustrated in FIG. 16B. Segments 5-8 are stored in the DSN memory at vault source name addresses of BBB5-BBB8 in accordance with contiguous segment numbering. A SAT associated with region 1 (e.g., as discussed with reference to ... segmentation scheme (e.g., a previous segmentation scheme utilized for storing other data associated with the data), a data size indicator, a data type indicator, a storage requirement, a vault identifier (ID), a lookup, a message, and a query. The method continues at step **354** whether processing module determines how to store ... at step **362** where the processing module facilitates storage of the plurality of data segments in the DSN memory in accordance with the information for storing the data. The facilitating storage of the plurality of data segments in the DSN memory includes for each data segment of the plurality of data segments: dispersed storage error encoding ... for storing the data **386**, and generates an entry within a segment allocation table **388** associated with the file, wherein the entry includes the information for storing the data **386** and the segmentation scheme **384**. The generate segment allocation table module **374** determines the segmentation scheme **384** based on one or more of a previous segmentation scheme, a data size indicator, a data type indicator, a storage requirement, a vault identifier (ID), a lookup, a message, and a query. The store segment allocation table module **376** facilitates storage of the segment allocation table **388** in the DSN memory **22**. The store segment allocation table module **376** facilitates storage of the segment allocation table **388** by obtaining a segment allocation table vault source name, dispersed storage error encoding the segment allocation table **388** to produce encoded table slices **390**, and outputting the encoded table slices **390** to the DSN memory **22** for storage therein utilizing the segment allocation table

... segment data module **378** segments the data **382** in accordance with the segmentation scheme **384** to produce a plurality of data segments **392**. The store data segments module **380** facilitates storage of the plurality of data segments **392** in the DSN memory **22** in accordance with the information for storing the data **386**. The store data segments module **380** facilitates storage of the plurality of data segments **392** in the DSN memory by for each data segment of the plurality of data segments **392**: dispersed ... include one or more of directory metadata, a user ID, a vault ID, a data object and, a filename, a data type indicator, and a storage requirement. The content field **414** includes content entry such as a commonly accessed portion of the data associated with the file name. For example, the ... table (SAT) **446** and a plurality of consecutive segments 1-4 corresponding to initially storing data as a first region. For example, the SAT **446** is stored in a dispersed storage network (DSN) memory at a vault source name address of AA00. An append marker is set to zero for the first region. The SAT **446** ... and segment 4 contains 40 bytes in accordance with the total length of 340 bytes as indicated in the SAT. Note that segment 1 is stored in the DSN memory at a vault source name address of AA01 in accordance with the start segment vault source name AA01 as indicated in the SAT **446**. Segments 2-4 are stored in the DSN memory at vault source name addresses of AA02-AA04 in accordance with contiguous segment numbering. FIG. 20C is a diagram illustrating another example of data segmentation that ... segments 5-8 corresponding to a second storing data as a second region (e.g., data appended to a first region). For example, the SAT **448** is stored in a dispersed storage network (DSN) memory at a vault source name address of AA10. An append marker is set to a nonzero value to indicate that the region ... the SAT. Segments 5-8 each contain 300 bytes in accordance with the total length of 1200 bytes as indicated in the SAT. Segment 5 is stored in the DSN memory at a vault source name address of AA15 in accordance with the start segment vault source name AA15 as indicated in the SAT. The segment number 5 is next sequentially after segment 4 of the first region as illustrated in FIG. 20B. Segments 5-8 are stored in the DSN memory at vault source name addresses of AA15-AA18 in accordance with contiguous segment numbering. The append marker is set to a nonzero value indicating that the ... where a processing module (e.g., of a dispersed storage (DS) processing unit) receives data of a file for storage in a dispersed storage network (DSN) memory, determines a segmentation scheme for storing the data, determines how to store the data to produce information for storing the data, generates an entry within a segment allocation table associated with ... such that the append marker is nonzero. As yet another example, the processing module determines the append marker to be zero when the data for storage is a first write sequence (e.g., a first region). The method continues at step **362** of FIG. 17A where the processing module facilitates storage of the plurality of data ... more data regions is divided into a plurality of data segments and stored as a plurality of sets of encoded data slices in a dispersed storage network (DSN) memory. The file retrieval request may include one or more of a vault source name, a data identifier (ID), a segmentation allocation table (SAT) vault source name, a filename, a ... source name from a directory utilizing a filename of the file, generates SAT slice names based on the SAT slice names, sends a plurality of read requests to the DSN memory that includes the SAT slice names, receives SAT slices, and decodes the SAT slices to reproduce the SAT. The method continues at step **456** where ... data slices per set of the plurality of sets of encoded data slices. For example, the processing module facilitates sending a plurality of sets of read requests to the DSN memory that includes the plurality of sets of slice names, receives at least a decode threshold number of encoded data slices per set of the plurality ... source name from a directory utilizing a filename of the file, generates SAT slice names based on the SAT slice names, sends a plurality of

read requests to the DSN memory **22** that includes the SAT slice names, receives SAT slices **480**, and decodes the SAT slices **480** to reproduce the SAT **482**. The ... plurality of sets of encoded data slices based on the plurality of segment vault source names. For example, the processing module sends a plurality of read requests messages to the DSN memory to recover a most recent SAT, a first region SAT, and at most N first region segments in a common prefetch operation. The plurality of ... of sets of encoded data slices based on the plurality of segment vault source names; and sending a plurality of sets of encoded data slice requests to the DSN memory **22** that includes the plurality of sets of slice names **537**. The compare module **528** compares the estimated information and the estimated segmentation scheme ... data slices utilizing a first set of error coding dispersal storage function parameters. The processing module may generate the first set of error coding dispersal storage function parameters based on storage requirements of the data. For example, the processing module generates the first set of error coding dispersal storage function parameters to include a relatively large difference between a pillar width number and a decode threshold number when storage requirements indicate a high level of reliability is required. The method continues at step **562** where the processing module selects a first set of dispersed storage (DS) units based on the data. For example, the processing module selects the first set of DS units to match storage requirements and in accordance with the first set of error coding dispersal storage function parameters. For example, the processing module selects DS units 1-16 when DS ... dispersal storage function parameters. The processing module may generate the second set of error coding dispersal storage function parameters based on one or more of storage requirements of the data, the first set of error coding dispersal storage function parameters, the data, the directory metadata, storage requirements of the directory metadata, and a data type indicator. For example, the processing module generates the second set of error coding dispersal storage function parameters to include a relatively small pillar width and decode threshold number when the directory metadata storage requirements indicate a low access latency requirement. The method continues at step **568** where the processing module selects a second set of DS units based on the directory metadata. For example, the processing module selects the second set of DS units to match directory metadata storage requirements and in accordance with the second set of error coding dispersal storage function parameters. For example, the processing module selects DS units 20-23 when DS ... be a single memory device, a plurality of memory devices, and/or embedded circuitry of another processing module, module, processing circuit, and/or processing unit. Such a memory device may be a read-only memory, random access memory, volatile memory, non-volatile memory, static memory, dynamic memory, flash memory, cache memory, and/or any device that stores digital information. Note that if the processing module, module, processing circuit, and/or processing unit includes more than one processing device, the processing devices may be ... module, processing circuit, and/or processing unit implements one or more of its functions via a state machine, analog circuitry, digital circuitry, and/or logic circuitry, the memory and/or memory element storing the corresponding operational instructions ... may be embedded within, or external to, the circuitry comprising the state machine, analog circuitry, digital circuitry, and/or logic circuitry. Still further note that, the memory element may store, and the processing module, module, processing circuit, and/or processing unit executes, hard coded and/or operational instructions corresponding to at least some of the steps ... is used in the description of the various embodiments of the present invention. A module includes a processing module, a functional block, hardware, and/or software stored on memory for performing one or

more functions as may be described herein. Note that, if the module is implemented via hardware, the hardware may operate independently ...

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## Test report generating method, involves obtaining version information according to report generation rule, generating testing report based on version information according to version mark, and determining development processing state

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**Publication info**: Chen, Z; Cheng, G; Dai, W (Inventors). NETEASE HANGZHOU NETWORK CO LTD (Assignee). CN 106095670 A . (Published 09 Nov 2016). 201678 (First update). 201678 (Last update). Drawing available.

**Application number**: CN 201610392338 A (02 June 2016)

**Publication number**: CN 106095670 A (09 November 2016)

**Priority number**: CN 201610392338 A (02 June 2016)

**Priority applications**: CN 201610392338 A (02 June 2016)

| Publication number | Kind | Publication date | Application number | Kind | Application date | Update code | Type |
|---|---|---|---|---|---|---|---|
| CN 106095670 | A | 20161109 | CN 201610392338 | A | 20160602 | 201678 | B |

### Alerting

### Novelty

The method involves obtaining version information according to a report generation rule. Version mark is determined. A testing report is generated based on version information according to the version mark. Test requirement information is obtained according to the version information. Version information is identified in a pre-determined memory area by using a version identifier. Testing report displaying operation is performed by using a pre-set displaying interface. A development processing state is determined. Relationship between test processing states is determined.

### Description

An INDEPENDENT CLAIM is also included for a test report generating device.

### Use

Test report generating method.

**Advantage**

The method enables reducing test report operating complexity and improving real-time performance.

**Claims:**

[CLAIM 3] The method according to claim 2, wherein before the step of obtaining the version information from the first predetermined storage area according to said version identifier, further comprising: submitting the test report generation rule of the user identity, determining the storage access right of user to the first predetermined area. ... generation rule to acquire the test requirement information comprises: generating rule, extracting searching condition corresponding to the test report from the report, obtaining the test requirement information from a second predetermined storage area according to the search condition, wherein the test requirement information comprises the version identifier development process state and the test progress status of the ... ... 10, wherein the device further comprises an authentication module for performing identity authentication to submit the test report generating rule of the user, determining the storage access right of user to the first predetermined area. ... extracting unit for generating rule, extracting searching condition corresponding to the test report from the report, a second obtaining unit, used for obtaining the test requirement information from a second predetermined storage area according to the search condition, wherein the test requirement information comprises the version identifier development process state and the test progress status of the ...

## SQL coverage-based automatic testing method for application software in database based on

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**Publication info**: Hu, Jingyu; LI HUAYING; Chang, Ning; Cao, Hui; Xu, Tian; Dong, Xin; Chen, Guang; Liu, Yijing (Inventors). HU JINGYU (Assignee). CN 104636257 A . (Published 20 May 2015).

**Application number**: CN 201510111313 (13 March 2015)

**Publication number**: CN 104636257 A (20 May 2015)

**Priority number**: CN 201510111313 (13 March 2015)

**Family table**: Complete family ID: 171677994 Simple family ID: 53215041

| Publication number | Kind | Publication date | Application number | Application date | Type |
|---|---|---|---|---|---|
| CN 104636257 | A | 20150520 | CN 201510111313 | 20150313 | B |
| CN 104636257 | B | 20171027 | CN 201510111313 | 20150313 | |

**Abstract (summary)**: The invention discloses a SQL coverage-based automatic testing method for an application software in a database. The automatic testing method comprises the following steps: establishing a grammatical rule table for database access; statically analyzing a source code depending on a self-defined grammatical rule with the adoption of a lexical analysis and grammatical analysis technology, and acquiring code information related to the database access; dynamically analyzing the source code by adopting an ASM technology, respectively traversing multiple categories in the source code, and acquiring information, related to the database access, in each category; integrating a static analysis result and a dynamic analysis result to generate a database access behavior characteristic model, and constructing a database access behavior characteristic database according to the database access behavior characteristic model; and capturing database access dynamic execution characteristics when the source code is executed, carrying out matching calculation on the database access dynamic execution characteristics and the database access behavior characteristic database, and acquiring test coverage data based on SQL. The automatic testing method is capable of improving the adequacy and the effectiveness of an SQL coverage test and does not influence the execution characteristic of tested software while the SQL coverage test is realized.

**Specification**:
... the following additional technical characteristics: In some examples, the stated step S2 further includes: loading grammar rules database access characteristics and the rules of grammar rules form regular expression; loading the tested software source code, and uses the rules regexp positioning, matching identification and the source code of database access rules in accordance with; the in the source code of database access rules database access information in the classification and storage. In some example, the step S3 further includes: loading said software to be measured of a plurality of classes in source code; analyzing the ... source code of the database access rules. Step 1023 : in accordance with the database access rules in the source code of the classification database access information memory. Step S103: ASM technique to the dynamic analysis of the source code, including: separately software source code to be measured in the traverse of ...

**Claims**:
... identifying and with matching of the source code of the database access rules; Database access rules to the stated in the source code of database access information in the classification and storage.

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## Method and Apparatus for Graphical Presentation of Firewall Security Policy

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**Publication info**: Anderson, Brooke Madsen; Bunn, Wiliam C.; Karnes, Mary; Lieberman, Sarah M.; Wilczek, Mira E. (Inventors). Anderson, Brooke Madsen; Bunn, Wiliam C.; Karnes, Mary; Lieberman, Sarah M.; Wilczek, Mira E. (Assignees). US 20120216270 A1 . (Published 23 Aug 2012).

**Application number**: US 2012430186 (26 March 2012)

**Publication number**: US 20120216270 A1 (23 August 2012)

**Priority number**: US 2012430186 (26 March 2012)

**Family table**: Complete family ID: 153077141 Simple family ID: 35911017

| Publication number | Kind | Publication date | Application number | Application date | Type |
|---|---|---|---|---|---|
| US 20120216270 | A1 | 20120823 | US 2012430186 | 20120326 | B |
| US 8701177 | B2 | 20140415 | US 2012430186 | 20120326 | |


**Abstract (summary)**: A graphical representation of the firewall and a network coupled to the firewall is generated and displayed. A number of an inbound port of the network is displayed. An arrow adjacent to the port number pointing toward the network is displayed to indicate that a communication is permitted to the port. The port number and the arrow are located between an icon for the network and an icon for the firewall. A port number of a destination of a communication originating from the network is displayed. Also, another arrow adjacent to the destination port number pointing toward the firewall is displayed to indicate that a communication is permitted to the destination port number. The destination port number and the other arrow are located between an icon for the network and an icon for the firewall.

**Specification**:
... program function **112** gathers zone/network information needed to determine data flows, vulnerabilities and misconfigurations within firewall **21**. In step **402**, program function **112** reads from storage **305**, the configuration file **304** generated by program function **110**. Then, program function **112** parses the file **304** to identify the firewall **21** ... function **120** reads the first rule (step **510**), and determines if it is associated with the interface currently being evaluated (decision **512**). This determination is made by evaluating IP addresses or access list names. If the rule is associated with the interface currently being evaluated (decision **512**, yes branch), program function **120** writes the rule to a data flow checking table **514** (step **526**). However, if the rule is not so associated or after step **516**, program function **120** determines if this is ...

**Claims**:
**1**. A computer program product for reporting permitted message flows through a firewall, the computer program product comprising: one or more computer-readable tangible storage devices and program instructions stored on at least one of the one or more storage devices, the program instructions comprising: program

instructions to generate and display an icon representing the firewall and an icon representing a first network coupled to the firewall; program instructions ... **5**. A computer system for reporting permitted message flows through a firewall, the computer system comprising: one or more processors, one or more computer-readable memories, one or more computer-readable tangible storage devices, and program instructions stored on at least one of the one or more storage devices for execution by at least one of the one or more processors via at least one of the one or more memories, the program instructions comprising: program instructions to generate and display an icon representing the firewall and an icon representing a first network coupled to the firewall; program instructions to generate and ...

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## SYSTEM AND METHOD FOR TESTING DATA AT A DATA WAREHOUSE

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**Publication info**: Sankaranarayanan, Saji Valiyattil; Gudipati, Mahesh; Kachottil, Ajay Kumar; Balasubramoni Ayyar, Shyam; Janardhanan, Sreejan Manezhathu (Inventors). Sankaranarayanan, Saji Valiyattil; Gudipati, Mahesh; Kachottil, Ajay Kumar; Balasubramoni Ayyar, Shyam; Janardhanan, Sreejan Manezhathu (Assignees). US 20120150820 A1 . (Published 14 Jun 2012).

**Application number**: US 201148236 (15 March 2011)

**Publication number**: US 20120150820 A1 (14 June 2012)

**Priority number**: IN 2010CH3743 (08 December 2010)

**Family table**: Complete family ID: 151970556 Simple family ID: 46200390

| Publication number | Kind | Publication date | Application number | Application date | Type |
|---|---|---|---|---|---|
| US 20120150820 | A1 | 20120614 | US 201148236 | 20110315 | B |
| IN 2010CH3743 | A | 20121019 | IN 2010CH3743 | 20101208 | |
| US 9037549 | B2 | 20150519 | US 201148236 | 20110315 | |

**Abstract (summary)**: A system and method for performing testing of data at a data warehouse is provided. The methodology of the invention describes steps to develop and further invoke one or more data quality-accuracy test cases from a framework. The data quality-accuracy test cases check the sanity of the data stored

at the data warehouse. The one or more data quality-accuracy test cases are developed based on at least one predefined strategy, which in turn are stored in the framework. The methodology further executes the developed one or more data quality-accuracy test cases as either batch or independently, based on the requirements of the test. Thereafter, the methodology maintains traceability of the executed test at the data warehouse, incorporating details from the development of the one or more data quality-accuracy test cases to the final output of the test.

**Specification**:
... identified data format with a pre-identified data format. For example, datum corresponding to an email address should be in the form of xyz@abc.com. Various pre-identified formats relating to email address, zip code, phone number, date, currency and so forth are pre-stored in the Data Quality Analysis Strategy Component **110**. The business rules based strategy checks data compliance of the DWH data with respect to a pre-defined business rule/condition. In an exemplary embodiment of the present invention, a business rule is ... not intended to suggest any limitation as to scope of use or functionality of described embodiments. The computing device includes at least one processor and memory. The processor executes computer-executable instructions and may be a real or a virtual processor. In an embodiment of the present invention, the memory may store software for implementing various embodiments of the present invention. The present invention may be implemented in numerous ways including as an apparatus, method, or a computer program product such as a computer readable storage medium or a computer network wherein programming instructions are communicated from a remote location. While the exemplary embodiments of the present invention are described and ...

## Data storage using identifiers

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**Publication info**: Patterson, R. Hugo (Inventor). Patterson, R. Hugo (Assignee). US 20070101074 A1 . (Published 03 May 2007).

**Application number**: US 2006584433 A (20 October 2006)

**Publication number**: US 20070101074 A1 (03 May 2007)

**Priority number**: US 2006584433 A (20 October 2006)

**Family table**: Complete family ID: 239753986 Simple family ID: 37450043

| Publication number | Kind | Publication date | Application number | Kind | Application date | Type |
|---|---|---|---|---|---|---|
| US 20070101074 | A1 | 20070503 | US 2006584433 | A | 20061020 | B |
| US 7599932 | B2 | 20091006 | US 2006584433 | | 20061020 | |

**Abstract (summary)**: A system and method are disclosed for processing a data stream. A data segment is received. It is determined whether the data segment has been previously stored. In the event that the data segment is determined not to have been previously stored, a unique identifier for specifying the data segment in a representation of the data stream is generated.

**Specification**:
... systems is increasing. There are a variety of systems in existence today, utilizing both local and network storage for backup. In some of the existing data storage systems, a data stream is segmented and then stored. The data segments are identified by content derived identifiers derived from the data in the data segments. Examples of content derived identifiers include fingerprints generated by hash algorithms and checksums calculated based on the data segments. The content derived identifiers are stored, and used for retrieving the data segments when the original data stream is reconstructed. Since identical data segments result in the same identifier, a duplicate data segment can be identified and prevented from being stored again; instead, the content derived identifier is stored every time a duplicate data segment appears, thereby making the system more efficient. Because the content derived identifiers usually have fewer bits than the corresponding data segments, it is possible ... present invention can be implemented in numerous ways, including as a process, an apparatus, a system, or a computer readable medium such as a computer readable storage medium or a computer network wherein program instructions are sent over optical or electronic communication links. It should be noted that the order of the ... data segments stored in the system. FIG. 1 is a block diagram illustrating the data organization according to one embodiment. Data segments are received and stored to the appropriate data segment storage locations ( **120**, **122**, **124**, etc). In this embodiment, the unique identifiers are serial numbers that are generated as the data segments ... serial number is reused. FIG. 2B is a location table used in one embodiment for locating the data segments. The table is constructed during the write process of the data storage system as the data segments are received, and is used during the read process to identify the location of the data segments. The table entries ... adjoining buckets in the hash table. The data segment location or the region that includes the data segment location may be found using a single access of the storage device that stores the hash table. The content derived summaries are fingerprints of the data segments and the unique identifiers are derived using the first four bytes of ...

**Claims**:
... location; and updating a data structure for storing the content derived summary, the unique identifier, and the data segment storage location; wherein the data segment storage location is accessed given the unique identifier or given the content derived summary in the data structure... location; and updating a data structure for storing the content derived summary, the unique identifier, and the data segment storage location; wherein the data segment storage location is accessed given the unique identifier or given the content derived summary, using a single access of a storage device... the content derived summary, the unique identifier, and the data segment storage location; wherein a region of the data structure that includes the data segment storage location is accessed given the unique identifier or given the content derived summary, using a single access of a storage device.

## Data storage using identifiers

**Inventor**: Patterson, R. HugoMountain View, CA, USUS (Residence)Patent rights: US Only

**Assignee**: Patterson, R. HugoMountain View, CA, USUS (Residence)Patent rights: US Only

**Publication info**: Patterson, R. Hugo (Inventor). Patterson, R. Hugo (Assignee). US 7143251 B1 . (Published 28 Nov 2006).

**Application number**: US 2003611309 (30 June 2003)

**Publication number**: US 7143251 B1 (28 November 2006)

**Priority number**: US 2003611309 (30 June 2003)

**Family table**: Complete family ID: 296832831 Simple family ID: 37450043

| Publication number | Kind | Publication date | Application number | Application date | Type |
|---|---|---|---|---|---|
| US 7143251 | B1 | 20061128 | US 2003611309 | 20030630 | B |


**Abstract (summary)**: A system and method are disclosed for processing a data stream. A data segment is received. It is determined whether the data segment has been previously stored. In the event that the data segment is determined not to have been previously stored, a unique identifier for specifying the data segment in a representation of the data stream is generated.

**Specification**:
... systems is increasing. There are a variety of systems in existence today, utilizing both local and network storage for backup. In some of the existing data storage systems, a data stream is segmented and then stored. The data segments are identified by content derived identifiers derived from the data in the data segments. Examples of content derived identifiers include fingerprints generated by hash algorithms and checksums calculated based on the data segments. The content derived identifiers are stored, and used for retrieving the data segments when the original data stream is reconstructed. Since identical data segments result in the same identifier, a duplicate data segment can be identified and prevented from being stored again; instead, the content derived identifier is stored every time a duplicate data segment appears, thereby making the system more efficient. Because the content derived identifiers usually have fewer bits than the corresponding data segments, it is possible ... present invention can be implemented in numerous ways, including as a process, an apparatus, a system, or a computer readable medium such as a computer readable storage medium or a computer network wherein program instructions are sent over optical or electronic communication links. It should be noted that the order of the ... data segments stored in the system. FIG. 1 is a block diagram illustrating the data organization according to one embodiment. Data segments are received and stored to the appropriate data segment storage locations ( **120**, **122**, **124**, etc). In this embodiment, the unique identifiers are serial numbers that are generated as the data segments ... serial number is reused. FIG. 2B is a location

table used in one embodiment for locating the data segments. The table is constructed during the write process of the data storage system as the data segments are received, and is used during the read process to identify the location of the data segments. The table entries ... adjoining buckets in the hash table. The data segment location or the region that includes the data segment location may be found using a single access of the storage device that stores the hash table. The content derived summaries are fingerprints of the data segments and the unique identifiers are derived using the first four bytes of ...

**Claims**:
... location; and updating a data structure for storing the content derived summary, the unique identifier, and the data segment storage location; wherein the data segment storage location is accessed given the unique identifier or given the content derived summary in the data structure... location; and updating a data structure for storing the content derived summary, the unique identifier, and the data segment storage location; wherein the data segment storage location is accessed given the unique identifier or given the content derived summary, using a single access of a storage device... the content derived summary, the unique identifier, and the data segment storage location; wherein a region of the data structure that includes the data segment storage location is accessed given the unique identifier or given the content derived summary, using a single access of a storage device. 30. A computer program product for processing a data stream, the computer program product being embodied in a computer readable storage medium and comprising computer instructions for: receiving a data segment; determining whether the data segment has been previously stored; and in the event that the data segment is determined not ...

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## Data processing and write-in method in HDD appts for amplifier: by positioning magnetic head in disk in order to write record which consists of user data and ECC that is formed from sector information

**Inventor**: Hashimoto, MHaswell, JJohn, HSakai, TYamaguchi, M

**Assignee**: IBM CORP (IBMC)INT BUSINESS MACHINES CORP (IBMC)

**Publication info**: Hashimoto, M; Haswell, J; John, H; Sakai, T; Yamaguchi, M (Inventors). IBM CORP; INT BUSINESS MACHINES CORP (Assignees). JP 3307529 B2 . (Published 24 Jul 2002). 199647 (First update). 200255 (Last update). Drawing available.

**Application number**: JP 1995327363 A (15 December 1995)

**Publication number**: JP 08235793 A (13 September 1996)

**Priority number**: JP 1994324716 A (27 December 1994)

**Priority applications**: JP 1994324716 A (27 December 1994)

| Publication number | Kind | Publication date | Application number | Kind | Application date | Update code | Type |
|---|---|---|---|---|---|---|---|
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|---|---|---|---|---|---|---|---|
| JP 08235793 | A | 19960913 | JP 1995327363 | A | 19951215 | 199647 | B |
| US 5864440 | A | 19990126 | US 1995569326 | A | 19951206 | 199911 | E |
| JP 3307529 | B2 | 20020724 | JP 1995327363 | A | 19951215 | 200255 | E |

**Alerting**

**First section**

The method involves holding the user data (D) in a register (46). An ECC generation algorithm (Ar) forms the error correcting code (ECC) from the sector information (ID) which gives address data and user data. A magnetic head is positioned to the disk, based on the sector information. A record (Rw) which consists of the user data and formed ECC, is written into the disk. The user data (Dr) of the record readout from the disk is temporarily stored in the register, during reading operation. ECC is separated from the record, and error check of user data and sector information is performed with ECC check algorithm. When it is judged that there is no error in the sector information, the user data stored in the register is corrected and then output to a host.

**Claims**:
... combination of a user information data bit sequence and an address information bit sequence which corresponds to the position where the user information data is stored on the disk; and executing a write operation by writing the user information data and the generated ECC in the position designated by said address information.

## Write horizon data management

**Inventor**: Donlan, Bryan JamesSeattle, WA, USPatent rights: US OnlyKumar, SandeepIssaquah, WA, USPatent rights: US Only

**Assignee**: Amazon Technologies, Inc.Seattle, WA, USUS (Residence)Patent rights: US Only

**Publication info**: Donlan, Bryan James; Kumar, Sandeep (Inventors). Amazon Technologies, Inc. (Assignee). US 9465551 B1 . (Published 11 Oct 2016).

**Application number**: US 2015711525 (13 May 2015)

**Publication number**: US 9465551 B1 (11 October 2016)

**Priority number**: US 2015711525 (13 May 2015)

**Family table**: Complete family ID: 186180027 Simple family ID: 53054760

| Publication number | Kind | Publication date | Application number | Application date | Type |
|---|---|---|---|---|---|
| US 9465551 | B1 | 20161011 | US 2015711525 | 20150513 | B |

**Abstract (summary)**: Conditions are enforced to prevent unintended deletion of data stored by a data storage system. For example, to delete a collection of data, a condition on the collection of data's size may be enforced. The collection may be required to be empty, for example. In addition, a condition that there not exist a pending data processing operation that can affect fulfillment of the condition on the collection of data's size is also enforced.

**Specification**:
... the retrieval request may be based at least in part on the data object identifier that is included in the retrieval request. As described above, data object identifier may encode storage location information, payload validation information such as size, creation timestamp, payload digest and the like, metadata validation information, policy information and the like. In an embodiment, processing **404** the retrieval request includes decoding the information encoded in the data object identifier, for example, using ...

## Write horizon data management

**Inventor**: Donlan, Bryan JamesSeattle, WA, USPatent rights: US OnlyKumar, SandeepIssaquah, WA, USPatent rights: US Only

**Assignee**: Amazon Technologies, Inc.Reno, NV, USUS (Residence)Patent rights: US Only

**Publication info**: Donlan, Bryan James; Kumar, Sandeep (Inventors). Amazon Technologies, Inc. (Assignee). US 9037825 B1 . (Published 19 May 2015).

**Application number**: US 2012682501 (20 November 2012)

**Publication number**: US 9037825 B1 (19 May 2015)

**Priority number**: US 2012682501 (20 November 2012)

**Family table**: Complete family ID: 171612443 Simple family ID: 53054760

| Publication number | Kind | Publication date | Application number | Application date | Type |
|---|---|---|---|---|---|
| US 9037825 | B1 | 20150519 | US 2012682501 | 20121120 | B |

**Abstract (summary)**: Conditions are enforced to prevent unintended deletion of data stored by a data storage system. For example, to delete a collection of data, a condition on the collection of data's size may be enforced. The collection may be required to be empty, for example. In addition, a condition that there not exist a pending data processing operation that can affect fulfillment of the condition on the collection of data's size is also enforced.

**Specification**:
... the retrieval request may be based at least in part on the data object identifier that is included in the

retrieval request. As described above, data object identifier may encode storage location information, payload validation information such as size, creation timestamp, payload digest and the like, metadata validation information, policy information and the like. In an embodiment, processing **404** the retrieval request includes decoding the information encoded in the data object identifier, for example, using ...

## ARCHIVAL DATA STORAGE SYSTEM

**Inventor**: PATIEJUNAS, Kestutis410 Terry Ave North, Seattle, Washington 98109, US 98109Patent rights: AllLAZIER, Colin L410 Terry Ave North, Seattle, Washington 98109, US 98109Patent rights: AllSEIGLE, Mark C410 Terry Ave North, Seattle, Washington 98109, US 98109Patent rights: AllHAMILTON, James R410 Terry Avenue North, Seattle, Washington 98109, US 98109Patent rights: AllHENRY, Alyssa H410 Terry Avenue North, Seattle, Washington 98109, US 98109Patent rights: AllDONLAN, Bryan J410 Terry Ave North, Seattle, Washington 98109, US 98109Patent rights: AllCLAIBORN, Christian L410 Terry Ave North, Seattle, Washington 98109, US 98109Patent rights: All

**Assignee**: AMAZON TECHNOLOGIES, INC.P.O. Box 8102, Reno, Nevada 89507, US 89507US (Residence); US (Nationality)Patent rights: All

**Publication info**: PATIEJUNAS, Kestutis; LAZIER, Colin L; SEIGLE, Mark C; HAMILTON, James R; HENRY, Alyssa H; DONLAN, Bryan J; CLAIBORN, Christian L (Inventors). AMAZON TECHNOLOGIES, INC. (Assignee). WO 2014025820 A2 . (Published 13 Feb 2014).

**Application number**: WO 2013US53852 (06 August 2013)

**Publication number**: WO 2014025820 A2 (13 February 2014)

**Priority number**: US 2012569591 (08 August 2012)US 2012570088 (08 August 2012)US 2012570151 (08 August 2012)

**Family table**: Complete family ID: 324003900 Simple family ID: 50068694

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| CA 2830068 | A1 | 20120927 | CA 2830068 | | 20120320 | |
| AU 2012230989 | A1 | 20131003 | AU 2012230989 | A1 | 20120320 | |
| SG 193915 | A1 | 20131129 | SG 201370156 | A | 20120320 | |
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| WO 2014025820 | A3 | 20140501 | WO 2013US53852 | | 20130806 | |
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| JP 2014515860 | A | 20140703 | JP 2014501189 | | 20120320 | |
| CN 103930845 | A | 20140716 | CN 201280014274 | | 20120320 | |
| US 8805793 | B2 | 20140812 | US 2012570151 | | 20120808 | |
| IN 2013DN8094 | A | 20141219 | IN 2013DN8094 | | 20130916 | |
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| AU 2013299731 | A1 | 20150226 | AU 2013299731 | A1 | 20130806 | |
| SG 11201500836Q | A | 20150330 | SG 11201500836Q | A | 20130806 | |
| CN 104520822 | A | 20150415 | CN 201380042166 | | 20130806 | |
| KR 1020150041056 | A | 20150415 | KR 1020157005788 | | 20130806 | |
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| CN 104603740 | A | 20150506 | CN 201380042169 | | 20130806 | |

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| JP 5739579 | B2 | 20150624 | JP 2014501189 | | 20120320 | |
| IN 2015DN1689 | A | 20150703 | IN 2015DN1689 | | 20150227 | |
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| AU 2012230989 | B2 | 20150709 | AU 2012230989 | B2 | 20120320 | |
| EP 2883132 | A4 | 20150722 | EP 2013827419 | A | 20130806 | |
| US 9092441 | B1 | 20150728 | US 2012570029 | | 20120808 | |
| EP 2883170 | A4 | 20150729 | EP 2013828257 | A | 20130806 | |
| EP 2689315 | A4 | 20150819 | EP 2012761434 | A | 20120320 | |
| EP 2883145 | A4 | 20150819 | EP 2013828316 | A | 20130806 | |
| JP 2015149117 | A | 20150820 | JP 201588586 | | 20150423 | |
| JP 2015531125 | A | 20151029 | JP 2015526646 | | 20130806 | |
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| US 9225675 | B2 | 20151229 | US 2012570074 | | 20120808 | |
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| JP 6039733 | B2 | 20161207 | JP 201588586 | | 20150423 | |
| CA 2830068 | C | 20170110 | CA 2830068 | | 20120320 | |
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| AU 2015238911 | B2 | 20170202 | AU 2015238911 | B2 | 20151009 | |
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| BR 112015002837 | A2 | 20170808 | BR 20112015002837 | A | 20130806 | |
| US 9727559 | B2 | 20170808 | US 2012570088 | | 20120808 | |
| US 9727492 | B1 | 20170808 | US 2012569984 | | 20120808 | |
| KR 101766214 | B1 | 20170809 | KR 1020167012877 | | 20130806 | |
| KR 1020170092712 | A | 20170811 | KR 1020177021593 | | 20130806 | |
| JP 2017162485 | A | 20170914 | JP 201780044 | | 20170413 | |
| US 9767098 | B2 | 20170919 | US 2012570088 | | 20120808 | |
| US 9779035 | B1 | 20171003 | US 2012569984 | | 20120808 | |

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| CN 103930845 | B | 20171020 | CN 201280014274 | | 20120320 | |
| JP 6224102 | B2 | 20171101 | JP 2015526652 | | 20130806 | |
| EP 2689315 | B1 | 20171115 | EP 2012761434 | | 20120320 | |
| US 9830111 | B1 | 20171128 | US 2012569714 | | 20120808 | |
| DK 2689315 | T3 | 20171211 | DK 2012761434 | T | 20120320 | |
| JP 2017228302 | A | 20171228 | JP 2017152756 | | 20170807 | |
| ES 2648133 | T3 | 20171228 | ES 2012761434 | T | 20120320 | |
| NO 2790516 | T3 | 20171230 | NO 12857720 | A | 20121211 | |
| PT 2689315 | T | 20180104 | PT 2012761434 | T | 20120320 | |
| CN 107589812 | A | 20180116 | CN 201710862492 | | 20120320 | |
| JP 6276829 | B2 | 20180207 | JP 2016216454 | | 20161104 | |
| EP 3285138 | A1 | 20180221 | EP 2017188422 | | 20120320 | |
| US 9904788 | B2 | 20180227 | US 20164592 | | 20160122 | |
| CN 104603740 | B | 20180313 | CN 201380042169 | | 20130806 | |
| KR 101825905 | B1 | 20180322 | KR 1020177021593 | | 20130806 | |
| PL 2689315 | T3 | 20180330 | PL 2012761434 | T | 20120320 | |
| US 20180157853 | A1 | 20180607 | US 2018889053 | | 20180205 | |
| EP 3333713 | A1 | 20180613 | EP 2017196030 | | 20130806 | |
| AU 2018204309 | A1 | 20180705 | AU 2018204309 | A1 | 20180615 | |
| HU 037731 | T2 | 20180928 | HU 2012761434 | A | 20120320 | |
| US 10095728 | B2 | 20181009 | US 2016286473 | | 20161005 | |
| US 10120579 | B1 | 20181106 | US 2012570057 | | 20120808 | |
| US 10157199 | B2 | 20181218 | US 2016286473 | | 20161005 | |
| CN 104520822 | B | 20190108 | CN 201380042166 | | 20130806 | |
| JP 6463796 | B2 | 20190206 | JP 201794235 | | 20170510 | |

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|---|---|---|---|---|---|---|
| KR 101954594 | B1 | 20190306 | KR 1020157005788 | | 20130806 | |
| JP 6483746 | B2 | 20190313 | JP 201780044 | | 20170413 | |
| EP 2883132 | B1 | 20190501 | EP 2013827419 | | 20130806 | |
| EP 3285138 | B1 | 20190717 | EP 2017188422 | | 20120320 | |
| CA 2881475 | C | 20191217 | CA 2881475 | | 20130806 | |
| CN 104603776 | B | 20200512 | CN 201380042170 | | 20130806 | |
| US 10698880 | B2 | 20200630 | US 2015973715 | | 20151217 | |
| AU 2018204309 | B2 | 20201029 | AU 2018204309 | B2 | 20180615 | |
| CN 107589812 | B | 20201030 | CN 201710862492 | | 20120320 | |
| IN 350921 | A1 | 20201106 | IN 2013DN8094 | | 20130916 | |
| US 10936729 | B2 | 20210302 | US 2018889053 | | 20180205 | |
| EP 3805941 | A1 | 20210414 | EP 20197244 | | 20130806 | |
| CA 2881490 | C | 20220802 | CA 2881490 | | 20130806 | |

**Abstract (summary):** A cost-effective, durable and scalable archival data storage system is provided herein that allow customers to store, retrieve and delete archival data objects, among other operations. For data storage, in an embodiment, the system stores data in a transient data store and provides a data object identifier may be used by subsequent requests. For data retrieval, in an embodiment, the system creates a job corresponding to the data retrieval and provides a job identifier associated with the created job. Once the job is executed, data retrieved is provided in a transient data store to enable customer download. In various embodiments, jobs associated with storage, retrieval and deletion are scheduled and executed using various optimization techniques such as load balancing, batch processed and partitioning. Data is redundantly encoded and stored in self-describing storage entities increasing reliability while reducing storage costs. Data integrity is ensured by integrity checks along data paths.

**Specification:**

... the retrieval request may be based at least in part on the data object identifier that is included in the retrieval request. As described above, data object identifier may encode storage location information, payload validation information such as size, creation timestamp, payload digest and the like, metadata validation information, policy information and the like. In an embodiment, processing 604 the retrieval request includes decoding the information encoded in the data object identifier, for example, using ...

## INFORMATION PROCESSING SYSTEM, MANAGEMENT DEVICE, PROCESSING REQUEST DEVICE AND PROGRAM

**Inventor:** SAITO SHINICHI (齊藤 信一)神奈川県川崎市高津区坂戸3丁目2番1号 KSP R&D ビジネスパークビル 富士ゼロックス株式会社内

**Assignee:** FUJI XEROX CO LTD (富士ゼロックス株式会社 000005496)東京都港区赤坂九丁目7番3号

**Publication info:** SAITO SHINICHI (Inventor). FUJI XEROX CO LTD (Assignee). JP 2012003476 A . (Published 05 Jan 2012).

**Application number:** JP 2010137300 A (16 June 2010)

**Publication number:** JP 2012003476 A (05 January 2012)

**Priority number:** JP 2010137300 A (16 June 2010)

**Family table:** Complete family ID: 146495897 Simple family ID: 45329668

| Publication number | Kind | Publication date | Application number | Kind | Application date | Type |
|---|---|---|---|---|---|---|
| CN 102289385 | A | 20111221 | CN 201010590046 | | 20101209 | B |
| US 20110314157 | A1 | 20111222 | US 2010917164 | A | 20101101 | |
| JP 2012003476 | A | 20120105 | JP 2010137300 | A | 20100616 | |
| JP 5533315 | B2 | 20140625 | JP 2010137300 | | 20100616 | |

**Abstract (summary):** PROBLEM TO BE SOLVED: To suppress delay by data transfer in a system that allocates at least a part of computer resources from among a computer group and performs data processing.

SOLUTION: An information processing system 10 receives an allocation request of computer resources for processing data and identification information for identifying data processing; allocates, corresponding to the received allocation request, at least a part of the computer resources included in one of one or plural computers 300; specifies storage destination information indicating a storage destination of the data in the allocated computer resources on the basis of the allocated computer resources; transfers processing object data to be processed by the allocated computer resources to the storage destination indicated in the specified storage destination information; and arranges, in the allocated computer resources, one or plural programs configuring the data processing identified by the received identification information so as to be executed using the allocated computer resources after the processing object data are transferred to the storage destination.

**Specification:**

... the virtual machine, a virtual machine processing data storage destination information indicating (specific) is generated. For example, the processing of the data storing destination information generating unit 110, and

can generate a file name is stored as a storage location information (data storage device) contained in storage in a virtual machine by the virtual machine section 108. The storage location information, data is uniquely identifying the virtual machine if rehardlessly ~~~ generated on the basis of the rules. In this embodiment, the processed data storage destination information generating unit 110, for example, a virtual machine (VM1), virtual machine of storage (S1), the ...

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## DYNAMIC CODE SELECTION BASED ON DATA POLICIES

**Inventor**: Balasubramanian, SwaminathanTroy, MI, USPatent rights: US OnlyDe, Radha M.West Bengal, INPatent rights: US OnlyO'Connell, Brian M.Cary, NC, USPatent rights: US OnlyVasudevan, CheranelloreBastrop, TX, USPatent rights: US Only

**Assignee**: International Business Machines CorporationArmonk, NY, USUS (Residence)Patent rights: US Only

**Publication info**: Balasubramanian, Swaminathan; De, Radha M.; O'Connell, Brian M.; Vasudevan, Cheranellore (Inventors). International Business Machines Corporation (Assignee). US 20150106797 A1 . (Published 16 Apr 2015).

**Application number**: US 201352799 (14 October 2013)

**Publication number**: US 20150106797 A1 (16 April 2015)

**Priority number**: US 201352799 (14 October 2013)

**Family table**: Complete family ID: 171071361 Simple family ID: 52810776

| Publication number | Kind | Publication date | Application number | Application date | Type |
|---|---|---|---|---|---|
| US 20150106797 | A1 | 20150416 | US 201352799 | 20131014 | B |
| US 9606783 | B2 | 20170328 | US 201352799 | 20131014 | |

**Abstract (summary)**: In a method for dynamically replacing code within a software application on a device, an annotated code segment that performs a function according to a first data policy is received. The computer determines an alternate segment that performs the function according to a second data policy.

**Specification**:
... policy database **140** is accessible to energy policy server program **100**, energy policy client program **170**, and/or application execution function **120**. Energy policy server program **100** operates to retrieve alternate data structure classes or other code segments, generate compiled code for each data structure class or code segment, store the alternate compiled code, and otherwise assist in selecting a data structure class or code segment that matches a particular data policy or energy policy. In one embodiment, energy policy server program **100** includes code generation function **110**. In one embodiment, energy policy server program **100** resides on ...

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**EAST Search History**

**EAST Search History (Prior Art)**

| Ref # | Hits | Search Query | DBs | Default Operator | Plurals | Time Stamp |
|---|---|---|---|---|---|---|
| L1 | 4 | "8578111".pn. or "6973556".pn. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2019/04/29 11:14 |
| L2 | 4041 | (programmable with memory with controller).clm. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2019/04/29 11:16 |
| L3 | 6 | (programmable with memory with controller with policy).clm. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2019/04/29 11:17 |
| L4 | 100 | ((processor or microprocessor or computer or cpu) with memory adj5 controller with policy).clm. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2019/04/29 11:23 |
| L5 | 7 | "20110075555" | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2019/04/29 11:25 |
| L6 | 4 | "20160054922" | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2019/04/29 11:26 |
| L7 | 9 | 4 AND ( (G06F13/1694 OR G06F2009/45583 OR G06F2212/70).CPC. ) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2019/04/29 11:30 |
| L8 | 349 | ((processor or microprocessor or computer or cpu) with memory adj5 controller with policy) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2019/04/29 11:33 |
| L9 | 25 | 8 AND ( (G06F13/1694 OR G06F2009/45583 OR G06F2212/70).CPC. ) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2019/04/29 11:34 |
| L10 | 1282 | ((jack or john) and lane).xp. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2019/04/29 11:52 |
| L11 | 6 | 10 and ((processor or microprocessor or computer or cpu) with memory adj5 controller with policy) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2019/04/29 11:52 |
| L12 | 708 | (((memory or device) with controller) with object with (Id or identif$5)).clm. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2019/04/29 12:04 |



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| | | | | | | |
|---|---|---|---|---|---|---|
| L13 | 0 | 12 AND ( (G06F13/1694 OR G06F2009/45583 OR G06F2212/70).CPC. ) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2019/04/29 12:07 |
| L14 | 15 | (((memory or device) with controller) with object with (Id or identif$5) same (policy or rule)).clm. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2019/04/29 12:08 |
| L15 | 2 | "20100218177" | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2019/04/29 12:18 |
| L16 | 5 | "20150052167" | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2019/04/29 12:26 |
| L17 | 2 | 16 and (storage adj5 devices) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2019/04/29 12:26 |
| L18 | 2 | 16 and (controller) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2019/04/29 12:28 |
| L19 | 3 | 16 and (storage with (media or device)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2019/04/29 12:34 |
| L20 | 3 | 16 and (instruct$5 or code or program$5 or application or app) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2019/04/29 12:40 |
| L21 | 3 | 16 and (instruct$5 or code or program$5 or application or app or software) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2019/04/29 12:42 |
| L22 | 2 | 16 and (policy or rule) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2019/04/29 12:44 |
| L23 | 3 | 16 and (request$4) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2019/04/29 12:47 |
| L24 | 3 | 16 and (data or object) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2019/04/29 12:49 |
| L26 | 2 | 16 and ((stor$5 or writ$5 or record$5 or sav$5) with (policy or rule)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2019/04/29 12:50 |
| L27 | 2 | 16 and (identifier) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2019/04/29 12:55 |
| L28 | 2 | 16 and ((read$5 or recover$5 or return$4) with (object or id or identifier)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; | OR | ON | 2019/04/29 12:58 |



**Meta Platforms, Inc. and Samsung Electronics Co. Ltd. - Ex. 1002**
**Page 165**

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | IBM_TDB | | | |
| L29 | 2 | 16 and ((read$5 or recover$5 or return$4)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2019/04/29 13:00 |
| L30 | 3 | 16 and (metadata) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2019/04/29 13:04 |
| L31 | 2 | 16 and (metadata with (id or identifier)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2019/04/29 13:09 |
| L32 | 2 | 16 and (image or text or picture) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2019/04/29 13:31 |
| L33 | 2 | 16 and (image or text or picture or density or compact$4) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2019/04/29 13:32 |
| L34 | 0 | 16 and (density or compact$4) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2019/04/29 13:32 |

**4/ 29/ 2019 2:09:51 PM**

**EAST Search History**

**EAST Search History (Prior Art)**

| Ref # | Hits | Search Query | DBs | Default Operator | Plurals | Time Stamp |
|---|---|---|---|---|---|---|
| L1 | 87,844 | g06f3/0632 or g06f9/3004 or g06f9/06 or g06f3/0674 or g06f3/0659 or g06f3/068 or g06f3/0665 or g06f3/0673 or g06f3/0604 or g06f3/0619 or g06f3/061 or g06f3/0679 or g06f3/0676 or g0f3/0658 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2021/12/16 09:04 |
| L2 | 5,272 | ((policy or policies or script or overlay or code or coding or algorithm or firmware or program$5 or rule or guideline) same (storage or memory or dram or sram or ssd or disk or raid) same (record$4 or writ$4 or stor$4 or program$4) same (id or identif$4 or address$4 or point$4) same (control$4 or processor or cpu or microprocessor) same (content or data or object or block or byte or word or page) same (type or characteristic or defect$4 or head or strength) same (read$4 or recover$4 or request$4 or access$4) same (density or protect$4)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2021/12/16 09:04 |
| L3 | 194 | L1 and L2 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2021/12/16 09:04 |
| L4 | 100 | L3 and @ad<"20170120" | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2021/12/16 09:04 |
| L5 | 87,844 | g06f3/0632 or g06f9/3004 or g06f9/06 or g06f3/0674 or g06f3/0659 or g06f3/068 or g06f3/0665 or g06f3/0673 or g06f3/0604 or g06f3/0619 or g06f3/061 or g06f3/0679 or g06f3/0676 or g0f3/0658 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2021/12/16 09:12 |
| L6 | 11,283 | ((policy or policies or script or overlay or code or coding or algorithm or firmware or program$5 or rule or | US-PGPUB; USPAT; USOCR; FPRS; | OR | ON | 2021/12/16 09:12 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | guideline) same (storage or memory or dram or sram or ssd or disk or raid) same (record$4 or writ$4 or stor$4 or program$4) same (id or identif$4 or address$4 or point$4) same (control$4 or processor or cpu or microprocessor) same (content or data or object or block or byte or word) same (type or characteristic or defect$4 or head or strength) same (read$4 or recover$4 or request$4 or access$4)).clm. | EPO; JPO; DERWENT; IBM_TDB | | | |
| L7 | 275 | L5 and L6 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2021/12/16 09:12 |

12/16/2021 9:14:31 AM
C:\Users\jlane\Documents\EAST\Workspaces\16990433-2.wsp

***Potential References***

## US20170075909 In-line policy management with multi-level object handle

UNITED STATES UTILITY APPLICATION PUBLICATION USPTO GLOBAL EPO

| | |
|---|---|
| PUBLICATION NUMBER: US 2017/0075909 A1 | PUBLICATION DATE: 16-Mar-2017 |
| APPLICATION NUMBER: US 15/359,249 | FILING DATE: 22-Nov-2016 |
| SIMPLE FAMILY: 57351757 (size 3) | EARLIEST PRIORITY DATE: 08-Dec-2009 |

PRIMARY INFORMATION (SOURCE: USPTO)

**Abstract (English):**
A distributed object store in a network storage system uses location-independent global object identifiers (IDs) for stored data objects. The global object ID enables a data object to be seamlessly moved from one location to another without affecting clients of the storage system, i.e., "transparent migration". The global object ID can be part of a multilevel object handle, which also can include a location ID indicating the specific location at which the data object is stored, and a policy ID identifying a set of data management policies associated with the data object. The policy ID may be associated with the data object by a client of the storage system, for example when the client creates the object, thus allowing "inline" policy management. An object location subsystem (OLS) can be used to locate an object when a client request does not contain a valid location ID for the object.

**Inventors:**
Goodson, Garth Richard (Fremont, CA, US) • Pasupathy, Shankar (Sunnyvale, CA, US) • Voruganti, Kaladhar (San Jose, CA, US) • Kavuri, Ravi Kumar (San Ramon, CA, US) • Srinivasan, Sudhir (Acton, MA, US)

**Applicants:**
NetApp, Inc. (Sunnyvale, CA, US)

**Specification:**
distributed object store in a network storage server system. The distributed object store can be part of a content repository, which aside from the distributed object store includes a presentation layer, a metadata subsystem, and a policy-based management subsystem. The content repository can be implemented in a multi-node storage server cluster.
**[0008]** The distributed object store creates and uses system-generated, location-independent (location-transparent), global object identifiers (IDs) for sub-volume level data objects (e.g., files) managed by the storage system. A "data object" can be any unit of data, such as a file, a block of data, or a logical unit ("LUN"). A "sub-volume level" data object is a data object that can be stored within a volume (defined below). The global object ID described herein enables the corresponding data object to be seamlessly moved from one location to another (e.g., from one physical or logical storage container to another) without affecting clients of the storage system; this capability can be called "transparent migration".
**[0009]** The global object ID can be part of a multilevel object handle, which also includes (in addition to the global object ID) a location identifier that indicates the specific location at which the data object is stored. The multilevel object handle can also include other information such as a policy ID that identifies a

set of one or more data management policies associated with the data object. The policy ID may be associated with the data object by a client of the storage system, for example at the time the client creates the data object. Embedding policy information within the object handle allows policy management to be implemented efficiently within the input/output (I/O) path of the server system, i.e., "inline" policy management. For example, in response to receiving from a client a request that includes the object handle, the server system uses the policy ID in the object handle to look up in a database the particular policy or policies associated with that policy ID, and then applies such policy or policies to the request and/or to the data object.

system **202** looks up in the policy store the policy or policies that correspond to the (valid) policy ID, at **904**. At **905** the server system **202** then applies the identified policy or policies. A policy may apply to a specific data object (e.g., "encrypt file A"). A policy can also (or alternatively) apply to a particular client or user (e.g., "Joe is prohibited from [redacted] file A") or to a particular logical container (e.g., "volume X is read-only"). The server system **202** sends an appropriate response to the client at **906**, and the process then ends.

**[0085]** FIG. 10 illustrates an example of the process of associating a data object with one or more policies. At **1001** the server system **202** receives from a client **204** a request to create a data object. At **1002** the server system **202** checks whether the request specifies one or more policies for the data object. If the request specifies one or more policies, then at **1003** the server system **202** creates a policy ID and stores the specified policy or policies in the policy store in association with that policy ID. The policies can be expressed in any known or convenient format. The server system **202** then creates an object handle including a global object ID for the object and includes the created policy ID in the object handle at **1004**. At **1005** the server system **202** creates the target object. The server system **202** includes in the object handle a location ID identifying the identifying the stored location of the object

## US9449007 Controlling access to XAM metadata

UNITED STATES UTILITY PATENT USPTO GLOBAL DOC

| | |
|---|---|
| PUBLICATION NUMBER: US 9449007 B1 | PUBLICATION DATE: 20-Sep-2016 |
| APPLICATION NUMBER: US 12/826,534 | FILING DATE: 29-Jun-2010 |
| SIMPLE FAMILY: 56896073 (size 1) | EARLIEST PRIORITY DATE: 29-Jun-2010 |

PRIMARY INFORMATION (SOURCE: USPTO)

**Abstract (English):**
A method is used in controlling access to XAM metadata. An object derived from a set of content is stored in an object addressable data storage system. The object has an object identifier. Storage system specific metadata is added to the object. The storage system specific metadata is accessible when the object is retrieved using the object identifier. Based on sub-object access control, a retrieving application is allowed to have access to only a subset of the object.

**Inventors:**
Wood, Douglas A. (Westford, MA, US) • Todd, Stephen J. (Shrewsbury, MA, US)

**Applicants:**
Wood, Douglas A. (Westford, MA, US) • Todd, Stephen J. (Shrewsbury, MA, US)

**Assignees:**
EMC Corporation (Hopkinton, MA, US)

**Specification:**
The eXtensible Access Method (XAM) proposal is a proposed standard, that employs content addressable storage techniques, that is being developed jointly by members of the storage industry and provides a specification for storing and managing content and metadata associated with the content. In accordance with XAM, an "XSet" is a logical object that can be defined to include one or more pieces of content and metadata associated with the content, and the XSet can be accessed using a single object identifier (referred to as an XUID). As used herein, a logical object refers to any logical construct or logical unit of storage, and is not limited to a software object in the context of object-oriented systems. As discussed above, an XSet can store one or more pieces of content. For example, an XSet can be created to store a photograph and the photograph itself can be provided as a first "stream" to the XSet. One or more files (e.g., text files) can be created to include metadata relating to the photograph, and the metadata file(s) can be provided to the XSet as one or more additional streams. Once the XSet has been created, a XUID is created for it so that the content (e.g., the photograph) and its associated metadata can thereafter be accessed using the single object identifier (e.g., its XUID)
receive and process access requests that identify data organized by file system. A file system is a logical construct that translates physical blocks of storage on a storage device into logical files and directories. In this way, the file system aids in organizing content stored on a disk. For example, an application program having ten logically related blocks of content to store on disk may store the content in a single file in the file

system. Thus, the application program may simply track the name and/or location of the file, rather than tracking the block addresses of each of the ten blocks on disk that store the content.
File systems maintain metadata for each file that, inter alia, indicates the physical disk locations of the content logically stored in the file. For example, in UNIX file systems an inode is associated with each file and stores metadata about the file. The metadata includes information such as access permissions, time of last access of the file, time of last modification of the file, and which blocks on the physical storage devices store its content. The file system may also maintain a map, referred to as a free map in UNIX file systems, of all the blocks on the physical storage system at which the file system may store content. The file system tracks which blocks in the map are currently in use to store file content and which are available to store file content.
When an application program requests that the file system store content in a file, the file system may use the map to select available blocks and send a request to the physical storage devices to store the file content at the selected blocks. The file system may then store metadata (e.g., in an inode) that associates the filename for the file with the physical location of the content on the storage devices. When the file system receives a subsequent request to access the file, the file system may access the metadata, use it to determine the blocks on the physical storage devices at which the file's content is physically stored.
XAM provides a mechanism for migrating files from performance based pre-provisioned locations to location independent archived storage. True Hierarchical Storage Management (HSM) and policy driven lifecycle management is enabled. A self describing canonical format can include references to key stores, authentication warehouses, and policy information in a portable fashion. Any XAM device can be used as a migration destination.
Thus, no matter which protocol is used to ingest data, the data is stored using object-based storage processes, in combinations of objects and metadata, so that under the XAM protocol content can be stored and metadata can be associated along with it, and a unique object identifier can be returned back.

# US20150052167 Searchable data in an object storage system

UNITED STATES UTILITY APPLICATION PUBLICATION USPTO GLOBAL IPO

| | |
|---|---|
| PUBLICATION NUMBER: US 2015/0052167 A1 | PUBLICATION DATE: 19-Feb-2015 |
| APPLICATION NUMBER: US 13/966,108 | FILING DATE: 13-Aug-2013 |
| SIMPLE FAMILY: 52467597 (size 2) | EARLIEST PRIORITY DATE: 13-Aug-2013 |

PRIMARY INFORMATION (SOURCE: USPTO)

**Abstract (English):**
A searchable data storage system is described herein. The storage system includes zones that are independent, and autonomous from each other. The zones include nodes that are independent and autonomous. The nodes include storage devices. When a data item is stored, a local database is updated with information about the newly stored data item. When a search for a data item meeting certain metadata criteria is received, multiple concurrent searches are conducted across all storage devices in all nodes in all zones of the storage system. The configuration of the data storage system allows a parallel concurrent search at constituent storage devices to be performed quickly.

**Inventors:**
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**Applicants:**
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**Assignees:**
DataDirect Networks, Inc. (Chatsworth, CA, US)

**Specification:**
each object includes a storage policy identifier and a data portion. The object including its constituent data portion may be stored among storage nodes and storage zones according to the storage policy specified by the storage policy identifier included in the object. Various policies may be maintained and distributed or known to the nodes in all zones in the distributed data storage system.
The replication and placement component of a policy defines the replication and placement of data objects in the data storage system.
objects **310** are stored on the storage devices, object specific information including certain metadata about the objects are stored in the object database **320**. The object database **320** may be indexed according to the object identifier or OIDs of the objects stored on the storage devices. In one embodiment, each entry in the object database **320** is limited to 256 bytes or less of data per object. Thus the object database may only store a small amount of information for each object. In alternative embodiments the object database is larger to allow for the storage of a larger number of fields or larger amount of object specific information or metadata. The maximum size of the embedded object databases may be a configuration parameter of the system or it may be a parameter of the policy that the objects are stored under. Example metadata fields that may be stored in the object database as object specific information include a user identifier or UID for

the author or owner or caretaker of the object, and pertinent time information for the object, including time created and time stored, and may include ATIME, CTIME and MTIME values for the object. Additional fields may also be stored as metadata regarding the object such as a code or designator or text name for [a] the kind of data represented by the object, including, for example, image, video, audio, text document, and the like, and/or [b] the content of the data, such as, for example, name of person or location or subject, and/or [c] geo-location of where the data was obtained or captured, and/or [d] other information concerning the object. The fields or entries in the object database may be stored as field/value pairs. The object database may be searchable according to a multiple operators including "equal", "or", "and", "less than" and "greater than". In one embodiment the object database may be an SQLITE® database. In other embodiments the database may be a MONGODB® or other key-value store.

**[0040]** The objects and the object database may be referenced by object identifier or OIDs like those shown and described regarding FIG. 4. Referring now to FIG. 4, a block diagram of an object identifier used in the data storage system is shown. According to the data storage system described herein, an object identifier **400** includes two components and may include three or more components. The object identifier **400** includes a location identifier **404** and a unique identifier **406**. The object identifier **400** may optionally include flags **408** and other fields. The location identifier **404** specifies a device, address, storage node or nodes where an object resides. The specific format of the location identifier may be system dependent.

**[0041]** In one version of the system, the object identifier **304** may include both a group identifier ("group ID") and an index. The group ID may represent a collection of objects stored under the same policy, and having the same searchable metadata fields; the group ID of the object becomes a reference for the embedded database of the object group. The group ID may be used to map the object to a particular storage node or storage device such as a hard disk drive. The mapping may be stored in a mapping table maintained by the object storage system. The mapping information is distributed and is hierarchical. More specifically, the system stores a portion of mapping information in memory, and the storage nodes hold a portion of the mapping information in their memory. Master copies of the mapping information are kept on disk or other nonvolatile storage medium on the storage nodes. The master copies of the mapping information are dynamically updated to be consistent with any changes made while the system is active. The index may be the specific location of the object within the group. The index may refer to a specific location on disk or other storage device.

**Method for sharding disk partition allocated to tenant based on rules created for tenants in data storage unit by storage module involves Receiving tenant memory model, Generate UID, allocate disk partition, and create UID map to set rules**

**Inventor**: Dutta, DGeorge, JUdupi, Y BZhang, K

**Assignee**: CISCO TECHNOLOGY INC (CISC)

**Publication info**: Dutta, D; George, J; Udupi, Y B; Zhang, K (Inventors). CISCO TECHNOLOGY INC (Assignee). US 11354039 B2 . (Published 07 Jun 2022). 2020076 (First update). 2022046 (Last update). Drawing available.

**Application number**: US 2020879612 A (20 May 2020)

**Publication number**: US 20200285396 A1 (10 September 2020)

**Priority number**: US 2020879612 A (20 May 2020)US 2019268397 A (05 February 2019)US 2015713851 A (15 May 2015)

**Priority applications**: US 2020879612 A (20 May 2020); US 2019268397 A (05 February 2019); US 2015713851 A (15 May 2015)

| Publication number | Kind | Publication date | Application number | Kind | Application date | Update code | Type |
|---|---|---|---|---|---|---|---|
| US 20200285396 | A1 | 20200910 | US 2020879612 | A | 20200520 | 2020076 | B |
| US 11354039 | B2 | 20220607 | US 2020879612 | A | 20200520 | 2022046 | E |

**Alerting**

**Novelty**

The method involves receiving (302) indications of subscription memory model for a tenant. An indication of policies to be applied to date of the tenant is received (304). The indication of a data storage module is received (306) for the tenant model. The unique identifier (UID) is generated (308)for data storage module. When automatic selection of data partition is selected, the disk partition is identified (310) and allocated for the tenant based on policies and subscription type. When the manual selection of partition is performed an indication of disk partition to be allocated for the tenant is received and allocate disk partition for the tenant indicated by the user. The map of UID is created (316) to allocate disk partition. The mapping of UID is created (318) to the tenant partition. The rules for the tenant specific data storage module is created (320) based on the policies.

**Description**

INDEPENDENT CLAIMS are also included for the following:

1. non-transitory machine readable storage medium; and

2. an apparatus for sharding disk partition of tenants.

**Use**

Method for sharding disk partition allocated to tenant based on rules and policies created for tenants in data storage system by storage modules.

**Advantage**

The method enables distributed storage system to produce unique, per-tenant configurations for tenant data stored in a shared storage cluster. The differential behavior enabled for each tenant can provide the benefits of performance isolation between tenants and failure isolation between disk partitions. By enabling tenant-specific partitions per disk with a dedicated data storage module per tenant, a partition failure that occurs for a particular tenant can trigger a recovery process that impacts only that tenant during re-balancing and recreating replicas of data that is lost due to the failure. The disk shared by limited number of tenants minimize the risk of interruption by other tenants... administration host **10** receives an indication of policies to be applied to data of the tenant. The policies may be configured by the user via a user interface. Policies may include, for example, performance requirements, distribution requirements, replication factor, etc. preferred by the tenant. In some embodiments, any of the performance, distribution and/or replication requirements may be included in a subscription model rather than being configured separately. At **306**, administration host **10** receives an indication of a data storage module to be assigned to the tenant. The data storage module may be assigned to the tenant by the user via a user interface, and may be dedicated to that tenant. At **308**, a unique identifier (UID) may be generated for the data storage module assigned to the tenant.

**EAST Search History**

**EAST Search History (Prior Art)**

| Ref # | Hits | Search Query | DBs | Default Operator | Plurals | Time Stamp |
|---|---|---|---|---|---|---|
| S220 | 2 | "7581061".pn. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2019/10/21 08:53 |
| S221 | 0 | S220 and (density) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2019/10/21 08:53 |
| S222 | 677 | ((policy or rule) with density).clm. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2019/10/21 09:00 |
| S223 | 2028 | ((policy or rule) with density).ab,ti. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2019/10/21 09:01 |
| S224 | 13555 | ((policy or rule) with density) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2019/10/21 09:01 |
| S225 | 1 | 15/804,772 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2019/10/21 09:04 |
| S226 | 1 | S225 and (error or reduc$4) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2019/10/21 09:04 |
| S227 | 74 | ((policy or rule) same density same | US-PGPUB; | OR | ON | 2019/10/21 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | (error or fail$4 or bad or defect$6 or corrupt$5)).clm. | USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | | | 09:06 |
| S228 | 316 | ((policy or rule) same density same (error or fail$4 or bad or defect$6 or corrupt$5)).ab,ti. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2019/10/21 09:06 |
| S229 | 3392 | ((policy or rule) same density same (error or fail$4 or bad or defect$6 or corrupt$5)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2019/10/21 09:07 |
| S230 | 20 | S227 AND ( (G06F17/5081 OR G06F17/5072 OR G06F17/5068 OR G06F11/104 OR G06F11/1076 OR G06F11/3696 OR G06F16/9027 OR G06F21/552 OR G06F21/566 OR G06F17/18 OR G06F17/5045 OR G06F21/554 OR G06F21/577 OR G11C29/785 OR G11C29/808).CPC. ) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2019/10/21 09:39 |
| S231 | 707 | ((policy or rule) same density same (error or fail$4 or bad or defect$6 or corrupt$5) same (stor$4 or writ$4)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2019/10/21 09:46 |
| S232 | 15 | ((policy or rule) same density same (error or fail$4 or bad or defect$6 or corrupt$5) same (stor$4 or writ$4)).clm. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2019/10/21 09:46 |
| S233 | 34 | ((policy or rule) same density same (error or fail$4 or bad or defect$6 or corrupt$5) same (stor$4 or writ$4)).ab,ti. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2019/10/21 11:24 |
| S234 | 707 | ((policy or rule) same density same (error or fail$4 or bad or defect$6 or corrupt$5) same (stor$4 or writ$4)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2019/10/21 11:27 |
| S235 | 19 | S234 AND ( (G06F11/10 OR G06F16/27 OR G06F17/5068 OR G06F17/5072 OR G06F17/5077 OR G06F17/5081 OR G06F21/126 OR G06F21/566 OR G06F3/0604 OR G06F3/061 OR | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; | OR | ON | 2019/10/21 11:27 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | G06F3/0619 OR G06F3/0632 OR G06F3/0658 OR G06F3/0665 OR G06F3/0673 OR G06F3/068 OR G06F9/485).CPC. ) | DERWENT; IBM_TDB | | | |
| S236 | 1 | 15/804,772 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2019/10/21 17:56 |
| S237 | 1 | S236 and ("605") | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2019/10/21 17:56 |
| S238 | 1 | S236 and (programmable with processor) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2019/10/21 17:57 |
| S239 | 1 | S236 and (corrupt$5 or error) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2019/10/21 18:02 |
| S240 | 184 | (record$5 same (density or capacity) same (corrupt$5 or bad or fail$5 or error) same (disk or disc or track or magnetic)).clm. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2019/10/21 18:07 |
| S241 | 23 | S240 AND ( (G11B27/36 OR G11B19/041 OR G11B20/12).CPC. ) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2019/10/21 18:16 |
| S242 | 2 | 12/164,336 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2019/10/21 18:21 |
| S243 | 2 | S242 and (density or capacity or frequency) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2019/10/21 18:21 |

**10/22/2019 7:42:58 AM**
**C:\Users\jlane\Documents\EAST\Workspaces\15896879.wsp**



**Meta Platforms, Inc. and Samsung Electronics Co. Ltd. - Ex. 1002**

**EAST Search History**

**EAST Search History (Prior Art)**

| Ref # | Hits | Search Query | DBs | Default Operator | Plurals | Time Stamp |
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| S3 | 87,349 | g06f3/0632 or g06f9/3004 or g06f9/06 or g06f3/0674 or g06f3/0659 or g06f3/068 or g06f3/0665 or g06f3/0673 or g06f3/0604 or g06f3/0619 or g06f3/061 or g06f3/0679 or g06f3/0676 or g0f3/0658 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2021/09/14 06:44 |
| S4 | 792,743 | (policy or policies or script or overlay or code or coding or algorithm or firmware or program$5 or rule or guideline) same (storage or memory or dram or sram or ssd or disk or raid) same (record$4 or writ$4 or stor$4 or program$4) same (id or identif$4 or address$4 or point$4) same (control$4 or processor or cpu or microprocessor) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2021/09/14 06:57 |
| S5 | 2 | "10776023".pn. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2021/09/14 07:02 |
| S6 | 98,575 | (policy or policies or script or overlay or code or coding or algorithm or firmware or program$5 or rule or guideline) same (storage or memory or dram or sram or ssd or disk or raid) same (record$4 or writ$4 or stor$4 or program$4) same (id or identif$4 or address$4 or point$4) same (control$4 or processor or cpu or microprocessor) same (content or data or object or block or byte or word) same (type or characteristic or defect$4 or head or strength) same (read$4 or recover$4 or request$4 or access$4) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2021/09/14 07:36 |
| S7 | 10,971 | ((policy or policies or script or overlay or code or coding or algorithm or firmware or program$5 or rule or guideline) same (storage or memory or dram or sram or ssd or disk or raid) same (record$4 or writ$4 or stor$4 or | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2021/09/14 07:38 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | program$4) same (id or identif$4 or address$4 or point$4) same (control$4 or processor or cpu or microprocessor) same (content or data or object or block or byte or word) same (type or characteristic or defect$4 or head or strength) same (read$4 or recover$4 or request$4 or access$4)).clm. | | | | |
| S8 | 264 | S3 and S7 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2021/09/14 07:43 |
| S9 | 10,075 | ((jack or john) and lane).xp. or (reg$7 and bragdon).xp. or (glen$4 and gossage).xp. or (brian and peugh).xp. or (kevin and verbrugge).xp. or (gary and portka).xp. or ((heip or hiep ) and nguyen).xp. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2021/09/14 07:46 |
| S10 | 57 | S7 and S9 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2021/09/14 07:47 |
| S11 | 5 | "20100100680" | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2021/09/14 12:35 |
| S12 | 0 | S11 and (polic$4) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2021/09/14 12:35 |
| S13 | 3 | S11 and (rule or program$4 or guideline) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2021/09/14 12:36 |
| S14 | 10 | "20170091120" | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; | OR | ON | 2021/09/15 13:45 |

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|---|---|---|---|---|---|---|
| | | | DERWENT; IBM_TDB | | | |
| S15 | 87,349 | g06f3/0632 or g06f9/3004 or g06f9/06 or g06f3/0674 or g06f3/0659 or g06f3/068 or g06f3/0665 or g06f3/0673 or g06f3/0604 or g06f3/0619 or g06f3/061 or g06f3/0679 or g06f3/0676 or g0f3/0658 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2021/09/15 13:47 |
| S16 | 10,971 | ((policy or policies or script or overlay or code or coding or algorithm or firmware or program$5 or rule or guideline) same (storage or memory or dram or sram or ssd or disk or raid) same (record$4 or writ$4 or stor$4 or program$4) same (id or identif$4 or address$4 or point$4) same (control$4 or processor or cpu or microprocessor) same (content or data or object or block or byte or word) same (type or characteristic or defect$4 or head or strength) same (read$4 or recover$4 or request$4 or access$4)).clm. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2021/09/15 13:47 |
| S17 | 264 | S15 and S16 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2021/09/15 13:47 |
| S18 | 10,075 | ((jack or john) and lane).xp. or (reg$7 and bragdon).xp. or (glen$4 and gossage).xp. or (brian and peugh).xp. or (kevin and verbrugge).xp. or (gary and portka).xp. or ((heip or hiep ) and nguyen).xp. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2021/09/15 13:47 |
| S19 | 57 | S16 and S18 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2021/09/15 13:47 |
| S20 | 87,349 | g06f3/0632 or g06f9/3004 or g06f9/06 or g06f3/0674 or g06f3/0659 or g06f3/068 or g06f3/0665 or g06f3/0673 or g06f3/0604 or g06f3/0619 or g06f3/061 or g06f3/0679 or g06f3/0676 or g0f3/0658 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2021/09/15 14:53 |

| | | | | | | |
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| S21 | 10,971 | ((policy or policies or script or overlay or code or coding or algorithm or firmware or program$5 or rule or guideline) same (storage or memory or dram or sram or ssd or disk or raid) same (record$4 or writ$4 or stor$4 or program$4) same (id or identif$4 or address$4 or point$4) same (control$4 or processor or cpu or microprocessor) same (content or data or object or block or byte or word) same (type or characteristic or defect$4 or head or strength) same (read$4 or recover$4 or request$4 or access$4)).clm. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2021/09/15 14:53 |
| S22 | 264 | S20 and S21 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2021/09/15 14:53 |
| S23 | 10,075 | ((jack or john) and lane).xp. or (reg$7 and bragdon).xp. or (glen$4 and gossage).xp. or (brian and peugh).xp. or (kevin and verbrugge).xp. or (gary and portka).xp. or ((heip or hiep ) and nguyen).xp. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2021/09/15 14:53 |
| S24 | 57 | S21 and S23 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2021/09/15 14:53 |
| S25 | 247 | S22 not S24 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2021/09/15 14:53 |
| S26 | 5,162 | ((policy or policies or script or overlay or code or coding or algorithm or firmware or program$5 or rule or guideline) same (storage or memory or dram or sram or ssd or disk or raid) same (record$4 or writ$4 or stor$4 or program$4) same (id or identif$4 or address$4 or point$4) same (control$4 or processor or cpu or microprocessor) same (content or data or object or block or byte or word or page) same (type or | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2021/09/15 17:26 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | characteristic or defect$4 or head or strength) same (read$4 or recover$4 or request$4 or access$4) same (density or protect$4)) | | | | |
| S27 | 185 | S20 and S26 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2021/09/15 17:29 |
| S28 | 100 | S27 and @ad<"20170120" | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2021/09/15 17:44 |

9/16/2021 9:18:15 AM
C:\Users\jlane\Documents\EAST\Workspaces\16990433.wsp

## Securing Writes to Memory Modules Having Memory Controllers

Gopal, Vinodh; Wolrich, Gilbert M.; Yap, Kirk S. (Inventors). Gopal, Vinodh; Wolrich, Gilbert M.; Yap, Kirk S. (Assignees). **US 20170091120 A1**. (Published 30 Mar 2017).

**Specification:**

... to the memory controller. This information about storage policies is stored inside the memory controller or in the memory itself. The storage policy may be based on a particular characteristic of the data to be stored including the fact the data values are in a particular sequence (i.e. sequential or monotonic), that the data values are of a ...

may involve a unique encryption key inaccessible by other entities.

Once the data policies have been established in the memory, the system is ready to process memory transactions. With each write transaction, the policy enforcer applies all policies valid for that region that the transaction is addressed to and examines the data in the device's memory controller. The transaction is accepted if it adheres to the preset policy. If there is a violation, then a fault may be signaled, for example ...

in software, firmware and/or hardware. In software and firmware embodiments it may be implemented by computer executed instructions stored in one or more non-transitory computer readable media such as magnetic, optical or semiconductor storages. In one embodiment it may be stored in the memory controller or in a memory controlled by that ...

register than sets the doorbell. After the doorbell is set, the host polls the status register for completion status. When completed, if command results in data being returned, the host reads the payload register in which the data is stored

For example, in a Diffie-Hellman key exchange, the host and the device need to exchange each ...

write policy in an external memory, and enabling a write to external memory from a host central processing unit subsystem to be checked using a memory controller of said memory and the policy stored in said memory. The method may also include wherein said write policy includes a specification of a monotonic sequence for an address range in said memory. The method may also include wherein said write policy is only ... counter mode encryption and comparing each value to be stored to a prior stored value.

Another example embodiment may be one or more non-transitory computer readable media storing instructions to perform a sequence comprising storing a write policy based on a characteristic data being stored, and enabling a write to external memory from a host central processing unit subsystem to be checked using the policy stored in said ... perform a sequence wherein said write policy is only applied to a specific address range within said memory that includes less than all of the addresses in said memory. The media may include further storing instructions to perform a sequence including issuing an error if the write policy is violated. The media may include further storing ... to a prior stored value.

In another example embodiment may be an apparatus comprising an external memory and a processor to store a write policy based on a characteristic of data being stored and enable a write to the external memory from a host central processing unit subsystem to be checked using the policy stored in ...

**Claims:**

**11**. One or more non-transitory computer readable media storing instructions to perform a sequence comprising:

- storing a write policy based on a characteristic of data being stored; and
- enabling a write to external ...

Found in:

United States Patents Fulltext (1790 - current)

## System, Method and Computer-Readable Medium for Dynamically Configuring an Operational Mode in a Storage Controller

Simionescu, Horia; Panda, Siddhartha Kumar; Sablok, Kunal; Sundrani, Kapil (Inventors). LSI Corporation (Assignee). **US 20150286438 A1**. (Published 08 Oct 2015).

**Specification:**

... **12** via RAID controller **10**. That is, a processor **16**, operating in accordance with an application program **18**, issues requests for writing data to and reading data from storage array **12**. Although for purposes of clarity host system **14** and RAID controller **10** are depicted in FIG. 1 as separate elements, ...

data that RAID controller **10** has frequently read from storage array **12** in response to read requests from host system **14**. Caching frequently requested data is more efficient than reading the same data from storage array **12** each time host system **14** requests it, since cache memory modules **21** are of a type of memory, such as flash ...

processing system **20** is responsible for computing the parity information. Processing system **20** includes some amount of fast local memory **34**, such as double data rate synchronous dynamic random access memory (DDR SDRAM) that processor **32** utilizes when performing the parity computation. To compute the parity in the foregoing example, processor **32** reads data blocks A, B and C from storage devices **24**, **26** and **28**, respectively, into local memory **34** and then performs an exclusive disjunction ...

disk drives and is commonly referred to as a "stripe." The stripe consists of the related data written in each of the disk drives containing data plus the parity (error recovery) information written to the parity disk drive. In RAID level 5, as described, the data is segmented into blocks for storage across several disks ...

disk array are mapped to blocks in the cache. This mapping is also transparent to the host system. The host system simply requests blocks of data to be read or written and the RAID controller manipulates the disk array and cache memory as required.

In RAID level 5 subsystems (as well as other RAID ... that the new parity block values may be determined therefrom. This process is often referred to as a read-modify-write cycle due to the need to read old data from the stripe, modify the intended data blocks and associated parity data, and write the new data blocks and new parity block back to the ... A stripe write therefore avoids the performance penalty of read-modify-write cycles.

U.S. Pat. No. 6,760,807 to Brant et al. discloses a data storage system and method that applies an adaptive write policy for handling host write commands to write-back system drives in a dual active controller environment. The data storage system includes a host computer, a primary controller and an alternate controller. The primary and alternate controllers are coupled to one or more disk storage devices. When a write command is communicated from ...

should be sent directly to a data store. The decision to cache data or to send the data directly to the data store is determined based on the type of data requested, the state of the cache, the state of I/O components, or system policies. In one aspect, the data flow manager tries to predict data access patterns. In another aspect, the data flow manager attempts to group writes

together. In still another aspect, the data flow manager receives an input responsive to the content contained in a data access. In this aspect, the data flow manager is a content aware data flow manager.

Conventional data storage controllers configured to operate in a write back or data caching mode send ...

the data to be written is in alignment based on the characteristic of the set of flash-based storage elements.

In another exemplary embodiment, a computer-readable medium includes stored instructions in a non-transitory form that, when executed on a processing system of a host computer, direct the host computer to: identify a ...

DDR for large sequential write operations in a write back mode of operation.

FIG. 17 is a schematic illustration of an embodiment of a computer-readable medium accessible to a host computer.

## WRITTEN DESCRIPTION OF ILLUSTRATIVE EMBODIMENTS

In a multi-workload environment a single cache policy or switching policy for a storage volume ...

and non-volatile storage elements are illustrated and described in exemplary embodiments.

Attention is now directed to the illustrated embodiments of the improved storage system, computer-readable medium, and methods for processing data transfers using a storage controller to manage data transfers between a host computer or host system and a primary ...

a host system **100**.

Accordingly, the storage controller **200** is provided for identifying or acting in response to the identification of "hot" or frequently accessed data that is already stored in the primary data store **260**. The storage controller **200** acting in response to such an indication, will store a ...

read-only memory (not shown) coupled to the processor **110**, or stored in the memory **120**, can also be stored in a non-transitory computer-readable medium. When stored on such a medium, data values and processor instructions stored thereon may be transferred to other computing devices and/or other storage devices. ...

not achievable because data is not sent on every clock signal transition. For example address and control signals must also be communicated to manage the data transfers. These address and control signals are typically sent only on the rising edge of the clock signal. The table **13** further includes measured data transfer rates for ...

the illustrated logic elements or modules whether enabled in firmware **1710** or stored in the RAM **1730** can also be stored in a non-transitory computer-readable medium. When stored on such a medium, the data values and processor instructions stored thereon may be transferred to other computing devices and/or other storage ...

**Claims:**

**20**. A computer-readable medium having stored thereon in computer executable non-transitory form instructions that, when executed on a processing system of a host computer, direct the host computer to: ...

Found in:

United States Patents Fulltext (1790 - current)

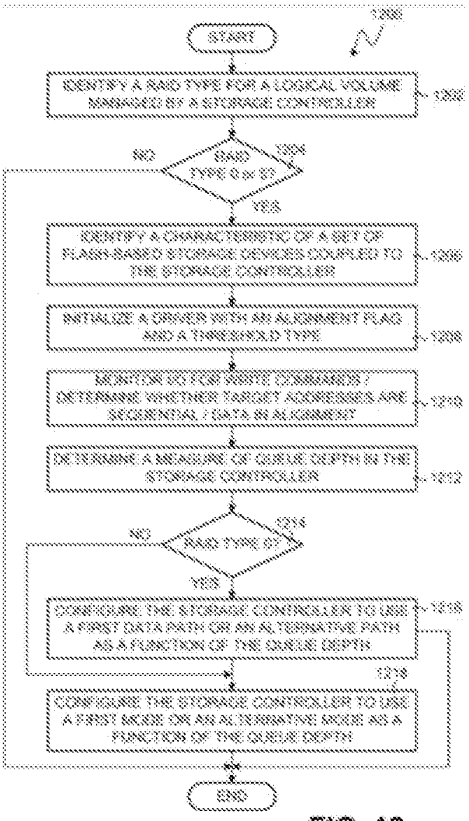



FIG. 12

Intelligent die aware storage device scheduler

CURRENT ASSIGNEES: PURE STORAGE INC

US20210182190 | US APPLICATIONS | 17-JUN-2021

PUBLICATION NUMBER: US 2021/0182190 A1 PUBLICATION DATE: 17-Jun-2021
APPLICATION NUMBER: US 17/159,986 FILING DATE: 27-Jan-2021
SIMPLE FAMILY: 76317946 (size 1) EARLIEST PRIORITY DATE: 22-Jul-2016

**Abstract (English):**

A scheduling system for a memory controller is provided. The system includes operation queues and a scheduler. The scheduler receives operation requests, prioritizes each operation request according to one or more policies, and inserts each operation request into an operation queue.

What is claimed is:

1. A scheduling system, comprising: a plurality of operation queues arranged to couple to a plurality of memory dies of storage memory wherein a relationship of operation queue to memory die is a one to one relationship; and a scheduler arranged to: receive a plurality of requests for the storage memory; prioritize each request according to one or more policies that limit maximum number of concurrent writes and concurrent reads for a memory die and prioritize operations to be performed relating to the memory die; and insert each request as an operation into one of the plurality of operation queues, with priority relative to one or more other operation in the one of the plurality of operation queues according to the one or more policies.

2. The scheduling system of claim 1, wherein the scheduler is configured to differentiate frontend reads and writes and backend reads and writes.

3. The scheduling system of claim 1, wherein the scheduler is configured to prioritize frontend operations over backend operations.

4. The scheduling system of claim 1, wherein the scheduler is configured to prioritize a frontend read over a frontend write.

5. The scheduling system of claim 1, wherein the scheduler is configured to prioritize a frontend write over a garbage collection read and a garbage collection write.

6. The scheduling system of claim 1, wherein to prioritize a frontend read over a frontend write in an operation queue, the scheduler is to insert the frontend read ahead of the frontend write in the operation queue.

7. The scheduling system of claim 1, wherein the scheduler is configured to limit the maximum number of concurrent reads to three for the memory die and the maximum number of concurrent writes to one for the memory die.

8. The scheduling system of claim 1, wherein the scheduler is configured to delay queuing a second write in an operation queue when there is one of a first write and more than one read, for the memory die, in the one of the plurality of operation queues.

9. The scheduling system of claim 1, wherein the scheduler is configured to insert a frontend write ahead of a garbage collection write in an operation queue, responsive to receiving a request for the frontend write when there is the garbage collection write in the operation queue.

...

Data storage system with data storage devices operative to manage storage device functions specific to a particular data storage device

CURRENT ASSIGNEES: MICROSOFT TECH LICENSING LLC

US20180232151 | US APPLICATIONS | 16-AUG-2018

PUBLICATION NUMBER: US 2018/0232151 A1PUBLICATION DATE: 16-Aug-2018APPLICATION NUMBER: US 15/953,943FILING DATE: 16-Apr-2018SIMPLE FAMILY: 58236931 (size 6)EARLIEST PRIORITY DATE: 14-Sep-2015

**Abstract (English):**

Operations of a variety of components of a storage system stack are redefined to make the system more efficient when the underlying media has a "multi-log" type interface such as the case with NAND flash SSD memory or shingled magnetic recording media. The responsibilities of components of the storage system stack are modified such that each responsibility is performed at the most efficient component (level of abstraction) of the storage stack.

We claim:

**1**. A method of improving utilization of a data storage system, comprising: determining one or more data storage device management functions that are applicable to one or more data storage devices; determining one or more data storage device management functions that are particular to a given one of the one or more data storage devices; assigning data storage device management functions that are particular to the given one of the one or more data storage devices to the given one of the one or more data storage devices; and assigning data storage device management functions that are not particular to the given one of the one or more data storage devices to the data storage system host layer.

**2**. The method of claim 1, wherein the one or more data storage devices include a data storage device selected from the group consisting of: a solid state storage device, a magnetic recording media device, a shingled magnetic recording device, an optical recording devices, and a magnetic tape recording device.

**3**. The method of claim 1, prior to determining one or more data storage device management functions that are applicable to one or more data storage devices, associating the one or more data storage devices with the data storage system host layer, and querying the one or more data storage devices for device configuration information.

**4**. The method of claim 3, further comprising utilizing the device configuration information for determining the one or more data storage device management functions that are applicable to each of the one or more data storage devices.

**5**. The method of claim 4, further comprising passing the device configuration information to a data storage system file system.

**6**. The method of claim 5, further comprising utilizing the device configuration information for assigning one or more memory allocation functions to the data storage system file system in association with the one or more data storage devices.

**7**. The method of claim 1, further comprising: establishing an interface between the data storage system host layer and the one or more data storage devices, and directing, via the interface, under the command of the data storage system host layer, storage of data to particular storage areas on the one or more data storage devices.

**8**. The method of claim 7, wherein directing storage of data to particular storage areas of the one or more data storage devices includes: directing storage of sequential data writes from a first storing application to a first storage area of the one or more data storage devices; directing storage of sequential data writes from a second storing application to a second storage area of the one of more data storage devices; wherein the sequential data writes from the first storing application are stored separately from the sequential data writes from the second storing application.

**9**. The method of claim 8, wherein directing storage of data to particular storage areas on the given one of the one or more data storage devices includes converting one or more file system storage area

allocations into one or more actual storage allocations on the given one of the one or more data storage devices.

**10**. The method of claim 1, further comprising applying by the data storage system host layer one or more data storage policies for managing data storage on each of one or more data storage devices operating in the data storage system.

**11**. The method of claim 10, wherein applying one or more data storage policies includes applying a policy for causing the one or more data storage devices to erase a data storage area immediately before returning data storage operation to the data storage system host layer when the data storage system host layer deallocates the storage area.

**12**. The method of claim 10, wherein during storage reallocation of a data storage area on the one or more data storage devices by the data storage system host layer, applying one or more data storage policies includes applying a policy for causing an immediate erase of a previously de-allocated block or zone into which data storage is allocated when the data storage system host layer indicates it is going to allocate the storage area for data storage, but where there are no currently available erase blocks or zones in the storage area.

**13**. The method of claim 10, wherein applying one or more data storage policies includes applying a policy for causing the one or more data storage devices to erase de-allocated but not erased blocks or zones during an idle period when the one or more data storage devices detect an idle period in which no current data read, write or erase operation is in progress.

...

Performance tuning in a storage system that includes one or more storage devices

CURRENT ASSIGNEES: PURE STORAGE INC

US20180113640 | US APPLICATIONS | 26-APR-2018

US10007459 | US PATENTS | 26-JUN-2018

PUBLICATION NUMBER: US 2018/0113640 A1PUBLICATION DATE: 26-Apr-2018APPLICATION NUMBER: US 15/642,958FILING DATE: 06-Jul-2017SIMPLE FAMILY: 61969639 (size 4)EARLIEST PRIORITY DATE: 20-Oct-2016

**Abstract (English):**
Performance tuning in a storage system that includes one or more storage devices, including: storing, by a primary controller of the storage system, data corresponding to one or more computer processes into one or more of the one or more storage devices, determining, by a secondary controller that is configured similarly to the primary controller, one or more utilization patterns of the data, and initiating, in dependence upon the one or more utilization patterns of the data, a modification to a manner in which the one or more computer processes access the data stored in the one or more storage devices.

**1**. A method of performance tuning in a storage system that includes one or more storage devices, the method comprising: storing, by a primary controller of the storage system, first data of a first workload

type and second data of a second workload type into one or more of the one or more storage devices; determining, by a secondary controller that is configured similarly to the primary controller, a first utilization pattern associated with the first workload type and a second utilization pattern associated with the second workload type; and initiating, in dependence upon the first utilization pattern and the second utilization pattern, a modification to a manner in which one or more computer processes access the first data and the second data stored in the one or more storage devices.

**2**. The method of claim 1, wherein the one or more computer processes correspond to one or more software applications from one or more of: a user application layer, an operating system layer, or a data storage layer.

**3**. The method of claim 2, wherein at least one of the one or more computer processes is a process at the data storage layer, and wherein initiating the modification to the manner in which the one or more computer processes access the first data and the second data comprises: modifying one or more system configuration parameters of the one or more storage devices.

**4**. The method of claim 2, wherein initiating the modification to the manner in which the one or more computer processes access the first data and the second data comprises: sending, from the secondary controller to an application programming interface of the one or more software applications, the first utilization pattern and the second utilization pattern.

**5**. The method of claim 4, wherein at least one of the one or more software applications is a management application for a virtual computing environment, and wherein the first utilization pattern and the second utilization pattern each correspond to one or more configurable virtual or physical resource constraints.

**6**. The method of claim 1, further comprising: creating a snapshot of data stored within the one or more storage devices, wherein the snapshot includes the data corresponding to the one or more computer processes; wherein determining, by the secondary controller, the first utilization pattern and the second utilization pattern comprises analyzing the snapshot to determine one or more of: workload patterns, client access patterns, or tracing information.

**7**. The method of claim 1, wherein determining, by the secondary controller, the first utilization pattern and the second utilization pattern comprises: evaluating, by the secondary controller, metadata corresponding to each input/output (I/O) operation handled by the primary controller to determine tracing information.

**8**. The method of claim 7, wherein the tracing information includes one or more of: an indication that a given I/O operation is a read operation, an indication that a given I/O operation is a write operation, an indication of a source entity for a given I/O operation, an indication of a volume identification for a target volume of a given I/O operation, an indication of addressing information for a given I/O operation, or an indication of a memory size for a given I/O operation.

**9**. The method of claim 1, further comprising: determining, in dependence upon one or more utilization patterns, a second storage location for one or more portions of data stored within a first storage location on the one or more storage volumes; and moving the one or more portions of the data to the second storage location, wherein the second storage location that has better performance characteristics than the first storage location on the one or more storage volumes.

**10**. The method of claim 1, further comprising: for a section of data stored within the one or more storage devices, reverse mapping the section of data to a software application, wherein the data

corresponding to the one or more computer processes includes the section of data; and sending, in dependence upon reverse mapping the section of data, one or more utilization patterns to the software application.

...

Incorporating Network RAM and Flash into Fast Backing Store for Clusters

IEEE Xplore | IEEE CONFERENCES | 01-SEP-2011 | 2011 IEEE International Conference on Cluster Computing (Page(s): 121-129)

https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=6061047

**Abstract:**

We present Nswap2L, a fast backing storage system for general purpose clusters. Nswap2L implements a single device interface on top of multiple heterogeneous physical storage devices, particularly targeting fast random access devices such as Network RAM and flash SSDs. A key design feature of Nswap2L is the separation of the interface from the underlying physical storage, data that are read and written to our ``device" are managed by our underlying system and may be stored in local RAM, remote RAM, flash, local disk or any other cluster-wide storage. Nswap2L chooses which physical device will store data based on cluster resource usage and the characteristics of various storage media. In addition, it migrates data from one physical device to another in response to changes in capacity and to take advantage of the strengths of different types of physical media, such as fast writes over the network and fast reads from flash. Performance results of our prototype implementation of Nswap2L added as a swap device on a 12 node Linux cluster show speed-ups of over 30 times versus swapping to disk and over 1.7 times versus swapping to flash. In addition, we show that for parallel benchmarks, Nswap2L using Network RAM and a flash device that is slower than Network RAM can perform better than Network RAM alone.

Data processing method, storage equipment and electronic equipment

Wang, Haiyang; Xie, Wei; WEN JUNKUAI (Inventors). LENOVO (BEIJING) LTD (Assignee). **CN 105867839 A**. (Published 17 Aug 2016).

**Specification:**

... can read the stored content from the 1st memory, and then make the 1st memory space can be timely release, thereby ensuring that the 1st type of storage medium will not drop the access performance of the, the user experience is good.

Please refer to Figure 2, show the embodiment of the invention provides ...

host computer sends the detected write command, a write commands are sent to the processor.

Step S202: processor, based on the write command to the memory controller sends the write instruction.

The processor, based on the write command to the memory controller sends the write instruction can include the process of: processor first, based on the write command generating and storage controller matching the write instruction, then the generated by the write instruction sent to the memory controller, in order to make the storage controller uses the 1st type of storage medium storing the content write 2nd class storage medium.

Step S203: a memory controller to a reading assembly sends read instruction.

Wherein for controlling reading instruction from the host computer reading assembly reads the stored in a memory of the content.

Step S204: reading assembly on the basis of the reading instruction from the host using a communication interface reads the stored content in the memory of, and will store the content storage to the 1st type of storage medium.

In this embodiment, a memory controller to read the assembly sends reading in the instruction of the host computer to include the storage content of the address is stored in the memory, when the read instruction is received to read, from the read instruction is stored in the memory address of the content, then based on the memory address of the communication interface from the host reads the stored content in the memory, and the memory content storage to the 1st type of storage medium.

Step S205: 1st type from the memory controller reads the storage content in the storage medium, the storage of content load and 2nd class storage medium.

In a preferred ...

Found in:

China Patents Fulltext (1985 - current)

## Flash memory wear optimization method and device

Shi, Liang; SHA XINGMIAN; ZHU GUANYU; Wang, Yuangang; ZHUGE QINGFENG (Inventors). HUAWEI TECH CO LTD (Assignee). **CN 105138472 A**. (Published 09 Dec 2015).

**Specification:**

... lapse of time, the refresh the write operation to flash memory block of the write data.

3rd aspects, the embodiment of the invention provides a solid-state hard disk SSD controller, including: a memory and a processor is connected with the memory, wherein the memory storage instruction execution, when receiving the write operation, the communication between the processor and the memory, the processor executing the execution instruction such that if the controller performs SSD in 1st to any one of the method.

The embodiment of the invention based on different types of data have different storage time of demand, by obtaining the holding time of the pre-stored data, and according to the stored time in preset retention time ...

the flash memory is solid-state hard disk (SolidStateDisk, abbreviated as: SSD) and SSD scene of the controller. Wherein the host computer SSD control device to read and write data in the flash memory. For example, as shown in Figure 2, the single machine or server machine frame 20 includes the bottom plate 21, bottom ...

are used to determine a certain data are hot data, or cold data. For example, the judgement standard: in the a setting time, if the data to be accessed is greater than or equal to the frequency of the preset

frequency, it is determined that the data as the heat data; otherwise, cold data ... and cold data of the actual judgement criteria, can also be determined by other means, no longer listed here.

Due to the heat by the access frequency of the data is relatively large, may face the hot data erasing repeatedly; and the decision of the erasing/writing voltage of the abrasion of the large and small ... voltage is less than the voltage of the programming operation to the thermal data, thereby reducing wear. By the same token, because of the thermal data by the access frequency is relatively small, conventional programming voltage by performing a programming operation to the cold data. Here, refer to the conventional programming voltage to the ...

steps can be in whole or in part by a program instruction related hardware to finish. The foregoing program can be stored in a computer readable storage medium. During execution of the program, the above-mentioned execution including the steps of the method embodiment; and the aforementioned storage medium includes: ROM, RAM, magnetic ...

Found in:

China Patents Fulltext (1985 - current)

## DATA STORAGE DEVICE, USER DEVICE AND DATA WRITE METHOD

Ahn, Kwang Soo; Choi, Hyun Jin (Inventors). Ahn, Kwang Soo; Choi, Hyun Jin (Assignees). **US 20120124276 A1**. (Published 17 May 2012).

**Abstract:**

Disclosed is an address mapping method for a data storage device using a hybrid mapping scheme. The address mapping method determines whether write data includes a defined super sequential block (SSB), and selects an ...

**Specification:**

... provide address mapping methods capable of increasing the efficiency of merge operations.

One aspect of embodiments of the inventive concept is directed to provide an address mapping method for a data storage device using hybrid mapping, the address mapping method comprising; determining whether the write data includes at least one super sequential block (SSB), and if the write data includes at least one SSB, using a block mapping mode to map a logical address associated with write data in the at least one SSB to a corresponding physical address, while using a page mapping mode to map a logical address associated with a ...

mapping scheme, the address mapping method comprising; communicating a write command from the host to the data storage device, wherein the write command includes write data and a logical address for the write data, determining whether the write data includes at least one super sequential block (SSB), selecting a block mapping mode for mapping a first portion of the logical address associated with write data in the at least one SSB to a corresponding physical address, and selecting a page mapping mode for mapping a second portion of the logical ...

of embodiments of the inventive concept is directed to provide a data storage device comprising; a buffer memory configured to temporarily store externally provided write data having a logical address, a non-volatile memory device configured to store the write data, and a memory controller configured to map the logical address of the write data to a physical address of the non-volatile memory device, wherein the memory controller is further configure to select a block mapping mode for mapping a first portion of the logical address associated with write data in the at least one super sequential block (SSB) to a corresponding physical address, and to select a page mapping mode for mapping a second ...

of the inventive concept is directed to provide a user device, comprising; a host configured to generate an address mapping mode indication and a logical address used to program write data in a non-volatile memory device, and a data storage device configured to select one of a plurality of mapping modes in accordance with the address ...

illustrating on approach to determining an address mapping mode for a buffer layer.

FIG. 8 is a conceptual diagram illustrating possible relationships between a logical address for sequential data and a super consecution block.

FIGS. 9 and 10 are diagrams illustrating address mapping schemes according to certain embodiments of the inventive concept.

FIG. 11 ...

**20**. The file system **20** may be used to define a set of abstract data structures (e.g., a file system) facilitating the storage, search, access, and manipulation of data stored in the data storage device.

The buffer layer **30** may be used to manage data stored in a buffer memory according to requests and/or ... memory (e.g., a RAM) provided in a data storage device. In particular, the buffer layer **30** may be used to determine an address mapping mode based on the size and type of the write data being stored in the working memory and/or buffer memory. That is, the buffer layer **30** may control a "mapping mode" (AM_mode) for the program/write operation ...

the file system **20** into a physical address of the non-volatile memory device **50**. More particularly, the FTL **40** may be used to execute address for write data in accordance with an address mapping mode determined by the buffer layer **30**.

With the above-described hierarchical structure of software, the buffer layer **30** and the FTL **40** may be used to cooperatively control address mapping of data in a data storage device. For example, the buffer layer may be used to detect or determine a particular "data attribute" (e.g., a size, a ...

inventive concept. The user device generally includes a host **110** and a data storage device **120**. The storage device **120** may include a memory controller **122**, a non-volatile memory device **124**, and a buffer memory **126**.

Upon receiving a write request (i.e., a command or instruction indicating a write operation should be performed), the host **110** transfers write data and a corresponding logical address (LA) to the data storage device **120**. If the user device **100** is, for example, a personal computer (PC) or a notebook, the logical address LA may be provided according to a sector number. That is, upon receiving a write request, the host **110** may provide a start address (LAB) for the write data and a sector number (nSC) to the data storage device **120**.

...

## Data processing method, storage equipment and electronic equipment

Wang, Haiyang; Xie, Wei; WEN JUNKUAI (Inventors). LENOVO (BEIJING) LTD (Assignee). **CN 105867839 A**. (Published 17 Aug 2016).

**Abstract:**

... types of storage mediums. According to the data processing method, the storage equipment and the electronic equipment provided by the invention, the storage controller can read the storage content from the first type of storage medium so as to release the storage space of the first type of storage medium in time, so that ...

**Specification:**

... computer interface module of the data write to the memory, hard disk controller in the control device does not ensure the timely Flash 1st the data in the memory is read, this is due to the limitation of its own Flash controller, such as the write operation-of-order execution, execution time caused by reasons such as ...

using 1st class storage medium will store the content write 2nd class storage medium, wherein such said 1st and 2nd storage medium such as storage medium different types of storage medium.

Wherein based on the write order of the processor to the memory controller sends the write instruction, comprising:

The processor based on the write order is matched with the storage controller generates the write instruction;

The processor to the memory controller sends the write instruction.

In the processor based on the write command to the memory controller after sending the write instruction, the method further comprises:

The memory controller sends the read instruction to the reading assembly;

The reading assembly based on the read instruction from using the communication interface of the host computer reads the stored content in the memory, and the memory content storage to the 1st type of storage medium, in order to the memory controller using the 1st class ... to the memory content written to the 2nd type of storage medium.

The method also includes:

The memory controller from the 1st type of storage medium reading the storage content, and the stored content is written into the 2nd type of storage medium.

In the stated memory content written to the 2nd after such ...

to the reading assembly sends read instruction;

The read assembly, based on the read instruction for using the communication interface from the host computer of reading the stored content in the memory, and the memory content storage to the 1st type of storage medium, in order to the memory controller using 1st class storage medium will store the content write 2nd class storage medium.

The memory controller, is also used for such storage medium from the 1st reading the storage content, and the stored content is written into the 2nd type of storage medium.

The memory controller, is also used for the storage of content ...

content data storage to the 1st type of storage medium, the processor then will only informs the memory controller from the 1st type of storage medium for writing data read in 2nd class storage medium, the invention provides a data processing method, the communication interface of the host computer sends the detected write command, from the host computer reads the stored content is not, instead, the write commands are sent to the processor, then the processor, based on the write command to the memory controller sends the ... medium. From this it can be seen, the present invention provides a data processing method in a timely manner to make the memory controller can read the stored content from the 1st memory, and then make the 1st memory space can be timely release, thereby ensuring that the 1st type of storage medium will not drop the access performance of the, the user experience is good.

Description of drawings

In order to more clearly illustrate the embodiment of the invention or a technical ...

content data storage to the 1st type of storage medium, the processor then will only informs the memory controller from the 1st type of storage medium for writing data read in 2nd class storage medium, and the embodiment of the invention provides a data processing method, the communication interface of the host computer sends the detected write command, from the host computer reads the stored content is not, instead, the write commands are sent to the processor, then the processor, based on the write command to the memory controller sends the ... this it can be seen, the embodiment of the invention provides a data processing method in a timely manner to make the memory controller can read the stored content from the 1st memory, and then make the 1st memory space can be timely release, thereby ensuring that the 1st type of storage medium will not drop the access performance of the, the user experience is good.

Please refer to Figure 2, show the embodiment of the invention provides data processing method of the ...

a reading assembly sends read instruction.

Wherein for controlling reading instruction from the host computer reading assembly reads the stored in a memory of the content.

Step S204: reading assembly on the basis of the reading instruction from the host using a communication interface reads the stored content in the memory of, and will store the content storage to the 1st type of storage medium.

In this embodiment, a memory controller to read the assembly sends reading in the instruction of the host computer to include the storage content of the address is stored in the memory, when the read instruction is received to read, from the read instruction is stored in the memory address of the content, then based on the memory address of the communication interface from the host reads the stored content in the memory, and the memory content storage to the 1st type of storage medium.

Step S205: 1st type from the memory controller reads the storage content in the storage medium, the storage of content load and 2nd class storage medium.

In a preferred implementation, reading assembly will be read from the host computer in the memory of memory to the storage content of the storage medium after such 1st, to ... memory controller sends the read completion instruction information, when the memory controller receives information indicative of the completion of the reading, from the 1st type reading storage contents in the storage medium, the storage of content load and 2nd class storage medium.

Step S206: the memory controller to send the feedback information to ...

embodiment of the invention provides a data processing method, the communication interface of the host computer sends the detected write command, from the host computer reads the stored content is not, instead, the write commands are sent to the processor, then the processor, based on the write command to the memory controller sends the write instruction, memory controller after receiving the write such as instructions, to a reading assembly sends read instruction, the reading assembly from the host computer reads and stores the content of the memory content storage to 1st class storage medium, reading assembly will store the content storage to 1st after such storage medium, memory controller from the 1st type reading storage contents in the storage medium, the storage of content load and 2nd class storage medium, taking into account such 1st limited storage space of storage medium, in order to ensure such 1st the access performance of the storage medium, in the data write is completed, the memory controller sends the feedback information to the processor, in order to make the processor control releases ...

to a reading assembly sends read instruction;

(5) reading assembly after receiving the read instruction, is read in from the host computer memory for storing content;

(6) reading assembly will read write the storage content of the SRAM;

(7) read assembly in the written completely stored content after SRAM, to send the notice message Flash controller;

(8) the receiving controller Flash after the communication message, reads the stored content from the SRAM;

(9) in the control device will Flash from the storage content of the SRAM write Nand Flash read in;

(10) the controller ...

be seen by the above-mentioned process, in the data writing process, when the host of the arrival of the write instruction, reading assembly does not read the memory contents, but the can be performed Nand Flash when the write instruction, then the Flash controller read instruction issued to the reading assembly, at this time, reading assembly from the host computer reads and stores the content in the storage content stored in the SRAM, the memory content Flash controller that is has been stored to the SRAM, the immediate implementation of ...

generated write instruction.

The embodiment of the invention provides a storage device, while the communication interface detecting the host computer sends the write order, not reading the stored content from the host, the

write command is sent to the processor, then the processor, based on the write command to the memory controller sends the ... 2nd type of storage medium. From this it can be seen, the embodiment of the invention provides the storage device in the storage controller can read the stored content from the 1st memory, and then make the 1st memory storage space of the release in time, improving the access performance of the 1st memory, ...

assembly 504 sends the read instruction.

Reading assembly 504, on the basis of the reading instruction for using a communication interface 501 from the host reads the stored content in the memory of, and will store the content storage to 1st class storage medium 505, in order to memory controller 503 using 1st class ... store the content write 2nd class storage medium 506.

Memory controller 503, is also used for such storage medium from the 1st 505 stores the content read in, and will store the content write 2nd class storage medium 506.

Memory controller 503, is also used for the storage of content load of ...

the storage content.

The embodiment of the invention provides a storage device, while the communication interface detecting the host computer sends the write order, not reading the stored content from the host, the write command is sent to the processor, then the processor, based on the write command to the memory controller sends the write instruction, memory controller after receiving the write instruction, to a reading assembly sends read instruction, the reading assembly from the host computer reads and stores the content of the memory content storage to 1st class storage medium, reading assembly will store the content storage to 1st after such storage medium, memory controller from the 1st type reading storage contents in the storage medium, the storage of content load and 2nd class storage medium, taking into account such 1st limited storage space of storage medium, in order to ensure such 1st the access performance of the storage medium, in the data write is completed, the memory controller sends the feedback information to the processor, in order to make the processor control releases ...

**Claims:**

... sends the read instruction to the reading assembly;

The reading assembly based on the read instruction from using the communication interface of the host computer reads the stored content in the memory, and the memory content storage to the 1st type of storage medium, in order to the memory controller using the 1st class ...

4. Method according to Claim 3, characterized in that the method further comprises:

The memory controller from the 1st type of storage medium reading the storage content, and the stored content is written into the 2nd type of storage medium.

... to the reading assembly sends read instruction;

The read assembly, based on the read instruction for using the communication interface from the host computer of reading the stored content in the memory, and the memory content storage to the 1st type of storage medium, in order to the memory controller using 1st class storage ...

9. Storage equipment according to Claim 8, characterized in that the memory controller, is also used for such storage medium from the 1st reading the storage content, and the stored content is written into the 2nd type of storage medium.

Found in:

China Patents Fulltext (1985 - current)

Apparatus and method for predicting target storage unit

Teyssier, Melanie Emanuelle Lucie; Begon, Florent; Jaubert, Jocelyn Francois Orion; Huot, Nicolas Jean Phillippe (Inventors). Teyssier, Melanie Emanuelle Lucie; Begon, Florent; Jaubert, Jocelyn Francois Orion; Huot, Nicolas Jean Phillippe (Assignees). **US 20120124300 A1**. (Published 17 May 2012).

**Abstract:**

A data processing apparatus comprises processing circuitry and a plurality of storage units. When the processing circuitry executes a data access instruction, then a storage controller identifies based on a target storage address of the data access instruction, which of the storage units includes the target storage location identified by the target storage address. Prediction circuitry is provided to predict a predicted ... can be initiated before the storage controller has identified the target storage unit. The prediction circuitry makes the prediction based on the type of the data access instruction executed by the processing circuitry.

**Specification:**

... Some processing apparatuses are provided with multiple storage units for storing data and/or instructions on behalf of a processing circuit. When the processing circuit requests access to a data value (whether a read access for reading the current value of the data value or a write access for writing a new value of the data value), the circuit determines which of the storage units stores the requested data value. Determining which storage ... read or write access can slow down processing performance.

For faster performance, some processing apparatuses can predict which of the storage units contains the target data, and initiate access to the predicted storage unit before it has been determined which storage unit actually stores the target data. Hence, it is not necessary to wait for the actual determination of the target storage unit before the data access can be initiated. The prediction may be made in dependence on part of the target storage address of the access request. The present technique seeks ... which storage unit stores the target data.

## SUMMARY OF THE INVENTION

The present invention provides a data processing apparatus comprising:

processing circuitry configured to execute program instructions to process data;

a plurality of storage units comprising storage locations addressable by storage addresses; and

a storage controller configured to control access to said plurality of storage units; wherein:

said storage controller is configured such that, when said processing circuitry executes a data access instruction for controlling said processing circuitry to access a target storage location addressed by a target storage address, said storage controller identifies based on said ... storage unit that includes said target storage location;

said data processing apparatus comprises prediction circuitry configured to detect whether said processing circuitry is executing a data access instruction of a predetermined type, and, upon detecting said processing circuitry executing said data access instruction of said predetermined type, to predict based on the type of data access instruction a predicted storage unit predicted to include said target storage location; and

...

Another kind of data access instruction for which an instruction type-specific prediction of a target storage unit may be made is a stack access instruction for controlling the processing circuitry to access a data value in a stack data structure. A stack data structure is a last-in-first-out data structure which can be used, for example, for storing temporary variables. When a data value is written to the stack, it is placed at the top of the stack, while when a data value is read from the stack it is taken from the top of the stack. A stack pointer is typically maintained for indicating the storage

location representing the ... recently added to the stack, or may indicate the storage location for storing the next data value to be added to the stack. The stack pointer is modified as data values are pushed onto the stack and popped from the stack.

As the location of the stack data structure within the plurality of storage units ...

for controlling access to said plurality of storage unit means; wherein:

said storage control means is configured such that, when said processing means executes a data access instruction for controlling said processing means to access a target storage location addressed by a target storage address, said storage control means identifies based on ... storage unit means that includes said target storage location;

said data processing apparatus comprises prediction means for detecting whether said processing means is executing a data access instruction of a predetermined type, and, upon detecting said processing means executing said data access instruction of said predetermined type, predicting based on the type of data access instruction a predicted storage unit means predicted to include said target storage location; and

said storage control means is configured to initiate a data access to said predicted storage unit means before said storage control means has identified said target storage unit means.

...

**Claims:**

We claim:

1. A data processing apparatus comprising:

- processing circuitry configured to execute program instructions to process data;
- a plurality of storage units comprising storage locations addressable by storage addresses; and
- a storage controller configured to control access to said plurality of storage units; wherein:
- said storage controller is configured such that, when said processing circuitry executes a data access instruction for controlling said processing circuitry to access a target storage location addressed by a target storage address, said storage controller identifies based on said ... storage unit that includes said target storage location;
- said data processing apparatus comprises prediction circuitry configured to detect whether said processing circuitry is executing a data access instruction of a predetermined type, and, upon detecting said processing circuitry executing said data access instruction of said predetermined type, to predict based on the type of data access instruction a predicted storage unit predicted to include said target storage location; and
- said storage controller is configured to initiate a data access to said predicted storage unit before said storage controller has identified said target storage unit.

2. The data processing apparatus according to claim 1 , wherein, for said data access instruction of said predetermined type, said prediction circuitry is configured to predict said predicted storage unit based on which storage unit was identified by said storage controller as said target storage unit on execution of a previous data access instruction of said predetermined type.

... has identified said target storage unit, whether said prediction circuitry correctly predicted said predicted storage unit, and to control said storage controller to reinitiate said data access to said target storage unit if said prediction circuitry incorrectly predicted said predicted storage unit.

- ... comprises a program counter indicating a storage address of a storage location storing a program instruction currently being executed by said processing circuitry; and
- said data access instruction of said predetermined type is a program-counter-relative load instruction for controlling said processing circuitry to request a data value from a target storage location ...

... The data processing apparatus according to claim 1 , wherein said data processing apparatus comprises a stack pointer indicating a storage location of a stack data structure; and

- said data access instruction of said predetermined type is a stack access instruction for controlling said processing circuitry to access a target storage location addressed by a target storage address determined using said stack pointer.

...

EFFICIENT CONTEXT BASED INPUT/OUTPUT (I/O) CLASSIFICATION

Kaminski, Maciej; Wysocki, Piotr; Barczak, Mariusz (Inventors). Intel Corporation (Assignee). **US 20180004690 A1**. (Published 04 Jan 2018).

**Specification:**

... the one or more I/O class types according to I/O context and metadata of historically executed I/O requests to define the caching and processing priority policy.

In one example of a data storage system, wherein the memory controller is configured to classify the one or more I/O requests into the I/O classes based on at least one of data accesses patterns, data types, data storage types associated with the one or more I/O requests, I/O context call instructions, I/O context call parameters, metadata, and one or more read or write operation ...

**Publication number**

US 20180004690 A1 (04 January 2018)

**Application number**

US 2016201056 (01 July 2016)

**Priority number**

US 2016201056 (01 July 2016)

Found in:

United States Patents Fulltext (1790 - current)

SYSTEM AND METHOD FOR CLIENT POLICY ASSIGNMENT IN A DATA STORAGE SYSTEM

KARANDIKAR, Amey Vijaykumar (Inventor). Commvault Systems, Inc. (Assignee). **US 20160316017 A1**. (Published 27 Oct 2016).

**Claims:**

... specified by the first client configuration profile template, cause a modification to the configuration of the first client computing device based on one or more data storage properties or policies not associated with the first client configuration profile template.

**6.** The data storage system of claim 2 further comprising a plurality of third computing devices configured as storage controllers, wherein the second computing device is further configured to, based on a storage policy associated with the first client computing device, select one of the plurality of third computing devices and instruct the selected third computing device to write ...

Found in:

United States Patents Fulltext (1790 - current)

## CONTENT AWARE STORAGE OF VIDEO DATA

MARMAN, DOUGLAS H; SAPTHARISHI MAHESH (Inventors). AVIGILON ANALYTICS CORP (Assignee). **KR 1020160103162 A**. (Published 31 Aug 2016).

**Specification:**

... memory by a disc created air received from the/read head of the hard disk is storage memory disk lifts contact are held until a sufficiently strong. Recording/read head, storage memory disc is is in contact while since the disc rotates storage memory, recording/read head, CSS is wear memory disk storage hard drive. ...

**Claims:**

- ... a video field of view of different quality in relation to the area of the imaging system level to clear topolygical number storage management system configured to; includes, said rule based engine for video according to rule determine the memory controller is further configured to, said storage management system priority is determined according to video an entry for a time period to maintain a data storage system to clear topolygical number a ...

Found in:

Korea Patents Fulltext (1978 - current)

SYSTEM ARCHITECTURE BASED ON ASYMMETRIC RAID STORAGE

Cho, Byungcheol; Kim, Moon J. (Inventors). CHO BYUNGCHEOL; KIM MOON J (Assignees). **US 20120278526 A1**. (Published 01 Nov 2012).

**Specification:**

... based on an asymmetric RAID storage. Specifically, embodiments of the present invention provide an asymmetric RAID controller coupled to a system board. A set of storage drives is coupled to the asymmetric RAID controller. The RAID method and configuration of each storage device are dynamically adapted based on user policy parameters.

The storage device of an I/O standard such as a serial attached small computer system interface (SAS)/serial advanced technology attachment (SATA) type supports a low-speed data processing speed for a host by adjusting synchronization of a data signal transmitted/received between the host and a memory disk during data communications between the ...

Found in:

United States Patents Fulltext (1790 - current)

Information lifecycle management for binding content

Ostapovicz, Scott; Todd, Stephen J. (Inventors). EMC Corporation (Assignee). **US 8977814 B1**. (Published 10 Mar 2015).

**Specification:**

... is stored on a particular storage system and/or migrated to a particular storage system). In addition, configuration interface **801** may be used, for example, to configure which storage system serves as the transactional storage system and which storage system serves as the fixed-content storage system. In some embodiments, OAS controller **611** may be configured (e.g., via the configuration interface) to apply different migration policies to different objects, or portions of objects, based on one or more characteristics of the object, or portion of the object. The policy applied to a particular portion of an object may be based on any suitable characteristic of the ...

Found in:

United States Patents Fulltext (1790 - current)

System and method for the implementation of an adaptive cache policy in a storage controller

Guinn, Kevin P.; Najafirad, Peyman; Vasudevan, Bharath V. (Inventors). Guinn, Kevin P.; Najafirad, Peyman; Vasudevan, Bharath V. (Assignees). **US 20060236033 A1**. (Published 19 Oct 2006).

**Specification:**

... respect to data access commands directed to transaction log files of the database.

The system and method disclosed herein is technically advantageous because the cache policy of a storage controller for a redundant storage system can be tailored for improved performance and failover reliability on the basis of the characteristics of the data access commands being received by the storage controller. Another technical advantage of the system and method disclosed herein is the operation of the cache optimization ...

Found in:

United States Patents Fulltext (1790 - current)

**EAST Search History**

**EAST Search History (Prior Art)**

| Ref # | Hits | Search Query | DBs | Default Operator | Plurals | Time Stamp |
|---|---|---|---|---|---|---|
| L1 | 87,349 | g06f3/0632 or g06f9/3004 or g06f9/06 or g06f3/0674 or g06f3/0659 or g06f3/068 or g06f3/0665 or g06f3/0673 or g06f3/0604 or g06f3/0619 or g06f3/061 or g06f3/0679 or g06f3/0676 or g0f3/0658 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2021/09/15 14:53 |
| L2 | 10,971 | ((policy or policies or script or overlay or code or coding or algorithm or firmware or program$5 or rule or guideline) same (storage or memory or dram or sram or ssd or disk or raid) same (record$4 or writ$4 or stor$4 or program$4) same (id or identif$4 or address$4 or point$4) same (control$4 or processor or cpu or microprocessor) same (content or data or object or block or byte or word) same (type or characteristic or defect$4 or head or strength) same (read$4 or recover$4 or request$4 or access$4)).clm. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2021/09/15 14:53 |
| L3 | 264 | L1 and L2 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2021/09/15 14:53 |
| L4 | 10,075 | ((jack or john) and lane).xp. or (reg$7 and bragdon).xp. or (glen$4 and gossage).xp. or (brian and peugh).xp. or (kevin and verbrugge).xp. or (gary and portka).xp. or ((heip or hiep ) and nguyen).xp. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2021/09/15 14:53 |
| L5 | 57 | L2 and L4 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2021/09/15 14:53 |
| L6 | 247 | L3 not L5 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; | OR | ON | 2021/09/15 14:53 |

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|---|---|---|---|---|---|---|
| | | | DERWENT; IBM_TDB | | | |
| S3 | 87,349 | g06f3/0632 or g06f9/3004 or g06f9/06 or g06f3/0674 or g06f3/0659 or g06f3/068 or g06f3/0665 or g06f3/0673 or g06f3/0604 or g06f3/0619 or g06f3/061 or g06f3/0679 or g06f3/0676 or g0f3/0658 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2021/09/14 06:44 |
| S4 | 792,743 | (policy or policies or script or overlay or code or coding or algorithm or firmware or program$5 or rule or guideline) same (storage or memory or dram or sram or ssd or disk or raid) same (record$4 or writ$4 or stor$4 or program$4) same (id or identif$4 or address$4 or point$4) same (control$4 or processor or cpu or microprocessor) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2021/09/14 06:57 |
| S5 | 2 | "10776023".pn. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2021/09/14 07:02 |
| S6 | 98,575 | (policy or policies or script or overlay or code or coding or algorithm or firmware or program$5 or rule or guideline) same (storage or memory or dram or sram or ssd or disk or raid) same (record$4 or writ$4 or stor$4 or program$4) same (id or identif$4 or address$4 or point$4) same (control$4 or processor or cpu or microprocessor) same (content or data or object or block or byte or word) same (type or characteristic or defect$4 or head or strength) same (read$4 or recover$4 or request$4 or access$4) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2021/09/14 07:36 |
| S7 | 10,971 | ((policy or policies or script or overlay or code or coding or algorithm or firmware or program$5 or rule or guideline) same (storage or memory or dram or sram or ssd or disk or raid) same (record$4 or writ$4 or stor$4 or program$4) same (id or identif$4 or address$4 or point$4) same (control$4 or processor or cpu or microprocessor) same (content or data or object or block or byte or | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2021/09/14 07:38 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | word) same (type or characteristic or defect$4 or head or strength) same (read$4 or recover$4 or request$4 or access$4)).clm. | | | | |
| S8 | 264 | S3 and S7 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2021/09/14 07:43 |
| S9 | 10,075 | ((jack or john) and lane).xp. or (reg$7 and bragdon).xp. or (glen$4 and gossage).xp. or (brian and peugh).xp. or (kevin and verbrugge).xp. or (gary and portka).xp. or ((heip or hiep ) and nguyen).xp. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2021/09/14 07:46 |
| S10 | 57 | S7 and S9 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2021/09/14 07:47 |
| S11 | 5 | "20100100680" | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2021/09/14 12:35 |
| S12 | 0 | S11 and (polic$4) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2021/09/14 12:35 |
| S13 | 3 | S11 and (rule or program$4 or guideline) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2021/09/14 12:36 |
| S14 | 10 | "20170091120" | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2021/09/15 13:45 |
| S15 | 87,349 | g06f3/0632 or g06f9/3004 or g06f9/06 or g06f3/0674 or g06f3/0659 or g06f3/068 or | US-PGPUB; USPAT; USOCR; FPRS; | OR | ON | 2021/09/15 13:47 |

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| | | g06f3/0665 or g06f3/0673 or g06f3/0604 or g06f3/0619 or g06f3/061 or g06f3/0679 or g06f3/0676 or g0f3/0658 | EPO; JPO; DERWENT; IBM_TDB | | | |
| S16 | 10,971 | ((policy or policies or script or overlay or code or coding or algorithm or firmware or program$5 or rule or guideline) same (storage or memory or dram or sram or ssd or disk or raid) same (record$4 or writ$4 or stor$4 or program$4) same (id or identif$4 or address$4 or point$4) same (control$4 or processor or cpu or microprocessor) same (content or data or object or block or byte or word) same (type or characteristic or defect$4 or head or strength) same (read$4 or recover$4 or request$4 or access$4)).clm. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2021/09/15 13:47 |
| S17 | 264 | S15 and S16 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2021/09/15 13:47 |
| S18 | 10,075 | ((jack or john) and lane).xp. or (reg$7 and bragdon).xp. or (glen$4 and gossage).xp. or (brian and peugh).xp. or (kevin and verbrugge).xp. or (gary and portka).xp. or ((heip or hiep ) and nguyen).xp. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2021/09/15 13:47 |
| S19 | 57 | S16 and S18 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2021/09/15 13:47 |

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Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (02-18)
Approved for use through 11/30/2020. OMB 0651-0031
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**INFORMATION DISCLOSURE STATEMENT BY APPLICANT**
**( Not for submission under 37 CFR 1.99)**

| | |
|---|---|
| Application Number | 17716275 |
| Filing Date | 2022-04-08 |
| First Named Inventor | Joshua Johnson |
| Art Unit | |
| Examiner Name | |
| Attorney Docket Number | 980.0023c2 |

**U.S.PATENTS** Remove

| Examiner Initial* | Cite No | Patent Number | Kind Code[1] | Issue Date | Name of Patentee or Applicant of cited Document | Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear |
|---|---|---|---|---|---|---|
| | 1 | 5596458 | A | 1997-01-21 | EMO, et al. | |
| | 2 | 6195218 | B1 | 2001-02-27 | GUTTMANN, et al. | |
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| | 1 | 20020036852 | A1 | 2002-03-28 | LEOW, et al. | |



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| INFORMATION DISCLOSURE STATEMENT BY APPLICANT ( Not for submission under 37 CFR 1.99) | | |
|---|---|---|
| | Application Number | 17716275 |
| | Filing Date | 2022-04-08 |
| | First Named Inventor | Joshua Johnson |
| | Art Unit | |
| | Examiner Name | |
| | Attorney Docket Number | 980.0023c2 |

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|---|---|---|---|---|---|---|
| | 2 | 20040174627 | A1 | 2004-09-09 | KIM, et al. | |
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| | 5 | 20140172930 | A1 | 2014-06-19 | MOLARO, et al. | |
| | 6 | 20150052167 | A1 | 2015-02-19 | OLSTER, et al. | |
| | 7 | 20160313943 | A1 | 2016-10-27 | HASHIMOTO, et al. | |
| | 8 | 20180121136 | | 2018-05-03 | ISHIYAMA | |
| | 9 | 20180260154 | A1 | 2018-09-13 | DRONAMRAJU, et al. | |
| | 10 | 20180349035 | A1 | 2018-12-06 | ELLIS, et al. | |
| | 11 | 20210182190 | A1 | 2021-01-27 | Gao et al. | |
| | 12 | 20200278793 | A1 | 2020-09-03 | Jiang et al. | |



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| INFORMATION DISCLOSURE STATEMENT BY APPLICANT ( Not for submission under 37 CFR 1.99) | | |
|---|---|---|
| | Application Number | 17716275 |
| | Filing Date | 2022-04-08 |
| | First Named Inventor | Joshua Johnson |
| | Art Unit | |
| | Examiner Name | |
| | Attorney Docket Number | 980.0023c2 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | 13 | 20170091120 | A1 | 2017-03-30 | Gopal et al. | |
| | 14 | 20100100680 | A1 | 2010-04-22 | Koseki | |

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**EXAMINER SIGNATURE**

| Examiner Signature | /JOHN A LANE/ | Date Considered | 02/10/2023 |
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[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.



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| INFORMATION DISCLOSURE STATEMENT BY APPLICANT ( Not for submission under 37 CFR 1.99) | | |
|---|---|---|
| | Application Number | 17716275 |
| | Filing Date | 2022-04-08 |
| | First Named Inventor | Joshua Johnson |
| | Art Unit | |
| | Examiner Name | |
| | Attorney Docket Number | 980.0023c2 |

**CERTIFICATION STATEMENT**

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

**OR**

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

✓ A certification statement is not submitted herewith.

**SIGNATURE**

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

| Signature | /Stephen S. Roche/ | Date (YYYY-MM-DD) | 2022-06-29 |
|---|---|---|---|
| Name/Print | Stephen S. Roche | Registration Number | 52176 |

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**



ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /J.A.L/

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# Dialog Search Strategy - Patents

**Databases:** China Patents Fulltext, Derwent World Patents Index®, European Patents Fulltext, Germany Patents Fulltext, Japan Patents Fulltext, Korea Patents Fulltext, United States Patents Fulltext, WIPO PCT Patents Fulltext

| Set# | Searched for | Results |
|---|---|---|
| S1 | storage OR memory OR disk OR disc OR volume | 67858715 |
| S2 | s1 N/5 (request* OR command OR instruction* OR requir* OR submit* OR submission* OR writ$4 OR store$1 OR storing OR read$4 OR access$4 OR retriev* OR fetch$4) | 22794790 |
| S3 | policy OR rule OR strateg* OR algorithm* OR parameter OR variable OR requirement* | 113925761 |
| S4 | s3 N/5 (check$4 OR consult* OR lookup* OR (look$3 P/0 up) OR test$4 OR examin* OR inspect* OR assess*) | 2631046 |
| S5 | location OR address OR position* OR partition* OR segment* OR sector OR area OR zone OR track OR place OR placement | 108448040 |
| S6 | s5 N/5 (determin* OR detect* OR identif* OR find$3 OR found OR discover* OR recogni* OR discern* OR ascertain*) | 19026272 |
| S7 | content OR data OR datum OR information OR info | 97936438 |
| S8 | s7 N/5 (stor$4 OR sav$4 OR writ$4 OR record$3 OR archiv* OR hold$3 OR held OR keep$3 OR kept OR retain* OR preserv*) | 22867742 |
| S9 | s4 N/30 s6 N/30 s8 | 3884 |
| S10 | ID OR IDs OR identifier OR indicator OR name OR code OR UID OR UIDs OR GUID OR GUIDs | 151327587 |
| S11 | s5 N/5 s10 | 7363903 |
| S12 | s11 N/7 (generat* OR produc* OR creat* OR construct* OR build$3 OR built OR make OR made OR making OR form$3 OR formation* OR deriv* OR establish* OR output*) | 1018018 |
| S13 | s9 N/100 s12 | 75 |
| S14 | s2 AND s13 | 72 |
| S15 | s14 AND APDA(<=2016) | 53 |
| S16 | s14 AND APDA(<=2016) | 33° |
| S17 | policy OR rule | 79560865* |
| S18 | s6 N/10 s8 | 1149215* |
| S19 | s17 N/20 s18 | 12233* |
| S20 | s19 N/50 s12 | 175° |
| S21 | cpc(g06f3/* OR g06f9/*) | 2375300* |
| S22 | s20 AND s21 | 18° |
| S23 | s22 NOT s14 | 18° |
| S24 | s23 AND APDA(<=2016) | 9° |
| S25 | s5 N/5 s8 | 4807911* |
| S26 | s25 N/10 (select* OR choos$4 OR chosen* OR choice* OR pick$4 OR decid* OR decision* OR determin* OR identif*) | 1188329* |
| S27 | s26 N/15 s17 | 13060* |
| S28 | s27 N/50 s12 | 144° |
| S29 | s28 AND s21 | 13° |

| | | |
|---|---|---|
| S30 | s29 NOT (s14 OR s22) | 3° |
| S31 | s30 AND APDA(<=2016) | 3° |

* Duplicates are removed from the search, but included in the result count.
° Duplicates are removed from the search and from the result count.

# Dialog Search Strategy - NPL

**Databases:** ABI/INFORM® Professional Advanced, Abstracts in New Technology & Engineering, Abstracts in New Technology & Engineering, Ei Compendex®, Gale Group Computer Database™, Gale Group New Product Announcements / Plus®, Gale Group Newsletter Database™, Gale Group PROMT®, Inspec®, NTIS: National Technical Information Service, ProQuest Advanced Tech & Aerospace Professional, ProQuest Advanced Tech & Aerospace Professional, SciSearch®: a Cited Reference Science Database, UBM Computer Full Text

| Set# | Searched for | Results |
|---|---|---|
| S1 | storage OR memory OR disk OR disc OR volume | 49516187* |
| S2 | s1 N/5 (request* OR command OR instruction* OR requir* OR submit* OR submission* OR writ$4 OR store$1 OR storing OR read$4 OR access$4 OR retriev* OR fetch$4) | 2641682* |
| S3 | policy OR rule OR strateg* OR algorithm* OR parameter OR variable OR requirement* | 95025528* |
| S4 | s3 N/5 (check$4 OR consult* OR lookup* OR (look$3 P/0 up) OR test$4 OR examin* OR inspect* OR assess*) | 4372227* |
| S5 | location OR address OR position* OR partition* OR segment* OR sector OR area OR zone OR track OR place OR placement | 148977001* |
| S6 | s5 N/5 (determin* OR detect* OR identif* OR find$3 OR found OR discover* OR recogni* OR discern* OR ascertain*) | 7581089* |
| S7 | content OR data OR datum OR information OR info | 245393420* |
| S8 | s7 N/5 (stor$4 OR sav$4 OR writ$4 OR record$3 OR archiv* OR hold$3 OR held OR keep$3 OR kept OR retain* OR preserv*) | 14662862* |
| S9 | s4 N/30 s6 N/30 s8 | 242° |
| S10 | ID OR IDs OR identifier OR indicator OR name OR code OR UID OR UIDs OR GUID OR GUIDs | 146046165* |
| S11 | s5 N/5 s10 | 12248670* |
| S12 | s11 N/7 (generat* OR produc* OR creat* OR construct* OR build$3 OR built OR make OR made OR making OR form$3 OR formation* OR deriv* OR establish* OR output*) | 814451* |
| S13 | s9 AND s12 | 2° |
| S14 | s2 AND s13 | 0° |
| S15 | policy OR rule | 31108837* |
| S16 | s6 N/10 s8 | 26891* |
| S17 | s15 N/20 s16 | 489° |
| S18 | s17 AND s12 | 3° |
| S19 | s18 AND YR(<=2016) | 2° |
| S20 | s5 N/5 s8 | 520858* |
| S21 | s20 N/10 (select* OR choos$4 OR chosen* OR choice* OR pick$4 OR decid* OR decision* OR determin* OR identif*) | 25603* |
| S22 | s21 N/15 s15 | 495° |
| S23 | s22 AND s12 | 8° |
| S24 | s23 NOT s18 | 6° |
| S25 | s24 AND YR(<=2016) | 6° |

* Duplicates are removed from the search, but included in the result count.

° Duplicates are removed from the search and from the result count.



Meta Platforms, Inc. and Samsung Electronics Co. Ltd. - Ex. 1002
Page 219

Main Concept Document
==========
US20220229571
Title: Data storage device with configurable policy-based storage device behavior

Concept Modifiers (1)
==========
1. More Like Text: when a storage request comes in, a policy is checked to determine the location to store the content, the content is stored according to the policy/rule, and an identifier/indication of the storage location is generated by the controller

Filters (1)
==========
Earliest Priority Date: To 2016-11-07

Options
==========
De-dup: Simple Family Numbers
Cut-off: None
Sort: Relevance

Content: Patent Publications (167)
==========
US Patents
US Designs
US Applications
EPO Patents
EPO Applications
China Patents
China Applications
Japan Patents
Japan Applications
Korea Patents
Korea Applications
WIPO Applications
Argentina Patents
Argentina Applications
Brazil Patents
Brazil Applications
Canada Patents
Canada Applications
Chile Patents
Chile Applications
Colombia Applications
Costa Rica Applications
Cuba Patents
Cuba Applications
Dominican Republic Applications
Ecuador Patents
Ecuador Applications
El Salvador Applications
Guatemala Applications
Honduras Applications
Mexico Patents
Mexico Applications
Nicaragua Patents
Panama Applications
Peru Applications
Trinidad & Tobago Patents
Uruguay Applications
Austria Patents
Austria Applications
Belarus Patents
Belgium Patents
Belgium Applications
Bosnia & Herzegovina Patents
Bosnia & Herzegovina Applications
Bulgaria Patents
Bulgaria Applications
Croatia Patents
Croatia Applications
Czech Republic Patents
Czech Republic Applications
Czechoslovakia Patents
Czechoslovakia Applications
Denmark Patents
Denmark Applications
Estonia Patents
Estonia Applications
EUIPO Patents
Finland Patents
Finland Applications
France Patents
France Applications
Germany Patents
Germany Applications
Great Britain Patents
Great Britain Applications
Greece Patents
Greece Applications
Hungary Patents
Hungary Applications
Iceland Patents
Iceland Applications
Ireland Patents
Ireland Applications
Italy Patents
Italy Applications
Latvia Patents
Latvia Applications
Lithuania Patents
Lithuania Applications
Luxembourg Patents
Malta Patents
Monaco Patents
Montenegro Patents
Montenegro Applications
Netherlands Patents
Netherlands Applications
Norway Patents
Norway Applications
Poland Patents
Poland Applications
Portugal Patents
Portugal Applications
Republic of Moldova Patents
Republic of Moldova Applications
Romania Patents
Romania Applications
San Marino Patents
San Marino Applications
Serbia Patents
Serbia Applications
Slovakia Patents
Slovakia Applications
Slovenia Patents
Spain Patents
Spain Applications
Sweden Patents
Sweden Applications
Switzerland Patents
Switzerland Applications

Ukraine Patents
Yugoslavia/Serbia and Montenegro Patents
Yugoslavia/Serbia and Montenegro Applications
Armenia Patents
Australia Patents
Australia Applications
Cyprus Patents
Gulf Cooperation Council Patents
Hong Kong Patents
India Patents
India Applications
Indonesia Patents
Indonesia Applications
Israel Applications
Jordan Patents
Jordan Applications
Kyrgyzstan Patents
Macao Applications
Malaysia Patents
Mongolia Patents
New Zealand Patents
Philippines Patents
Philippines Applications
Saudi Arabia Patents
Saudi Arabia Applications
Singapore Patents
Singapore Applications
Taiwan Patents
Taiwan Applications
Tajikistan Patents
Tajikistan Applications
Thailand Patents
Thailand Applications
Uzbekistan Patents
Vietnam Patents
Algeria Patents
ARIPO Patents
ARIPO Applications
Egypt Patents
Kenya Patents
Malawi Patents
Morocco Patents
Morocco Applications
OAPI Patents
South Africa Patents
Tunisia Applications
Zambia Patents
Zimbabwe Patents
EAPO Patents
EAPO Applications
Georgia Patents
Georgia Applications
Kazakhstan Patents
Kazakhstan Applications
Russia Patents
Russia Applications
Turkey Patents
Turkey Applications

Main Concept Document
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US20220229571
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Concept Modifiers (1)
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Filters (1)
==========
Publication Date: To 2016-11-07

Options
=======
De-dup: None
Cut-off: None
Sort: Relevance

Content: Non-Patent Literature (23)
==========
IEEE Xplore Publications: IEEE Periodicals
IEEE Xplore Publications: IEEE Conferences
IEEE Xplore Publications: IEEE Standards
IEEE Xplore Publications: IEEE Early Access
IEEE Xplore Publications: SMPTE Periodicals
IEEE Xplore Publications: SMPTE Conferences
IEEE Xplore Publications: SMPTE Standards
IEEE Xplore Publications: MIT Press eBooks
IEEE Xplore Publications: Wiley-IEEE eBooks
IEEE Xplore Publications: IBM Periodicals
IEEE Xplore Publications: URSI Periodicals
IEEE Xplore Publications: VDE Conferences
IEEE Xplore Publications: Periodicals from China
IP.com Prior Art Database: The IP.com Journal
IP.com Prior Art Database: Internet Society RFC
IP.com Prior Art Database: IBM TDB Archive
IP.com Prior Art Database: Legacy Journals
IP.com Prior Art Database: Software Patent Institute
OnePetro.org: Periodicals at OnePetro.org
OnePetro.org: Conferences at OnePetro.org
Other Literature: IBM Redbooks
Other Literature: PubMed Central
Other Literature: arXiv.org

***NPL Search Results***

**International Business Machines (IBM) issued new patent [9,270,950]**

**Publication info**: News Bites - Computing & Information [Melbourne] 24 Feb 2016.

**Abstract (summary)**: NEWS BITES - COMPUTING &INFORMATION TECHNOLOGY Corporate Wire Date: 23 February 2016 16:20 EST International Business Machines (IBM) has been issued a new patent titled "Identifying a locale for controlling capture of data by a digital life recorder based on location" by the US Patent and Trademark Office.

**Publication title**: News Bites - Computing &Information

**Publisher location**: Melbourne

**Document type**: News

**Copyright**: Copyright News Bites Pty Ltd Feb 24, 2016

**First available**: 2016-02-23

**Updates**: 2016-02-23

**Database**: ABI/INFORM® Professional Advanced (1971 - current)

**Full text**: ... embodiments described herein provide a computer implemented method, apparatus, and computer program product controlling a capture of data. In one embodiment, the process identifies a location from locale identifier data to form an identified location in response to receiving the locale identifier data. The locale identifier data is associated with a location of the digital life recorder. In addition, the identified location is associated with a set of usage policies. The process then determines whether the set of usage policies restricts the capture of data by the digital life recorder at the identified location or whether the set of usage policies restricts playback of the data by a playback system. Thereafter, the process disables a set of sensors while the digital life recorder is in the ...

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**System design for location name recognition in ancient local chronicles**

**Author**: Bao, Ping; Zhu, Suoling

**Publication info**: Library Hi Tech 32.2: 276-284. Emerald Group Publishing Limited. (2014)

**Abstract (summary)**: Purpose

- The purpose of this paper is to present a system for recognition of location names in ancient books written in languages, such as Chinese, in which proper names are not signaled by an initial capital letter.

Design/methodology/approach

- Rule-based and statistical methods were combined to develop a set of rules for identification of product-related location names in the local chronicles of Guangdong. A name recognition system, with functions of

document management, information extraction and storage, rule management, location name recognition, and inquiry and statistics, was developed using Microsoft's .NET framework, SQL Server 2005, ADO.NET and XML. The system was evaluated with precision ratio, recall ratio and the comprehensive index,F .

Findings

- The system was quite successful at recognizing product-related location names (F was 71.8 percent), demonstrating the potential for application of automatic named entity recognition techniques in digital collation of ancient books such as local chronicles.

Research limitations/implications

- Results suffered from limitations in initial digitization of the text. Statistical methods, such as the hidden Markov model, should be combined with an extended set of recognition rules to improve recognition scores and system efficiency.

Practical implications

- Electronic access to local chronicles by location name saves time for chorographers and provides researchers with new opportunities.

Social implications

- Named entity recognition brings previously isolated ancient documents together in a knowledge base of scholarly and cultural value.

Originality/value

- Automatic name recognition can be implemented in information extraction from ancient books in languages other than English. The system described here can also be adapted to modern texts and other named entities.

**Publication title**: Library Hi Tech

**Volume**: 32

**Issue**: 2

**Pagination**: 276-284

**Publisher location**: Bradford

**DOI**: http://dx.doi.org/10.1108/LHT-07-2013-0101

**Document type**: Journal Article

**Copyright**: © Emerald Group Publishing Limited 2014

**First available**: 2015-03-06

**Updates**: 2015-03-062015-03-062015-04-062015-04-062017-03-312018-09-302018-10-062019-07-232019-09-06

**Database**: 2 databasesView listHide listABI/INFORM® Professional Advanced, ProQuest Advanced Tech &Aerospace Professional

**Full text**: ... short, while others are long, and there is no upper limit on the length of the name. The ancient local chronicles also include some foreign location names, most of these are former names, and there is no translation standard for them. Multiple location names often appear together, but the meaning of the text where the names appear ... chronicles of China's Guangdong Province. The paper describes a combined rule-based and statistical approach to development of a named entity recognition method for extraction of product-related location names in the local chronicles. Section 3 presents the system design, Section 4 describes the implementation, and Section 5 presents evaluation results. Conclusions are drawn and an outlook for future development and application is presented in Section 6. **3. System design for product location name recognition** The steps developed to recognize product location names are described in this section and illustrated in Figure 1. **3.1 Database of ancient local chronicles and product information** Location name recognition in ancient local chronicles begins with electronic texts. For this project, we used an existing database of ancient books (Heng, 2007). A description of the products referred to in the corpus also exists, although not in a standardized format. **3.2 Recognition of product location names 3.2.1 Building the location name dictionary** A dictionary of location names was developed from the ancient and modern location names contrast table, popular titles of ancient location names and other sources of information about administrative districts ... in the period between the Ming Dynasty and the Republic of China. The dictionary contains a list of names with statistics about their occurrence. **3.2.2 Building the list of rules for location name recognition** The first step in building the list of rules was to select a set of local chronicles which are rich in location names (a training corpus), and to use this ... After reviewing the reasons for poor matches, the following reward and punishment rules were added to improve the ability of poor performing rules to recognize product-related location names: (1) reward rule: include if location characteristic words, such as "country," "Fu" and "state," appear in candidate location names. (2) punishment rules: exclude if the candidate location name is more than ... location name; and exclude if the character detected by a rule constitutes a fixed expression with the character immediately prior to or following it. **3.2.3 Product location name recognition** Three steps are involved in product location name recognition: (1) match the basic recognition rules to product descriptions to generate candidate product location names; (2) screen the candidate location names with the reward and punishment rules; and (3) scan the screened candidate product location names in the location name dictionary and correct and modify location names recognized by the rules as necessary. **4. Implementation 4.1 System development environment and software** The system was developed using ASP.NET under the Microsoft .NET ... for system expansion, update and maintenance. The system provides internet access to web pages for a number of functions, including document management, management of the rules database, location name recognition and statistics. **4.2 System functions** The main system functions are document management, information extraction and storage, rule management, location name recognition and inquiry and statistics. **4.2.1 Document management** Permits browsing and upload of documents for location name recognition, supports multiple document upload. Uploaded documents can be ... reward and punishment rules. When editing reward and punishment rules, permits rule selection and editing and filtering by direction, character length and rule state. **4.2.4 Location name recognition** Carries out recognition of product location names from documents in the database. Recognition results are displayed as "edited" or "to edit." "Edited" results contain the extracted location name information. These results can be sorted and browsed by location name, product name and rule. Where no location name is extracted but a product exists in the database, results are

flagged "to edit." These results provide only product details. Location names and rules can be added manually and modified according to the product descriptions as necessary. **4.2.5 Inquiry and statistics** Displays all the location name recognition results. Inquiries can be made by product name, location name, rule name, book name and year. Results can also be ranked and filtered by these categories. Duplicates can be counted and removed. **5. Evaluation 5.1 Evaluation indexes** Three evaluation ... ,. **5.2 Evaluation method** After randomly selecting a test set of ten documents, experts were invited to read each document carefully and record each product-related location name in the document along with details of the corresponding rule(s). Only product location names on which multiple experts agreed were recorded as correct. **5.3 Evaluation results** A total of 643 correct location names were identified by the experts and ... rules results in some names being recognized repeatedly. Third, the original process of local chronicle digitization did not correct misprints or capture some uncommon words. Location names in these forms could not be matched to the location name indexing dictionary, so they could not be recognized and modified by the system, thus reducing the recall and PR. **6. Conclusions and outlook** This paper ... priority rule would be given precedence. This approach would avoid repeated recognition of location names and substantially improve the efficiency of the system. Third, the product location name recognition system described in this paper has some portability to other named entries and other languages. Common named entities include person names, location names and organization names, and while this paper focusses on recognition of location names in Products in Local Chronicles of Guangdong, other named entities, such as the names of each book or chronicle, the time covered by the chronicle and product ... as historical references for agricultural production and scholarly research. Of course, the purpose of this paper is not to just to describe how recognition of location names was achieved in the Products in Local Chronicles in Guangdong project, but also to demonstrate how modern digital technology can be used as a tool to provide access to the ... sorting; on the other hand, they provide opportunities for researchers to obtain new ideas and explore new directions and topics for research. **Figure 1**

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**Diplomatics of born digital documents - considering documentary form in a digital environment**

**Author**: Rogers, Corinne

**Publication info**: Records Management Journal 25.1: 6-20. Emerald Group Publishing Limited. (2015)

**Abstract (summary)**: Purpose

- This paper aims to explore a new model of "record" that maps traditional attributes of a record onto a technical decomposition of digital records. It compares the core characteristics necessary to call a digital object a "record" in terms of diplomatics or "evidence" in terms of digital forensics. It then isolates three layers of abstraction: the conceptual, the logical and the physical. By identifying the essential elements of a record at each layer of abstraction, a diplomatics of digital records can be proposed.

Design/methodology/approach

- Digital diplomatics, a research outcome of the International Research on Permanent Authentic Records in Electronic Systems (InterPARES) project, gives archivists a methodology for analyzing the identity and integrity

of digital records in electronic systems and thereby assessing their authenticity (Duranti and Preston, 2008; Duranti, 2005) and tracing their provenance.

Findings

- Digital records consist of user-generated data (content), system-generated metadata identifying source and location, application-generated metadata managing the look and performance of the record (e.g., native file format), application-generated metadata describing the data (e.g., file system metadata OS), and user-generated metadata describing the data. Digital diplomatics, based on a foundation of traditional diplomatic principles, can help identify digital records through their metadata and determine what metadata needs to be captured, managed and preserved.

Originality/value

- The value and originality of this paper is in the application of diplomatic principles to a deconstructed, technical view of digital records through functional metadata for assessing the identity and authenticity of digital records.

**Publication title**: Records Management Journal

**Volume**: 25

**Issue**: 1

**Pagination**: 6-20

**Publisher location**: Bradford

**DOI**: http://dx.doi.org/10.1108/RMJ-03-2014-0021

**Document type**: Journal Article

**Copyright**: © Emerald Group Publishing Limited 2015

**First available**: 2015-03-17

**Updates**: 2015-03-172015-03-202015-03-202015-03-222015-04-162017-04-212018-09-272018-09-282018-09-302018-10-062019-07-232019-09-06

**Database**: ABI/INFORM® Professional Advanced (1971 - current)

**Full text**: ... "track changes" or "comments" in a word processing file [...], it may only be available in the original, native file. *File system metadata* : Metadata generated by the system to track the demographics (name, size, location, usage, etc.) of the ESI and not embedded within, but stored externally from the ESI. *User-added metadata* : Data, possibly work product, created by ... life cycle of the record(s) that need to be documented; links to external documentation that governs preservation, transfer and access to the record(s) over time; rules of representation that determine the appearance of an entity; handling information; location information about storage, backup or duplication; identification of individuals or legally defined entities who are subjects of rights and duties and are recognized by the juridical system as capable of or having ...

---

**Information Privacy Management by Digital Rights Management Systems**

**Author**: Jackson, Margaret

**Publication info**: Telecommunications Journal of Australia 55.4: 52-62. Monash University Publishing. (Summer 2005)

**Publication title**: Telecommunications Journal of Australia

**Volume**: 55

**Issue**: 4

**Pagination**: 52-62

**Publisher location**: Melbourne

**Document type**: General Information

**Copyright**: Copyright Telecommunication Society of Australia Ltd Summer 2005

**First available**: 2010-06-07

**Database**: ABI/INFORM® Professional Advanced (1971 - current)

**Full text**: ... that all data is stored securely in Cupertino, California. Apple has established a simple privacy rights management system for users, called 'Apple ID'. The user creates a personal profile - name, phone number, email address and if relevant, mailing address and credit card details, together with a password and password hint. The data is stored and the user is assigned ... privacy legislation. Only financial institutions are required by US Federal law to have a privacy policy and to abide by the data protection guidelines.[22] The Policy states that SML may collect information such as name and email address and that it may retain the content of emails. It does not disclose personally identifiable information to anyone outside SML. The Policy also explains the use of cookies and says they can be disabled but doesn't explain how. It allows opting out of receiving advertising emails. No ...

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# 15804772 Search Strategy-Dialog

**Databases:** Abstracts in New Technology & Engineering, British Library Inside Conferences, Computer and Information Systems Abstracts, Ei Compendex®, Electronics & Communications Abstracts, Gale Group Computer Database™, Inspec®, Jane's Defense & Aerospace News, NTIS: National Technical Information Service, SciSearch®: a Cited Reference Science Database

| Set# | Searched for | Results |
|---|---|---|
| S1 | storage N/2 (policies or policy or rule$1 or guideline$1) | 12525* |
| S2 | storage N/2 density or recording N/2 path N/2 density or areal N/2 density | 60908* |
| S3 | (critical or high N/1 priority) N/3 data | 110185* |
| S4 | (lower or smaller or low or small or less or lesser) N/2 (s2 or density) | 886047* |
| S5 | (Avoid* or prevent*) N/3 (defect$1 or error$1) | 186714* |
| S6 | AU("Johnson, Joshua" or "Bruner, Curt" or "Reh, Jeffrey" or "Squires, Christopher" or "Wilson, Brian" or "Johnson, J" or "Bruner, C" or "Reh, J" or "Squires, C" or "Wilson, B") | 35086* |
| S7 | (storing or saving) and s3 and s4 | 120° |
| S8 | s7 and s1 | 1° |
| S9 | s7 and s5 | 6° |
| S10 | s7 and s6 | 0° |
| S11 | s1 and s2 and s3 | 2° |
| S12 | s1 N/100 s2 | 30° |
| S13 | s12 and s6 | 0° |
| S14 | s12 AND YR(<=2018) | 28° |

# Search Strategy

**Databases:** Argentina Patents Fulltext, Australia Patents Fulltext, Austria Patents Fulltext, Belgium Patents Fulltext, Brazil Patents Fulltext, Canada Patents Fulltext, China Patents Fulltext, Denmark Patents Fulltext, Derwent Patents Citation Index®, Derwent World Patents Index®, Eurasia Patents Fulltext, European Patents Fulltext, Finland Patents Fulltext, France Patents Fulltext, Germany Patents Fulltext, Global Patents Bibliographic, Great Britain Patents Fulltext, India Patents Fulltext™, Ireland Patents Fulltext, Italy Patents Fulltext, Japan Patents Fulltext, JAPIO - Patent Abstracts of Japan, Korea Patents Fulltext, Luxembourg Patents Fulltext, Mexico Patents Fulltext, Monaco Patents Fulltext, Netherlands Patents Fulltext, Norway Patents Fulltext, Portugal Patents Fulltext, Russia Patents Fulltext, Spain Patents Fulltext, Sweden Patents Fulltext, Switzerland Patents Fulltext, United States Patents Fulltext, WIPO PCT Patents Fulltext

| Set# | Searched for | Results |
|---|---|---|

| | | |
|---|---|---|
| S1 | storage N/2 (policies or policy or rule$1 or guideline$1) | 82301 |
| S2 | storage N/2 density or recording N/2 path N/2 density or areal N/2 density | 185389 |
| S3 | (critical or high N/1 priority) N/3 data | 195999 |
| S4 | (lower or smaller or low or small or less or lesser) N/2 (s2 or density) | 3282908 |
| S5 | (Avoid* or prevent*) N/3 (defect$1 or error$1) | 1205779 |
| S6 | AU("Johnson, Joshua" or "Bruner, Curt" or "Reh, Jeffrey" or "Squires, Christopher" or "Wilson, Brian" or "Johnson, J" or "Bruner, C" or "Reh, J" or "Squires, C" or "Wilson, B") | 15332 |
| S7 | CPC("G06F 3/0632" or "G06F 3/0673" or "G06F 3/0604" or "G06F 3/061" or "G06F 3/0619" or "G06F 3/0658" or "G06F 3/0665" or "G06F 3/068") | 86250 |
| S8 | (storing or saving) N/50 s3 N/50 s4 | 8 |
| S9 | s8 N/100 s1 | 0 |
| S10 | s8 N/100 s5 | 0 |
| S11 | s8 and s6 | 0 |
| S12 | s8 and apda(<=20170120) | 8 |
| S13 | s8 and apda(<=20170120) | 7° |
| S14 | s1 N/50 s2 N/50 s3 | 0° |
| S15 | s1 N/50 s2 | 49° |
| S16 | s15 N/50 s5 | 0° |
| S17 | s15 and s7 | 3° |
| S18 | s17 and apda(<=20170120) | 2° |

IP.COM

Complete Main Concept Text
==========
Storage policy storage density invention stores critical or high priority data at a low or lower density

==========
Earliest Priority Date: To 2017-01-20
De-dup: Simple Family Numbers

Patent Collections
==========
US Patents
US Designs
US Applications
EPO Patents
EPO Applications
China Patents
China Applications
Japan Patents
Japan Applications
Korea Patents
Korea Applications
WIPO Applications
Argentina Patents
Argentina Applications
Brazil Patents
Brazil Applications

Canada Patents
Canada Applications
Chile Patents
Chile Applications
Colombia Applications
Costa Rica Applications
Cuba Patents
Cuba Applications
Dominican Republic Applications
Ecuador Patents
Ecuador Applications
El Salvador Applications
Guatemala Applications
Honduras Applications
Mexico Patents
Mexico Applications
Nicaragua Patents
Panama Applications
Peru Applications
Trinidad & Tobago Patents
Uruguay Applications
Austria Patents
Austria Applications
Belarus Patents
Belgium Patents
Belgium Applications
Bosnia & Herzegovina Patents
Bosnia & Herzegovina Applications
Bulgaria Patents
Bulgaria Applications
Croatia Patents
Croatia Applications
Czech Republic Patents
Czech Republic Applications
Czechoslovakia Patents
Czechoslovakia Applications
Denmark Patents
Denmark Applications
Estonia Patents
Estonia Applications
EUIPO Patents
Finland Patents
Finland Applications
France Patents
France Applications
Germany Patents
Germany Applications
Great Britain Patents
Great Britain Applications
Greece Patents
Greece Applications
Hungary Patents
Hungary Applications
Iceland Patents
Iceland Applications
Ireland Patents
Ireland Applications
Italy Patents
Italy Applications
Latvia Patents
Latvia Applications
Lithuania Patents
Lithuania Applications
Luxembourg Patents
Malta Patents
Monaco Patents
Montenegro Patents
Montenegro Applications
Netherlands Patents
Netherlands Applications
Norway Patents
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Poland Patents
Poland Applications
Portugal Patents
Portugal Applications
Republic of Moldova Patents
Republic of Moldova Applications
Romania Patents
Romania Applications
San Marino Patents
San Marino Applications
Serbia Patents
Serbia Applications
Slovakia Patents
Slovakia Applications
Slovenia Patents
Spain Patents
Spain Applications
Sweden Patents
Sweden Applications
Switzerland Patents
Switzerland Applications
Ukraine Patents
Yugoslavia/Serbia and Montenegro Patents
Yugoslavia/Serbia and Montenegro Applications
Armenia Patents
Australia Patents
Australia Applications
Cyprus Patents
Gulf Cooperation Council Patents
Hong Kong Patents
India Patents
India Applications
Indonesia Patents
Indonesia Applications
Israel Applications
Jordan Patents
Kyrgyzstan Patents
Macao Applications
Malaysia Patents
Mongolia Patents
New Zealand Patents
Philippines Patents
Philippines Applications
Saudi Arabia Patents
Singapore Patents
Singapore Applications
Taiwan Patents
Taiwan Applications
Tajikistan Patents
Tajikistan Applications
Thailand Applications

Uzbekistan Patents
Vietnam Patents
Algeria Patents
ARIPO Patents
ARIPO Applications
Egypt Patents
Kenya Patents
Malawi Patents
Morocco Patents
Morocco Applications
OAPI Patents
South Africa Patents
Tunisia Applications
Zambia Patents
Zimbabwe Patents
EAPO Patents
EAPO Applications
Georgia Patents
Georgia Applications
Kazakhstan Patents
Kazakhstan Applications
Russia Patents
Russia Applications
Turkey Patents
Turkey Applications

NPL Collections
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IEEE Xplore Publications: IEEE Periodicals
IEEE Xplore Publications: IEEE Conferences
IEEE Xplore Publications: IEEE Standards
IEEE Xplore Publications: IEEE Early Access
IEEE Xplore Publications: IET Periodicals
IEEE Xplore Publications: IET Conferences
IEEE Xplore Publications: SMPTE Periodicals
IEEE Xplore Publications: SMPTE Conferences
IEEE Xplore Publications: SMPTE Standards
IEEE Xplore Publications: MIT Press eBooks
IEEE Xplore Publications: Wiley-IEEE eBooks
IEEE Xplore Publications: IBM Periodicals
IEEE Xplore Publications: URSI Periodicals
IEEE Xplore Publications: VDE Conferences
IEEE Xplore Publications: Periodicals from China
IP.com Prior Art Database: The IP.com Journal
IP.com Prior Art Database: Internet Society RFC
IP.com Prior Art Database: IBM TDB Archive
IP.com Prior Art Database: Legacy Journals
IP.com Prior Art Database: Software Patent Institute
OnePetro.org: Periodicals at OnePetro.org
OnePetro.org: Conferences at OnePetro.org
OnePetro.org: Standards at OnePetro.org
Other Literature: IBM Redbooks
Other Literature: PubMed Central

**Version #2**
Classic Syntax limited to: storage NEAR2 density

# Patents Search Strategy - Dialog

**Databases:** Canada Patents Fulltext, China Patents Fulltext, Derwent World Patents Index®, European Patents Fulltext, France Patents Fulltext, Germany Patents Fulltext, Great Britain Patents Fulltext, Japan Patents Fulltext, JAPIO - Patent Abstracts of Japan, Korea Patents Fulltext, United States Patents Fulltext, WIPO PCT Patents Fulltext

| Set# | Searched for | Results |
|---|---|---|
| S1 | storage or disc or disk or hd or hdd or sdd or solid-state or flash or harddrive$1 or hard-drive or raid or memory or ram or dram or sram | 57752670 |
| S2 | s1 n/7 controller | 3645693 |
| S3 | policy or rule or guideline or guidance or instructions or script | 93866281 |
| S4 | ((record* or writ$4 or store$1 or storing or program*) n/4 (method or mechanism or mode or operation or process)) or (head n/4 (strength or strong* or age or old or oldness)) | 16298277 |
| S5 | s3 n/7 s4 | 1181426 |
| S6 | content or data or object or media | 158211853 |
| S7 | s6 n/4 (id or identifier or address or pointer) | 143738962 |
| S8 | s6 n/4 (read$4 or access* or recover*) | 14320746 |
| S9 | s6 n/4 (type or kind or category or characteristic or trait or property) | 144317543 |
| S10 | s2 n/20 s5 | 17456 |
| S11 | (s10 n/100 (s7 n/100 s8)) n/100 s9 | 64 |
| S12 | s11 and apda(<20170120) | 39 |
| S13 | s11 and apda(<20170120) | 27° |
| S14 | head n/4 (strength or strong* or age or old or oldness) | 201275* |
| S15 | s10 n/200 s14 | 2° |
| S16 | s10 and s14 | 12° |

| | | |
|---|---|---|
| S17 | s9 n/4 (custom* or tailor* or based) | 652849* |
| S18 | s10 n/200 s17 | 29° |
| S19 | s10 n/1000 s17 | 93° |
| S20 | s19 and (s7 or s8) | 93° |
| S21 | s20 and apda(<20170120) | 63° |
| S22 | storage n/10 controller | 1663388* |
| S23 | s22 n/20 (policy or rule or guideline) | 10585* |
| S24 | s23 n/20 (configur* or custom* or tailor*) | 1055° |
| S25 | (s24 n/50 s9) or (s24 and s14) | 44° |
| S26 | s25 and apda(<20170120) | 29° |
| S27 | s26 not (s21 or s16 or s13) | 28° |

* Duplicates are removed from the search, but included in the result count.

° Duplicates are removed from the search and from the result count.

## NPL Search Strategy - Dialog

**Databases:** ABI/INFORM® Professional Advanced, Abstracts in New Technology & Engineering, Abstracts in New Technology & Engineering, British Library Inside Conferences, Business & Industry, Computer and Information Systems Abstracts, Computer and Information Systems Abstracts, Current Contents® Search, Ei Compendex®, Electronics & Communications Abstracts, Electronics & Communications Abstracts, Gale Group Computer Database™, Gale Group New Product Announcements / Plus®, Gale Group Newsletter Database™, Gale Group PROMT®, Gale Group Trade & Industry Database™, Inspec®, NTIS: National Technical Information Service, ProQuest Newsstand Professional, Solid State and Superconductivity Abstracts, Solid State and Superconductivity Abstracts

| Set# | Searched for | Results |
|---|---|---|

| | | |
|---|---|---|
| S1 | storage or disc or disk or hd or hdd or sdd or solid-state or flash or harddrive$1 or hard-drive or raid or memory or ram or dram or sram | 49625572* |
| S2 | s1 n/7 controller | 267015* |
| S3 | policy or rule or guideline or guidance or instructions or script | 84317192* |
| S4 | ((record* or writ$4 or store$1 or storing or program*) n/4 (method or mechanism or mode or operation or process)) or (head n/4 (strength or strong* or age or old or oldness)) | 5415155* |
| S5 | s3 n/7 s4 | 81940* |
| S6 | content or data or object or media | 533478161* |
| S7 | s6 n/4 (id or identifier or address or pointer) | 737756* |
| S8 | s6 n/4 (read$4 or access* or recover*) | 17811282* |
| S9 | s6 n/4 (type or kind or category or characteristic or trait or property) | 11184570* |
| S10 | s2 n/20 s5 | 233° |
| S11 | (s10 n/100 (s7 n/100 s8)) n/100 s9 | 0° |
| S12 | s10 and s7 and s8 and s9 | 2° |
| S13 | s10 and s9 | 4° |
| S14 | head n/4 (strength or strong* or age or old or oldness) | 1538912* |
| S15 | s10 and s14 | 0° |
| S16 | storage n/10 controller | 101678* |
| S17 | s16 n/20 (policy or rule or guideline) | 718° |
| S18 | s17 n/20 (configur* or custom* or tailor*) | 81° |
| S19 | s18 and s9 | 2° |
| S20 | s18 and s7 and s8 | 3° |
| S21 | s18 not (s20 or s19) | 79° |

| | | |
|---|---|---|
| S22 | s21 and yr(<2017) | 27° |

* Duplicates are removed from the search, but included in the result count.

° Duplicates are removed from the search and from the result count.

**IP.com InnovationQ:**

Main Concept Document

==========

US20210055873

Title: Data storage device with configurable policy-based storage device behavior

Concept Modifiers (1)

==========

1. More Like Text: head strength

Filters (1)

==========

Earliest Priority Date: To 2017-01-20

Options

=======

De-dup: Simple Family Numbers

Cut-off: None

Sort: Relevance

Content: Patent Publications (164)

==========

US Patents

US Designs

US Applications

EPO Patents

EPO Applications

China Patents

China Applications

Japan Patents

Japan Applications

Korea Patents

Korea Applications

WIPO Applications

Argentina Patents

Argentina Applications

Brazil Patents

Brazil Applications

Canada Patents

Canada Applications

Chile Patents

Chile Applications

Colombia Applications

Costa Rica Applications

Cuba Patents

Cuba Applications

Dominican Republic Applications

Ecuador Patents

Ecuador Applications

El Salvador Applications

Guatemala Applications

Honduras Applications

Mexico Patents

Mexico Applications

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Panama Applications

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Uruguay Applications

Austria Patents

Austria Applications

Belarus Patents

Belgium Patents

Belgium Applications

Bosnia & Herzegovina Patents

Bosnia & Herzegovina Applications

Bulgaria Patents

Bulgaria Applications

Croatia Patents

Croatia Applications

Czech Republic Patents

Czech Republic Applications

Czechoslovakia Patents

Czechoslovakia Applications

Denmark Patents

Denmark Applications

Estonia Patents

Estonia Applications

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Finland Patents

Finland Applications

France Patents

France Applications

Germany Patents

Germany Applications

Great Britain Patents

Great Britain Applications

Greece Patents

Greece Applications

Hungary Patents

Hungary Applications

Iceland Patents

Iceland Applications

Ireland Patents

Ireland Applications

Italy Patents

Italy Applications

Latvia Patents

Latvia Applications

Lithuania Patents

Lithuania Applications

Luxembourg Patents

Malta Patents

Monaco Patents

Montenegro Patents

Montenegro Applications

Netherlands Patents

Netherlands Applications

Norway Patents

Norway Applications

Poland Patents

Poland Applications

Portugal Patents

Portugal Applications

Republic of Moldova Patents

Republic of Moldova Applications

Romania Patents

Romania Applications

San Marino Patents

San Marino Applications

Serbia Patents

Serbia Applications

Slovakia Patents

Slovakia Applications

Slovenia Patents

Spain Patents

Spain Applications

Sweden Patents

Sweden Applications

Switzerland Patents

Switzerland Applications

Ukraine Patents

Yugoslavia/Serbia and Montenegro Patents

Yugoslavia/Serbia and Montenegro Applications

Armenia Patents

Australia Patents

Australia Applications

Cyprus Patents

Gulf Cooperation Council Patents

Hong Kong Patents

India Patents

India Applications

Indonesia Patents

Indonesia Applications

Israel Applications

Jordan Patents

Kyrgyzstan Patents

Macao Applications

Malaysia Patents

Mongolia Patents

New Zealand Patents

Philippines Patents

Philippines Applications

Saudi Arabia Patents

Singapore Patents

Singapore Applications

Taiwan Patents

Taiwan Applications

Tajikistan Patents

Tajikistan Applications

Thailand Applications

Uzbekistan Patents

Vietnam Patents

Algeria Patents

ARIPO Patents

ARIPO Applications

Egypt Patents

Kenya Patents

Malawi Patents

Morocco Patents

Morocco Applications

OAPI Patents

South Africa Patents

Tunisia Applications

Zambia Patents

Zimbabwe Patents

EAPO Patents

EAPO Applications

Georgia Patents

Georgia Applications

Kazakhstan Patents

Kazakhstan Applications

Russia Patents

Russia Applications

Turkey Patents

Turkey Applications

Main Concept Document

==========

US20210055873

Title: Data storage device with configurable policy-based storage device behavior

Concept Modifiers (1)

==========

1. More Like Text: head strength

(No Filters)

==========

Options

=======

De-dup: None

Cut-off: None

Sort: Relevance

Content: Non-Patent Literature (22)

==========

| | | |
|---|---|---|
| IEEE Xplore Publications: IEEE Periodicals | IEEE Xplore Publications: SMPTE Periodicals | IEEE Xplore Publications: Wiley-IEEE eBooks |
| IEEE Xplore Publications: IEEE Conferences | IEEE Xplore Publications: SMPTE Conferences | IEEE Xplore Publications: Wiley Telecom eBooks |
| IEEE Xplore Publications: IEEE Standards | IEEE Xplore Publications: SMPTE Standards | IEEE Xplore Publications: IBM Periodicals |
| IEEE Xplore Publications: IEEE Early Access | IEEE Xplore Publications: MIT Press eBooks | IEEE Xplore Publications: Periodicals from China |

IP.com Prior Art Database: The IP.com Journal

IP.com Prior Art Database: Internet Society RFC

IP.com Prior Art Database: IBM TDB Archive

IP.com Prior Art Database: Legacy Journals

IP.com Prior Art Database: Software Patent Institute

OnePetro.org: Periodicals at OnePetro.org

OnePetro.org: Conferences at OnePetro.org

Other Literature: IBM Redbooks

Other Literature: PubMed Central

Other Literature: arXiv.org

## PE2E SEARCH - Search History (Prior Art)

| Ref # | Hits | Search Query | DBs | Default Operator | Plurals | British Equivalents | Time Stamp |
|---|---|---|---|---|---|---|---|
| L1 | 257093 | g06f3/0632 OR g06f3/0604 OR g06f3/0658 OR g06f3/0673 OR g06f3/0674 OR g06f3/0676 OR g06f3/0679 OR g06f9/06 OR g06f9/3004 OR g06f3/061 | (US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB) | OR | ON | ON | 2023/02/12 05:25 PM |
| L2 | 50 | (Artificial Intelligence) Similar to: 17/716,275 with 0 CPC Selections and 0 Text Selections<br>Text: (US-20220229571-A1 OR US-20210055873-A1 OR US-11327669-B2 OR US-20180129439-A1 OR US-10776023-B2 OR CN-106201339-A OR US-20050190483-A1 OR CN-111833911-B OR DE-102020107166-A1 OR KR-20210001897-A OR US-20200409578-A1 OR CN-112148520-A OR US-10268374-B2 OR US-20200341636-A1 OR WO-2013188095-A2 OR CN-112416241-A OR KR-102351489-B1 OR JP-2021034080-A OR US-8832405-B1 OR US-20180088812-A1 OR US-20210124503-A1 OR US-8090904-B2 OR US-20150227316-A1 OR US-10990304-B2 OR US-20090198884-A1 OR US-10496312-B2 OR US-9933962-B1 OR | (US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO)) | OR | ON | ON | 2023/02/12 05:28 PM |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | US-10338833-B1 OR US-10776010-B1 OR CN-111833911-A OR US-9588687-B1 OR CN-115202590-B OR US-11531492-B2 OR US-8473707-B2 OR US-11169747-B2 OR US-20200393966-A1 OR US-11042298-B2 OR US-20190079688-A1 OR DE-102016001682-A1 OR CN-105808162-B OR US-11301159-B2 OR CN-105808162-A OR US-20220214836-A1 OR US-20160239207-A1 OR US-20220334772-A1 OR DE-102020124761-A1 OR CN-101571708-B OR CN-113360080-A OR US-20210223954-A1 OR US-11507311-B2).did. | | | | | |
| L9 | 1653016 | ((storage OR memory OR disk OR disc OR volume OR drive OR ssd) SAME (request$4 OR command$4 OR instruction$4 OR requir$7 OR submit$5 OR submission OR writ$4 OR store$2 OR storing OR read$4 OR access$5 OR retriev$5 OR fetch$5) SAME (policy OR rule OR strateg$4 OR algorithm$2 OR parameter OR variable OR requirement$2) SAME (location OR address$4 OR position$4 OR partition$5 OR segment$5 OR sector OR area OR zone OR track OR place OR placement) SAME (content OR data OR dataum OR information OR info OR file OR object) SAME (stor$4 OR sav$4 OR writ$5 OR record$5 OR archiv$4 OR hold$5 OR | (US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB) | OR | ON | ON | 2023/02/13 09:10 AM |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | held OR keep$4 OR kept OR retain$5 OR preserv$5) SAME (check$5 OR consult$5 OR lookup OR look$3 adj3 up OR test$ OR examin$5 OR inspect$5 OR assess$5 OR base OR based OR accord$6)) | | | | | |
| L10 | 301685 | ((storage OR memory OR disk OR disc OR volume OR drive OR ssd) SAME (request$4 OR command$4 OR instruction$4 OR requir$7 OR submit$5 OR submission OR writ$4 OR store$2 OR storing OR read$4 OR access$5 OR retriev$5 OR fetch$5) SAME (policy OR rule OR strateg$4 OR algorithm$2 OR parameter OR variable OR requirement$2) SAME (location OR address$4 OR position$4 OR partition$5 OR segment$5 OR sector OR area OR zone OR track OR place OR placement) SAME (content OR data OR dataum OR information OR info OR file OR object) SAME (stor$4 OR sav$4 OR writ$5 OR record$5 OR archiv$4 OR hold$5 OR held OR keep$4 OR kept OR retain$5 OR preserv$5) SAME (check$5 OR consult$5 OR lookup OR look$3 adj3 up OR test$ OR examin$5 OR inspect$5 OR assess$5 OR base OR based OR accord$6)) | (US-PGPUB; USPAT) | OR | ON | ON | 2023/02/13 09:11 AM |
| L11 | 43230 | ((storage OR memory OR disk OR disc OR volume OR drive OR ssd) SAME (request$4 OR command$4 OR | (US-PGPUB; USPAT) | OR | ON | ON | 2023/02/13 09:11 AM |

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|---|---|---|---|---|---|---|---|
| | | instruction$4 OR requir$7 OR submit$5 OR submission OR writ$4 OR store$2 OR storing OR read$4 OR access$5 OR retriev$5 OR fetch$5) SAME (policy OR rule OR strateg$4 OR algorithm$2 OR parameter OR variable OR requirement$2) SAME (location OR address$4 OR position$4 OR partition$5 OR segment$5 OR sector OR area OR zone OR track OR place OR placement) SAME (content OR data OR dataum OR information OR info OR file OR object) SAME (stor$4 OR sav$4 OR writ$5 OR record$5 OR archiv$4 OR hold$5 OR held OR keep$4 OR kept OR retain$5 OR preserv$5) SAME (check$5 OR consult$5 OR lookup OR look$3 adj3 up OR test$ OR examin$5 OR inspect$5 OR assess$5 OR base OR based OR accord$6)).clm. | | | | | |
| L12 | 1414 | 1 AND 11 | (US-PGPUB; USPAT) | OR | ON | ON | 2023/02/13 09:11 AM |
| L13 | 642609 | ((storage OR memory OR disk OR disc OR volume OR drive OR ssd) SAME (request$4 OR command$4 OR instruction$4 OR requir$7 OR submit$5 OR submission OR writ$4 OR store$2 OR storing OR read$4 OR access$5 OR retriev$5 OR fetch$5) SAME (policy OR rule OR strateg$4 OR algorithm$2 OR parameter OR variable OR requirement$2) SAME (location OR | (US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB) | OR | ON | ON | 2023/02/13 09:14 AM |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | address$4 OR position$4 OR partition$5 OR segment$5 OR sector OR area OR zone OR track OR place OR placement) SAME (content OR data OR dataum OR information OR info OR file OR object) SAME (stor$4 OR sav$4 OR writ$5 OR record$5 OR archiv$4 OR hold$5 OR held OR keep$4 OR kept OR retain$5 OR preserv$5) SAME (check$5 OR consult$5 OR lookup OR look$3 adj3 up OR test$ OR examin$5 OR inspect$5 OR assess$5 OR base OR based OR accord$6) SAME (select$5 OR choos$6 OR pick$5)) | | | | | |
| L14 | 74309 | ((storage OR memory OR disk OR disc OR volume OR drive OR ssd) SAME (request$4 OR command$4 OR instruction$4 OR requir$7 OR submit$5 OR submission OR writ$4 OR store$2 OR storing OR read$4 OR access$5 OR retriev$5 OR fetch$5) SAME (policy OR rule OR strateg$4 OR algorithm$2 OR parameter OR variable OR requirement$2) SAME (location OR address$4 OR position$4 OR partition$5 OR segment$5 OR sector OR area OR zone OR track OR place OR placement) SAME (content OR data OR dataum OR information OR info OR file OR object) SAME (stor$4 OR sav$4 OR writ$5 OR record$5 OR archiv$4 OR hold$5 OR | (US-PGPUB; USPAT) | OR | ON | ON | 2023/02/13 09:14 AM |

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| | | held OR keep$4 OR kept OR retain$5 OR preserv$5) SAME (check$5 OR consult$5 OR lookup OR look$3 adj3 up OR test$ OR examin$5 OR inspect$5 OR assess$5 OR base OR based OR accord$6) SAME (select$5 OR choos$6 OR pick$5)) | | | | | |
| L15 | 11928 | ((storage OR memory OR disk OR disc OR volume OR drive OR ssd) SAME (request$4 OR command$4 OR instruction$4 OR requir$7 OR submit$5 OR submission OR writ$4 OR store$2 OR storing OR read$4 OR access$5 OR retriev$5 OR fetch$5) SAME (policy OR rule OR strateg$4 OR algorithm$2 OR parameter OR variable OR requirement$2) SAME (location OR address$4 OR position$4 OR partition$5 OR segment$5 OR sector OR area OR zone OR track OR place OR placement) SAME (content OR data OR dataum OR information OR info OR file OR object) SAME (stor$4 OR sav$4 OR writ$5 OR record$5 OR archiv$4 OR hold$5 OR held OR keep$4 OR kept OR retain$5 OR preserv$5) SAME (check$5 OR consult$5 OR lookup OR look$3 adj3 up OR test$ OR examin$5 OR inspect$5 OR assess$5 OR base OR based OR accord$6) SAME (select$5 OR choos$6 OR pick$5)).clm. | (US-PGPUB; USPAT) | OR | ON | ON | 2023/02/13 09:15 AM |
| L16 | 340 | 1 AND 15 | (US-PGPUB; USPAT) | OR | ON | ON | 2023/02/13 |

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| L17 | 198 | 16 AND @ay<"2017" | (US-PGPUB; USPAT) | OR | ON | ON | 09:15 AM<br>2023/02/13<br>09:20 AM |

**PE2E SEARCH - Search History (Interference)**

| |
|---|
| There are no Interference searches to show. |

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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 17/716,275 | 04/08/2022 | Joshua Johnson | 980.0023C2 | 7982 |

76444 7590 02/17/2023

Setter Roche Smith & Shellenberger LLP
1860 Blake Street
Suite 500
Denver, CO 80202

| EXAMINER | |
|---|---|
| LANE, JOHN A | |

| ART UNIT | PAPER NUMBER |
|---|---|
| 2139 | |

| NOTIFICATION DATE | DELIVERY MODE |
|---|---|
| 02/17/2023 | ELECTRONIC |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

uspto@setterroche.com

PTOL-90A (Rev. 04/07)

| *Office Action Summary* | Application No. 17/716,275 | Applicant(s) Johnson et al. | |
|---|---|---|---|
| | Examiner JOHN A LANE | Art Unit 2139 | AIA (FITF) Status Yes |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☑ Responsive to communication(s) filed on 04/08/2022.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☐ This action is **FINAL.** 2b) ☑ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims***

5) ☑ Claim(s) 1-36 is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6) ☐ Claim(s) _____ is/are allowed.

7) ☑ Claim(s) 1-36 is/are rejected.

8) ☐ Claim(s) _____ is/are objected to.

9) ☐ Claim(s) _____ are subject to restriction and/or election requirement

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to **PPHfeedback@uspto.gov.**

**Application Papers**

10)☐ The specification is objected to by the Examiner.

11)☑ The drawing(s) filed on 04/08/2022 is/are: a)☑ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

**Certified copies:**

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☑ Notice of References Cited (PTO-892)

2) ☑ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date 06/30/22( 5 pages).

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date _____.

4) ☐ Other: _____.

## DETAILED ACTION

1. This Office action is responsive to the application filed 04/08/2022. The Drawings are accepted by the Examiner. Claims 1-36 are presented for examination.

The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

Applicant should note the Related Application section [0001] of the present specification and the Application Data Sheet (ADS) do not match. That is, reference to application 16/990,433 present in the specification is not present on the ADS. Correction is required.

Furthermore, the present specification does not appear to be a continuation of parent applications 15/804,772 and 16/990,433 but instead perhaps a continuation-in-part. That is, at least the following text in section [0005] does not appear in the same form in either parent applications. Moreover, the highlighted text portion appears to provide support specific to the present claims. Such support is not found in the parent applications.

In an embodiment, an apparatus comprises a storage device and a device controller operatively coupled with the storage device is provided. The device controller comprises a memory that stores an application. The application stored on the memory comprises instructions. When executed, the instruction direct the device controller to receive a storage request comprising content. **The device controller retrieves a storage device policy from the memory that indicates a set of storage locations on the storage device. The device controller selects one of the storage locations on the storage device based on the storage device policy.** The device controller stores the content on the storage device at the selected storage location. The device controller records storage information for the content that indicates the selected location on the memory.

2. The amendment filed 04/08/2022 is objected to under 35 U.S.C. section 132 because it introduces new matter into the specification. 35 U.S.C. section 132 states that no amendment shall introduce new matter into the disclosure of the invention. The added material which is not supported by the original disclosure is shown in bold below:

In an embodiment, an apparatus comprises a storage device and a device controller operatively coupled with the storage device is provided. The device controller comprises a memory that stores an application. The application stored on the memory comprises instructions. When executed, the instruction direct the device controller to receive a storage request comprising content. **The device controller retrieves a storage device policy from the memory that indicates a set of storage locations on the storage device. The device controller selects one of the storage locations on the storage device based on the storage device policy.** The device controller stores the content on the storage device at the selected storage location. The device controller records storage information for the content that indicates the selected location on the memory.

Claims 1, 9 and 32:

"retrieve a storage device policy from the memory that indicates a set of storage locations on the storage device" and

"select one of the storage locations on the storage device based on the storage device policy"

Claims 16 and 21

"retrieve a storage device policy from the memory that indicates a set of storage locations on the storage device and a recording method for writing the content to the storage device" and

"select one of the storage locations on the storage device based on the storage device policy"

Applicant is required to cancel the new matter in the response to this Office action.

3. Claims 1-36 are rejected under 35 U.S.C. 112(a) or 35 U.S.C. 112 (pre-AIA), first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the original specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor or a joint inventor, or for applications subject to pre-AIA 35 U.S.C. 112, the

inventor(s), at the time the application was filed, had possession of the claimed invention.

As discussed above, the following language does not find support in the specification as originally filed.

Present specification, [0005]:

> "The device controller retrieves a storage device policy from the memory that indicates a set of storage locations on the storage device"

Claims 1, 9 and 32:

"retrieve a storage device policy from the memory that indicates a set of storage locations on the storage device" and

"select one of the storage locations on the storage device based on the storage device policy"

Claims 16 and 21

"retrieve a storage device policy from the memory that indicates a set of storage locations on the storage device and a recording method for writing the content to the storage device" and

"select one of the storage locations on the storage device based on the storage device policy"

## Double Patenting

4. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the

conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

**Please use EFS-WEB eTD for processing the Terminal Disclaimer.**

5. Claims 1-36 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-36 of U.S. patent no. 10,776,023 and claims 1-36 of U.S. patent no 11,327,669. Although the conflicting claims are not identical, they are not patentably distinct from each other because claims 1-36 of the '023 patent and claims 1-36 of the '669 patent each in view of Leow et al. (US 2002/0036852) contain every element of claims 1-36 of the instant application and as such renders claims 1-36 obvious in view thereof.

> "A later patent claim is not patentably distinct from an earlier patent claim if the later claim is obvious over, or **anticipated by**, the earlier claim. In re Longi, 759 F.2d at 896, 225 USPQ at 651 (affirming a holding of obviousness-type

double patenting because the claims at issue were obvious over claims in four prior art patents); In re Berg, 140 F.3d at 1437, 46 USPQ2d at 1233 (Fed. Cir. 1998) (affirming a holding of obviousness-type double patenting where a patent application claim to a genus is anticipated by a patent claim to a species within that genus). " ELI LILLY AND COMPANY v BARR LABORATORIES, INC., United States Court of Appeals for the Federal Circuit, ON PETITION FOR REHEARING EN BANC (DECIDED: May 30, 2001).

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Application claim 1, '023 patent claim 1 and '669 patent claim 1 all recite "a storage…", "a device controller…", "receive…storage device policy…", "receive a storage request", "store the content…", "record storage information…".

However, the patents do not recite "retrieve a device policy from the memory that indicates a set of storage locations on the storage device" or "select one of the storage locations…based on the storage policy."

Leow is presented as teaching a BPI setting table and zone table corresponding to the claimed policy for selecting a storage location (zone) based on the BPI and zone tables. These tables are maintained in memory for use during a write of data.

Because storing policy/settings/parameters for use in selecting where to write/store data on a memory device improves performance as found in Leow, it would have been obvious to use such a scheme in the '023 patent and '669 patent to write/store data. Therefore, the claimed invention would have been obvious to one of ordinary skill in the art before the effective filing data of the claimed invention.

Independent application claims 9, 16, 21, 26 and 32 likewise correspond to patent claims 9, 16, 21, 26 and 32 and are rejected in a similar manner. The remaining application dependent claim limitations are also found in the dependent patent claims.

6. The following is a quotation of 35 U.S.C. 103 which forms the basis for all obviousness rejections set forth in this Office action:

> A patent for a claimed invention may not be obtained, notwithstanding that the claimed invention is not identically disclosed as set forth in section 102 of this title, if the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which the claimed invention pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 1-36 are rejected under 35 U.S.C. 103 as being unpatentable over Olster et al. (US 2015/0052167) in view of Leow et al. (US 2002/0036852).

1. An apparatus comprising:

a storage device **(corresponds to "storage media", see [0022], [0026] and throughout Olster; corresponds to disk drive 100, see Fig. 1 of Leow)**;

a device controller operatively coupled with the storage device **(corresponds to "controller…included with the storage media and/or storage node", see [0026] and throughout Olster; corresponds to controller/circuit board 128 and/or circuitry including frequency processor 308, see [0047], [0048] of Leow)** comprising a memory **(corresponds to "volatile memory and non-volatile memory", see [0024] and throughout Olster;**

**corresponds to "BPI setting table may be stored in a controller (not shown)", see [0047] of Leow**); an application stored on the memory and comprising instructions (**corresponds to "software", "application program", "object code", "machine code", see [0020] and throughout Olster; programming of some kind appears to be inherent within the device of Leow**) that, when executed, direct the device controller to at least:

receive a storage request (**corresponds to "request", (see [0046], [0047] and throughout Olster; corresponds to signals generated by host computer (not shown), see [0014] of Leow**) to store content on the storage device (**corresponds to "data" or "object" discussed throughout Olster; corresponds to "data" discussed throughout Leow**);

retrieve a storage device policy (**corresponds to "storage policy", "policy" or "polices", see [0030] and throughout Olster; corresponds to "capacity requirements of the disc drive", "error rate requirements", "BPI setting", see [0020], [0023] and throughout Leow; Zone tables, see throughout Leow**) from the memory that indicates a set of storage locations on the storage device (**corresponds to "zones", see throughout Leow**);

select one of the storage locations one the storage device based on the storage device policy **(corresponds to selecting a zone to write data, see Leow and Olster)**;

store the content on the storage device at the selected storage location **(corresponds to "[t]he object including its constituent data portion may be stored among storage nodes and storage zones according to the storage policy…", see [0030] of Olster; "replication and placement component of a policy defines the replication and placement of data objects in the data storage system", see [0031] of Olster; data is written into a zone, see Leow)**;

26. An apparatus comprising:

a storage device **(discussed above)**;

a device controller operatively coupled with the storage device, comprising a memory, the device controller configured to receive content to be stored on the storage device **(discussed above)**;

a programmable processor configured to implement a storage device policy that indicates a set of storage locations on the storage device **(corresponds to "processors such as microprocessors", see [0020] and "zones" throughout Olster; see above with regard to Leow)**,

the programmable processor communicatively coupled with the device controller wherein the content received by the device controller is processed by the programmable processor; and

an application stored on the memory and comprising instructions that, when executed, direct the device controller to select one of the storage locations and store the content at the selected storage location on the storage device after the content has been processed by the programmable processor **(discussed above)**.

32. An apparatus comprising:

a storage device **(discussed above)**;

a device controller operatively coupled with the storage device, comprising a memory **(discussed above)**;

an application stored on the memory and comprising instructions that, when executed, direct the device controller to at least **(discussed above)**:

receive a storage request to store a first content and a second content on the storage device **(discussed above)**;

receive a storage device policy from the memory that indicates a set of storage locations on the storage device **(discussed above)**;

select a first one of the storage locations based on the content type of the first content and select a second one of the storage locations based on the content type of the second content **(corresponds to storing "documents, images, audio, videos", see [0060] of Olster; "[a]dditional fields may also be stored as metadata regarding the object such as a code or designator or text name for (a) the kind of data represented by the object, including, for example, image, video, audio, text document, and the like…", see [0039] of Olster; see also above regarding storing data in accordance with metadata and/or policy)**; and

store the first content at the first selected storage location on the storage device and store the second content at the second selected storage location on the storage device.

**(corresponds to storing another type of data in accordance with metadata and/or policy).**

Independent claims 9, 16 and 21 define embodiments similar in scope to the embodiment of claim 1 and are rejected accordingly.

The remaining dependent claim features are expressly or inherently found in the applied art. For example,

record storage information for the content that indicates the selected location on the memory **(corresponds to "metadata", "object identifier", (see [0039], [0040], [0041] and throughout Olster)**

subsequent to storing the content, receive a content request for the content, comprising at least the content identifier for the content **(corresponds to "reading", see [0029]) "request" throughout Olster)**;

in response to the content request, retrieve from the memory the storage information for the content **(corresponds to reading metadata (see [0039], [0041] and [0049] of Olster)**;

**Any response to this action should be mailed to:**

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**or faxed to:**

(571) 273-8300, (for Official communications intended for entry)

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**Or:**

Via e-mail at Jack.Lane@uspto.gov (for Non-Official or Draft communications, please label "Non-Official or "DRAFT")

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jack Lane whose telephone number is 571 272-4208. The examiner can normally be reached on Mon-Fri 8am to 5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Reg Bragdon can be reached on 571 272-4204.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 571 272-2100.

/JOHN A LANE/

Primary Examiner, Art Unit 2139

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**Courtesy Reminder for**
**Application Serial No: 17/716,275**

Attorney Docket No: 980.0023C2
Customer Number: 76444
Date of Electronic Notification: 02/23/2023

This is a courtesy reminder that new correspondence is available for this application. If you have not done so already, please review the correspondence. The official date of notification of the outgoing correspondence will be indicated on the form PTOL-90 accompanying the correspondence.

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uspto@setterroche.com

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If you have any questions, please email the Electronic Business Center (EBC) at EBC@uspto.gov or call 1-866-217-9197.

## REMARKS

Claims 1-36 are pending in the application. Claims 1-36 stand rejected. Claims 1-36 are amended. Paragraph [0005] of the Specification and the Abstract are replaced. Applicant respectfully requests entry of the present amendment, consideration of the following remarks, and allowance of the claims.

### *35 U.S.C. §132 Objection*

The amendment filed 04/08/2022 is objected to under 35 U.S.C. §132 for introducing new matter. Specifically, the Office Action indicates paragraph [0005] of the Specification and the claim limitations *receive a storage device policy from the memory that indicates a set of storage locations on the storage device*, *select one of the storage locations on the storage device based on the storage device policy*, and *retrieve a storage device policy from the memory that indicates a set of storage locations on the storage device and a recording method for writing the content to the storage device*. Without acquiescing to the merits of the §132 objection, claims 1-36 are amended to remove the objected to limitations, paragraph [0005] of the Specification is replaced by the unnumbered Overview paragraph in the parent case U.S. Patent 11,327,023, and the Abstract is replaced by the Abstract of the parent case U.S. Patent 11,327,023. Accordingly, Applicant respectfully request the removal of the §132 objection.

### *35 U.S.C. §112 Rejection*

Claims 1-36 are rejected under 35 U.S.C. §112(a) as failing to comply with the written description requirement. The following claim chart provides support in the Specification to claims 1-8 and 16 as amended.

| | |
|---|---|
| 1. An apparatus comprising:<br>a solid-state memory;<br>a device memory;<br>a programmable processor operatively coupled to the device memory;<br>a device controller operatively coupled with the solid-state memory and the programmable processor; and | [0048] In an implementation, drive 100 optionally includes a case 105, which physically supports printed-circuit board 140, interface connector 125 and connector 120. Solid-state memory 145-148, as well as the device controller 130 and memory 135, are mounted on the printed-circuit board 140.<br><br>[0086] In this example, drive 600 includes case 105, which physically supports a storage |

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| an application stored on the device memory and comprising instructions that, when executed by the programmable processor, direct the programmable processor to at least: | media 110, a device controller 130, a programmable logic device 605, a memory 135, interface connectors 125, and connector 120.<br><br>[0088] Device controller 130 may be in the form of a hard disk controller linked with processor chip. In an implementation, device controller 130 could be in the form of a computing system, such as that described in Fig. 12. When device controller is represented by the computing system described in Fig. 12, it should be noted that the storage system 1203 may be represented by memory 135. |
| in response to receiving a storage request comprising content, retrieve a storage device policy from the device memory; | [00108] A user sends a request to store content in step 815. At a minimum, this request comprises content to be stored. In an implementation, the user may include information such as an identification code, encoding information, or data protection information, for example.<br><br>[0093] The storage device policy can be stored (and modified or updated) on the device controller 130. |
| process the content for storage based on the storage device policy; and | [0089] The programmable logic device 605 could be used broadly for the entire drive 600, or could be used on a per-request basis, such that different requests to read or write content could use different programmable logic configurations. |
| transfer the content to the device controller; and | [0091] For example, programmable logic device 605 may be connected to device controller 130, and the hardware and/or software in device controller 130 will automatically route some or all of the signals through programmable logic device 605. |

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| the device controller configured to:<br>receive the content from the programmable processor and store the content on the solid-state memory. | [105] In step 840, the device controller can write the content to the storage media 110 as determined in step 820. |
| 2. The apparatus of claim 1 further comprising an interface connector that communicatively couples the solid-state memory, the device controller, the programmable processor, and the device memory to a host computer. | [0049] Interface connector 125 is structured to allow drive 100 to connect to a network fabric, such as through a cable and/or backplane. In an implementation, the interface connector may be in the form of an RJ45, QSFP, or CXP connector, to which copper wiring or optical fiber optic cable can connect, for example. |
| 3. The apparatus of claim 2 further comprising a printed circuit board communicatively coupled to the interface connector that mounts the solid-state memory, the device memory, the device controller, and the programmable processor. | [0048] Solid-state memory 145-148, as well as the device controller 130 and memory 135, are mounted on the printed-circuit board 140. |
| 4. The apparatus of claim 3 further comprising a case that supports the printed circuit board. | [0048] In an implementation, drive 100 optionally includes a case 105, which physically supports printed-circuit board 140, interface connector 125 and connector 120. |
| 5. the instructions that, when executed, direct the programmable processor to:<br>compress the content based on the storage device policy;<br>transfer the compressed content to the device controller; and<br>wherein the device controller is configured to:<br>receive the compressed content from the programmable processor and store the compressed content on the solid-state memory. | [0089] For example, a write of a text file may use programmable logic for compression, while a write of a picture may use programmable logic for facial recognition. |
| 6. the instructions that, when executed, direct the programmable processor to:<br>encrypt the content based on the storage device policy; | [0089] In an embodiment, this could be used for custom encryption through hardware. |

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| transfer the encrypted content to the device controller; and wherein the device controller is configured to:<br>receive the encrypted content from the programmable processor and store the encrypted content on the solid-state memory. | |
| 7. The apparatus of claim 1 wherein the content comprises one or more of medical records, video data, image data, on-line temporal video data, cached data, financial data, online transaction data, credit card data, or medical data. | [0065] For example, if one drive, such as drive 310 is configured to store medical records, the device controller in drive 310 can be configured to optimize reliability for medical record storage.<br><br>[0066] In another implementation, a drive, such as drive 311, could be configured as a drive to store on-line temporal video data. In this case, the drive may be configured to store data very densely, as there may be little concern over content corruption. Similarly, the drive 311 may be configured with little to no security for short-lived, redundant or cached data. The device controller could further be configured to differentiate between short-lived, redundant or cached data, and online shopping financial content, such as credit card data, etc. |
| 8. wherein the application comprises at least one of a learning algorithm or an artificial intelligence algorithm. | [0089] In an implementation, the programmable logic device 605 may include a learning algorithm or artificial intelligence that can act of the signals passing through drive 100. |
| 16. An apparatus comprising:<br>…processor to at least:<br>in response to receiving a content request to retrieve content, retrieve a storage device policy from the device memory;<br>direct the device controller to read the requested content from the solid-state memory; | [0089] Programmable logic device 605 is inserted directly into the data and/or control path of drive 600. The programmable logic device 605 can be programmed by a user of the drive 600 for any operational need that is desired. In an embodiment, this could be used for custom encryption through hardware. Alternatively, this could be used as a regular expression engine to search for words, |

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| receive the content from the device controller and process the content for transfer based on the storage device policy; and<br>transfer the content; and<br>the device controller configured to:<br>read the requested content from the solid-state memory in response to the direction from the programmable processor; and<br>transfer the requested content to the programmable processor. | phrases, pictures etc. that meet certain criteria. The programmable logic device 605 could be used broadly for the entire drive 600, or could be used on a per-request basis, such that different requests to read or write content could use different programmable logic configurations.<br><br>[0124] In step 880, the device controller 130 receives a content request. This request includes at least a content or object identifier to identify the requested content.<br><br>[0127] In step 893, the device controller 130 retrieves the requested content according to the storage device policy that has been defined.<br><br>[0127] In step 895, the device controller 130 sends the content back to the user. |

The above claim chart provides explicit support in the Specification for amended claims 1-8 and 16. Claims 9-15, and 17-36 comprise limitations similar to those of claims 1-8 and 16 and are therefore also supported by the above claim chart. Applicant maintains that the above limitations are well supported throughout the Specification, not just by the cited passages in the claim chart. Moreover, the claim limitations objected to under §132 and specifically rejected under §112(a) have been removed. Accordingly, Applicant respectfully requests the removal of the §112(a) rejection from claims 1-36.

***Double Patenting Rejection***

Claims 1-36 were rejected on the grounds of non-statutory obviousness-type double patenting as being unpatentable over claims 1-36 of U.S. Patent 10,776,023 and claims 1-36 of U.S. Patent 11,327,669. Applicant hereby files a terminal disclaimer with both U.S. Patent 10,776,023 and U.S. Patent 11,327,669. Applicant respectfully requests the removal of the double patenting rejection.

***35 U.S.C. §103 Rejection***

Claims 1-36 are rejected under 35 U.S.C. §103 as being unpatentable over U.S. Patent Application Publication 2015/0052167 (Olster) in view of U.S. Patent Application Publication 2002/0036852 (Leow). Without acquiescing to the merits of the §103 rejection, claims 1-36 are amended and Applicant respectfully traverses the rejection as follows.

Amended claim 1 recites:

"*An apparatus comprising:*

*a solid-state memory;*

*a device memory;*

*a programmable processor operatively coupled to the device memory;*

*a device controller operatively coupled with the solid-state memory and the programmable processor; and*

*an application stored on the device memory and comprising instructions that, when executed by the programmable processor, direct the programmable processor to at least:*

*in response to receiving a storage request comprising content, retrieve a storage device policy from the device memory;*

*process the content for storage based on the storage device policy; and*

*transfer the content to the device controller; and*

*the device controller configured to:*

*receive the content from the programmable processor and store the content on the solid-state memory.*"

Applicant can find no teaching in the cited combination that anticipates at least these limitations of amended claim 1. At best, paragraph [0024] of Olster states:

> "When the storage media in a storage node are included in a single cabinet, rack, shelf or blade, they may be coupled with a backplane. A controller may be included in the cabinet, rack, shelf or blade with the storage devices. The backplane may be coupled with or include the controller. The controller may communicate with and allow for communications with the storage media according to a storage media specification, such as, for example, a hard disk drive specification. The controller may include a processor, volatile memory and non-volatile memory. The controller may be a single computer chip such as an FPGA, ASIC, PLD and PLA. The controller may include or be coupled with a network interface."

Although Olster mentions that the controller is associated with the storage devices in a storage node, Olster does not suggest that the controller or any processing element (e.g., FPGA)

is included on board the storage device, but instead suggests the controller be mounted in a location proximate to the storage devices. Moreover, Olster does not suggest that the controller perform any specific data processing operations like encryption but instead suggests that the controller participate in a distributed search process for data stored on traditional storage drives. Applicant respectfully asserts the distributed search methods taught by Olster are different than the apparatus recited by claim 1. Leow, which generally relates to modifying data storage density on hard disk drives based on an error rate, does not appear to overcome the deficiencies of Olster. Moreover, Applicant notes that amended claim 1 is at least similar to allowed claim 26 of the parent case U.S. Patent 11,327,669. Therefore, the cited combination does not render obvious the limitations of claims.

Based on the above remarks, claim 1 is allowable over the art of record. Claims 9, 16, 21, 26, and 32 comprise limitations similar to those of claim 1 and are therefore also allowable over the art of record. Claims 2-8, 10-15, 17-20, 22-24, 27-31, and 33-36 depend from otherwise allowable base claims.



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## CONCLUSION

Based on the above remarks, Applicant submits that the claims in their present form are allowable. Applicant further submits that additional reasons in support of patentability exist, but such reasons are omitted in the interests of clarity and brevity. No estoppel is intended, and no estoppel should apply, to assertions in the recent Office Action that are not refuted herein by Applicant. Applicant respectfully requests allowance of the claims at the Examiner's earliest convenience.

Applicant believes that no additional fees are due with respect to this filing. However, should the Office determine that any fees are necessary, the Office is hereby authorized to contact the undersigned for any necessary fees.

Respectfully submitted,

/David J. Setter/

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## APPENDIX I

***Amended claims 1-36 (unmarked)***

1. (CURRENTLY AMENDED) An apparatus comprising:

a solid-state memory;

a device memory;

a programmable processor operatively coupled to the device memory;

a device controller operatively coupled with the solid-state memory and the programmable processor; and

an application stored on the device memory and comprising instructions that, when executed by the programmable processor, direct the programmable processor to at least:

in response to receiving a storage request comprising content, retrieve a storage device policy from the device memory;

process the content for storage based on the storage device policy; and

transfer the content to the device controller; and

the device controller configured to:

receive the content from the programmable processor and store the content on the solid-state memory.

2. (CURRENTLY AMENDED) The apparatus of claim 1 further comprising an interface connector that communicatively couples the solid-state memory, the device controller, the programmable processor, and the device memory to a host computer.

3. (CURRENTLY AMENDED) The apparatus of claim 2 further comprising a printed circuit board communicatively coupled to the interface connector that mounts the solid-state memory, the device memory, the device controller, and the programmable processor.

4. (CURRENTLY AMENDED) The apparatus of claim 3 further comprising a case that supports the printed circuit board.

5. (CURRENTLY AMENDED) The apparatus of claim 1 wherein the instructions that, when executed, direct the programmable processor to process the content for storage based on the

storage device policy and transfer the content to the device controller comprise the instructions that, when executed, direct the programmable processor to:

compress the content based on the storage device policy;

transfer the compressed content to the device controller; and wherein:

the device controller is configured to:

receive the compressed content from the programmable processor and store the compressed content on the solid-state memory.

6. (CURRENTLY AMENDED) The apparatus of claim 1 wherein the instructions that, when executed, direct the programmable processor to process the content for storage based on the storage device policy and transfer the content to the device controller comprise the instructions that, when executed, direct the programmable processor to:

encrypt the content based on the storage device policy;

transfer the encrypted content to the device controller; and wherein:

the device controller is configured to:

receive the encrypted content from the programmable processor and store the encrypted content on the solid-state memory.

7. (CURRENTLY AMENDED) The apparatus of claim 1 wherein the content comprises one or more of medical records, video data, image data, on-line temporal video data, cached data, financial data, online transaction data, credit card data, or medical data.

8. (CURRENTLY AMENDED) The apparatus of claim 1 wherein the application comprises at least one of a learning algorithm or an artificial intelligence algorithm.

9. (CURRENTLY AMENDED) An apparatus comprising:

a solid-state memory;

a device memory;

a programmable processor operatively coupled to the device memory;

a device controller operatively coupled with the solid-state memory and the programmable processor; and

an application stored on the device memory and comprising instructions that, when executed by the programmable processor, direct the programmable processor to at least:

receive a storage request comprising content and a storage device policy;

in response to receiving the storage request and the storage device policy, process the content for storage based on the storage device policy; and

transfer the content to the device controller; and

the device controller configured to:

receive the content from the programmable processor and store the content on the solid-state memory.

10. (CURRENTLY AMENDED) The apparatus of claim 9 further comprising an interface connector that communicatively couples the solid-state memory, the device controller, the programmable processor, and the device memory to a host computer.

11. (CURRENTLY AMENDED) The apparatus of claim 10 further comprising a printed circuit board communicatively coupled to the interface connector that mounts the solid-state memory, the device memory, the device controller, and the programmable processor.

12. (CURRENTLY AMENDED) The apparatus of claim 11 further comprising a case that supports the printed circuit board.

13. (CURRENTLY AMENDED) The apparatus of claim 9 wherein the instructions that, when executed, direct the programmable processor to process the content for storage based on the storage device policy and transfer the content to the device controller comprise the instructions that, when executed, direct the programmable processor to:

compress the content based on the storage device policy;

transfer the compressed content to the device controller; and wherein:

the device controller is configured to:

receive the compressed content from the programmable processor and store the compressed content on the solid-state memory.

14. (CURRENTLY AMENDED) The apparatus of claim 9 wherein the instructions that, when executed, direct the programmable processor to process the content for storage based on the storage device policy and transfer the content to the device controller comprise the instructions that, when executed, direct the programmable processor to:

encrypt the content based on the storage device policy;

transfer the encrypted content to the device controller; and wherein:

the device controller is configured to:

receive the encrypted content from the programmable processor and store the encrypted content on the solid-state memory.

15. (CURRENTLY AMENDED) The apparatus of claim 9 wherein the content comprises one or more of medical records, video data, image data, on-line temporal video data, cached data, financial data, online transaction data, credit card data, or medical data.

16. (CURRENTLY AMENDED) An apparatus comprising:

a solid-state memory

a device memory;

a programmable processor operatively coupled to the device memory;

a device controller operatively coupled with the solid-state memory and the programmable processor; and

an application stored on the device memory and comprising instructions that, when executed be the programmable processor, direct the programmable processor to at least:

in response to receiving a content request to retrieve content, retrieve a storage device policy from the device memory;

direct the device controller to read the requested content from the solid-state memory;

receive the requested content from the device controller and process the requested content for transfer based on the storage device policy; and

transfer the requested content; and

the device controller configured to:

read the requested content from the solid-state memory in response to the direction from the programmable processor; and

transfer the requested content to the programmable processor.

17. (CURRENTLY AMENDED) The apparatus of claim 16 further comprising an interface connector that communicatively couples the solid-state memory, the device controller, the programmable processor, and the device memory to a host computer.

18. (CURRENTLY AMENDED) The apparatus of claim 17 further comprising:

a printed circuit board communicatively coupled to the interface connector that mounts the solid-state memory, the device memory, the device controller, and the programmable processor; and

a case that supports the printed circuit board.

19. (CURRENTLY AMENDED) The apparatus of claim 16 wherein:

the requested content stored on the solid-state memory is compressed;

the device controller is configured to:

read the compressed content from the solid-state memory in response to the direction from the programmable processor; and

transfer the compressed content to the programmable processor; and.

the instructions that, when executed, direct the programmable processor to process the requested content for transfer based on the storage device policy and transfer the requested content comprise the instructions that, when executed, direct the programmable processor to:

decompress the compressed content based on the storage device policy; and

transfer the decompressed content.

20. (CURRENTLY AMENDED) The apparatus of claim 16 wherein:

the requested content stored on the solid-state memory is encrypted;

the device controller is configured to:

read the encrypted content from the solid-state memory in response to the direction from the programmable processor; and

transfer the encrypted content to the programmable processor; and.

the instructions that, when executed, direct the programmable processor to process the content for transfer based on the storage device policy and transfer the requested content comprise the instructions that, when executed, direct the programmable processor to:

decrypt the encrypted content based on the storage device policy; and

transfer the decrypted content.

21. (CURRENTLY AMENDED) An apparatus comprising:

a solid-state memory;

a device memory;

a programmable processor operatively coupled to the device memory;

a device controller operatively coupled with the solid-state memory and the programmable processor; and

an application stored on the device memory and comprising instructions that, when executed by the programmable processor, direct the programmable processor to at least:

receive a storage device policy and a content request comprising search criteria;

direct the device controller to read content stored on the memory;

receive the content from the device controller;

process the content using the storage device policy to identify portions of the content that comprise the requested search criteria; and

transfer the portions of the content that comprise the requested search criteria; and the device controller configured to:

read the content from the solid-state memory in response to the direction from the programmable processor; and

transfer the content to the programmable processor.

22. (CURRENTLY AMENDED) The apparatus of claim 21 further comprising an interface connector that communicatively couples the solid-state memory, the device controller, the programmable processor, and the device memory to a host computer.

23. (CURRENTLY AMENDED) The apparatus of claim 22 further comprising:

a printed circuit board communicatively coupled to the interface connector that mounts the solid-state memory, the device memory, the device controller, and the programmable processor; and

a case that supports the printed circuit board.

24. (CURRENTLY AMENDED) The apparatus of claim 21 wherein:

the search criteria comprise a phrase;

the device controller is configured to:

read the content including the portions of the content that comprise the phrase from the solid-state memory in response to the direction from the programmable processor; and

transfer the content to the programmable processor; and.

the instructions that, when executed, direct the programmable processor to process the content using the storage device policy to identify the portions of the content that comprise the requested search criteria and transfer the portions of the content that comprise the requested search criteria comprise the instructions that, when executed, direct the programmable processor to:

process the content using the storage device policy to identify the portions of the content that comprise the phrase; and

transfer the portions of the content that comprise the phrase.

25. (CURRENTLY AMENDED) The apparatus of claim 21 wherein:

the search criteria comprise a photo;

the device controller is configured to:

read the content including the portions of the content that comprise the photo from the solid-state memory in response to the direction from the programmable processor; and

transfer the content to the programmable processor; and.

the instructions that, when executed, direct the programmable processor to process the content using the storage device policy to identify the portions of the content that comprise the requested search criteria and transfer the portions of the content that comprise the requested search criteria comprise the instructions that, when executed, direct the programmable processor to:

process the content using the storage device policy to identify the portions of the content that comprise the photo; and

transfer the portions of the content that comprise the photo.

26. (CURRENTLY AMENDED) An apparatus comprising:

a solid-state memory;

a device memory;

a programmable processor operatively coupled to the device memory;

a device controller operatively coupled with the solid-state memory and the programmable processor; and

an application stored on the device memory and comprising instructions that, when executed by the programmable processor, direct the programmable processor to at least:

in response to receiving a storage request comprising content, retrieve a storage device policy from the device memory;

process the content for storage based on the storage device policy;

transfer the content to the device controller;

subsequent to storing the content on the solid-state memory and in response to receiving a content request, direct the device controller to read the requested content from the solid-state memory;

receive the requested content from the device controller;

process the requested content for transfer based on the storage device policy; and

transfer the requested content; and

the device controller configured to:

receive the content from the programmable processor and store the content on the solid-state memory;

read the requested content from the solid-state memory in response to the direction from the programmable processor; and

transfer the requested content to the programmable processor.

27. (CURRENTLY AMENDED) The apparatus of claim 26 further comprising an interface connector that communicatively couples the solid-state memory, the device controller, the programmable processor, and the device memory to a host computer.

28. (CURRENTLY AMENDED) The apparatus of claim 27 further comprising a printed circuit board communicatively coupled to the interface connector that mounts the solid-state memory, the device memory, the device controller, and the programmable processor.

29. (CURRENTLY AMENDED) The apparatus of claim 28 further comprising a case that supports the printed circuit board.

30. (CURRENTLY AMENDED) The apparatus of claim 26 wherein the instructions that, when executed, direct the programmable processor to retrieve a storage device policy from the device memory, process the content for storage based on the storage device policy, transfer the content to the device controller; direct the device controller to read the requested content from the solid-state memory, receive the requested content from the device controller, process the requested content for transfer based on the storage device policy, and transfer the requested content comprise the instructions that, when executed, direct the programmable processor to:

compress the content based on the storage device policy;

transfer the compressed content to the device controller;

subsequent to storing the compressed content on the solid-state memory and in response to receiving a content request, direct the device controller to read the compressed content from the solid-state memory;

receive the compressed content from the device controller;

decompress the compressed content based on the storage device policy; and

transfer the decompressed content; and wherein:

the device controller is configured to:

receive the compressed content from the programmable processor and store the compressed content on the solid-state memory;

read the compressed content from the solid-state memory in response to the direction from the programmable processor; and

transfer the compressed content to the programmable processor.

31. (CURRENTLY AMENDED) The apparatus of claim 26 wherein the instructions that, when executed, direct the programmable processor to retrieve a storage device policy from the device memory, process the content for storage based on the storage device policy, transfer the content to the device controller; direct the device controller to read the requested content from the solid-state memory, receive the requested content from the device controller, process the requested content for transfer based on the storage device policy, and transfer the requested content comprise the instructions that, when executed, direct the programmable processor to:

encrypt the content based on the storage device policy;

transfer the encrypted content to the device controller;

subsequent to storing the encrypted content on the solid-state memory and in response to receiving a content request, direct the device controller to read the encrypted content from the solid-state memory;

receive the encrypted content from the device controller;

decrypt the encrypted content based on the storage device policy; and

transfer the decrypted content; and wherein:

the device controller is configured to:

receive the encrypted content from the programmable processor and store the encrypted content on the solid-state memory;

read the encrypted content from the solid-state memory in response to the direction from the programmable processor; and

transfer the encrypted content to the programmable processor.

32. (CURRENTLY AMENDED) An apparatus comprising:

a solid-state memory;

a device memory:

a programmable processor operatively coupled to the device memory;

a device controller operatively coupled with the solid-state memory and the programmable processor; and

an application stored on the memory and comprising instructions that, when executed by the programmable processor, direct the programmable processor to at least:

receive a storage request comprising content and a storage device policy;

in response to receiving the storage request and the storage device policy, process the content for storage based on the storage device policy;

transfer the content to the device controller;

subsequent to storing the content on the solid-state memory, receive a content request comprising search criteria;

direct the device controller to read the content from the solid-state memory;

receive the content from the device controller;

process the content based on the storage device policy to identify portions of the content that comprise the search criteria; and

transfer the portions of the content the comprise the search criteria; and

the device controller configured to:

receive the content from the programmable processor and store the content on the solid-state memory;

read the content from the solid-state memory in response to the direction from the programmable processor; and

transfer the content to the programmable processor.

33. (CURRENTLY AMENDED) The apparatus of claim 32 further comprising an interface connector that communicatively couples the solid-state memory, the device controller, the programmable processor, and the device memory to a host computer.

34. (CURRENTLY AMENDED) The apparatus of claim 33 further comprising:

a printed circuit board communicatively coupled to the interface connector that mounts the solid-state memory, the device memory, the device controller, and the programmable processor; and

a case that supports the printed circuit board.

35. (CURRENTLY AMENDED) The apparatus of claim 32 wherein the instructions that, when executed, direct the programmable processor to process the content for storage based on the storage device policy, transfer the content to the device controller, receive a content request comprising search criteria, direct the device controller to read the content from the solid-state memory, receive the content from the device controller, process the content based on the storage device policy to identify the portions of the content that comprise the search criteria, and transfer the portions of the content that comprise the search criteria comprise the instructions that, when executed, direct the programmable processor to:

in response to receiving the storage request comprising the content and the storage device policy, compress the content based on the storage device policy;

transfer the compressed content to the device controller;

subsequent to storing the content on the solid-state memory, receive the content request comprising the search criteria that comprises a word;

direct the device controller to read the compressed content from the solid-state memory;

receive the compressed content from the device controller;

decompress the content based on the storage device policy to identify the portions of the content that comprise the word; and

transfer the portions of the content that comprise the word; and wherein:

the device controller is configured to:

receive the compressed content from the programmable processor and store the compressed content on the solid-state memory;

read the compressed content from the solid-state memory in response to the direction from the programmable processor; and

transfer the compressed content to the programmable processor.

36. (CURRENTLY AMENDED) The apparatus of claim 32 wherein the instructions that, when executed, direct the programmable processor to process the content for storage based on the storage device policy, transfer the content to the device controller, receive a content request comprising search criteria, direct the device controller to read the content from the solid-state memory, receive the content from the device controller, process the content based on the storage device policy to identify the portions of the content that comprise the search criteria, and transfer the portions of the content that comprise the search criteria comprise the instructions that, when executed, direct the programmable processor to:

in response to receiving the storage request comprising the content and the storage device policy, encrypt the content based on the storage device policy;

transfer the encrypted content to the device controller;

subsequent to storing the content on the solid-state memory, receive the content request comprising the search criteria that comprises a word;

direct the device controller to read the encrypted content from the solid-state memory;

receive the encrypted content from the device controller;

decrypt the content based on the storage device policy to identify the portions of the content that comprise the word; and

transfer the portions of the content that comprise the word; and wherein:

the device controller is configured to:

receive the encrypted content from the programmable processor and store the encrypted content on the solid-state memory;

read the encrypted content from the solid-state memory in response to the direction from the programmable processor; and

transfer the encrypted content to the programmable processor.

PTO/SB/06 (09-11)
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| PATENT APPLICATION FEE DETERMINATION RECORD<br>Substitute for Form PTO-875 | Application or Docket Number<br>17/716,275 | Filing Date<br>04/08/2022 | ☐ To be Mailed |
|---|---|---|---|

**ENTITY:** ☐ LARGE ☑ SMALL ☐ MICRO

## APPLICATION AS FILED - PART I

| FOR | (Column 1)<br>NUMBER FILED | (Column 2)<br>NUMBER EXTRA | | RATE ($) | FEE ($) |
|---|---|---|---|---|---|
| ☐ BASIC FEE<br>(37 CFR 1.16(a), (b), or (c)) | N/A | N/A | | N/A | |
| ☐ SEARCH FEE<br>(37 CFR 1.16(k), (i), or (m)) | N/A | N/A | | N/A | |
| ☐ EXAMINATION FEE<br>(37 CFR 1.16(o), (p), or (q)) | N/A | N/A | | N/A | |
| TOTAL CLAIMS<br>(37 CFR 1.16(i)) | minus 20 = | * | | x $50 = | |
| INDEPENDENT CLAIMS<br>(37 CFR 1.16(h)) | minus 3 = | * | | x $240 = | |
| ☐ APPLICATION SIZE FEE (37 CFR 1.16(s)) | If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s). | | | | |
| ☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j)) | | | | | |
| * If the difference in column 1 is less than zero, enter "0" in column 2. | | | | TOTAL | |

## APPLICATION AS AMENDED - PART II

| | | (Column 1) | | (Column 2) | (Column 3) | | | |
|---|---|---|---|---|---|---|---|---|
| AMENDMENT | 05/25/2023 | CLAIMS REMAINING AFTER AMENDMENT | | HIGHEST NUMBER PREVIOUSLY PAID FOR | PRESENT EXTRA | | RATE ($) | ADDITIONAL FEE ($) |
| | Total<br>(37 CFR 1.16(i)) | * 36 | Minus | ** 36 | = 0 | | x $40 = | 0 |
| | Independent<br>(37 CFR 1.16(h)) | * 6 | Minus | *** 6 | = 0 | | x $192 = | 0 |
| | ☐ Application Size Fee (37 CFR 1.16(s)) | | | | | | | |
| | ☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j)) | | | | | | | |
| | | | | | | | TOTAL ADD'L FEE | 0 |

| | | (Column 1) | | (Column 2) | (Column 3) | | | |
|---|---|---|---|---|---|---|---|---|
| AMENDMENT | | CLAIMS REMAINING AFTER AMENDMENT | | HIGHEST NUMBER PREVIOUSLY PAID FOR | PRESENT EXTRA | | RATE ($) | ADDITIONAL FEE ($) |
| | Total<br>(37 CFR 1.16(i)) | * | Minus | ** | = | | x $0 = | |
| | Independent<br>(37 CFR 1.16(h)) | * | Minus | *** | = | | x $0 = | |
| | ☐ Application Size Fee (37 CFR 1.16(s)) | | | | | | | |
| | ☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j)) | | | | | | | |
| | | | | | | | TOTAL ADD'L FEE | |

| | |
|---|---|
| * If the entry in column 1 is less than the entry in column 2, write "0" in column 3. | LIE |
| ** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20". | /FREDERICK E BRISCOE/ |
| *** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3". | |
| The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1. | |

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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PTO/AIA/26 (04-14)
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| TERMINAL DISCLAIMER TO OBVIATE A DOUBLE PATENTING REJECTION OVER A "PRIOR" PATENT | Docket Number (Optional) 980.0023c2 |
|---|---|

In re Application of: Joshua Johnson

Application No.: 17/716,275

Filed: April 8, 2022

For: DATA STORAGE DEVICE WITH CONFIGURABLE POLICY-BASED STORAGE DEVICE BEHAVIOR

The applicant, Gaea LLC, owner of 100 percent interest in the instant application hereby disclaims, except as provided below, the terminal part of the statutory term of any patent granted on the instant application which would extend beyond the expiration date of the full statutory term of **prior patent** No. 11,327,669. as the term of said **prior patent** is presently shortened by any terminal disclaimer. The applicant hereby agrees that any patent so granted on the instant application shall be enforceable only for and during such period that it and the **prior patent** are commonly owned. This agreement runs with any patent granted on the instant application and is binding upon the grantee, its successors or assigns.

In making the above disclaimer, the applicant does not disclaim the terminal part of the term of any patent granted on the instant application that would extend to the expiration date of the full statutory term of the **prior patent**, "as the term of said **prior patent** is presently shortened by any terminal disclaimer," in the event that said **prior patent** later:

expires for failure to pay a maintenance fee;
is held unenforceable;
is found invalid by a court of competent jurisdiction;
is statutorily disclaimed in whole or terminally disclaimed under 37 CFR 1.321;
has all claims canceled by a reexamination certificate;
is reissued; or
is in any manner terminated prior to the expiration of its full statutory term as presently shortened by any terminal disclaimer.

Check either box 1 or 2 below, if appropriate.

1. ☐ The undersigned is the applicant. If the applicant is an assignee, the undersigned is authorized to act on behalf of the assignee.

I hereby acknowledge that any willful false statements made are punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

2. ☑ The undersigned is an attorney or agent of record. Reg. No. 78758

/David J. Setter/ — Signature
2023-05-25 — Date

David J. Setter — Typed or printed name

Attorney — Title
720-562-2280 — Telephone Number

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# ELECTRONIC ACKNOWLEDGEMENT RECEIPT

| APPLICATION # | RECEIPT DATE / TIME | ATTORNEY DOCKET # |
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| **17/716,275** | **05/25/2023 10:41:49 AM ET** | **980.0023C2** |

## Title of Invention

DATA STORAGE DEVICE WITH CONFIGURABLE POLICY-BASED STORAGE DEVICE BEHAVIOR

## Application Information

| | | | |
|---|---|---|---|
| APPLICATION TYPE | Utility - Nonprovisional Application under 35 USC 111(a) | PATENT # | - |
| CONFIRMATION # | 7982 | FILED BY | Melissa Eichten |
| PATENT CENTER # | 62152326 | FILING DATE | 04/08/2022 |
| CUSTOMER # | 76444 | FIRST NAMED INVENTOR | Joshua Johnson |
| CORRESPONDENCE ADDRESS | - | AUTHORIZED BY | David Setter |

## Documents

**TOTAL DOCUMENTS: 6**

| DOCUMENT | | PAGES | DESCRIPTION | SIZE (KB) |
|---|---|---|---|---|
| 980.0023c2 Terminal Disclaimer 1.pdf | | 2 | Terminal Disclaimer Filed | 226 KB |
| 980.0023c2 Terminal Disclaimer 2.pdf | | 2 | Terminal Disclaimer Filed | 225 KB |
| 980.0023c2 Response to Non-Final Office Action.pdf | | 42 | - | 291 KB |
| 980.0023c2 Response to Non-Final Office Action-A...pdf | (1-1) | 1 | Amendment/Request for Reconsideration-After Non-Final Rejection | 90 KB |
| 980.0023c2 Response to | (2-3) | 2 | Specification | 95 KB |

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|---|---|---|---|---|
| Non-Final Office Action-SPEC.pdf | | | | |
| 980.0023c2 Response to Non-Final Office Action-CLM.pdf | (4-21) | 18 | Claims | 152 KB |
| 980.0023c2 Response to Non-Final Office Action-REM.pdf | (22-42) | 21 | Applicant Arguments/Remarks Made in an Amendment | 206 KB |

## Digest

| DOCUMENT | MESSAGE DIGEST(SHA-512) |
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| 980.0023c2 Terminal Disclaimer 1.pdf | 5E730BE7505A6DBA4D3E6CBCAA48051E5613662422022F1A5E446FE84709A53DF7010FC03DE3BDC22DE392F4ED8F582DE4360BDA7A64C0AFDC4C295D21D8E4BB |
| 980.0023c2 Terminal Disclaimer 2.pdf | B5B8D1CE93DFB83D676EF64EBD97E24BEABB9FE59D2760BDD2CC23EC001AAEABD52C0EBD40288DFB788478C75BBF1B19E95CCFEC0A244201422A5849DDDDCAF4 |
| 980.0023c2 Response to Non-Final Office Action.pdf | 16F28F08E3122AA3DE3A80670950EA544C73C64EEE7A7035FB4ACA02AEDE8DE3B9B54CC468A8EF48667A201B85595A358F61F64903E0C7C3357EAB85F6576AD9 |
| 980.0023c2 Response to Non-Final Office Action-A....pdf | 0B300B0B634205A93041BFA81F7F09C8EAA4B8F94C02B70A724DBA6207A324FDD323125ACFC9AA634A4D5EEB44CB13EB61F8EA797858CF80ED0679015D208397 |
| 980.0023c2 Response to Non-Final Office Action-SPEC.pdf | 4F33F16FC3B644036964226628CFD0E0BBD71EC427906CE4FFAC0FA5DF2F8BD3EA02DB85B71CB3DDB3DC211244763B4642C36C53AE8CC5E6BFDA872C8BC61182 |
| 980.0023c2 Response to Non-Final Office Action-CLM.pdf | 410BF2F9F4655072DF41079128B7315CCA7FC5C617F0DFB18C2F7ED26FCFE589C2A1B9B3E321001B1E126F79E4FEF8E8962FBCDD2E957E58577C71314F09241E |

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|---|---|
| 980.0023c2 Response to Non-Final Office Action-REM.pdf | EBB135349CE6905A20A45E4D5A6570858183596F2CB92CFF9B7F848D2094741A5240A8B68358CE55D1EBA21B2B94B8F689D90CE6889A6BBD6314F98437966B08 |

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|---|---|

In re Application of: Joshua Johnson

Application No.: 17/716,275

Filed: April 8, 2022

For: DATA STORAGE DEVICE WITH CONFIGURABLE POLICY-BASED STORAGE DEVICE BEHAVIOR

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/David J. Setter/ — Signature
2023-05-25 — Date

David J. Setter — Typed or printed name

Attorney — Title
720-562-2280 — Telephone Number

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**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

| | |
|---|---|
| In re application of: Joshua Johnson | Confirmation No.: 7982 |
| Application No.: 17/716,275 | Art Unit: 2139 |
| Filed: April 8, 2022 | Examiner: John A. Lane |

For: DATA STORAGE DEVICE WITH CONFIGURABLE POLICY-BASED STORAGE DEVICE BEHAVIOR

**Mail Stop: Amendment**
Commissioner for Patents
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**AMENDMENT**

This Amendment is submitted in response to the Office Action of 2/17/2023. In view of this Amendment, claims 1-36 are believed to be in condition for allowance, which allowance is respectfully requested.

## SPECIFICATION

Please amend the specification as follows. No new matter has been added.

Please replace the Abstract on page 56 (beginning with "An apparatus comprises a storage device…) with the following replacement Abstract:

ABSTRACT

~~An apparatus comprises a storage device and a device controller operatively coupled with the storage device. The device controller comprises a memory that stores an application. The application stored on the memory comprises instructions. When executed, the instruction direct the device controller to receive a storage request comprising content. The device controller retrieves a storage device policy from the memory that indicates a set of storage locations on the storage device. The device controller selects one of the storage locations on the storage device based on the storage device policy. The device controller stores the content on the storage device at the selected storage location. The device controller records storage information for the content that indicates the selected location on the memory.~~ In an embodiment, a storage device is provided. A device controller with a memory is coupled with the storage device. The memory stores an application with instructions that direct the controller to receive a storage device policy. The instructions further direct the controller to store content from a storage request in accordance with the storage device policy, and record storage information, including at least a content identifier, to the memory. Subsequent to storing the content, the instructions further direct the controller to retrieve the content according to the storage information received in a storage request. According to an implementation, the instructions further provide instruction to refuse a delete request in accordance with the storage information. According to an implementation, the instructions provide direction to store the storage information at a remote location.

Please replace the first full paragraph on page 2, marked paragraph [0005] (beginning with "In an embodiment, an apparatus comprises …") with the following replacement paragraph:

[0005] ~~In an embodiment, an apparatus comprises a storage device and a device controller operatively coupled with the storage device is provided. The device controller comprises a memory that stores an application. The application stored on the memory comprises instructions. When executed, the instruction direct the device controller to receive a storage request comprising content. The device controller retrieves a storage device policy from the memory that indicates a set of storage locations on the storage device. The device controller selects one of the storage locations on the storage device based on the storage device policy. The device controller stores the content on the storage device at the selected storage location. The device controller records storage information for the content that indicates the selected location on the memory.~~ In an embodiment, a storage device is provided. A device controller with a memory is coupled with the storage device. The memory stores an application with instructions that direct the controller to receive a storage device policy. The instructions further direct the controller to store content from a storage request in accordance with the storage device policy, and record storage information, including at least a content identifier, to the memory. Subsequent to storing the content, the instructions further direct the controller to retrieve the content according to the storage information received in a storage request. According to an implementation, the instructions further provide instruction to refuse a delete request in accordance with the storage information. According to an implementation, the instructions provide direction to store the storage information at a remote location.

## CLAIMS

Please amend claims 1-36

1. (CURRENTLY AMENDED) An apparatus comprising:

a ~~storage device~~ solid-state memory;

a device memory;

a programmable processor operatively coupled to the device memory;

a device controller operatively coupled with the ~~storage device, comprising a memory~~ solid-state memory and the programmable processor; and

an application stored on the device memory and comprising instructions that, when executed by the programmable processor, direct the ~~device controller~~ programmable processor to at least:

~~receive a storage request to store content on the storage device;~~

in response to receiving a storage request comprising content, retrieve a storage device policy from the device memory ~~that indicates a set of storage locations on the storage device~~;

~~select one of the storage locations on the storage device based on the storage device policy;~~

process the content for storage based on the storage device policy; and

transfer the content to the device controller; and

the device controller configured to:

receive the content from the programmable processor and store the content on the solid-state memory ~~storage device at the selected storage location; and~~

~~record storage information for the content that indicates the selected location on the memory~~.

2. (CURRENTLY AMENDED) The apparatus of claim 1 further comprising an interface connector that communicatively couples the solid-state memory, the device controller, the programmable processor, and the device memory to a host computer ~~wherein the storage device comprises a magnetic disk and the selected storage location comprises a location on the magnetic disk~~.

3. (CURRENTLY AMENDED) The apparatus of claim [[1]] 2 further comprising a printed circuit board communicatively coupled to the interface connector that mounts the solid-state memory, the device memory, the device controller, and the programmable processor ~~wherein the storage device comprises a Solid-State Drive (SSD) and the selected storage location comprises a set of memory blocks on the SSD~~.

4. (CURRENTLY AMENDED) The apparatus of claim [[1]] 3 further comprising a case that supports the printed circuit board ~~wherein the instructions that, when executed, further direct the device controller to:~~

~~scan the storage device and identify defective regions on the storage device; and~~

~~select the one of the storage locations to avoid the identified defective regions on the storage device~~.

5. (CURRENTLY AMENDED) The apparatus of claim 1 wherein the instructions that, when executed, ~~further~~ direct the ~~device controller~~ programmable processor to process the content for storage based on the storage device policy and transfer the content to the device controller comprise the instructions that, when executed, direct the programmable processor to:

~~determine a size of the content; and~~

~~select the one of the storage locations on the storage device based on the size of the content~~

compress the content based on the storage device policy;

transfer the compressed content to the device controller; and wherein:

the device controller is configured to:

receive the compressed content from the programmable processor and store the compressed content on the solid-state memory.

6. (CURRENTLY AMENDED) The apparatus of claim 1 wherein the instructions that, when executed, ~~further~~ direct the ~~device controller~~ programmable processor to process the content for storage based on the storage device policy and transfer the content to the device controller comprise the instructions that, when executed, direct the programmable processor to:

~~determine a location of an actuator arm of the storage device; and~~

~~select the one of the storage locations on the storage device based on the location of the actuator arm of the storage device~~

encrypt the content based on the storage device policy;

transfer the encrypted content to the device controller; and wherein:

the device controller is configured to:

receive the encrypted content from the programmable processor and store the encrypted content on the solid-state memory.

7. (CURRENTLY AMENDED) The apparatus of claim 1 wherein the content comprises one or more of medical records, video data, image data, on-line temporal video data, cached data, financial data, online transaction data, credit card data, or medical data ~~the instructions that, when executed, further direct the device controller to:~~

~~determine alternate write activity on adjacent blocks of the storage device; and~~

~~select the one of the storage locations on the storage device based on the alternate write activity on adjacent blocks of the storage device~~.

8. (CURRENTLY AMENDED) The apparatus of claim 1 wherein the application comprises at least one of a learning algorithm or an artificial intelligence algorithm ~~instructions that, when executed, further direct the device controller to:~~

~~subsequent to storing the content on the storage device at the selected storage location, transfer the location information to a requester that transferred the storage request to the device controller~~.

9. (CURRENTLY AMENDED) An apparatus comprising:

a ~~storage device~~ solid-state memory;

a device memory;

a programmable processor operatively coupled to the device memory;

a device controller operatively coupled with ~~the storage device, comprising a memory~~ the solid-state memory and the programmable processor; and

an application stored on the device memory and comprising instructions that, when executed by the programmable processor, direct the ~~device controller~~ programmable processor to at least:

receive a storage request ~~to store~~ comprising content ~~on the storage device~~ and a storage device policy;

~~retrieve a storage device policy from the memory that indicates a set of storage locations on the storage device;~~

~~select one of the storage locations on the storage device based on the storage device policy;~~

in response to receiving the storage request and the storage device policy, process the content for storage based on the storage device policy; and

transfer the content to the device controller; and

the device controller configured to:

receive the content from the programmable processor and store the content on the solid-state memory ~~storage device at the selected storage location;~~

~~record storage information for the content that indicates the selected location on the memory;~~

~~receive a content request comprising a content identifier for the content;~~

~~in response to the content request, retrieve the storage information for the content;~~

~~retrieve the content from the storage device based on the storage information; and~~

~~transfer the content~~.

10. (CURRENTLY AMENDED) The apparatus of claim 9 further comprising an interface connector that communicatively couples the solid-state memory, the device controller, the programmable processor, and the device memory to a host computer ~~wherein the storage request comprises a priority level for the content~~.

11. (CURRENTLY AMENDED) The apparatus of claim 10 further comprising a printed circuit board communicatively coupled to the interface connector that mounts the solid-state memory, the device memory, the device controller, and the programmable processor ~~wherein the instructions that, when executed, further direct the device controller to:~~

~~determine the priority level for the content based on the storage request; and~~

~~select the one of the storage locations on the storage device based on the priority level of the content~~.

12. (CURRENTLY AMENDED) The apparatus of claim [[9]] 11 further comprising a case that supports the printed circuit board ~~wherein the storage request comprises an identification code for the content, encoding information for the content, and data protection information for the content~~.

13. (CURRENTLY AMENDED) The apparatus of claim [[12]] 9 wherein the instructions that, when executed, ~~further~~ direct the ~~device controller~~ programmable processor to process the content for storage based on the storage device policy and transfer the content to the device controller comprise the instructions that, when executed, direct the programmable processor to:

~~encode the content according to the encoding information of the storage request; and~~

~~select the one of the storage locations on the storage device and store the encoded content on the storage device at the selected storage location; and~~

~~record the storage information for the content that comprises the selected location, the identification code for the content, the encoding information for the content, and the data protection information for the content on the memory~~

compress the content based on the storage device policy;

transfer the compressed content to the device controller; and wherein:

the device controller is configured to:

receive the compressed content from the programmable processor and store the compressed content on the solid-state memory.

14. (CURRENTLY AMENDED) The apparatus of claim 9 wherein the instructions that, when executed, ~~further~~ direct the ~~device controller~~ programmable processor to process the content for storage based on the storage device policy and transfer the content to the device controller comprise the instructions that, when executed, direct the programmable processor to:

~~determine the storage request is incomplete;~~

~~in response to determining the storage request is incomplete, transfer a request for a storage device policy update;~~

~~receive the storage device policy update; and~~

~~update the storage device policy~~

encrypt the content based on the storage device policy;

transfer the encrypted content to the device controller; and wherein:

the device controller is configured to:

receive the encrypted content from the programmable processor and store the encrypted content on the solid-state memory.

15. (CURRENTLY AMENDED) The apparatus of claim 9 wherein ~~the storage information comprises the selected location for the content, an identification code for the content, a size of the content, encoding information for the content, and an encryption key for the content~~ the content comprises one or more of medical records, video data, image data, on-line temporal video data, cached data, financial data, online transaction data, credit card data, or medical data.

16. (CURRENTLY AMENDED) An apparatus comprising:

a ~~storage device~~ solid-state memory

a device memory;

a programmable processor operatively coupled to the device memory;

a device controller operatively coupled with the ~~storage device, comprising a memory~~ solid-state memory and the programmable processor; and

an application stored on the device memory and comprising instructions that, when executed be the programmable processor, direct the ~~device controller~~ programmable processor to at least:

~~receive a storage request to store content on the storage device;~~

in response to receiving a content request to retrieve content, retrieve a storage device policy from the device memory ~~that indicates a set of storage locations on the storage device and a recording method for writing the content to the storage device~~;

direct the device controller to read the requested content from the solid-state memory;

receive the requested content from the device controller and process the requested content for transfer based on the storage device policy; and

transfer the requested content; and

the device controller configured to:

read the requested content from the solid-state memory in response to the direction from the programmable processor; and

transfer the requested content to the programmable processor

~~select one of the storage locations on the storage device based on the storage device policy;~~

~~store the content on the storage device at the selected storage location using the recording method; and~~

~~record storage information for the content that indicates the selected location on the memory~~.

17. (CURRENTLY AMENDED) The apparatus of claim 16 further comprising an interface connector that communicatively couples the solid-state memory, the device controller, the programmable processor, and the device memory to a host computer ~~wherein the storage device comprises a magnetic disk and the recording method comprises a recording path density~~.

18. (CURRENTLY AMENDED) The apparatus of claim [[16]] 17 further comprising:

a printed circuit board communicatively coupled to the interface connector that mounts the solid-state memory, the device memory, the device controller, and the programmable processor; and

a case that supports the printed circuit board ~~wherein the storage device comprises a magnetic disk and the recording method comprises a recording bit frequency~~.

19. (CURRENTLY AMENDED) The apparatus of claim 16 wherein: ~~the storage device comprises a magnetic disk and the recording method comprises a recording path pattern~~

the requested content stored on the solid-state memory is compressed;

the device controller is configured to:

read the compressed content from the solid-state memory in response to the direction from the programmable processor; and

transfer the compressed content to the programmable processor; and.

the instructions that, when executed, direct the programmable processor to process the requested content for transfer based on the storage device policy and transfer the requested content comprise the instructions that, when executed, direct the programmable processor to:

decompress the compressed content based on the storage device policy; and

transfer the decompressed content.

20. (CURRENTLY AMENDED) The apparatus of claim 16 wherein ~~the instructions that, when executed, further direct the device controller to~~:

~~determine a priority level for the content based on the storage request;~~

~~select the one of the storage locations on the storage device based on the priority level of the content;~~

~~determine a recording path density, recording bit frequency, and recording path pattern for the content based on the content priority level; and~~

~~store the content on the storage device at the selected storage location using the selected recording path density, recoding bit frequency, and recording path pattern~~

the requested content stored on the solid-state memory is encrypted;

the device controller is configured to:

read the encrypted content from the solid-state memory in response to the direction from the programmable processor; and

transfer the encrypted content to the programmable processor; and.

the instructions that, when executed, direct the programmable processor to process the content for transfer based on the storage device policy and transfer the requested content comprise the instructions that, when executed, direct the programmable processor to:

decrypt the encrypted content based on the storage device policy; and

transfer the decrypted content.

21. (CURRENTLY AMENDED) An apparatus comprising:

a ~~storage device~~ solid-state memory;

a device memory;

a programmable processor operatively coupled to the device memory;

a device controller operatively coupled with the ~~storage device, comprising a memory~~ solid-state memory and the programmable processor; and

an application stored on the device memory and comprising instructions that, when executed by the programmable processor, direct the ~~device controller~~ programmable processor to at least:

receive a storage device policy and a ~~storage~~ content request ~~to store content on the storage device~~ comprising search criteria;

direct the device controller to read content stored on the memory;

receive the content from the device controller;

process the content using the storage device policy to identify portions of the content that comprise the requested search criteria; and

transfer the portions of the content that comprise the requested search criteria; and the device controller configured to:

read the content from the solid-state memory in response to the direction from the programmable processor; and

transfer the content to the programmable processor

~~retrieve a storage device policy from the memory that indicates a set of storage locations on the storage device and a recording method for writing the content to the storage device;~~

~~select one of the storage locations on the storage device based on the storage device policy;~~

~~store the content on the storage device at the selected storage location; and~~

~~record storage information for the content that indicates the selected location on the memory;~~

~~receive a content request comprising a content identifier for the content;~~

~~in response to the content request, retrieve the storage information for the content;~~

~~retrieve the content from the storage device based on the storage information; and transfer the content~~.

22. (CURRENTLY AMENDED) The apparatus of claim 21 further comprising an interface connector that communicatively couples the solid-state memory, the device controller, the programmable processor, and the device memory to a host computer ~~wherein the content comprises medical records~~.

23. (CURRENTLY AMENDED) The apparatus of claim [[21]] 22 further comprising:

a printed circuit board communicatively coupled to the interface connector that mounts the solid-state memory, the device memory, the device controller, and the programmable processor; and

a case that supports the printed circuit board ~~wherein the content comprises on-line temporal video data~~.

24. (CURRENTLY AMENDED) The apparatus of claim 21 wherein: ~~the content comprises image data~~

the search criteria comprise a phrase;

the device controller is configured to:

read the content including the portions of the content that comprise the phrase from the solid-state memory in response to the direction from the programmable processor; and

transfer the content to the programmable processor; and.

the instructions that, when executed, direct the programmable processor to process the content using the storage device policy to identify the portions of the content that comprise the requested search criteria and transfer the portions of the content that comprise the requested search criteria comprise the instructions that, when executed, direct the programmable processor to:

process the content using the storage device policy to identify the portions of the content that comprise the phrase; and

transfer the portions of the content that comprise the phrase.

25. (CURRENTLY AMENDED) The apparatus of claim 21 wherein: ~~the content comprises online shopping financial data~~

the search criteria comprise a photo;

the device controller is configured to:

read the content including the portions of the content that comprise the photo from the solid-state memory in response to the direction from the programmable processor; and

transfer the content to the programmable processor; and.

the instructions that, when executed, direct the programmable processor to process the content using the storage device policy to identify the portions of the content that comprise the requested search criteria and transfer the portions of the content that comprise the requested search criteria comprise the instructions that, when executed, direct the programmable processor to:

process the content using the storage device policy to identify the portions of the content that comprise the photo; and

transfer the portions of the content that comprise the photo.

26. (CURRENTLY AMENDED) An apparatus comprising:

a ~~storage device~~ solid-state memory;

a device memory;

a programmable processor operatively coupled to the device memory;

a device controller operatively coupled with ~~the storage device and comprising a memory, the device controller configured to receive content to be stored on the storage device~~ the solid-state memory and the programmable processor; and

~~a programmable processor configured to implement a storage device policy that indicates a set of storage locations on the storage device;~~

~~the programmable processor communicatively coupled with the device controller wherein the content received by the device controller is processed by the programmable processor; and~~

an application stored on the device memory and comprising instructions that, when executed by the programmable processor, direct the ~~device controller~~ programmable processor to

at least: ~~select one of the storage locations and store the content at the selected storage location on the storage device after the content has been processed by the programmable processor~~

in response to receiving a storage request comprising content, retrieve a storage device policy from the device memory;

process the content for storage based on the storage device policy;

transfer the content to the device controller;

subsequent to storing the content on the solid-state memory and in response to receiving a content request, direct the device controller to read the requested content from the solid-state memory;

receive the requested content from the device controller;

process the requested content for transfer based on the storage device policy; and

transfer the requested content; and

the device controller configured to:

receive the content from the programmable processor and store the content on the solid-state memory;

read the requested content from the solid-state memory in response to the direction from the programmable processor; and

transfer the requested content to the programmable processor.

27. (CURRENTLY AMENDED) The apparatus of claim 26 further comprising an interface connector that communicatively couples the solid-state memory, the device controller, the programmable processor, and the device memory to a host computer ~~wherein the instructions that, when executed, further direct the device controller to:~~

~~determine a content type for the content; and~~

~~select the one of the storage locations on the storage device based on the content type~~.

28. (CURRENTLY AMENDED) The apparatus of claim [[26]] 27 further comprising a printed circuit board communicatively coupled to the interface connector that mounts the solid-state memory, the device memory, the device controller, and the programmable processor ~~wherein the instructions that, when executed, further direct the device controller to:~~

~~determine other ones of the storage locations that have already been written; and~~

~~select the one of the storage locations on the storage device based on the other ones of the storage locations that have already been written~~.

29. (CURRENTLY AMENDED) The apparatus of claim [[26]] 28 further comprising a case that supports the printed circuit board ~~wherein:~~

~~the selected storage location comprises a start location on the storage device; and wherein:~~

~~the instructions that, when executed, further direct the device controller to:~~

~~store the content using the start location at the selected storage location on the storage device~~.

30. (CURRENTLY AMENDED) The apparatus of claim 26 wherein the instructions that, when executed, direct the programmable processor to retrieve a storage device policy from the device memory, process the content for storage based on the storage device policy, transfer the content to the device controller; direct the device controller to read the requested content from the solid-state memory, receive the requested content from the device controller, process the requested content for transfer based on the storage device policy, and transfer the requested content comprise the instructions that, when executed, direct the programmable processor to:

~~the selected storage location comprises a start location and angle information on the storage device; and wherein:~~

~~the instructions that, when executed, further direct the device controller to:~~

~~store the content using the start location and the angle information at the selected storage location on the storage device~~

compress the content based on the storage device policy;

transfer the compressed content to the device controller;

subsequent to storing the compressed content on the solid-state memory and in response to receiving a content request, direct the device controller to read the compressed content from the solid-state memory;

receive the compressed content from the device controller;

decompress the compressed content based on the storage device policy; and

transfer the decompressed content; and wherein:

the device controller is configured to:

receive the compressed content from the programmable processor and store the compressed content on the solid-state memory;

read the compressed content from the solid-state memory in response to the direction from the programmable processor; and

transfer the compressed content to the programmable processor.

31. (CURRENTLY AMENDED) The apparatus of claim 26 wherein the instructions that, when executed, direct the programmable processor to retrieve a storage device policy from the device memory, process the content for storage based on the storage device policy, transfer the content to the device controller; direct the device controller to read the requested content from the solid-state memory, receive the requested content from the device controller, process the requested content for transfer based on the storage device policy, and transfer the requested content comprise the instructions that, when executed, direct the programmable processor to:

~~the selected storage location comprises a complete mapping of a recording path on the storage device; and wherein:~~

~~the instructions that, when executed, further direct the device controller to:~~

~~store the content using the complete recording path at the selected storage location on the storage device~~

encrypt the content based on the storage device policy;

transfer the encrypted content to the device controller;

subsequent to storing the encrypted content on the solid-state memory and in response to receiving a content request, direct the device controller to read the encrypted content from the solid-state memory;

receive the encrypted content from the device controller;

decrypt the encrypted content based on the storage device policy; and

transfer the decrypted content; and wherein:

the device controller is configured to:

receive the encrypted content from the programmable processor and store the encrypted content on the solid-state memory;

read the encrypted content from the solid-state memory in response to the direction from the programmable processor; and

transfer the encrypted content to the programmable processor.

32. (CURRENTLY AMENDED) An apparatus comprising:

a ~~storage device~~ solid-state memory;

a device memory:

a programmable processor operatively coupled to the device memory;

a device controller operatively coupled with the ~~storage device, comprising a memory~~ solid-state memory and the programmable processor; and

an application stored on the memory and comprising instructions that, when executed by the programmable processor, direct the ~~device controller~~ programmable processor to at least:

receive a storage request ~~to store a first~~ comprising content and a ~~second content on the storage device~~ storage device policy;

~~retrieve a storage device policy from the memory that indicates a set of storage locations on the storage device;~~

~~select a first one of the storage locations based on the content type of the first content and select a second one of the storage locations based on the content type of the second content; and~~

~~store the first content at the first selected storage location on the storage device and store the second content at the second selected storage location on the storage device~~

in response to receiving the storage request and the storage device policy, process the content for storage based on the storage device policy;

transfer the content to the device controller;

subsequent to storing the content on the solid-state memory, receive a content request comprising search criteria;

direct the device controller to read the content from the solid-state memory;

receive the content from the device controller;

process the content based on the storage device policy to identify portions of the content that comprise the search criteria; and

transfer the portions of the content the comprise the search criteria; and

the device controller configured to:

receive the content from the programmable processor and store the content on the solid-state memory;

read the content from the solid-state memory in response to the direction from the programmable processor; and

transfer the content to the programmable processor.

33. (CURRENTLY AMENDED) The apparatus of claim 32 further comprising an interface connector that communicatively couples the solid-state memory, the device controller, the programmable processor, and the device memory to a host computer ~~wherein the storage device comprises a storage array comprising multiple storage devices connected together to form the storage array~~.

34. (CURRENTLY AMENDED) The apparatus of claim [[32]] 33 further comprising:

a printed circuit board communicatively coupled to the interface connector that mounts the solid-state memory, the device memory, the device controller, and the programmable processor; and

a case that supports the printed circuit board ~~wherein the storage device comprises a storage array comprising multiple Solid-State Drives (SSDs) and multiple hard disk drives connected together to form the storage array~~.

35. (CURRENTLY AMENDED) The apparatus of claim 32 wherein ~~the storage device comprises a storage array for cloud storage support~~ the instructions that, when executed, direct the programmable processor to process the content for storage based on the storage device policy, transfer the content to the device controller, receive a content request comprising search criteria, direct the device controller to read the content from the solid-state memory, receive the content from the device controller, process the content based on the storage device policy to identify the portions of the content that comprise the search criteria, and transfer the portions of the content that comprise the search criteria comprise the instructions that, when executed, direct the programmable processor to:

in response to receiving the storage request comprising the content and the storage device policy, compress the content based on the storage device policy;

transfer the compressed content to the device controller;

subsequent to storing the content on the solid-state memory, receive the content request comprising the search criteria that comprises a word;

direct the device controller to read the compressed content from the solid-state memory;

receive the compressed content from the device controller;

decompress the content based on the storage device policy to identify the portions of the content that comprise the word; and

transfer the portions of the content that comprise the word; and wherein:

the device controller is configured to:

receive the compressed content from the programmable processor and store the compressed content on the solid-state memory;

read the compressed content from the solid-state memory in response to the direction from the programmable processor; and

transfer the compressed content to the programmable processor.

36. (CURRENTLY AMENDED) The apparatus of claim 32 wherein the instructions that, when executed, direct the programmable processor to process the content for storage based on the storage device policy, transfer the content to the device controller, receive a content request comprising search criteria, direct the device controller to read the content from the solid-state memory, receive the content from the device controller, process the content based on the storage device policy to identify the portions of the content that comprise the search criteria, and transfer the portions of the content that comprise the search criteria comprise the instructions that, when executed, direct the programmable processor to:

~~the storage device comprises a storage array comprising multiple storage devices connected together to form the storage array; and wherein:~~

~~the instructions that, when executed, further direct the device controller to:~~

~~select the first one of the storage locations on a first one of the multiple storage devices of the storage array based on the content type of the first content and select the second~~

~~one of the storage locations on a second one of the multiple storage devices of the storage array based on the content type of the second content~~

in response to receiving the storage request comprising the content and the storage device policy, encrypt the content based on the storage device policy;

transfer the encrypted content to the device controller;

subsequent to storing the content on the solid-state memory, receive the content request comprising the search criteria that comprises a word;

direct the device controller to read the encrypted content from the solid-state memory;

receive the encrypted content from the device controller;

decrypt the content based on the storage device policy to identify the portions of the content that comprise the word; and

transfer the portions of the content that comprise the word; and wherein:

the device controller is configured to:

receive the encrypted content from the programmable processor and store the encrypted content on the solid-state memory;

read the encrypted content from the solid-state memory in response to the direction from the programmable processor; and

transfer the encrypted content to the programmable processor.

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# ELECTRONIC PAYMENT RECEIPT

| APPLICATION # | RECEIPT DATE / TIME | ATTORNEY DOCKET # |
|---|---|---|
| 17/716,275 | 05/25/2023 10:41:49 AM ET | 980.0023C2 |

## Title of Invention

DATA STORAGE DEVICE WITH CONFIGURABLE POLICY-BASED STORAGE DEVICE BEHAVIOR

## Application Information

| | | | |
|---|---|---|---|
| APPLICATION TYPE | Utility - Nonprovisional Application under 35 USC 111(a) | PATENT # | - |
| CONFIRMATION # | 7982 | FILED BY | Melissa Eichten |
| PATENT CENTER # | 62152326 | AUTHORIZED BY | David Setter |
| CUSTOMER # | 76444 | FILING DATE | 04/08/2022 |
| CORRESPONDENCE ADDRESS | - | FIRST NAMED INVENTOR | Joshua Johnson |

## Payment Information

| PAYMENT METHOD | PAYMENT TRANSACTION ID | PAYMENT AUTHORIZED BY |
|---|---|---|
| CARD / 1006 | E20235OA44299407 | Melissa Eichten |

| FEE CODE | DESCRIPTION | ITEM PRICE($) | QUANTITY | ITEM TOTAL($) |
|---|---|---|---|---|
| 2251 | EXTENSION FOR RESPONSE WITHIN FIRST MONTH | 88.00 | 1 | 88.00 |
| 2814 | STATUTORY DISCLAIMER, INCLUDING TERMINAL DISCLAIMER | 170.00 | 2 | 340.00 |
| | | | TOTAL AMOUNT: | $428.00 |

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

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If a new application is being filed and the application includes the necessary components for filing date (see 37 CFR 1.53(b)-(d)

and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

**National Stage of an International Application under 35 U.S.C. 371**

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

**New International Application Filed with the USPTO as a Receiving Office**

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

| *Application Number* * 17/716,275 * | Application/Control No. 17/716,275 | Applicant(s)/Patent under Reexamination Johnson et al. | |
|---|---|---|---|
| | Examiner LANE, JOHN A | Art Unit 2139 | |

| Document Code - DISQ | Internal Document - DO NOT MAIL |
|---|---|

| TERMINAL DISCLAIMER | ☑ APPROVED | ☐ DISAPPROVED |
|---|---|---|
| Date Filed: 25 May 2023 | This patent is subject to a Terminal Disclaimer | |

**Approved/Disapproved by:**

/PAMELA A YOUNG/

**Technology Center:** OPLC

**Telephone:** (571)272-3622

2 TD

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# NOTICE OF ALLOWANCE AND FEE(S) DUE

76444 7590 06/23/2023

Setter Roche Smith & Shellenberger LLP
1860 Blake Street
Suite 500
Denver, CO 80202

| EXAMINER |
|---|
| LANE, JOHN A |

| ART UNIT | PAPER NUMBER |
|---|---|
| 2139 | |

DATE MAILED: 06/23/2023

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 17/716,275 | 04/08/2022 | Joshua Johnson | 980.0023C2 | 7982 |

TITLE OF INVENTION: DATA STORAGE DEVICE WITH CONFIGURABLE POLICY-BASED STORAGE DEVICE BEHAVIOR

| APPLN. TYPE | ENTITY STATUS | ISSUE FEE DUE | PUBLICATION FEE DUE | PREV. PAID ISSUE FEE | TOTAL FEE(S) DUE | DATE DUE |
|---|---|---|---|---|---|---|
| nonprovisional | SMALL | $480 | $0.00 | $0.00 | $480 | 09/25/2023 |

**THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.**

**THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.**

**HOW TO REPLY TO THIS NOTICE:**

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 40% the amount of undiscounted fees, and micro entity fees are 20% the amount of undiscounted fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

**IMPORTANT REMINDER: Maintenance fees are due in utility patents issuing on applications filed on or after Dec. 12, 1980. It is patentee's responsibility to ensure timely payment of maintenance fees when due. More information is available at www.uspto.gov/PatentMaintenanceFees.**



PTOL-85 (Rev. 02/11)

## PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), by mail or fax, or via EFS-Web.

By mail, send to: Mail Stop ISSUE FEE
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By fax, send to: (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications. **Because electronic patent issuance may occur shortly after issue fee payment, any desired continuing application should preferably be filed prior to payment of this issue fee in order not to jeopardize copendency.**

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

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Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

**Certificate of Mailing or Transmission**

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being transmitted to the USPTO via EFS-Web or by facsimile to (571) 273-2885, on the date below.

| |
|---|
| (Typed or printed name) |
| (Signature) |
| (Date) |

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 17/716,275 | 04/08/2022 | Joshua Johnson | 980.0023C2 | 7982 |

TITLE OF INVENTION: DATA STORAGE DEVICE WITH CONFIGURABLE POLICY-BASED STORAGE DEVICE BEHAVIOR

| APPLN. TYPE | ENTITY STATUS | ISSUE FEE DUE | PUBLICATION FEE DUE | PREV. PAID ISSUE FEE | TOTAL FEE(S) DUE | DATE DUE |
|---|---|---|---|---|---|---|
| nonprovisional | SMALL | $480 | $0.00 | $0.00 | $480 | 09/25/2023 |

| EXAMINER | ART UNIT | CLASS-SUBCLASS |
|---|---|---|
| LANE, JOHN A | 2139 | 711-170000 |

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

❑ Change of correspondence address (or Change of Correspondence Address form PTO/AIA/122 or PTO/SB/122) attached.

❑ "Fee Address" indication (or "Fee Address" Indication form PTO/AIA/47 or PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 _____
2 _____
3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ❑ Corporation or other private group entity ❑ Government

4a. Fees submitted: ❑ Issue Fee ❑ Publication Fee (if required)

4b. Method of Payment: *(Please first reapply any previously paid fee shown above)*

❑ Electronic Payment via Patent Center or EFS-Web ❑ Enclosed check ❑ Non-electronic payment by credit card (Attach form PTO-2038)

❑ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. _____

5. **Change in Entity Status** (from status indicated above)

❑ Applicant certifying micro entity status. See 37 CFR 1.29
NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

❑ Applicant asserting small entity status. See 37 CFR 1.27
NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

❑ Applicant changing to regular undiscounted fee status.
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Authorized Signature _____ Date _____

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**Meta Platforms, Inc. and Samsung Electronics Co. Ltd. - Ex. 1002**
**Page 322**

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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 17/716,275 | 04/08/2022 | Joshua Johnson | 980.0023C2 | 7982 |

76444 7590 06/23/2023

Setter Roche Smith & Shellenberger LLP
1860 Blake Street
Suite 500
Denver, CO 80202

| EXAMINER | |
|---|---|
| LANE, JOHN A | |

| ART UNIT | PAPER NUMBER |
|---|---|
| 2139 | |

DATE MAILED: 06/23/2023

**Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)**
(Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.



PTOL-85 (Rev. 02/11)

## OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 30 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

## Privacy Act Statement

**The Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

| Notice of Allowability | Application No. 17/716,275 | Applicant(s) Johnson et al. | |
|---|---|---|---|
| | Examiner JOHN A LANE | Art Unit 2139 | AIA (FITF) Status Yes |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--*

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☑ This communication is responsive to the amendment and T.D. filed 17/716,275.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

3. ☑ The allowed claim(s) is/are 1-36 . As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see **http://www.uspto.gov/patents/init_events/pph/index.jsp** or send an inquiry to **PPHfeedback@uspto.gov.**

4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   **Certified copies:**

   a) ☐ All b) ☐ Some* c) ☐ None of the:

   1. ☐ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____ .

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____ .

   **Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).**

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

**Attachment(s)**

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____.
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material _____.
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date. _____.
5. ☐ Examiner's Amendment/Comment
6. ☐ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

/JOHN A LANE/
Primary Examiner, Art Unit 2139

| Issue Classification | Application/Control No. | Applicant(s)/Patent Under Reexamination |
|---|---|---|
| | 17/716,275 | Johnson et al. |
| | **Examiner** | **Art Unit** |
| | JOHN A LANE | 2139 |

| CPC | | | | | | |
|---|---|---|---|---|---|---|
| **Symbol** | | | | | **Type** | **Version** |
| G06F | / | 3 | / | 0632 | F | 2013-01-01 |
| G06F | / | 3 | / | 0673 | I | 2013-01-01 |
| G06F | / | 3 | / | 0604 | I | 2013-01-01 |
| G06F | / | 3 | / | 0658 | I | 2013-01-01 |
| G06F | / | 3 | / | 068 | I | 2013-01-01 |
| G06F | / | 3 | / | 0665 | I | 2013-01-01 |
| G06F | / | 3 | / | 0659 | I | 2013-01-01 |
| G06F | / | 3 | / | 0674 | I | 2013-01-01 |
| G06F | / | 9 | / | 06 | I | 2013-01-01 |
| G06F | / | 9 | / | 3004 | I | 2013-01-01 |
| G06F | / | 3 | / | 0676 | I | 2013-01-01 |
| G06F | / | 3 | / | 0679 | I | 2013-01-01 |
| G06F | / | 3 | / | 0619 | A | 2013-01-01 |
| G06F | / | 3 | / | 061 | A | 2013-01-01 |

| CPC Combination Sets | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Symbol** | | | | | **Type** | **Set** | **Ranking** | **Version** |
| | / | | / | | | | | |

| NONE | | Total Claims Allowed: | |
|---|---|---|---|
| (Assistant Examiner) | (Date) | 36 | |
| /JOHN A LANE/<br>Primary Examiner, Art Unit 2139 | 11 June 2023 | O.G. Print Claim(s) | O.G. Print Figure |
| (Primary Examiner) | (Date) | 1 | 11A and 11C |

U.S. Patent and Trademark Office — Part of Paper No.: 20230611



Meta Platforms, Inc. and Samsung Electronics Co. Ltd. - Ex. 1002
Page 326

| Issue Classification | Application/Control No. | Applicant(s)/Patent Under Reexamination |
|---|---|---|
| | 17/716,275 | Johnson et al. |
| | **Examiner** | **Art Unit** |
| | JOHN A LANE | 2139 |

| INTERNATIONAL CLASSIFICATION | | | | |
|---|---|---|---|---|
| **CLAIMED** | | | | |
| G06F | / | 12 | / | 00 |

| NON-CLAIMED | | | | |
|---|---|---|---|---|
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| US ORIGINAL CLASSIFICATION | |
|---|---|
| **CLASS** | **SUBCLASS** |
| | |

| CROSS REFERENCES(S) | | | | | | |
|---|---|---|---|---|---|---|
| **CLASS** | **SUBCLASS (ONE SUBCLASS PER BLOCK)** | | | | | |
| | | | | | | |

| NONE<br>(Assistant Examiner) | (Date) | **Total Claims Allowed:**<br>36 | |
|---|---|---|---|
| /JOHN A LANE/<br>Primary Examiner, Art Unit 2139<br>(Primary Examiner) | 11 June 2023<br>(Date) | O.G. Print Claim(s)<br>1 | O.G. Print Figure<br>11A and 11C |

| Issue Classification | Application/Control No. | Applicant(s)/Patent Under Reexamination |
|---|---|---|
| | 17/716,275 | Johnson et al. |
| | Examiner | Art Unit |
| | JOHN A LANE | 2139 |

☑ Claims renumbered in the same order as presented by applicant ☐ CPA ☑ T.D. ☐ R.1.47

CLAIMS

| Final | Original | Final | Original | Final | Original | Final | Original | Final | Original | Final | Original | Final | Original | Final | Original |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 10 | 10 | 19 | 19 | 28 | 28 | | | | | | | | |
| 2 | 2 | 11 | 11 | 20 | 20 | 29 | 29 | | | | | | | | |
| 3 | 3 | 12 | 12 | 21 | 21 | 30 | 30 | | | | | | | | |
| 4 | 4 | 13 | 13 | 22 | 22 | 31 | 31 | | | | | | | | |
| 5 | 5 | 14 | 14 | 23 | 23 | 32 | 32 | | | | | | | | |
| 6 | 6 | 15 | 15 | 24 | 24 | 33 | 33 | | | | | | | | |
| 7 | 7 | 16 | 16 | 25 | 25 | 34 | 34 | | | | | | | | |
| 8 | 8 | 17 | 17 | 26 | 26 | 35 | 35 | | | | | | | | |
| 9 | 9 | 18 | 18 | 27 | 27 | 36 | 36 | | | | | | | | |

| NONE | | Total Claims Allowed: | |
|---|---|---|---|
| (Assistant Examiner) | (Date) | 36 | |
| /JOHN A LANE/<br>Primary Examiner, Art Unit 2139 | 11 June 2023 | O.G. Print Claim(s) | O.G. Print Figure |
| (Primary Examiner) | (Date) | 1 | 11A and 11C |

U.S. Patent and Trademark Office Part of Paper No.: 20230611



Meta Platforms, Inc. and Samsung Electronics Co. Ltd. - Ex. 1002
Page 328

| Search Notes | Application/Control No. | Applicant(s)/Patent Under Reexamination |
|---|---|---|
| | 17/716,275 | Johnson et al. |
| | Examiner | Art Unit |
| | JOHN A LANE | 2139 |

| CPC - Searched* | | |
|---|---|---|
| Symbol | Date | Examiner |
| g06f3/0632 OR g06f3/0604 OR g06f3/0658 OR g06f3/0673 OR g06f3/0674 OR g06f3/0676 OR g06f3/0679 OR g06f9/06 OR g06f9/3004 OR g06f3/061 | 02/13/2023 | JAL |

| CPC Combination Sets - Searched* | | |
|---|---|---|
| Symbol | Date | Examiner |
| | | |

| US Classification - Searched* | | | |
|---|---|---|---|
| Class | Subclass | Date | Examiner |
| | | | |

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

| Search Notes | | |
|---|---|---|
| Search Notes | Date | Examiner |
| PE2E text search with and w/o limited classification search | 02/13/2023 | JAL |
| STIC search | 02/13/2023 | JAL |
| Multiple past STIC searches from parent applications 15/804,772 and 16/990,433 | 02/13/2023 | JAL |
| Multiple EAST searches | 02/13/2023 | JAL |
| PE2E to date | 06/11/2023 | JAL |

| Interference Search | | | |
|---|---|---|---|
| US Class/CPC Symbol | US Subclass/CPC Group | Date | Examiner |
| | see above | 02/13/2023 | JAL |

| Search Notes | Application/Control No. | Applicant(s)/Patent Under Reexamination |
|---|---|---|
| | 17/716,275 | Johnson et al. |
| | Examiner | Art Unit |
| | JOHN A LANE | 2139 |



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Page 330

# Bibliographic Data

Application No: 17/716,275

Foreign Priority claimed: ○ Yes ◉ No

35 USC 119 (a-d) conditions met: ☐ Yes ☑ No ☐ Met After Allowance

Verified and Acknowledged: /JOHN A LANE/ (Examiner's Signature) (Initials)

Title: DATA STORAGE DEVICE WITH CONFIGURABLE POLICY-BASED STORAGE DEVICE BEHAVIOR

| FILING or 371(c) DATE | CLASS | GROUP ART UNIT | ATTORNEY DOCKET NO. |
|---|---|---|---|
| 04/08/2022 | 711 | 2139 | 980.0023C2 |
| RULE | | | |

**APPLICANTS**

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Curt Bruner, Niwot, CO, UNITED STATES

Jeffrey Reh, Niwot, CO, UNITED STATES

Christopher Squires, Boulder, CO, UNITED STATES

Brian Wilson, Zumbro Falls, MN, UNITED STATES

**CONTINUING DATA**

This application is a CON of 15804772 11/06/2017 PAT 10776023

15804772 has PRO of 62448826 01/20/2017

15804772 has PRO of 62418742 11/07/2016

15804772 has PRO of 62418785 11/07/2016

15804772 has PRO of 62418687 11/07/2016

15804772 has PRO of 62418775 11/07/2016

15804772 has PRO of 62418780 11/07/2016

15804772 has PRO of 62418764 11/07/2016

15804772 has PRO of 62418510 11/07/2016

15804772 has PRO of 62418696 11/07/2016

15804772 has PRO of 62418759 11/07/2016

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15804772 has PRO of 62418768 11/07/2016

15804772 has PRO of 62418717 11/07/2016

15804772 has PRO of 62418724 11/07/2016

15804772 has PRO of 62418561 11/07/2016

15804772 has PRO of 62418693 11/07/2016

**FOREIGN APPLICATIONS**

**IF REQUIRED, FOREIGN LICENSE GRANTED****

04/12/2022

**** SMALL ENTITY ****

**STATE OR COUNTRY**

UNITED STATES

**ADDRESS**

Setter Roche Smith & Shellenberger LLP
1860 Blake Street
Suite 500
Denver, CO 80202
UNITED STATES

**FILING FEE RECEIVED**

$2,350

## PE2E SEARCH - Search History (Prior Art)

| Ref # | Hits | Search Query | DBs | Default Operator | Plurals | British Equivalents | Time Stamp |
|---|---|---|---|---|---|---|---|
| L1 | 257093 | g06f3/0632 OR g06f3/0604 OR g06f3/0658 OR g06f3/0673 OR g06f3/0674 OR g06f3/0676 OR g06f3/0679 OR g06f9/06 OR g06f9/3004 OR g06f3/061 | (US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB) | OR | ON | ON | 2023/02/12 05:25 PM |
| L2 | 50 | (Artificial Intelligence) Publication Status Unavailable from Similarity Search Text: (US-20220229571-A1 OR US-20210055873-A1 OR US-11327669-B2 OR US-20180129439-A1 OR US-10776023-B2 OR CN-106201339-A OR US-20050190483-A1 OR CN-111833911-B OR DE-102020107166-A1 OR KR-20210001897-A OR US-20200409578-A1 OR CN-112148520-A OR US-10268374-B2 OR US-20200341636-A1 OR WO-2013188095-A2 OR CN-112416241-A OR KR-102351489-B1 OR JP-2021034080-A OR US-8832405-B1 OR US-20180088812-A1 OR US-20210124503-A1 OR US-8090904-B2 OR US-20150227316-A1 OR US-10990304-B2 OR US-20090198884-A1 OR US-10496312-B2 OR US-9933962-B1 OR US-10338833-B1 OR | (US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO)) | OR | ON | ON | 2023/02/12 05:28 PM |

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| L9 | 1653016 | ((storage OR memory OR disk OR disc OR volume OR drive OR ssd) SAME (request$4 OR command$4 OR instruction$4 OR requir$7 OR submit$5 OR submission OR writ$4 OR store$2 OR storing OR read$4 OR access$5 OR retriev$5 OR fetch$5) SAME (policy OR rule OR strateg$4 OR algorithm$2 OR parameter OR variable OR requirement$2) SAME (location OR address$4 OR position$4 OR partition$5 OR segment$5 OR sector OR area OR zone OR track OR place OR placement) SAME (content OR data OR dataum OR information OR info OR file OR object) SAME (stor$4 OR sav$4 OR writ$5 OR record$5 OR archiv$4 OR hold$5 OR held OR keep$4 OR | (US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB) | OR | ON | ON | 2023/02/13 09:10 AM |

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| | | kept OR retain$5 OR preserv$5) SAME (check$5 OR consult$5 OR lookup OR look$3 adj3 up OR test$ OR examin$5 OR inspect$5 OR assess$5 OR base OR based OR accord$6)) | | | | | |
| L10 | 301685 | ((storage OR memory OR disk OR disc OR volume OR drive OR ssd) SAME (request$4 OR command$4 OR instruction$4 OR requir$7 OR submit$5 OR submission OR writ$4 OR store$2 OR storing OR read$4 OR access$5 OR retriev$5 OR fetch$5) SAME (policy OR rule OR strateg$4 OR algorithm$2 OR parameter OR variable OR requirement$2) SAME (location OR address$4 OR position$4 OR partition$5 OR segment$5 OR sector OR area OR zone OR track OR place OR placement) SAME (content OR data OR dataum OR information OR info OR file OR object) SAME (stor$4 OR sav$4 OR writ$5 OR record$5 OR archiv$4 OR hold$5 OR held OR keep$4 OR kept OR retain$5 OR preserv$5) SAME (check$5 OR consult$5 OR lookup OR look$3 adj3 up OR test$ OR examin$5 OR inspect$5 OR assess$5 OR base OR based OR accord$6)) | (US-PGPUB; USPAT) | OR | ON | ON | 2023/02/13 09:11 AM |
| L11 | 43230 | ((storage OR memory OR disk OR disc OR volume OR drive OR ssd) SAME (request$4 OR command$4 OR instruction$4 OR | (US-PGPUB; USPAT) | OR | ON | ON | 2023/02/13 09:11 AM |

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| L13 | 642609 | ((storage OR memory OR disk OR disc OR volume OR drive OR ssd) SAME (request$4 OR command$4 OR instruction$4 OR requir$7 OR submit$5 OR submission OR writ$4 OR store$2 OR storing OR read$4 OR access$5 OR retriev$5 OR fetch$5) SAME (policy OR rule OR strateg$4 OR algorithm$2 OR parameter OR variable OR requirement$2) SAME (location OR address$4 OR | (US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB) | OR | ON | ON | 2023/02/13 09:14 AM |



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Page 336

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| | | position$4 OR partition$5 OR segment$5 OR sector OR area OR zone OR track OR place OR placement) SAME (content OR data OR dataum OR information OR info OR file OR object) SAME (stor$4 OR sav$4 OR writ$5 OR record$5 OR archiv$4 OR hold$5 OR held OR keep$4 OR kept OR retain$5 OR preserv$5) SAME (check$5 OR consult$5 OR lookup OR look$3 adj3 up OR test$ OR examin$5 OR inspect$5 OR assess$5 OR base OR based OR accord$6) SAME (select$5 OR choos$6 OR pick$5)) | | | | | |
| L14 | 74309 | ((storage OR memory OR disk OR disc OR volume OR drive OR ssd) SAME (request$4 OR command$4 OR instruction$4 OR requir$7 OR submit$5 OR submission OR writ$4 OR store$2 OR storing OR read$4 OR access$5 OR retriev$5 OR fetch$5) SAME (policy OR rule OR strateg$4 OR algorithm$2 OR parameter OR variable OR requirement$2) SAME (location OR address$4 OR position$4 OR partition$5 OR segment$5 OR sector OR area OR zone OR track OR place OR placement) SAME (content OR data OR dataum OR information OR info OR file OR object) SAME (stor$4 OR sav$4 OR writ$5 OR record$5 OR archiv$4 OR hold$5 OR held OR keep$4 OR | (US-PGPUB; USPAT) | OR | ON | ON | 2023/02/13 09:14 AM |

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| | | kept OR retain$5 OR preserv$5) SAME (check$5 OR consult$5 OR lookup OR look$3 adj3 up OR test$ OR examin$5 OR inspect$5 OR assess$5 OR base OR based OR accord$6) SAME (select$5 OR choos$6 OR pick$5)) | | | | | |
| L15 | 11928 | ((storage OR memory OR disk OR disc OR volume OR drive OR ssd) SAME (request$4 OR command$4 OR instruction$4 OR requir$7 OR submit$5 OR submission OR writ$4 OR store$2 OR storing OR read$4 OR access$5 OR retriev$5 OR fetch$5) SAME (policy OR rule OR strateg$4 OR algorithm$2 OR parameter OR variable OR requirement$2) SAME (location OR address$4 OR position$4 OR partition$5 OR segment$5 OR sector OR area OR zone OR track OR place OR placement) SAME (content OR data OR dataum OR information OR info OR file OR object) SAME (stor$4 OR sav$4 OR writ$5 OR record$5 OR archiv$4 OR hold$5 OR held OR keep$4 OR kept OR retain$5 OR preserv$5) SAME (check$5 OR consult$5 OR lookup OR look$3 adj3 up OR test$ OR examin$5 OR inspect$5 OR assess$5 OR base OR based OR accord$6) SAME (select$5 OR choos$6 OR pick$5)).clm. | (US-PGPUB; USPAT) | OR | ON | ON | 2023/02/13 09:15 AM |
| L16 | 340 | 1 AND 15 | (US-PGPUB; USPAT) | OR | ON | ON | 2023/02/13 09:15 AM |

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|---|---|---|---|---|---|---|---|
| L17 | 198 | 16 AND @ay<"2017" | (US-PGPUB; USPAT) | OR | ON | ON | 2023/02/13 09:20 AM |
| L21 | 263611 | g06f3/0632 OR g06f3/0604 OR g06f3/0658 OR g06f3/0673 OR g06f3/0674 OR g06f3/0676 OR g06f3/0679 OR g06f9/06 OR g06f9/3004 OR g06f3/061 | (US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB) | OR | ON | ON | 2023/06/11 11:30 AM |
| L22 | 50 | (Artificial Intelligence) Similar to: 17/716,275 with 0 CPC Selections and 0 Text Selections<br>Text: (US-20220229571-A1 OR US-20210055873-A1 OR US-11327669-B2 OR US-20180129439-A1 OR US-10776023-B2 OR CN-106201339-A OR US-20050190483-A1 OR CN-111833911-B OR DE-102020107166-A1 OR KR-20210001897-A OR US-20200409578-A1 OR CN-112148520-A OR US-10268374-B2 OR US-20200341636-A1 OR WO-2013188095-A2 OR CN-112416241-A OR KR-102351489-B1 OR JP-2021034080-A OR US-8832405-B1 OR US-20180088812-A1 OR US-20210124503-A1 OR US-8090904-B2 OR US-20150227316-A1 OR US-10990304-B2 OR US-20090198884-A1 OR US-10496312-B2 OR US-9933962-B1 OR US-10338833-B1 OR US-10776010-B1 OR | (US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO)) | OR | ON | ON | 2023/06/11 11:30 AM |

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|---|---|---|---|---|---|---|---|
| | | CN-111833911-A OR US-9588687-B1 OR CN-115202590-B OR US-11531492-B2 OR US-8473707-B2 OR US-11169747-B2 OR US-20200393966-A1 OR US-11042298-B2 OR US-20190079688-A1 OR DE-102016001682-A1 OR CN-105808162-B OR US-11301159-B2 OR CN-105808162-A OR US-20220214836-A1 OR US-20160239207-A1 OR US-20220334772-A1 OR DE-102020124761-A1 OR CN-101571708-B OR CN-113360080-A OR US-20210223954-A1 OR US-11507311-B2).did. | | | | | |
| L23 | 1679297 | ((storage OR memory OR disk OR disc OR volume OR drive OR ssd) SAME (request$4 OR command$4 OR instruction$4 OR requir$7 OR submit$5 OR submission OR writ$4 OR store$2 OR storing OR read$4 OR access$5 OR retriev$5 OR fetch$5) SAME (policy OR rule OR strateg$4 OR algorithm$2 OR parameter OR variable OR requirement$2) SAME (location OR address$4 OR position$4 OR partition$5 OR segment$5 OR sector OR area OR zone OR track OR place OR placement) SAME (content OR data OR dataum OR information OR info OR file OR object) SAME (stor$4 OR sav$4 OR writ$5 OR record$5 OR archiv$4 OR hold$5 OR held OR keep$4 OR kept OR retain$5 OR | (US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB) | OR | ON | ON | 2023/06/11 11:30 AM |

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| | | preserv$5) SAME (check$5 OR consult$5 OR lookup OR look$3 adj3 up OR test$ OR examin$5 OR inspect$5 OR assess$5 OR base OR based OR accord$6)) | | | | | |
| L24 | 309297 | ((storage OR memory OR disk OR disc OR volume OR drive OR ssd) SAME (request$4 OR command$4 OR instruction$4 OR requir$7 OR submit$5 OR submission OR writ$4 OR store$2 OR storing OR read$4 OR access$5 OR retriev$5 OR fetch$5) SAME (policy OR rule OR strateg$4 OR algorithm$2 OR parameter OR variable OR requirement$2) SAME (location OR address$4 OR position$4 OR partition$5 OR segment$5 OR sector OR area OR zone OR track OR place OR placement) SAME (content OR data OR dataum OR information OR info OR file OR object) SAME (stor$4 OR sav$4 OR writ$5 OR record$5 OR archiv$4 OR hold$5 OR held OR keep$4 OR kept OR retain$5 OR preserv$5) SAME (check$5 OR consult$5 OR lookup OR look$3 adj3 up OR test$ OR examin$5 OR inspect$5 OR assess$5 OR base OR based OR accord$6)) | (US-PGPUB; USPAT) | OR | ON | ON | 2023/06/11 11:30 AM |
| L25 | 44517 | ((storage OR memory OR disk OR disc OR volume OR drive OR ssd) SAME (request$4 OR command$4 OR instruction$4 OR requir$7 OR submit$5 | (US-PGPUB; USPAT) | OR | ON | ON | 2023/06/11 11:30 AM |

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| | | OR submission OR writ$4 OR store$2 OR storing OR read$4 OR access$5 OR retriev$5 OR fetch$5) SAME (policy OR rule OR strateg$4 OR algorithm$2 OR parameter OR variable OR requirement$2) SAME (location OR address$4 OR position$4 OR partition$5 OR segment$5 OR sector OR area OR zone OR track OR place OR placement) SAME (content OR data OR dataum OR information OR info OR file OR object) SAME (stor$4 OR sav$4 OR writ$5 OR record$5 OR archiv$4 OR hold$5 OR held OR keep$4 OR kept OR retain$5 OR preserv$5) SAME (check$5 OR consult$5 OR lookup OR look$3 adj3 up OR test$ OR examin$5 OR inspect$5 OR assess$5 OR base OR based OR accord$6)).clm. | | | | | |
| L26 | 1479 | 1 AND 11 | (US-PGPUB; USPAT) | OR | ON | ON | 2023/06/11 11:30 AM |
| L27 | 648172 | ((storage OR memory OR disk OR disc OR volume OR drive OR ssd) SAME (request$4 OR command$4 OR instruction$4 OR requir$7 OR submit$5 OR submission OR writ$4 OR store$2 OR storing OR read$4 OR access$5 OR retriev$5 OR fetch$5) SAME (policy OR rule OR strateg$4 OR algorithm$2 OR parameter OR variable OR requirement$2) SAME (location OR address$4 OR position$4 OR | (US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB) | OR | ON | ON | 2023/06/11 11:30 AM |



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Page 342

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| | | partition$5 OR segment$5 OR sector OR area OR zone OR track OR place OR placement) SAME (content OR data OR dataum OR information OR info OR file OR object) SAME (stor$4 OR sav$4 OR writ$5 OR record$5 OR archiv$4 OR hold$5 OR held OR keep$4 OR kept OR retain$5 OR preserv$5) SAME (check$5 OR consult$5 OR lookup OR look$3 adj3 up OR test$ OR examin$5 OR inspect$5 OR assess$5 OR base OR based OR accord$6) SAME (select$5 OR choos$6 OR pick$5)) | | | | | |
| L28 | 76154 | ((storage OR memory OR disk OR disc OR volume OR drive OR ssd) SAME (request$4 OR command$4 OR instruction$4 OR requir$7 OR submit$5 OR submission OR writ$4 OR store$2 OR storing OR read$4 OR access$5 OR retriev$5 OR fetch$5) SAME (policy OR rule OR strateg$4 OR algorithm$2 OR parameter OR variable OR requirement$2) SAME (location OR address$4 OR position$4 OR partition$5 OR segment$5 OR sector OR area OR zone OR track OR place OR placement) SAME (content OR data OR dataum OR information OR info OR file OR object) SAME (stor$4 OR sav$4 OR writ$5 OR record$5 OR archiv$4 OR hold$5 OR held OR keep$4 OR kept OR retain$5 OR | (US-PGPUB; USPAT) | OR | ON | ON | 2023/06/11 11:30 AM |

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| | | preserv$5) SAME (check$5 OR consult$5 OR lookup OR look$3 adj3 up OR test$ OR examin$5 OR inspect$5 OR assess$5 OR base OR based OR accord$6) SAME (select$5 OR choos$6 OR pick$5)) | | | | | |
| L29 | 12246 | ((storage OR memory OR disk OR disc OR volume OR drive OR ssd) SAME (request$4 OR command$4 OR instruction$4 OR requir$7 OR submit$5 OR submission OR writ$4 OR store$2 OR storing OR read$4 OR access$5 OR retriev$5 OR fetch$5) SAME (policy OR rule OR strateg$4 OR algorithm$2 OR parameter OR variable OR requirement$2) SAME (location OR address$4 OR position$4 OR partition$5 OR segment$5 OR sector OR area OR zone OR track OR place OR placement) SAME (content OR data OR dataum OR information OR info OR file OR object) SAME (stor$4 OR sav$4 OR writ$5 OR record$5 OR archiv$4 OR hold$5 OR held OR keep$4 OR kept OR retain$5 OR preserv$5) SAME (check$5 OR consult$5 OR lookup OR look$3 adj3 up OR test$ OR examin$5 OR inspect$5 OR assess$5 OR base OR based OR accord$6) SAME (select$5 OR choos$6 OR pick$5)).clm. | (US-PGPUB; USPAT) | OR | ON | ON | 2023/06/11 11:30 AM |
| L30 | 355 | 1 AND 15 | (US-PGPUB; USPAT) | OR | ON | ON | 2023/06/11 11:30 AM |
| L31 | 198 | 16 AND @ay<"2017" | (US-PGPUB; USPAT) | OR | ON | ON | 2023/06/11 |



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Page 344

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**PE2E SEARCH - Search History (Interference)**

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| There are no Interference searches to show. |

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

| | |
|---|---|
| In re application of: Joshua Johnson | Confirmation No.: 7982 |
| Application No.: 17/716,275 | Art Unit: 2139 |
| Filed: April 8, 2022 | Examiner: John A. Lane |

For: DATA STORAGE DEVICE WITH CONFIGURABLE POLICY-BASED STORAGE DEVICE BEHAVIOR

Commissioner for Patents
P. O. Box 1450
Alexandria, VA 22313-1450

**AMENDMENT AND REQUEST FOR CONTINUED EXAMINATION (RCE) AND CORRECTED FILING RECEIPT**

This Applicant hereby submits an Amendment and Request for Continued Examination along with a Request for Corrected Filing Receipt; a marked-up Filing Receipt mailed April 13, 2022; a Corrected ADS; and form sb0455 – PETITION TO ACCEPT AN UNINTENTIONALLY DELAYED CLAIM UNDER 35 U.S.C. 119(e) (37 CFR 1.78(c)) AND/OR TO ACCEPT AN UNINTENTIONALLY DELAYED CLAIM UNDER 35 U.S.C. 120, 121, 365(c), or 386(c) (37 CFR 1.78(e)) FOR THE BENEFIT OF A PRIOR-FILED APPLICATION. Applicant respectfully requests the priority information be corrected to list the correct priority information as stated in the application upon filing.

**AMENDMENT**

Please amend the specification as follows. No new matter has been added.

Please replace the first full paragraph on page 1, marked paragraph [0001] (beginning with "In an embodiment, an apparatus comprises …") with the following replacement paragraph:

**[0001]** The present application is a continuation of and claims priority to pending U.S. Application No. 16/990,433, filed August 11, 2020 which is a continuation of and claims priority to U.S. Application No. 15/804,772, filed on November 6, [[2019]] 2017, now U.S. Patent 10,776,023; which claims priority to U.S. Provisional Patent Application Nos. 62/418,510, 62/418,561, 62/418,687, 62/418,693, 62/418,696, 62/418,717, 62/418,724, 62/418,730, 62/418,742, 62/418,759, 62/418,764, 62/418,768, 62/418,773, 62/418,775, 62/418,780, 62/418,785, all filed on November 7, 2016, and to U.S. Provisional Patent Application 62/448,826, filed January 20, 2017, and which are all hereby incorporated by reference in their entirety.

## REMARKS

Upon filing of the application, the ADS failed to identify the parent application filing (16/990,433, filed August 11, 2020). However, the ADS did identify the grandparent application filing (15/804,772, filed November 6, 2017) as well as several provisional applications. However, the grandparent application filing (15/804,772) had previously issued on September 15, 2020 as Patent No. 10,776,023 at the time the current application (17/716,275, filed April 8, 2022) was filed. Therefore, the error was not intentional. The error was not identified at the time of filing.

The priority information should be listed as follows:

The present application is a continuation of and claims priority to pending U.S. Application No. 16/990,433, filed August 11, 2020, now U.S. Patent 11,327,669; which is a continuation of and claims priority to U.S. Application No. 15/804,772, filed on November 6, 2017, now U.S. Patent 10,776,023; which claims priority to U.S. Provisional Patent Application Nos. 62/418,510, 62/418,561, 62/418,687, 62/418,693, 62/418,696, 62/418,717, 62/418,724, 62/418,730, 62/418,742, 62/418,759, 62/418,764, 62/418,768, 62/418,773, 62/418,775, 62/418,780, 62/418,785, all filed on November 7, 2016, and to U.S. Provisional Patent Application 62/448,826, filed January 20, 2017, and which are all hereby incorporated by reference in their entirety.

## CONCLUSION

Applicant submits payment for the RCE ($544) and the Petition fee ($840). Applicant believes that no additional fees are due with respect to this filing. However, should the Office determine that any fees are necessary, the Office is hereby authorized to contact the undersigned for any necessary fees.

Respectfully submitted,

/David J. Setter /
**SIGNATURE OF PRACTITIONER**
David J. Setter, Reg. No. 78758
Setter Roche Smith & Shellenberger LLP
Telephone: (720) 562-2280
E-mail: jack@setterroche.com

**Correspondence address:**

**CUSTOMER NO. 76444**
Setter Roche Smith & Shellenberger LLP
1860 Blake Street
Suite 500
Denver, CO 80202

UNITED STATES PATENT AND TRADEMARK OFFICE
P.O. Box 1450
Alexandria, VA 22313 - 1450
www.uspto.gov

# ELECTRONIC ACKNOWLEDGEMENT RECEIPT

| APPLICATION # | RECEIPT DATE / TIME | ATTORNEY DOCKET # |
|---|---|---|
| **17/716,275** | **09/21/2023 01:49:06 PM ET** | **980.0023C2** |

## Title of Invention

DATA STORAGE DEVICE WITH CONFIGURABLE POLICY-BASED STORAGE DEVICE BEHAVIOR

## Application Information

| | | | |
|---|---|---|---|
| APPLICATION TYPE | Utility - Nonprovisional Application under 35 USC 111(a) | PATENT # | - |
| CONFIRMATION # | 7982 | FILED BY | Melissa Eichten |
| PATENT CENTER # | 62840635 | FILING DATE | 04/08/2022 |
| CUSTOMER # | 76444 | FIRST NAMED INVENTOR | Joshua Johnson |
| CORRESPONDENCE ADDRESS | - | AUTHORIZED BY | David Setter |

## Documents

**TOTAL DOCUMENTS: 7**

| DOCUMENT | | PAGES | DESCRIPTION | SIZE (KB) |
|---|---|---|---|---|
| 980.0023c2 RCE-Request for Corrected FR.pdf | | 4 | - | 102 KB |
| 980.0023c2 RCE-Request for Corrected FR-AMSB.pdf | (1-1) | 1 | Amendment Submitted/Entered with Filing of Continued Prosecution Application (CPA)/Request for Continued Examination(RCE) | 92 KB |
| 980.0023c2 RCE-Request for Corrected FR-SPEC.pdf | (2-2) | 1 | Specification | 91 KB |
| 980.0023c2 RCE-Request for Corrected FR-REM.pdf | (3-4) | 2 | Applicant Arguments/Remarks Made in an Amendment | 93 KB |

| | | | |
|---|---|---|---|
| 980.0023c2 sb0445.pdf | 3 | Petition for review by the Office of Petitions | 312 KB |
| 980.0023c2 RCE.pdf | 3 | Request for Continued Examination (RCE) | 1320 KB |
| 980.0023c2 Marked up Filing Receipt.pdf | 4 | Request for Corrected Filing Receipt | 613 KB |
| 980.0023c2 Corrected ADS.pdf | 6 | Application Data Sheet | 706 KB |

Warning: This is not a USPTO supplied ADS fillable form. Data in the form cannot be automatically loaded to other USPTO systems.

## Digest

| DOCUMENT | MESSAGE DIGEST(SHA-512) |
|---|---|
| 980.0023c2 RCE-Request for Corrected FR.pdf | FF624A6EC748DFA00FBD91799920BB5B6CA50DA89CE295B464FE73941F4A0AAD611EF4179901E2D308E50BEFB4F768F006FBD858B47104EAFEF3D8A1FAEB10BD |
| 980.0023c2 RCE-Request for Corrected FR-AMSB.pdf | 892D62AFF1B0AF2E90D26C2EA27298450109BD8284B2F4E5963C50F51CC7940D12AE5DEEA5F3554166EEB428BE7DBE796C1274DD1383AAB3E4EA9B72B921102E |
| 980.0023c2 RCE-Request for Corrected FR-SPEC.pdf | 5B85C78AD329BED66149AA33C2BD414B1860C7421691427C8695BA9C19DD092C62D76E8AE505DD32F13C505BC26DF1A2649787593098588ABD83F4EB360163E0 |
| 980.0023c2 RCE-Request for Corrected FR-REM.pdf | 50BFD309DF2C2DFC8C321B1B1809DEBB32722BA1F7F8BF431C200F2A3C95991B2D03F931E9A998CA2556E8A00DC7C35FBBDD13509FF7EFD542C33764859B9D71 |
| 980.0023c2 sb0445.pdf | 5398B25F052453188ED6C7CA3C3857D131AABFB0031AABCE72923D03BFC3FB8428683AF24E25692BCC32455E78293221D329CBAC5CC57C50C0CABA3242B27010 |

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| 980.0023c2 RCE.pdf | 577A4C81C3991B5433B6E9CF9A65EB28084C34362087FD57C3BFCD37F265311B88CD2E7543C106BE047E2A1E115A05CCDF9A41BEE7534FBFF20B11D604488FC7 |
| 980.0023c2 Marked up Filing Receipt.pdf | FE862F8A768A6BB32DE0349437BCDBF53B61477E35E3282439D3844BBDE1180042CB2551157827EA8E61AAF023D71B0015075AB616B5811CE3CDFEB4B80F9677 |
| 980.0023c2 Corrected ADS.pdf | D5380309EEB2228E24376B9F72084324558539D84D463CB1A982C10EEFAF5DCBAFCAA79E61AB55CED363A4D1A92898627F7165FB8D7E93BE68B5C7CD28EA926A |

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

**New Applications Under 35 U.S.C. 111**

If a new application is being filed and the application includes the necessary components for filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application

**National Stage of an International Application under 35 U.S.C. 371**

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

**New International Application Filed with the USPTO as a Receiving Office**

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

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# ELECTRONIC PAYMENT RECEIPT

| APPLICATION # | RECEIPT DATE / TIME | ATTORNEY DOCKET # |
|---|---|---|
| **17/716,275** | **09/21/2023 01:49:06 PM ET** | **980.0023C2** |

## Title of Invention

DATA STORAGE DEVICE WITH CONFIGURABLE POLICY-BASED STORAGE DEVICE BEHAVIOR

## Application Information

| | | | |
|---|---|---|---|
| APPLICATION TYPE | Utility - Nonprovisional Application under 35 USC 111(a) | PATENT # | - |
| CONFIRMATION # | 7982 | FILED BY | Melissa Eichten |
| PATENT CENTER # | 62840635 | AUTHORIZED BY | David Setter |
| CUSTOMER # | 76444 | FILING DATE | 04/08/2022 |
| CORRESPONDENCE ADDRESS | - | FIRST NAMED INVENTOR | Joshua Johnson |

## Payment Information

| PAYMENT METHOD | PAYMENT TRANSACTION ID | PAYMENT AUTHORIZED BY |
|---|---|---|
| **CARD / 1006** | **E20239KD49579160** | **Melissa Eichten** |

| FEE CODE | DESCRIPTION | ITEM PRICE($) | QUANTITY | ITEM TOTAL($) |
|---|---|---|---|---|
| 2801 | REQUEST FOR CONTINUED EXAMINATION (RCE) - 1ST REQUEST (SEE 37 CFR 1.114) | 544.00 | 1 | 544.00 |
| 2454 | PETITION FOR THE DELAYED SUBMISSION OF A PRIORITY OR BENEFIT CLAIM, OR TO RESTORE THE RIGHT OF PRIORITY OR BENEFIT | 840.00 | 1 | 840.00 |
| | | | **TOTAL AMOUNT:** | **$1,384.00** |

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described in MPEP 503.

**New Applications Under 35 U.S.C. 111**

If a new application is being filed and the application includes the necessary components for filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application

**National Stage of an International Application under 35 U.S.C. 371**

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

**New International Application Filed with the USPTO as a Receiving Office**

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

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United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NUMBER | FILING or 371(c) DATE | GRP ART UNIT | FIL FEE REC'D | ATTY.DOCKET.NO | TOT CLAIMS | IND CLAIMS |
|---|---|---|---|---|---|---|
| 17/716,275 | 04/08/2022 | 2139 | 2350 | 980.0023C2 | 36 | 6 |

**CONFIRMATION NO. 7982**

**FILING RECEIPT**

76444
Setter Roche LLP
1860 Blake Street
Suite 100
Denver, CO 80202

Date Mailed: 04/13/2022

Receipt is acknowledged of this non-provisional utility patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF FIRST INVENTOR, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection.

**Please verify the accuracy of the data presented on this receipt.** If an error is noted on this Filing Receipt, please submit a written request for a corrected Filing Receipt, including a properly marked-up ADS showing the changes with strike-through for deletions and underlining for additions. If you received a "Notice to File Missing Parts" or other Notice requiring a response for this application, please submit any request for correction to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections provided that the request is grantable.

**Inventor(s)**

Joshua Johnson, Frederick, CO;
Curt Bruner, Niwot, CO;
Jeffrey Reh, Niwot, CO;
Christopher Squires, Boulder, CO;
Brian Wilson, Zumbro Falls, MN;

**Applicant(s)**

Gaea LLC, Niwot, CO;

**Power of Attorney:** The patent practitioners associated with Customer Number 76444

**Domestic Priority data as claimed by applicant** This application is a CON of 16/990,433, 08/11/2020 PAT 11327669
which is ~~This application is~~ a CON of 15/804,772 11/06/2017 PAT 10776023
which claims benefit of 62/418,510 11/07/2016
and claims benefit of 62/418,561 11/07/2016
and claims benefit of 62/418,687 11/07/2016
and claims benefit of 62/418,693 11/07/2016
and claims benefit of 62/418,696 11/07/2016
and claims benefit of 62/418,717 11/07/2016
and claims benefit of 62/418,724 11/07/2016
and claims benefit of 62/418,730 11/07/2016
and claims benefit of 62/418,742 11/07/2016
and claims benefit of 62/418,759 11/07/2016
and claims benefit of 62/418,764 11/07/2016

and claims benefit of 62/418,768 11/07/2016
and claims benefit of 62/418,773 11/07/2016
and claims benefit of 62/418,775 11/07/2016
and claims benefit of 62/418,780 11/07/2016
and claims benefit of 62/418,785 11/07/2016
and claims benefit of 62/448,826 01/20/2017

**Foreign Applications** for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.) - None.
*Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.*

**Permission to Access Application via Priority Document Exchange:** Yes

**Permission to Access Search Results:** Yes

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

**If Required, Foreign Filing License Granted:** 04/12/2022

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 17/716,275**

**Projected Publication Date:** 07/21/2022

**Non-Publication Request:** No

**Early Publication Request:** No
** **SMALL ENTITY** **
**Title**

DATA STORAGE DEVICE WITH CONFIGURABLE POLICY-BASED STORAGE DEVICE BEHAVIOR

**Preliminary Class**

711

**Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications:** No

## PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ

in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

## LICENSE FOR FOREIGN FILING UNDER

## Title 35, United States Code, Section 184

## Title 37, Code of Federal Regulations, 5.11 & 5.15

**GRANTED**

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

**NOT GRANTED**

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

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## *SelectUSA*

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The U.S. offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to promote and facilitate business investment. SelectUSA provides information assistance to the international investor community; serves as an ombudsman for existing and potential investors; advocates on behalf of U.S. cities, states, and regions competing for global investment; and counsels U.S. economic development organizations on investment attraction best practices. To learn more about why the United States is the best country in the world to develop technology, manufacture products, deliver services, and grow your business, visit http://www.SelectUSA.gov or call +1-202-482-6800.

Doc Code: PET.OP
Document Description: Petition for Review by the Office of Petitions

PTO/SB/445 (09-22)
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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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# PETITION TO ACCEPT AN UNINTENTIONALLY DELAYED CLAIM UNDER 35 U.S.C. 119(e) (37 CFR 1.78(c)) AND/OR TO ACCEPT AN UNINTENTIONALLY DELAYED CLAIM UNDER 35 U.S.C. 120, 121, 365(c), or 386(c) (37 CFR 1.78(e)) FOR THE BENEFIT OF A PRIOR-FILED APPLICATION



First named inventor: Joshua Johnson

Application No.: 17/716,275 Art Unit: 2139

Filed: April 8, 2022 Examiner: John A. Lane

Title: DATA STORAGE DEVICE WITH CONFIGURABLE POLICY-BASED STORAGE DEVICE BEHAVIOR

Attention: Office of Petitions
**Mail Stop Petition**
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450
FAX 571-273-8300

When filing via USPTO's patent electronic filing systems, use Doc Code PET.PCT (Petition for review by the PCT Legal Office) for applications filed under 35 U.S.C. 371 and/or if the reference to the prior-filed application(s) includes an international application or an international design application. In all other instances, use Doc Code PET.OP (Petition for review by the Office of Petitions).

NOTE: If information or assistance is needed in completing this form, please contact the Office of Petitions at 571-272-3282.

**APPLICANT HEREBY PETITIONS FOR ACCEPTANCE OF AN UNINTENTIONALLY DELAYED BENEFIT CLAIM TO A PRIOR-FILED APPLICATION UNDER 37 CFR 1.78(c) AND/OR 37 CFR 1.78(e).**

NOTE: For a petition under 37 CFR 1.78(e), the above-identified application must have been filed during the pendency of the prior application or during the pendency of an intermediate application similarly entitled to the benefit of the filing date of the prior application. For a petition under 37 CFR 1.78(c), the above-identified application must have been filed within 12 months of the filing date of the provisional application or be entitled to claim the benefit under 35 U.S.C. 120, 121, or 365(c) of an application that was filed within 12 months of the filing date of the provisional application, except as provided in 37 CFR 1.78(b).

NOTE: A grantable petition requires the following items:

(1) the reference required by 35 U.S.C. 119(e) and 37 CFR 1.78(a)(3) to the prior-filed provisional application and/or the reference required by 35 U.S.C. 120 and 37 CFR 1.78(d)(2) to the prior-filed nonprovisional application, international application designating the United States, or international design application designating the United States, unless previously submitted;
(2) the petition fee set forth in 37 CFR 1.17(m); and
(3) a statement that the entire delay between the date the benefit claim was due under 37 CFR 1.78(d)(3) and/or 37 CFR 1.78(a)(4) and the date the benefit claim was filed was unintentional. The Director may require additional information where there is a question as to whether the delay was unintentional.

**1. The required reference to the prior-filed application:**

☑ The above-identified application was filed on or after September 16, 2012, and the reference is either set forth in the attached corrected application data sheet (ADS) or in a corrected ADS that was previously submitted.

☐ The above-identified application was filed prior to September 16, 2012, and the reference is either (1) set forth in a supplemental ADS, (2) set forth in the attached amendment to the first sentence(s) of the specification, or (3) set forth in a supplemental ADS or amendment to the first sentence(s) of the specification that was previously submitted. See 37 CFR 1.78(h).

**Reminder: Any ADS which corrects or updates the information of record must comply with 37 CFR 1.76(c)(2) (or for applications filed prior to September 16, 2012, pre-AIA 37 CFR 1.76(c)).**

A Federal agency may not conduct or sponsor, and a person is not required to respond to, nor shall a person be subject to a penalty for failure to comply with an information collection subject to the requirements of the Paperwork Reduction Act of 1995, unless the information collection has a currently valid OMB Control Number. The OMB Control Number for this information collection is 0651-0032. Public burden for this form is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the information collection. Send comments regarding this burden estimate or any other aspect of this information collection, including suggestions for reducing this burden to the Chief Administrative Officer, United States Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450 or email InformationCollection@uspto.gov. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

*If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.*

**PETITION TO ACCEPT AN UNINTENTIONALLY DELAYED CLAIM UNDER 35 U.S.C. 119(e) (37 CFR 1.78(c)) AND/OR TO ACCEPT AN UNINTENTIONALLY DELAYED CLAIM UNDER 35 U.S.C. 120, 121, 365(c), or 386(c) (37 CFR 1.78(e)) FOR THE BENEFIT OF A PRIOR-FILED APPLICATION**



**2. Petition fee (37 CFR 1.17(m)):**

☐ Other than a small or micro entity (undiscounted) fee $ _____ (Fee Code 1454).

☑ Small entity fee $ 840.00 (Fee Code 2454). Applicant asserts small entity status. See 37 CFR 1.27.

☐ Micro entity fee $ _____ (Fee Code 3454). Applicant has established or is establishing micro entity status. See 37 CFR 1.29. Form PTO/SB/15A or B or equivalent must either be enclosed or have been submitted previously.

**3. Statement:** The entire delay between the date the benefit claim was due under 37 CFR 1.78(d)(3) and/or 37 CFR 1.78(a)(4) and the date the benefit claim was filed was unintentional.

Petitioner is reminded that a change in circumstance or a delay resulting from a deliberately chosen course of action does not become an "unintentional" delay because, for example:

- the applicant does not consider any patent to be of sufficient value to justify the financial expense of obtaining the patent; or
- the applicant remains interested in eventually obtaining a patent, but simply seeks to defer patent fees and patent prosecution expenses.

NOTE: Where the petition under 37 CFR 1.78(c) and/or 37 CFR 1.78(e) is filed more than two years after the date the priority or benefit claim was due, the United States Patent and Trademark Office requires an additional explanation of the circumstances surrounding the delay that establishes the entire delay was unintentional. This requirement is in addition to the requirement to provide a statement that the entire delay was unintentional. See *Clarification of the Practice for Requiring Additional Information in Petitions Filed in Patent Applications and Patents Based on Unintentional Delay*, 85 FR 12222 (March 2, 2020). See MPEP 711.03(c)(II)(C)-(F) for additional guidance on the information required to establish that the entire delay was unintentional.

☐ Because this petition under 37 CFR 1.78(c) and/or 37 CFR 1.78(e) is being filed more than two years after the date the priority or benefit claim was due, additional explanation of the circumstances surrounding the delay that establishes the entire delay was unintentional is enclosed herewith.

PTO/SB/445 (09-22)
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**PETITION TO ACCEPT AN UNINTENTIONALLY DELAYED CLAIM UNDER 35 U.S.C. 119(e) (37 CFR 1.78(c)) AND/OR TO ACCEPT AN UNINTENTIONALLY DELAYED CLAIM UNDER 35 U.S.C. 120, 121, 365(c), or 386(c) (37 CFR 1.78(e)) FOR THE BENEFIT OF A PRIOR-FILED APPLICATION**



**WARNING:**

Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

/David J. Setter/ — Signature*

2023-09-21 — Date

David J. Setter — Typed or Printed Name

78758 — Registration Number, if applicable

1860 Blake Street, Ste. 500 — Address

720-562-2280 — Telephone Number

Denver, CO 80202 — Address

* This petition must be signed in accordance with 37 CFR 1.33. Please see 37 CFR 1.4(d) for the signature requirements. Submit multiple forms if more than one signature is required.

**Enclosures:**

- [x] Application Data Sheet (see instructions starting on page 4)
- [x] Fee (along with supporting documentation, if required)
- [x] Other: Amendment and RCE; Request for Corrected Filing Receipt; Marked-up Filing Receipt

**CERTIFICATE OF MAILING OR TRANSMISSION [37 CFR 1.8(a)]**

I hereby certify that this correspondence is being:

- [ ] Deposited with the United States Postal Service on the date shown below with sufficient postage as first class mail in an envelope addressed to: Mail Stop Petition, Commissioner for Patents, P. O. Box 1450, Alexandria, VA 22313-1450.
- [x] Transmitted by electronic filing (EFS-Web or Patent Center) or by facsimile on the date shown below to the United States Patent and Trademark Office at 571-273-8300.

2023-09-21 — Date

/Melissa Eichten/ — Signature

Melissa Eichten — Typed or printed name of person signing certificate

Doc code: RCEX
Doc description: Request for Continued Examination (RCE)

PTO/SB/30EFS (02-18)
Approved for use through 11/30/2020. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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# REQUEST FOR CONTINUED EXAMINATION(RCE)TRANSMITTAL
## (Submitted Only via EFS-Web)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Application Number | 17716275 | Filing Date | 2022-04-08 | Docket Number (if applicable) | 980.0023c2 | Art Unit | 2139 |
| First Named Inventor | Joshua Johnson | | | Examiner Name | John A. Lane | | |

**This is a Request for Continued Examination (RCE) under 37 CFR 1.114 of the above-identified application.**
Request for Continued Examination (RCE) practice under 37 CFR 1.114 does not apply to any utility or plant application filed prior to June 8, 1995, or to any design application. The Instruction Sheet for this form is located at WWW.USPTO.GOV

### SUBMISSION REQUIRED UNDER 37 CFR 1.114

Note: If the RCE is proper, any previously filed unentered amendments and amendments enclosed with the RCE will be entered in the order in which they were filed unless applicant instructs otherwise. If applicant does not wish to have any previously filed unentered amendment(s) entered, applicant must request non-entry of such amendment(s).

☑ Previously submitted. If a final Office action is outstanding, any amendments filed after the final Office action may be considered as a submission even if this box is not checked.

☐ Consider the arguments in the Appeal Brief or Reply Brief previously filed on _____

☑ Other Response to Office Action and Terminal Disclaimer filed May 25, 2023

☑ Enclosed

☐ Amendment/Reply

☐ Information Disclosure Statement (IDS)

☐ Affidavit(s)/ Declaration(s)

☑ Other Amendment and RCE; PETITION TO ACCEPT AN UNINTENTIONALLY DELAYED CLAIM; Request for Corrected Filing Receipt; Marked-up Filing Receipt

### MISCELLANEOUS

☐ Suspension of action on the above-identified application is requested under 37 CFR 1.103(c) for a period of months _____
(Period of suspension shall not exceed 3 months; Fee under 37 CFR 1.17(i) required)

☐ Other _____

### FEES

☐ **The RCE fee under 37 CFR 1.17(e) is required by 37 CFR 1.114 when the RCE is filed.**
The Director is hereby authorized to charge any underpayment of fees, or credit any overpayments, to Deposit Account No _____

### SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

☑ Patent Practitioner Signature

☐ Applicant Signature

PTO/SB/30EFS (02-18)
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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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| Signature of Registered U.S. Patent Practitioner | | | |
|---|---|---|---|
| Signature | /David J. Setter/ | Date (YYYY-MM-DD) | 2023-09-21 |
| Name | David J. Setter | Registration Number | 78758 |

This collection of information is required by 37 CFR 1.114. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450.

*If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.*

# Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

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| CORRECTED Application Data Sheet 37 CFR 1.76 | Attorney Docket Number | 980.0023C2 |
|---|---|---|
| | Application Number | 17/716,275 |
| Title of Invention | DATA STORAGE DEVICE WITH CONFIGURABLE POLICY-BASED STORAGE DEVICE BEHAVIOR | |

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.
This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.

## Secrecy Order 37 CFR 5.2:

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

## Inventor Information:

**Inventor 1** Remove

**Legal Name**

| Prefix | Given Name | Middle Name | Family Name | Suffix |
|---|---|---|---|---|
| | Joshua | | Johnson | |

**Residence Information (Select One)** ◉ US Residency ○ Non US Residency ○ Active US Military Service

| City | Frederick | State/Province | CO | Country of Residence | US |
|---|---|---|---|---|---|

**Mailing Address of Inventor:**

| | |
|---|---|
| Address 1 | c/o Gaea LLC |
| Address 2 | 8374 Greenwood Drive |

| City | Niwot | State/Province | CO |
|---|---|---|---|
| Postal Code | 80503 | Country | US |

**Inventor 2** Remove

**Legal Name**

| Prefix | Given Name | Middle Name | Family Name | Suffix |
|---|---|---|---|---|
| | Curt | | Bruner | |

**Residence Information (Select One)** ◉ US Residency ○ Non US Residency ○ Active US Military Service

| City | Niwot | State/Province | CO | Country of Residence | US |
|---|---|---|---|---|---|

**Mailing Address of Inventor:**

| | |
|---|---|
| Address 1 | c/o Gaea LLC |
| Address 2 | 8374 Greenwood Drive |

| City | Niwot | State/Province | CO |
|---|---|---|---|
| Postal Code | 80503 | Country | US |

**Inventor 3** Remove

**Legal Name**

| Prefix | Given Name | Middle Name | Family Name | Suffix |
|---|---|---|---|---|
| | Jeffrey | | Reh | |

**Residence Information (Select One)** ◉ US Residency ○ Non US Residency ○ Active US Military Service

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Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

| Application Data Sheet 37 CFR 1.76 | Attorney Docket Number | 980.0023C2 |
|---|---|---|
| | Application Number | |
| Title of Invention | DATA STORAGE DEVICE WITH CONFIGURABLE POLICY-BASED STORAGE DEVICE BEHAVIOR | |

## Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim information in the Application Data Sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.
When referring to the current application, please leave the "Application Number" field blank.

| Prior Application Status | Patented | | | | Remove |
|---|---|---|---|---|---|
| Application Number | Continuity Type | Prior Application Number | Filing Date (YYYY-MM-DD) | Patent Number | Issue Date (YYYY-MM-DD) |
| | Continuation of | 16990433 | 2020-08-11 | 11327669 | 2022-05-10 |
| Prior Application Status | Patented | | | | Remove |
| Application Number | Continuity Type | Prior Application Number | Filing Date (YYYY-MM-DD) | Patent Number | Issue Date (YYYY-MM-DD) |
| 16990433 | Continuation of | 15804772 | 2017-11-06 | 10776023 | 2020-09-15 |

| Prior Application Status | Expired | | Remove |
|---|---|---|---|
| Application Number | Continuity Type | Prior Application Number | Filing or 371(c) Date (YYYY-MM-DD) |
| 15804772 | Claims benefit of provisional | 62418561 | 2016-11-07 |
| Prior Application Status | Expired | | Remove |
| Application Number | Continuity Type | Prior Application Number | Filing or 371(c) Date (YYYY-MM-DD) |
| 15804772 | Claims benefit of provisional | 62418687 | 2016-11-07 |
| Prior Application Status | Expired | | Remove |
| Application Number | Continuity Type | Prior Application Number | Filing or 371(c) Date (YYYY-MM-DD) |
| 15804772 | Claims benefit of provisional | 62418693 | 2016-11-07 |
| Prior Application Status | Expired | | Remove |
| Application Number | Continuity Type | Prior Application Number | Filing or 371(c) Date (YYYY-MM-DD) |
| 15804772 | Claims benefit of provisional | 62418696 | 2016-11-07 |
| Prior Application Status | Expired | | Remove |
| Application Number | Continuity Type | Prior Application Number | Filing or 371(c) Date (YYYY-MM-DD) |
| 15804772 | Claims benefit of provisional | 62418717 | 2016-11-07 |
| Prior Application Status | Expired | | Remove |
| Application Number | Continuity Type | Prior Application Number | Filing or 371(c) Date (YYYY-MM-DD) |
| 15804772 | Claims benefit of provisional | 62418724 | 2016-11-07 |

| Application Data Sheet 37 CFR 1.76 | Attorney Docket Number | 980.0023C2 |
|---|---|---|
| | Application Number | |
| Title of Invention | DATA STORAGE DEVICE WITH CONFIGURABLE POLICY-BASED STORAGE DEVICE BEHAVIOR | |

| Prior Application Status | Expired | | Remove |
|---|---|---|---|
| Application Number | Continuity Type | Prior Application Number | Filing or 371(c) Date (YYYY-MM-DD) |
| 15804772 | Claims benefit of provisional | 62418730 | 2016-11-07 |
| Prior Application Status | Expired | | Remove |
| Application Number | Continuity Type | Prior Application Number | Filing or 371(c) Date (YYYY-MM-DD) |
| 15804772 | Claims benefit of provisional | 62418742 | 2016-11-07 |
| Prior Application Status | Expired | | Remove |
| Application Number | Continuity Type | Prior Application Number | Filing or 371(c) Date (YYYY-MM-DD) |
| 15804772 | Claims benefit of provisional | 62418759 | 2016-11-07 |
| Prior Application Status | Expired | | Remove |
| Application Number | Continuity Type | Prior Application Number | Filing or 371(c) Date (YYYY-MM-DD) |
| 15804772 | Claims benefit of provisional | 62418764 | 2016-11-07 |
| Prior Application Status | Expired | | Remove |
| Application Number | Continuity Type | Prior Application Number | Filing or 371(c) Date (YYYY-MM-DD) |
| 15804772 | Claims benefit of provisional | 62418768 | 2016-11-07 |
| Prior Application Status | Expired | | Remove |
| Application Number | Continuity Type | Prior Application Number | Filing or 371(c) Date (YYYY-MM-DD) |
| 15804772 | Claims benefit of provisional | 62418773 | 2016-11-07 |
| Prior Application Status | Expired | | Remove |
| Application Number | Continuity Type | Prior Application Number | Filing or 371(c) Date (YYYY-MM-DD) |
| 15804772 | Claims benefit of provisional | 62418775 | 2016-11-07 |
| Prior Application Status | Expired | | Remove |
| Application Number | Continuity Type | Prior Application Number | Filing or 371(c) Date (YYYY-MM-DD) |
| 15804772 | Claims benefit of provisional | 62418780 | 2016-11-07 |
| Prior Application Status | Expired | | Remove |
| Application Number | Continuity Type | Prior Application Number | Filing or 371(c) Date (YYYY-MM-DD) |
| 15804772 | Claims benefit of provisional | 62418785 | 2016-11-07 |

PTO/AIA/14 (02-18)
Approved for use through 11/30/2020. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

| **Application Data Sheet 37 CFR 1.76** | Attorney Docket Number | 980.0023C2 |
|---|---|---|
| | Application Number | |
| Title of Invention | DATA STORAGE DEVICE WITH CONFIGURABLE POLICY-BASED STORAGE DEVICE BEHAVIOR | |

| Prior Application Status | Expired | | Remove |
|---|---|---|---|
| Application Number | Continuity Type | Prior Application Number | Filing or 371(c) Date (YYYY-MM-DD) |
| 15804772 | Claims benefit of provisional | 62418510 | 2016-11-07 |
| Prior Application Status | Expired | | Remove |
| Application Number | Continuity Type | Prior Application Number | Filing or 371(c) Date (YYYY-MM-DD) |
| 15804772 | Claims benefit of provisional | 62448826 | 2017-01-20 |
| Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button. | | | |

## Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)[i] the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

| | | | Remove |
|---|---|---|---|
| Application Number | Country[i] | Filing Date (YYYY-MM-DD) | Access Code[i] (if applicable) |
| | | | |
| Additional Foreign Priority Data may be generated within this form by selecting the **Add** button. | | | |

## Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.
NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

PTO/AIA/14 (02-18)
Approved for use through 11/30/2020. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

| Application Data Sheet 37 CFR 1.76 | Attorney Docket Number | 980.0023C2 |
|---|---|---|
| | Application Number | |
| Title of Invention | DATA STORAGE DEVICE WITH CONFIGURABLE POLICY-BASED STORAGE DEVICE BEHAVIOR | |

**Assignee 1**

Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication. An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.

If the Assignee or Non-Applicant Assignee is an Organization check here. ☒

| Organization Name | |
|---|---|

**Mailing Address Information For Assignee including Non-Applicant Assignee:**

| **Address 1** | | | |
|---|---|---|---|
| Address 2 | | | |
| **City** | | **State/Province** | |
| **Country**[i] | | Postal Code | |
| Phone Number | | Fax Number | |
| Email Address | | | |

Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button.

## Signature:

**NOTE:** This Application Data Sheet must be signed in accordance with 37 CFR 1.33(b). **However, if this Application Data Sheet is submitted with the INITIAL filing of the application and either box A or B is not checked in subsection 2 of the "Authorization or Opt-Out of Authorization to Permit Access" section, then this form must also be signed in accordance with 37 CFR 1.14(c).**

This Application Data Sheet **must** be signed by a patent practitioner if one or more of the applicants is a **juristic entity** (e.g., corporation or association). If the applicant is two or more joint inventors, this form must be signed by a patent practitioner, **all** joint inventors who are the applicant, or one or more joint inventor-applicants who have been given power of attorney (e.g., see USPTO Form PTO/AIA/81) on behalf of **all** joint inventor-applicants.

See 37 CFR 1.4(d) for the manner of making signatures and certifications.

| **Signature** | /David J. Setter/ | | | Date (YYYY-MM-DD) | 2023-09-21 |
|---|---|---|---|---|---|
| First Name | David J. | Last Name | Setter | Registration Number | 78758 |

Additional Signature may be generated within this form by selecting the Add button.

PTO/AIA/14 (02-18)
Approved for use through 11/30/2020. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

| **Application Data Sheet 37 CFR 1.76** | Attorney Docket Number | 980.0023C2 |
|---|---|---|
| | Application Number | |
| Title of Invention | DATA STORAGE DEVICE WITH CONFIGURABLE POLICY-BASED STORAGE DEVICE BEHAVIOR | |

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

# NOTICE OF ALLOWANCE AND FEE(S) DUE

76444 7590 10/13/2023

Setter Roche Smith & Shellenberger LLP
1860 Blake Street
Suite 500
Denver, CO 80202

| EXAMINER | |
|---|---|
| LANE, JOHN A | |
| ART UNIT | PAPER NUMBER |
| 2139 | |

DATE MAILED: 10/13/2023

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 17/716,275 | 04/08/2022 | Joshua Johnson | 980.0023C2 | 7982 |

TITLE OF INVENTION: DATA STORAGE DEVICE WITH CONFIGURABLE POLICY-BASED STORAGE DEVICE BEHAVIOR

| APPLN. TYPE | ENTITY STATUS | ISSUE FEE DUE | PUBLICATION FEE DUE | PREV. PAID ISSUE FEE | TOTAL FEE(S) DUE | DATE DUE |
|---|---|---|---|---|---|---|
| nonprovisional | SMALL | $480 | $0.00 | $0.00 | $480 | 01/16/2024 |

**THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.**

**THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.**

**HOW TO REPLY TO THIS NOTICE:**

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 40% the amount of undiscounted fees, and micro entity fees are 20% the amount of undiscounted fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

**IMPORTANT REMINDER: Maintenance fees are due in utility patents issuing on applications filed on or after Dec. 12, 1980. It is patentee's responsibility to ensure timely payment of maintenance fees when due. More information is available at www.uspto.gov/PatentMaintenanceFees.**



PTOL-85 (Rev. 02/11)

## PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), by mail or fax, or via EFS-Web.

By mail, send to: Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

By fax, send to: (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications. **Because electronic patent issuance may occur shortly after issue fee payment, any desired continuing application should preferably be filed prior to payment of this issue fee in order not to jeopardize copendency.**

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

76444 7590 10/13/2023
Setter Roche Smith & Shellenberger LLP
1860 Blake Street
Suite 500
Denver, CO 80202

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

**Certificate of Mailing or Transmission**

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being transmitted to the USPTO via EFS-Web or by facsimile to (571) 273-2885, on the date below.

| |
|---|
| (Typed or printed name) |
| (Signature) |
| (Date) |

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 17/716,275 | 04/08/2022 | Joshua Johnson | 980.0023C2 | 7982 |

TITLE OF INVENTION: DATA STORAGE DEVICE WITH CONFIGURABLE POLICY-BASED STORAGE DEVICE BEHAVIOR

| APPLN. TYPE | ENTITY STATUS | ISSUE FEE DUE | PUBLICATION FEE DUE | PREV. PAID ISSUE FEE | TOTAL FEE(S) DUE | DATE DUE |
|---|---|---|---|---|---|---|
| nonprovisional | SMALL | $480 | $0.00 | $0.00 | $480 | 01/16/2024 |

| EXAMINER | ART UNIT | CLASS-SUBCLASS |
|---|---|---|
| LANE, JOHN A | 2139 | 711-170000 |

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

❑ Change of correspondence address (or Change of Correspondence Address form PTO/AIA/122 or PTO/SB/122) attached.

❑ "Fee Address" indication (or "Fee Address" Indication form PTO/AIA/47 or PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 _____
2 _____
3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ❑ Corporation or other private group entity ❑ Government

4a. Fees submitted: ❑Issue Fee ❑Publication Fee (if required)

4b. Method of Payment: *(Please first reapply any previously paid fee shown above)*

❑ Electronic Payment via Patent Center or EFS-Web ❑ Enclosed check ❑ Non-electronic payment by credit card (Attach form PTO-2038)

❑ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. _____

5. **Change in Entity Status** (from status indicated above)

❑ Applicant certifying micro entity status. See 37 CFR 1.29

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

❑ Applicant asserting small entity status. See 37 CFR 1.27

NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

❑ Applicant changing to regular undiscounted fee status.

NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____



**Meta Platforms, Inc. and Samsung Electronics Co. Ltd. - Ex. 1002**
**Page 372**

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 17/716,275 | 04/08/2022 | Joshua Johnson | 980.0023C2 | 7982 |

76444 7590 10/13/2023

Setter Roche Smith & Shellenberger LLP
1860 Blake Street
Suite 500
Denver, CO 80202

| EXAMINER | |
|---|---|
| LANE, JOHN A | |
| ART UNIT | PAPER NUMBER |
| 2139 | |

DATE MAILED: 10/13/2023

**Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)**
(Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.



PTOL-85 (Rev. 02/11)

## OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 30 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

## Privacy Act Statement

**The Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

| Notice of Allowability | Application No. 17/716,275 | Applicant(s) Johnson et al. | |
|---|---|---|---|
| | Examiner JOHN A LANE | Art Unit 2139 | AIA (FITF) Status Yes |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--*

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☑ This communication is responsive to the RCE filed 09/21/2023.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

3. ☑ The allowed claim(s) is/are 1-36 . As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see **http://www.uspto.gov/patents/init_events/pph/index.jsp** or send an inquiry to **PPHfeedback@uspto.gov.**

4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   **Certified copies:**

   a) ☐ All  b) ☐ Some*  c) ☐ None of the:

   1. ☐ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____ .

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____ .

   **Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).**

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

**Attachment(s)**

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____.
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material _____.
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date. _____.
5. ☐ Examiner's Amendment/Comment
6. ☐ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

/JOHN A LANE/
Primary Examiner, Art Unit 2139

| Search Notes | Application/Control No. | Applicant(s)/Patent Under Reexamination |
|---|---|---|
| | 17/716,275 | Johnson et al. |
| | Examiner | Art Unit |
| | JOHN A LANE | 2139 |

| CPC - Searched* | | |
|---|---|---|
| Symbol | Date | Examiner |
| g06f3/0632 OR g06f3/0604 OR g06f3/0658 OR g06f3/0673 OR g06f3/0674 OR g06f3/0676 OR g06f3/0679 OR g06f9/06 OR g06f9/3004 OR g06f3/061 | 02/13/2023 | JAL |

| CPC Combination Sets - Searched* | | |
|---|---|---|
| Symbol | Date | Examiner |
| | | |

| US Classification - Searched* | | | |
|---|---|---|---|
| Class | Subclass | Date | Examiner |
| | | | |

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

| Search Notes | | |
|---|---|---|
| Search Notes | Date | Examiner |
| PE2E text search with and w/o limited classification search | 02/13/2023 | JAL |
| STIC search | 02/13/2023 | JAL |
| Multiple past STIC searches from parent applications 15/804,772 and 16/990,433 | 02/13/2023 | JAL |
| Multiple EAST searches | 02/13/2023 | JAL |
| PE2E to date | 06/11/2023 | JAL |
| PE2E to date | 10/04/2023 | JAL |

| Search Notes | Application/Control No. | Applicant(s)/Patent Under Reexamination |
|---|---|---|
| | 17/716,275 | Johnson et al. |
| | Examiner | Art Unit |
| | JOHN A LANE | 2139 |

| Interference Search | | | |
|---|---|---|---|
| US Class/CPC Symbol | US Subclass/CPC Group | Date | Examiner |
| | see above | 02/13/2023 | JAL |



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| Issue Classification | Application/Control No. | Applicant(s)/Patent Under Reexamination |
|---|---|---|
| | 17/716,275 | Johnson et al. |
| | **Examiner** | **Art Unit** |
| | JOHN A LANE | 2139 |

| CPC | | | | | | |
|---|---|---|---|---|---|---|
| **Symbol** | | | | | **Type** | **Version** |
| G06F | / | 3 | / | 0632 | F | 2013-01-01 |
| G06F | / | 3 | / | 0673 | I | 2013-01-01 |
| G06F | / | 3 | / | 0604 | I | 2013-01-01 |
| G06F | / | 3 | / | 0658 | I | 2013-01-01 |
| G06F | / | 3 | / | 068 | I | 2013-01-01 |
| G06F | / | 3 | / | 0665 | I | 2013-01-01 |
| G06F | / | 3 | / | 0659 | I | 2013-01-01 |
| G06F | / | 3 | / | 0674 | I | 2013-01-01 |
| G06F | / | 9 | / | 06 | I | 2013-01-01 |
| G06F | / | 9 | / | 3004 | I | 2013-01-01 |
| G06F | / | 3 | / | 0676 | I | 2013-01-01 |
| G06F | / | 3 | / | 0679 | I | 2013-01-01 |
| G06F | / | 3 | / | 0619 | A | 2013-01-01 |
| G06F | / | 3 | / | 061 | A | 2013-01-01 |

| CPC Combination Sets | | | | | | | |
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| **Symbol** | | | | | **Type** | **Set** | **Ranking** | **Version** |
| | / | | / | | | | | |

| NONE<br>(Assistant Examiner) | (Date) | **Total Claims Allowed:**<br>36 | |
|---|---|---|---|
| /JOHN A LANE/<br>Primary Examiner, Art Unit 2139<br>(Primary Examiner) | 04 October 2023<br>(Date) | O.G. Print Claim(s)<br>1 | O.G. Print Figure<br>11A and 11C |

U.S. Patent and Trademark Office — Part of Paper No.: 20231004



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| Issue Classification | Application/Control No. | Applicant(s)/Patent Under Reexamination |
|---|---|---|
| | 17/716,275 | Johnson et al. |
| | **Examiner** | **Art Unit** |
| | JOHN A LANE | 2139 |

| INTERNATIONAL CLASSIFICATION | | | | | |
|---|---|---|---|---|---|
| **CLAIMED** | | | | | |
| G06F | / | 12 | / | 00 | |

| NON-CLAIMED | | | | |
|---|---|---|---|---|
| | / | | / | |

| US ORIGINAL CLASSIFICATION | |
|---|---|
| **CLASS** | **SUBCLASS** |
| | |

| CROSS REFERENCES(S) | | | | | | |
|---|---|---|---|---|---|---|
| **CLASS** | **SUBCLASS (ONE SUBCLASS PER BLOCK)** | | | | | |
| | | | | | | |

| NONE<br>(Assistant Examiner) | (Date) | **Total Claims Allowed:**<br>36 | |
|---|---|---|---|
| /JOHN A LANE/<br>Primary Examiner, Art Unit 2139<br>(Primary Examiner) | 04 October 2023<br>(Date) | O.G. Print Claim(s)<br>1 | O.G. Print Figure<br>11A and 11C |

| Issue Classification | Application/Control No. | Applicant(s)/Patent Under Reexamination |
|---|---|---|
| | 17/716,275 | Johnson et al. |
| | Examiner | Art Unit |
| | JOHN A LANE | 2139 |

☑ Claims renumbered in the same order as presented by applicant ☐ CPA ☑ T.D. ☐ R.1.47

CLAIMS

| Final | Original | Final | Original | Final | Original | Final | Original | Final | Original | Final | Original | Final | Original | Final | Original |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 10 | 10 | 19 | 19 | 28 | 28 | | | | | | | | |
| 2 | 2 | 11 | 11 | 20 | 20 | 29 | 29 | | | | | | | | |
| 3 | 3 | 12 | 12 | 21 | 21 | 30 | 30 | | | | | | | | |
| 4 | 4 | 13 | 13 | 22 | 22 | 31 | 31 | | | | | | | | |
| 5 | 5 | 14 | 14 | 23 | 23 | 32 | 32 | | | | | | | | |
| 6 | 6 | 15 | 15 | 24 | 24 | 33 | 33 | | | | | | | | |
| 7 | 7 | 16 | 16 | 25 | 25 | 34 | 34 | | | | | | | | |
| 8 | 8 | 17 | 17 | 26 | 26 | 35 | 35 | | | | | | | | |
| 9 | 9 | 18 | 18 | 27 | 27 | 36 | 36 | | | | | | | | |

| NONE | | Total Claims Allowed: | |
|---|---|---|---|
| (Assistant Examiner) | (Date) | 36 | |
| /JOHN A LANE/<br>Primary Examiner, Art Unit 2139 | 04 October 2023 | O.G. Print Claim(s) | O.G. Print Figure |
| (Primary Examiner) | (Date) | 1 | 11A and 11C |

U.S. Patent and Trademark Office Part of Paper No.: 20231004



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## PE2E SEARCH - Search History (Prior Art)

| Ref # | Hits | Search Query | DBs | Default Operator | Plurals | British Equivalents | Time Stamp |
|---|---|---|---|---|---|---|---|
| L1 | 257093 | g06f3/0632 OR g06f3/0604 OR g06f3/0658 OR g06f3/0673 OR g06f3/0674 OR g06f3/0676 OR g06f3/0679 OR g06f9/06 OR g06f9/3004 OR g06f3/061 | (US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB) | OR | ON | ON | 2023/02/12 05:25 PM |
| L2 | 50 | (Artificial Intelligence) Publication Status Unavailable from Similarity Search Text: (US-20220229571-A1 OR US-20210055873-A1 OR US-11327669-B2 OR US-20180129439-A1 OR US-10776023-B2 OR CN-106201339-A OR US-20050190483-A1 OR CN-111833911-B OR DE-102020107166-A1 OR KR-20210001897-A OR US-20200409578-A1 OR CN-112148520-A OR US-10268374-B2 OR US-20200341636-A1 OR WO-2013188095-A2 OR CN-112416241-A OR KR-102351489-B1 OR JP-2021034080-A OR US-8832405-B1 OR US-20180088812-A1 OR US-20210124503-A1 OR US-8090904-B2 OR US-20150227316-A1 OR US-10990304-B2 OR US-20090198884-A1 OR US-10496312-B2 OR US-9933962-B1 OR US-10338833-B1 OR | (US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO)) | OR | ON | ON | 2023/02/12 05:28 PM |



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| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | US-10776010-B1 OR CN-111833911-A OR US-9588687-B1 OR CN-115202590-B OR US-11531492-B2 OR US-8473707-B2 OR US-11169747-B2 OR US-20200393966-A1 OR US-11042298-B2 OR US-20190079688-A1 OR DE-102016001682-A1 OR CN-105808162-B OR US-11301159-B2 OR CN-105808162-A OR US-20220214836-A1 OR US-20160239207-A1 OR US-20220334772-A1 OR DE-102020124761-A1 OR CN-101571708-B OR CN-113360080-A OR US-20210223954-A1 OR US-11507311-B2).did. | | | | | |
| L9 | 1653016 | ((storage OR memory OR disk OR disc OR volume OR drive OR ssd) SAME (request$4 OR command$4 OR instruction$4 OR requir$7 OR submit$5 OR submission OR writ$4 OR store$2 OR storing OR read$4 OR access$5 OR retriev$5 OR fetch$5) SAME (policy OR rule OR strateg$4 OR algorithm$2 OR parameter OR variable OR requirement$2) SAME (location OR address$4 OR position$4 OR partition$5 OR segment$5 OR sector OR area OR zone OR track OR place OR placement) SAME (content OR data OR dataum OR information OR info OR file OR object) SAME (stor$4 OR sav$4 OR writ$5 OR record$5 OR archiv$4 OR hold$5 OR held OR keep$4 OR | (US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB) | OR | ON | ON | 2023/02/13 09:10 AM |

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|---|---|---|---|---|---|---|---|
| | | kept OR retain$5 OR preserv$5) SAME (check$5 OR consult$5 OR lookup OR look$3 adj3 up OR test$ OR examin$5 OR inspect$5 OR assess$5 OR base OR based OR accord$6)) | | | | | |
| L10 | 301685 | ((storage OR memory OR disk OR disc OR volume OR drive OR ssd) SAME (request$4 OR command$4 OR instruction$4 OR requir$7 OR submit$5 OR submission OR writ$4 OR store$2 OR storing OR read$4 OR access$5 OR retriev$5 OR fetch$5) SAME (policy OR rule OR strateg$4 OR algorithm$2 OR parameter OR variable OR requirement$2) SAME (location OR address$4 OR position$4 OR partition$5 OR segment$5 OR sector OR area OR zone OR track OR place OR placement) SAME (content OR data OR dataum OR information OR info OR file OR object) SAME (stor$4 OR sav$4 OR writ$5 OR record$5 OR archiv$4 OR hold$5 OR held OR keep$4 OR kept OR retain$5 OR preserv$5) SAME (check$5 OR consult$5 OR lookup OR look$3 adj3 up OR test$ OR examin$5 OR inspect$5 OR assess$5 OR base OR based OR accord$6)) | (US-PGPUB; USPAT) | OR | ON | ON | 2023/02/13 09:11 AM |
| L11 | 43230 | ((storage OR memory OR disk OR disc OR volume OR drive OR ssd) SAME (request$4 OR command$4 OR instruction$4 OR | (US-PGPUB; USPAT) | OR | ON | ON | 2023/02/13 09:11 AM |

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| | | requir$7 OR submit$5 OR submission OR writ$4 OR store$2 OR storing OR read$4 OR access$5 OR retriev$5 OR fetch$5) SAME (policy OR rule OR strateg$4 OR algorithm$2 OR parameter OR variable OR requirement$2) SAME (location OR address$4 OR position$4 OR partition$5 OR segment$5 OR sector OR area OR zone OR track OR place OR placement) SAME (content OR data OR dataum OR information OR info OR file OR object) SAME (stor$4 OR sav$4 OR writ$5 OR record$5 OR archiv$4 OR hold$5 OR held OR keep$4 OR kept OR retain$5 OR preserv$5) SAME (check$5 OR consult$5 OR lookup OR look$3 adj3 up OR test$ OR examin$5 OR inspect$5 OR assess$5 OR base OR based OR accord$6)).clm. | | | | | |
| L12 | 1414 | 1 AND 11 | (US-PGPUB; USPAT) | OR | ON | ON | 2023/02/13 09:11 AM |
| L13 | 642609 | ((storage OR memory OR disk OR disc OR volume OR drive OR ssd) SAME (request$4 OR command$4 OR instruction$4 OR requir$7 OR submit$5 OR submission OR writ$4 OR store$2 OR storing OR read$4 OR access$5 OR retriev$5 OR fetch$5) SAME (policy OR rule OR strateg$4 OR algorithm$2 OR parameter OR variable OR requirement$2) SAME (location OR address$4 OR | (US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB) | OR | ON | ON | 2023/02/13 09:14 AM |



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| | | position$4 OR partition$5 OR segment$5 OR sector OR area OR zone OR track OR place OR placement) SAME (content OR data OR dataum OR information OR info OR file OR object) SAME (stor$4 OR sav$4 OR writ$5 OR record$5 OR archiv$4 OR hold$5 OR held OR keep$4 OR kept OR retain$5 OR preserv$5) SAME (check$5 OR consult$5 OR lookup OR look$3 adj3 up OR test$ OR examin$5 OR inspect$5 OR assess$5 OR base OR based OR accord$6) SAME (select$5 OR choos$6 OR pick$5)) | | | | | |
| L14 | 74309 | ((storage OR memory OR disk OR disc OR volume OR drive OR ssd) SAME (request$4 OR command$4 OR instruction$4 OR requir$7 OR submit$5 OR submission OR writ$4 OR store$2 OR storing OR read$4 OR access$5 OR retriev$5 OR fetch$5) SAME (policy OR rule OR strateg$4 OR algorithm$2 OR parameter OR variable OR requirement$2) SAME (location OR address$4 OR position$4 OR partition$5 OR segment$5 OR sector OR area OR zone OR track OR place OR placement) SAME (content OR data OR dataum OR information OR info OR file OR object) SAME (stor$4 OR sav$4 OR writ$5 OR record$5 OR archiv$4 OR hold$5 OR held OR keep$4 OR | (US-PGPUB; USPAT) | OR | ON | ON | 2023/02/13 09:14 AM |

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| | | kept OR retain$5 OR preserv$5) SAME (check$5 OR consult$5 OR lookup OR look$3 adj3 up OR test$ OR examin$5 OR inspect$5 OR assess$5 OR base OR based OR accord$6) SAME (select$5 OR choos$6 OR pick$5)) | | | | | |
| L15 | 11928 | ((storage OR memory OR disk OR disc OR volume OR drive OR ssd) SAME (request$4 OR command$4 OR instruction$4 OR requir$7 OR submit$5 OR submission OR writ$4 OR store$2 OR storing OR read$4 OR access$5 OR retriev$5 OR fetch$5) SAME (policy OR rule OR strateg$4 OR algorithm$2 OR parameter OR variable OR requirement$2) SAME (location OR address$4 OR position$4 OR partition$5 OR segment$5 OR sector OR area OR zone OR track OR place OR placement) SAME (content OR data OR dataum OR information OR info OR file OR object) SAME (stor$4 OR sav$4 OR writ$5 OR record$5 OR archiv$4 OR hold$5 OR held OR keep$4 OR kept OR retain$5 OR preserv$5) SAME (check$5 OR consult$5 OR lookup OR look$3 adj3 up OR test$ OR examin$5 OR inspect$5 OR assess$5 OR base OR based OR accord$6) SAME (select$5 OR choos$6 OR pick$5)).clm. | (US-PGPUB; USPAT) | OR | ON | ON | 2023/02/13 09:15 AM |
| L16 | 340 | 1 AND 15 | (US-PGPUB; USPAT) | OR | ON | ON | 2023/02/13 09:15 AM |

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|---|---|---|---|---|---|---|---|
| L17 | 198 | 16 AND @ay<"2017" | (US-PGPUB; USPAT) | OR | ON | ON | 2023/02/13 09:20 AM |
| L21 | 263611 | g06f3/0632 OR g06f3/0604 OR g06f3/0658 OR g06f3/0673 OR g06f3/0674 OR g06f3/0676 OR g06f3/0679 OR g06f9/06 OR g06f9/3004 OR g06f3/061 | (US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB) | OR | ON | ON | 2023/06/11 11:30 AM |
| L22 | 50 | (Artificial Intelligence) Similar to: 17/716,275 with 0 CPC Selections and 0 Text Selections<br>Text: (US-20220229571-A1 OR US-20210055873-A1 OR US-11327669-B2 OR US-20180129439-A1 OR US-10776023-B2 OR CN-106201339-A OR US-20050190483-A1 OR CN-111833911-B OR DE-102020107166-A1 OR KR-20210001897-A OR US-20200409578-A1 OR CN-112148520-A OR US-10268374-B2 OR US-20200341636-A1 OR WO-2013188095-A2 OR CN-112416241-A OR KR-102351489-B1 OR JP-2021034080-A OR US-8832405-B1 OR US-20180088812-A1 OR US-20210124503-A1 OR US-8090904-B2 OR US-20150227316-A1 OR US-10990304-B2 OR US-20090198884-A1 OR US-10496312-B2 OR US-9933962-B1 OR US-10338833-B1 OR US-10776010-B1 OR | (US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO)) | OR | ON | ON | 2023/06/11 11:30 AM |

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|---|---|---|---|---|---|---|---|
| | | CN-111833911-A OR US-9588687-B1 OR CN-115202590-B OR US-11531492-B2 OR US-8473707-B2 OR US-11169747-B2 OR US-20200393966-A1 OR US-11042298-B2 OR US-20190079688-A1 OR DE-102016001682-A1 OR CN-105808162-B OR US-11301159-B2 OR CN-105808162-A OR US-20220214836-A1 OR US-20160239207-A1 OR US-20220334772-A1 OR DE-102020124761-A1 OR CN-101571708-B OR CN-113360080-A OR US-20210223954-A1 OR US-11507311-B2).did. | | | | | |
| L23 | 1679297 | ((storage OR memory OR disk OR disc OR volume OR drive OR ssd) SAME (request$4 OR command$4 OR instruction$4 OR requir$7 OR submit$5 OR submission OR writ$4 OR store$2 OR storing OR read$4 OR access$5 OR retriev$5 OR fetch$5) SAME (policy OR rule OR strateg$4 OR algorithm$2 OR parameter OR variable OR requirement$2) SAME (location OR address$4 OR position$4 OR partition$5 OR segment$5 OR sector OR area OR zone OR track OR place OR placement) SAME (content OR data OR dataum OR information OR info OR file OR object) SAME (stor$4 OR sav$4 OR writ$5 OR record$5 OR archiv$4 OR hold$5 OR held OR keep$4 OR kept OR retain$5 OR | (US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB) | OR | ON | ON | 2023/06/11 11:30 AM |

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| | | preserv$5) SAME (check$5 OR consult$5 OR lookup OR look$3 adj3 up OR test$ OR examin$5 OR inspect$5 OR assess$5 OR base OR based OR accord$6)) | | | | | |
| L24 | 309297 | ((storage OR memory OR disk OR disc OR volume OR drive OR ssd) SAME (request$4 OR command$4 OR instruction$4 OR requir$7 OR submit$5 OR submission OR writ$4 OR store$2 OR storing OR read$4 OR access$5 OR retriev$5 OR fetch$5) SAME (policy OR rule OR strateg$4 OR algorithm$2 OR parameter OR variable OR requirement$2) SAME (location OR address$4 OR position$4 OR partition$5 OR segment$5 OR sector OR area OR zone OR track OR place OR placement) SAME (content OR data OR dataum OR information OR info OR file OR object) SAME (stor$4 OR sav$4 OR writ$5 OR record$5 OR archiv$4 OR hold$5 OR held OR keep$4 OR kept OR retain$5 OR preserv$5) SAME (check$5 OR consult$5 OR lookup OR look$3 adj3 up OR test$ OR examin$5 OR inspect$5 OR assess$5 OR base OR based OR accord$6)) | (US-PGPUB; USPAT) | OR | ON | ON | 2023/06/11 11:30 AM |
| L25 | 44517 | ((storage OR memory OR disk OR disc OR volume OR drive OR ssd) SAME (request$4 OR command$4 OR instruction$4 OR requir$7 OR submit$5 | (US-PGPUB; USPAT) | OR | ON | ON | 2023/06/11 11:30 AM |

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| | | OR submission OR writ$4 OR store$2 OR storing OR read$4 OR access$5 OR retriev$5 OR fetch$5) SAME (policy OR rule OR strateg$4 OR algorithm$2 OR parameter OR variable OR requirement$2) SAME (location OR address$4 OR position$4 OR partition$5 OR segment$5 OR sector OR area OR zone OR track OR place OR placement) SAME (content OR data OR dataum OR information OR info OR file OR object) SAME (stor$4 OR sav$4 OR writ$5 OR record$5 OR archiv$4 OR hold$5 OR held OR keep$4 OR kept OR retain$5 OR preserv$5) SAME (check$5 OR consult$5 OR lookup OR look$3 adj3 up OR test$ OR examin$5 OR inspect$5 OR assess$5 OR base OR based OR accord$6)).clm. | | | | | |
| L26 | 1479 | 1 AND 11 | (US-PGPUB; USPAT) | OR | ON | ON | 2023/06/11 11:30 AM |
| L27 | 648172 | ((storage OR memory OR disk OR disc OR volume OR drive OR ssd) SAME (request$4 OR command$4 OR instruction$4 OR requir$7 OR submit$5 OR submission OR writ$4 OR store$2 OR storing OR read$4 OR access$5 OR retriev$5 OR fetch$5) SAME (policy OR rule OR strateg$4 OR algorithm$2 OR parameter OR variable OR requirement$2) SAME (location OR address$4 OR position$4 OR | (US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB) | OR | ON | ON | 2023/06/11 11:30 AM |

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|---|---|---|---|---|---|---|---|
| | | partition$5 OR segment$5 OR sector OR area OR zone OR track OR place OR placement) SAME (content OR data OR dataum OR information OR info OR file OR object) SAME (stor$4 OR sav$4 OR writ$5 OR record$5 OR archiv$4 OR hold$5 OR held OR keep$4 OR kept OR retain$5 OR preserv$5) SAME (check$5 OR consult$5 OR lookup OR look$3 adj3 up OR test$ OR examin$5 OR inspect$5 OR assess$5 OR base OR based OR accord$6) SAME (select$5 OR choos$6 OR pick$5)) | | | | | |
| L28 | 76154 | ((storage OR memory OR disk OR disc OR volume OR drive OR ssd) SAME (request$4 OR command$4 OR instruction$4 OR requir$7 OR submit$5 OR submission OR writ$4 OR store$2 OR storing OR read$4 OR access$5 OR retriev$5 OR fetch$5) SAME (policy OR rule OR strateg$4 OR algorithm$2 OR parameter OR variable OR requirement$2) SAME (location OR address$4 OR position$4 OR partition$5 OR segment$5 OR sector OR area OR zone OR track OR place OR placement) SAME (content OR data OR dataum OR information OR info OR file OR object) SAME (stor$4 OR sav$4 OR writ$5 OR record$5 OR archiv$4 OR hold$5 OR held OR keep$4 OR kept OR retain$5 OR | (US-PGPUB; USPAT) | OR | ON | ON | 2023/06/11 11:30 AM |

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|---|---|---|---|---|---|---|---|
| | | preserv$5) SAME (check$5 OR consult$5 OR lookup OR look$3 adj3 up OR test$ OR examin$5 OR inspect$5 OR assess$5 OR base OR based OR accord$6) SAME (select$5 OR choos$6 OR pick$5)) | | | | | |
| L29 | 12246 | ((storage OR memory OR disk OR disc OR volume OR drive OR ssd) SAME (request$4 OR command$4 OR instruction$4 OR requir$7 OR submit$5 OR submission OR writ$4 OR store$2 OR storing OR read$4 OR access$5 OR retriev$5 OR fetch$5) SAME (policy OR rule OR strateg$4 OR algorithm$2 OR parameter OR variable OR requirement$2) SAME (location OR address$4 OR position$4 OR partition$5 OR segment$5 OR sector OR area OR zone OR track OR place OR placement) SAME (content OR data OR dataum OR information OR info OR file OR object) SAME (stor$4 OR sav$4 OR writ$5 OR record$5 OR archiv$4 OR hold$5 OR held OR keep$4 OR kept OR retain$5 OR preserv$5) SAME (check$5 OR consult$5 OR lookup OR look$3 adj3 up OR test$ OR examin$5 OR inspect$5 OR assess$5 OR base OR based OR accord$6) SAME (select$5 OR choos$6 OR pick$5)).clm. | (US-PGPUB; USPAT) | OR | ON | ON | 2023/06/11 11:30 AM |
| L30 | 355 | 1 AND 15 | (US-PGPUB; USPAT) | OR | ON | ON | 2023/06/11 11:30 AM |
| L31 | 198 | 16 AND @ay<"2017" | (US-PGPUB; USPAT) | OR | ON | ON | 2023/06/11 |

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|---|---|---|---|---|---|---|---|
| | | | | | | | 11:30 AM |
| L32 | 268860 | g06f3/0632 OR g06f3/0604 OR g06f3/0658 OR g06f3/0673 OR g06f3/0674 OR g06f3/0676 OR g06f3/0679 OR g06f9/06 OR g06f9/3004 OR g06f3/061 | (US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB) | OR | ON | ON | 2023/10/04 04:38 PM |
| L33 | 50 | (Artificial Intelligence) Similar to: 17/716,275 with 0 CPC Selections and 0 Text Selections<br>Text: (US-20220229571-A1 OR US-20210055873-A1 OR US-11327669-B2 OR US-20180129439-A1 OR US-10776023-B2 OR CN-106201339-A OR US-20050190483-A1 OR CN-111833911-B OR DE-102020107166-A1 OR KR-20210001897-A OR US-20200409578-A1 OR CN-112148520-A OR US-10268374-B2 OR US-20200341636-A1 OR WO-2013188095-A2 OR CN-112416241-A OR KR-102351489-B1 OR JP-2021034080-A OR US-8832405-B1 OR US-20180088812-A1 OR US-20210124503-A1 OR US-8090904-B2 OR US-20150227316-A1 OR US-10990304-B2 OR US-20090198884-A1 OR US-10496312-B2 OR US-9933962-B1 OR US-10338833-B1 OR US-10776010-B1 OR CN-111833911-A OR | (US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO)) | OR | ON | ON | 2023/10/04 04:38 PM |



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|---|---|---|---|---|---|---|---|
| | | US-9588687-B1 OR CN-115202590-B OR US-11531492-B2 OR US-8473707-B2 OR US-11169747-B2 OR US-20200393966-A1 OR US-11042298-B2 OR US-20190079688-A1 OR DE-102016001682-A1 OR CN-105808162-B OR US-11301159-B2 OR CN-105808162-A OR US-20220214836-A1 OR US-20160239207-A1 OR US-20220334772-A1 OR DE-102020124761-A1 OR CN-101571708-B OR CN-113360080-A OR US-20210223954-A1 OR US-11507311-B2).did. | | | | | |
| L34 | 1707817 | ((storage OR memory OR disk OR disc OR volume OR drive OR ssd) SAME (request$4 OR command$4 OR instruction$4 OR requir$7 OR submit$5 OR submission OR writ$4 OR store$2 OR storing OR read$4 OR access$5 OR retriev$5 OR fetch$5) SAME (policy OR rule OR strateg$4 OR algorithm$2 OR parameter OR variable OR requirement$2) SAME (location OR address$4 OR position$4 OR partition$5 OR segment$5 OR sector OR area OR zone OR track OR place OR placement) SAME (content OR data OR dataum OR information OR info OR file OR object) SAME (stor$4 OR sav$4 OR writ$5 OR record$5 OR archiv$4 OR hold$5 OR held OR keep$4 OR kept OR retain$5 OR preserv$5) SAME | (US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB) | OR | ON | ON | 2023/10/04 04:38 PM |

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|---|---|---|---|---|---|---|---|
| | | (check$5 OR consult$5 OR lookup OR look$3 adj3 up OR test$ OR examin$5 OR inspect$5 OR assess$5 OR base OR based OR accord$6)) | | | | | |
| L35 | 317110 | ((storage OR memory OR disk OR disc OR volume OR drive OR ssd) SAME (request$4 OR command$4 OR instruction$4 OR requir$7 OR submit$5 OR submission OR writ$4 OR store$2 OR storing OR read$4 OR access$5 OR retriev$5 OR fetch$5) SAME (policy OR rule OR strateg$4 OR algorithm$2 OR parameter OR variable OR requirement$2) SAME (location OR address$4 OR position$4 OR partition$5 OR segment$5 OR sector OR area OR zone OR track OR place OR placement) SAME (content OR data OR dataum OR information OR info OR file OR object) SAME (stor$4 OR sav$4 OR writ$5 OR record$5 OR archiv$4 OR hold$5 OR held OR keep$4 OR kept OR retain$5 OR preserv$5) SAME (check$5 OR consult$5 OR lookup OR look$3 adj3 up OR test$ OR examin$5 OR inspect$5 OR assess$5 OR base OR based OR accord$6)) | (US-PGPUB; USPAT) | OR | ON | ON | 2023/10/04 04:38 PM |
| L36 | 45847 | ((storage OR memory OR disk OR disc OR volume OR drive OR ssd) SAME (request$4 OR command$4 OR instruction$4 OR requir$7 OR submit$5 OR submission OR | (US-PGPUB; USPAT) | OR | ON | ON | 2023/10/04 04:38 PM |

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|---|---|---|---|---|---|---|---|
| | | writ$4 OR store$2 OR storing OR read$4 OR access$5 OR retriev$5 OR fetch$5) SAME (policy OR rule OR strateg$4 OR algorithm$2 OR parameter OR variable OR requirement$2) SAME (location OR address$4 OR position$4 OR partition$5 OR segment$5 OR sector OR area OR zone OR track OR place OR placement) SAME (content OR data OR dataum OR information OR info OR file OR object) SAME (stor$4 OR sav$4 OR writ$5 OR record$5 OR archiv$4 OR hold$5 OR held OR keep$4 OR kept OR retain$5 OR preserv$5) SAME (check$5 OR consult$5 OR lookup OR look$3 adj3 up OR test$ OR examin$5 OR inspect$5 OR assess$5 OR base OR based OR accord$6)).clm. | | | | | |
| L37 | 1532 | 1 AND 11 | (US-PGPUB; USPAT) | OR | ON | ON | 2023/10/04 04:38 PM |
| L38 | 655881 | ((storage OR memory OR disk OR disc OR volume OR drive OR ssd) SAME (request$4 OR command$4 OR instruction$4 OR requir$7 OR submit$5 OR submission OR writ$4 OR store$2 OR storing OR read$4 OR access$5 OR retriev$5 OR fetch$5) SAME (policy OR rule OR strateg$4 OR algorithm$2 OR parameter OR variable OR requirement$2) SAME (location OR address$4 OR position$4 OR partition$5 OR | (US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB) | OR | ON | ON | 2023/10/04 04:38 PM |

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| | | segment$5 OR sector OR area OR zone OR track OR place OR placement) SAME (content OR data OR dataum OR information OR info OR file OR object) SAME (stor$4 OR sav$4 OR writ$5 OR record$5 OR archiv$4 OR hold$5 OR held OR keep$4 OR kept OR retain$5 OR preserv$5) SAME (check$5 OR consult$5 OR lookup OR look$3 adj3 up OR test$ OR examin$5 OR inspect$5 OR assess$5 OR base OR based OR accord$6) SAME (select$5 OR choos$6 OR pick$5)) | | | | | |
| L39 | 78098 | ((storage OR memory OR disk OR disc OR volume OR drive OR ssd) SAME (request$4 OR command$4 OR instruction$4 OR requir$7 OR submit$5 OR submission OR writ$4 OR store$2 OR storing OR read$4 OR access$5 OR retriev$5 OR fetch$5) SAME (policy OR rule OR strateg$4 OR algorithm$2 OR parameter OR variable OR requirement$2) SAME (location OR address$4 OR position$4 OR partition$5 OR segment$5 OR sector OR area OR zone OR track OR place OR placement) SAME (content OR data OR dataum OR information OR info OR file OR object) SAME (stor$4 OR sav$4 OR writ$5 OR record$5 OR archiv$4 OR hold$5 OR held OR keep$4 OR kept OR retain$5 OR preserv$5) SAME | (US-PGPUB; USPAT) | OR | ON | ON | 2023/10/04 04:38 PM |



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|---|---|---|---|---|---|---|---|
| | | (check$5 OR consult$5 OR lookup OR look$3 adj3 up OR test$ OR examin$5 OR inspect$5 OR assess$5 OR base OR based OR accord$6) SAME (select$5 OR choos$6 OR pick$5)) | | | | | |
| L40 | 12554 | ((storage OR memory OR disk OR disc OR volume OR drive OR ssd) SAME (request$4 OR command$4 OR instruction$4 OR requir$7 OR submit$5 OR submission OR writ$4 OR store$2 OR storing OR read$4 OR access$5 OR retriev$5 OR fetch$5) SAME (policy OR rule OR strateg$4 OR algorithm$2 OR parameter OR variable OR requirement$2) SAME (location OR address$4 OR position$4 OR partition$5 OR segment$5 OR sector OR area OR zone OR track OR place OR placement) SAME (content OR data OR dataum OR information OR info OR file OR object) SAME (stor$4 OR sav$4 OR writ$5 OR record$5 OR archiv$4 OR hold$5 OR held OR keep$4 OR kept OR retain$5 OR preserv$5) SAME (check$5 OR consult$5 OR lookup OR look$3 adj3 up OR test$ OR examin$5 OR inspect$5 OR assess$5 OR base OR based OR accord$6) SAME (select$5 OR choos$6 OR pick$5)).clm. | (US-PGPUB; USPAT) | OR | ON | ON | 2023/10/04 04:38 PM |
| L41 | 365 | 1 AND 15 | (US-PGPUB; USPAT) | OR | ON | ON | 2023/10/04 04:38 PM |
| L42 | 199 | 16 AND @ay<"2017" | (US-PGPUB; USPAT) | OR | ON | ON | 2023/10/04 04:38 PM |

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|---|---|---|---|---|---|---|---|
| L43 | 268860 | g06f3/0632 OR g06f3/0604 OR g06f3/0658 OR g06f3/0673 OR g06f3/0674 OR g06f3/0676 OR g06f3/0679 OR g06f9/06 OR g06f9/3004 OR g06f3/061 | (US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB) | OR | ON | ON | 2023/10/04 04:38 PM |
| L44 | 50 | (Artificial Intelligence) Similar to: 17/716,275 with 0 CPC Selections and 0 Text Selections<br>Text: (US-20220229571-A1 OR US-20210055873-A1 OR US-11327669-B2 OR US-20180129439-A1 OR US-10776023-B2 OR CN-106201339-A OR US-20050190483-A1 OR CN-111833911-B OR DE-102020107166-A1 OR KR-20210001897-A OR US-20200409578-A1 OR CN-112148520-A OR US-10268374-B2 OR US-20200341636-A1 OR WO-2013188095-A2 OR CN-112416241-A OR KR-102351489-B1 OR JP-2021034080-A OR US-8832405-B1 OR US-20180088812-A1 OR US-20210124503-A1 OR US-8090904-B2 OR US-20150227316-A1 OR US-10990304-B2 OR US-20090198884-A1 OR US-10496312-B2 OR US-9933962-B1 OR US-10338833-B1 OR US-10776010-B1 OR CN-111833911-A OR US-9588687-B1 OR | (US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO)) | OR | ON | ON | 2023/10/04 04:38 PM |

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|---|---|---|---|---|---|---|---|
| | | CN-115202590-B OR US-11531492-B2 OR US-8473707-B2 OR US-11169747-B2 OR US-20200393966-A1 OR US-11042298-B2 OR US-20190079688-A1 OR DE-102016001682-A1 OR CN-105808162-B OR US-11301159-B2 OR CN-105808162-A OR US-20220214836-A1 OR US-20160239207-A1 OR US-20220334772-A1 OR DE-102020124761-A1 OR CN-101571708-B OR CN-113360080-A OR US-20210223954-A1 OR US-11507311-B2).did. | | | | | |
| L45 | 1707817 | ((storage OR memory OR disk OR disc OR volume OR drive OR ssd) SAME (request$4 OR command$4 OR instruction$4 OR requir$7 OR submit$5 OR submission OR writ$4 OR store$2 OR storing OR read$4 OR access$5 OR retriev$5 OR fetch$5) SAME (policy OR rule OR strateg$4 OR algorithm$2 OR parameter OR variable OR requirement$2) SAME (location OR address$4 OR position$4 OR partition$5 OR segment$5 OR sector OR area OR zone OR track OR place OR placement) SAME (content OR data OR dataum OR information OR info OR file OR object) SAME (stor$4 OR sav$4 OR writ$5 OR record$5 OR archiv$4 OR hold$5 OR held OR keep$4 OR kept OR retain$5 OR preserv$5) SAME (check$5 OR consult$5 | (US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB) | OR | ON | ON | 2023/10/04 04:38 PM |

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| | | OR lookup OR look$3 adj3 up OR test$ OR examin$5 OR inspect$5 OR assess$5 OR base OR based OR accord$6)) | | | | | |
| L46 | 317110 | ((storage OR memory OR disk OR disc OR volume OR drive OR ssd) SAME (request$4 OR command$4 OR instruction$4 OR requir$7 OR submit$5 OR submission OR writ$4 OR store$2 OR storing OR read$4 OR access$5 OR retriev$5 OR fetch$5) SAME (policy OR rule OR strateg$4 OR algorithm$2 OR parameter OR variable OR requirement$2) SAME (location OR address$4 OR position$4 OR partition$5 OR segment$5 OR sector OR area OR zone OR track OR place OR placement) SAME (content OR data OR dataum OR information OR info OR file OR object) SAME (stor$4 OR sav$4 OR writ$5 OR record$5 OR archiv$4 OR hold$5 OR held OR keep$4 OR kept OR retain$5 OR preserv$5) SAME (check$5 OR consult$5 OR lookup OR look$3 adj3 up OR test$ OR examin$5 OR inspect$5 OR assess$5 OR base OR based OR accord$6)) | (US-PGPUB; USPAT) | OR | ON | ON | 2023/10/04 04:38 PM |
| L47 | 45847 | ((storage OR memory OR disk OR disc OR volume OR drive OR ssd) SAME (request$4 OR command$4 OR instruction$4 OR requir$7 OR submit$5 OR submission OR writ$4 OR store$2 OR | (US-PGPUB; USPAT) | OR | ON | ON | 2023/10/04 04:38 PM |

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|---|---|---|---|---|---|---|---|
| | | storing OR read$4 OR access$5 OR retriev$5 OR fetch$5) SAME (policy OR rule OR strateg$4 OR algorithm$2 OR parameter OR variable OR requirement$2) SAME (location OR address$4 OR position$4 OR partition$5 OR segment$5 OR sector OR area OR zone OR track OR place OR placement) SAME (content OR data OR dataum OR information OR info OR file OR object) SAME (stor$4 OR sav$4 OR writ$5 OR record$5 OR archiv$4 OR hold$5 OR held OR keep$4 OR kept OR retain$5 OR preserv$5) SAME (check$5 OR consult$5 OR lookup OR look$3 adj3 up OR test$ OR examin$5 OR inspect$5 OR assess$5 OR base OR based OR accord$6)).clm. | | | | | |
| L48 | 1532 | 1 AND 11 | (US-PGPUB; USPAT) | OR | ON | ON | 2023/10/04 04:38 PM |
| L49 | 655881 | ((storage OR memory OR disk OR disc OR volume OR drive OR ssd) SAME (request$4 OR command$4 OR instruction$4 OR requir$7 OR submit$5 OR submission OR writ$4 OR store$2 OR storing OR read$4 OR access$5 OR retriev$5 OR fetch$5) SAME (policy OR rule OR strateg$4 OR algorithm$2 OR parameter OR variable OR requirement$2) SAME (location OR address$4 OR position$4 OR partition$5 OR segment$5 OR sector | (US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB) | OR | ON | ON | 2023/10/04 04:38 PM |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | OR area OR zone OR track OR place OR placement) SAME (content OR data OR dataum OR information OR info OR file OR object) SAME (stor$4 OR sav$4 OR writ$5 OR record$5 OR archiv$4 OR hold$5 OR held OR keep$4 OR kept OR retain$5 OR preserv$5) SAME (check$5 OR consult$5 OR lookup OR look$3 adj3 up OR test$ OR examin$5 OR inspect$5 OR assess$5 OR base OR based OR accord$6) SAME (select$5 OR choos$6 OR pick$5)) | | | | | |
| L50 | 78098 | ((storage OR memory OR disk OR disc OR volume OR drive OR ssd) SAME (request$4 OR command$4 OR instruction$4 OR requir$7 OR submit$5 OR submission OR writ$4 OR store$2 OR storing OR read$4 OR access$5 OR retriev$5 OR fetch$5) SAME (policy OR rule OR strateg$4 OR algorithm$2 OR parameter OR variable OR requirement$2) SAME (location OR address$4 OR position$4 OR partition$5 OR segment$5 OR sector OR area OR zone OR track OR place OR placement) SAME (content OR data OR dataum OR information OR info OR file OR object) SAME (stor$4 OR sav$4 OR writ$5 OR record$5 OR archiv$4 OR hold$5 OR held OR keep$4 OR kept OR retain$5 OR preserv$5) SAME (check$5 OR consult$5 | (US-PGPUB; USPAT) | OR | ON | ON | 2023/10/04 04:38 PM |

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|---|---|---|---|---|---|---|---|
| | | OR lookup OR look$3 adj3 up OR test$ OR examin$5 OR inspect$5 OR assess$5 OR base OR based OR accord$6) SAME (select$5 OR choos$6 OR pick$5)) | | | | | |
| L51 | 12554 | ((storage OR memory OR disk OR disc OR volume OR drive OR ssd) SAME (request$4 OR command$4 OR instruction$4 OR requir$7 OR submit$5 OR submission OR writ$4 OR store$2 OR storing OR read$4 OR access$5 OR retriev$5 OR fetch$5) SAME (policy OR rule OR strateg$4 OR algorithm$2 OR parameter OR variable OR requirement$2) SAME (location OR address$4 OR position$4 OR partition$5 OR segment$5 OR sector OR area OR zone OR track OR place OR placement) SAME (content OR data OR dataum OR information OR info OR file OR object) SAME (stor$4 OR sav$4 OR writ$5 OR record$5 OR archiv$4 OR hold$5 OR held OR keep$4 OR kept OR retain$5 OR preserv$5) SAME (check$5 OR consult$5 OR lookup OR look$3 adj3 up OR test$ OR examin$5 OR inspect$5 OR assess$5 OR base OR based OR accord$6) SAME (select$5 OR choos$6 OR pick$5)).clm. | (US-PGPUB; USPAT) | OR | ON | ON | 2023/10/04 04:38 PM |
| L52 | 365 | 1 AND 15 | (US-PGPUB; USPAT) | OR | ON | ON | 2023/10/04 04:38 PM |
| L53 | 199 | 16 AND @ay<"2017" | (US-PGPUB; USPAT) | OR | ON | ON | 2023/10/04 04:38 PM |

## PE2E SEARCH - Search History (Interference)

There are no Interference searches to show.



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# Bibliographic Data

Application No: 17/716,275

Foreign Priority claimed: ○ Yes ◉ No

35 USC 119 (a-d) conditions met: ☐ Yes ☑ No ☐ Met After Allowance

Verified and Acknowledged: /JOHN A LANE/ (Examiner's Signature) (Initials)

Title: DATA STORAGE DEVICE WITH CONFIGURABLE POLICY-BASED STORAGE DEVICE BEHAVIOR

| FILING or 371(c) DATE | CLASS | GROUP ART UNIT | ATTORNEY DOCKET NO. |
|---|---|---|---|
| 04/08/2022 | 711 | 2139 | 980.0023C2 |
| RULE | | | |

**APPLICANTS**

Gaea LLC, Niwot, CO,

**INVENTORS**

Joshua Johnson, Frederick, CO, UNITED STATES

Curt Bruner, Niwot, CO, UNITED STATES

Jeffrey Reh, Niwot, CO, UNITED STATES

Christopher Squires, Boulder, CO, UNITED STATES

Brian Wilson, Zumbro Falls, MN, UNITED STATES

**CONTINUING DATA**

This application is a CON of 15804772 11/06/2017 PAT 10776023

15804772 has PRO of 62448826 01/20/2017

15804772 has PRO of 62418742 11/07/2016

15804772 has PRO of 62418785 11/07/2016

15804772 has PRO of 62418687 11/07/2016

15804772 has PRO of 62418775 11/07/2016

15804772 has PRO of 62418764 11/07/2016

15804772 has PRO of 62418780 11/07/2016

15804772 has PRO of 62418510 11/07/2016

15804772 has PRO of 62418696 11/07/2016

15804772 has PRO of 62418759 11/07/2016

15804772 has PRO of 62418773 11/07/2016

15804772 has PRO of 62418730 11/07/2016

15804772 has PRO of 62418768 11/07/2016

15804772 has PRO of 62418717 11/07/2016

15804772 has PRO of 62418724 11/07/2016

15804772 has PRO of 62418561 11/07/2016

15804772 has PRO of 62418693 11/07/2016

**FOREIGN APPLICATIONS**

**IF REQUIRED, FOREIGN LICENSE GRANTED****

04/12/2022

**** SMALL ENTITY ****

**STATE OR COUNTRY**

UNITED STATES

**ADDRESS**

Setter Roche Smith & Shellenberger LLP
1860 Blake Street
Suite 500
Denver, CO 80202
UNITED STATES

**FILING FEE RECEIVED**

$2,350

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NUMBER | FILING or 371(c) DATE | GRP ART UNIT | FIL FEE REC'D | ATTY.DOCKET.NO | TOT CLAIMS | IND CLAIMS |
|---|---|---|---|---|---|---|
| 17/716,275 | 04/08/2022 | 2139 | 2350 | 980.0023C2 | 36 | 6 |

**CONFIRMATION NO. 7982**

**CORRECTED FILING RECEIPT**

76444
Setter Roche Smith & Shellenberger LLP
1860 Blake Street
Suite 500
Denver, CO 80202




Date Mailed: 11/30/2023

Receipt is acknowledged of this non-provisional utility patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF FIRST INVENTOR, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection.

**Please verify the accuracy of the data presented on this receipt.** If an error is noted on this Filing Receipt, please submit a written request for a corrected Filing Receipt, including a properly marked-up ADS showing the changes with strike-through for deletions and underlining for additions. If you received a "Notice to File Missing Parts" or other Notice requiring a response for this application, please submit any request for correction to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections provided that the request is grantable.

**Inventor(s)**

Joshua Johnson, Frederick, CO;
Curt Bruner, Niwot, CO;
Jeffrey Reh, Niwot, CO;
Christopher Squires, Boulder, CO;
Brian Wilson, Zumbro Falls, MN;

**Applicant(s)**

Gaea LLC, Niwot, CO;

**Power of Attorney:** The patent practitioners associated with Customer Number 76444

**Domestic Priority data as claimed by applicant**

This application is a CON of 16/990,433 08/11/2020 PAT 11,327,669
which is a CON of 15/804,772 11/06/2017 PAT 10,776,023
which claims benefit of 62/418,510 11/07/2016
and claims benefit of 62/418,561 11/07/2016
and claims benefit of 62/418,687 11/07/2016
and claims benefit of 62/418,693 11/07/2016
and claims benefit of 62/418,696 11/07/2016
and claims benefit of 62/418,717 11/07/2016
and claims benefit of 62/418,724 11/07/2016
and claims benefit of 62/418,730 11/07/2016
and claims benefit of 62/418,742 11/07/2016
and claims benefit of 62/418,759 11/07/2016

and claims benefit of 62/418,764 11/07/2016
and claims benefit of 62/418,768 11/07/2016
and claims benefit of 62/418,773 11/07/2016
and claims benefit of 62/418,775 11/07/2016
and claims benefit of 62/418,780 11/07/2016
and claims benefit of 62/418,785 11/07/2016
and claims benefit of 62/448,826 01/20/2017

Foreign Applications for which priority is claimed (You may be eligible to benefit from the Patent Prosecution Highway program at the USPTO. Please see http://www.uspto.gov for more information.) - None.
Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

**Permission to Access Application via Priority Document Exchange:** Yes

**Permission to Access Search Results:** Yes

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

**If Required, Foreign Filing License Granted:** 04/12/2022
The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 17/716,275**
**Projected Publication Date:** 07/21/2022
**Non-Publication Request:** No
**Early Publication Request:** No
**** SMALL ENTITY ****
**Title**

DATA STORAGE DEVICE WITH CONFIGURABLE POLICY-BASED STORAGE DEVICE BEHAVIOR

**Preliminary Class**

711

**Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications:** No

## PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ

in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

## LICENSE FOR FOREIGN FILING UNDER

## Title 35, United States Code, Section 184

## Title 37, Code of Federal Regulations, 5.11 & 5.15

**GRANTED**

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

**NOT GRANTED**

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

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The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The U.S. offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to promote and facilitate business investment. SelectUSA provides information assistance to the international investor community; serves as an ombudsman for existing and potential investors; advocates on behalf of U.S. cities, states, and regions competing for global investment; and counsels U.S. economic development organizations on investment attraction best practices. To learn more about why the United States is the best country in the world to develop technology, manufacture products, deliver services, and grow your business, visit http://www.SelectUSA.gov or call +1-202-482-6800.

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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 17/716,275 | 04/08/2022 | Joshua Johnson | 980.0023C2 | 7982 |

76444 7590 11/30/2023

Setter Roche Smith & Shellenberger LLP
1860 Blake Street
Suite 500
Denver, CO 80202

| EXAMINER | |
|---|---|
| LANE, JOHN A | |

| ART UNIT | PAPER NUMBER |
|---|---|
| 2139 | |

| NOTIFICATION DATE | DELIVERY MODE |
|---|---|
| 11/30/2023 | ELECTRONIC |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

uspto@setterroche.com

PTOL-90A (Rev. 04/07)

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| | | |
|---|---|---|
| In re Application of | : | |
| Gaea LLC | : | |
| Application No. 17/716,275 | : | |
| Filed: 8 Apr 2022 | : | DECISION ON PETITION |
| For: DATA STORAGE DEVICE WITH | : | |
| CONFIGURABLE POLICY-BASED | : | |
| STORAGE DEVICE BEHAVIOR | : | |
| Docket No. 980.0023c2 | | |

This is a decision on the petition under 37 CFR 1.78(e), filed September 21, 2023, to accept an unintentionally delayed claim under 35 U.S.C. § 120 for the benefit of priority to the prior-filed non-provisional application set forth in the contemporaneously filed corrected Application Data Sheet (ADS).

The petition under 37 CFR 1.78(e) is **GRANTED.**

A petition under 37 CFR 1.78(e) must be accompanied by:

(1) the reference required by 35 U.S.C. §120 and 37 CFR § 1.78(d)(2) of the prior-filed application, unless previously submitted;
(2) the petition fee set forth in § 1.17(m); and
(3) a statement that the entire delay between the date the claim was due under 37 CFR § 1.78(d)(3) and the date the claim was filed was unintentional. The Director may require additional information where there is a question whether the delay was unintentional.

Petitioner has filed the reference to the prior-filed non-provisional application in a properly marked up ADS, paid the $840 petition fee, and made the proper statement of unintentional delay. All of the above requirements having been satisfied with the instant petition, the late claim for benefit of priority under 35 U.S.C. § 120 is accepted as being unintentionally delayed.

Applicant is advised that this decision grants the petition to accept the unintentionally delayed domestic benefit claim to the prior filed application(s) because the petition requirements of 37 CFR 1.78(e) and the formal requirements for claiming domestic benefit (see MPEP 211.01 et. seq.) have been met. This acceptance should not be construed as meaning that this application is entitled to the benefit of the prior-filed application(s). Whether a claimed invention in a nonprovisional application is entitled to the benefit of the filing date of a prior-filed application

on the basis of the disclosure thereof is determined during examination if it becomes necessary to do so (e.g., intervening reference and interference proceeding). See MPEP 211.05.

Any questions concerning this matter may be directed to Attorney Advisor Cliff Congo at (571) 272-3207.

The application is being forwarded to the Office of Data Management to await Applicant's submission of the issue fee in response to the Notice of Allowance mailed October 13, 2023.

/DOUGLAS I. WOOD/
Attorney Advisor - OPET

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UNITED STATES DEPARTMENT OF COMMERCE
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www.uspto.gov

| APPLICATION NUMBER | FILING OR 371(C) DATE | FIRST NAMED APPLICANT | ATTY. DOCKET NO./TITLE |
|---|---|---|---|
| 17/716,275 | 04/08/2022 | Joshua Johnson | 980.0023C2 |

**CONFIRMATION NO. 7982**

76444
Setter Roche Smith & Shellenberger LLP
1860 Blake Street
Suite 500
Denver, CO 80202

**PUB REQUEST ACCEPTANCE LETTER**

*OC000000065485662*

Date Mailed: 12/07/2023

## NOTICE OF ACCEPTANCE OF PUBLICATION REQUEST

The request for voluntary publication, amended publication, early publication, redacted publication, republication, corrected publication or revised publication has been received for this application. The request, including payment of any necessary fee(s), is in compliance with 37 CFR 1.215, 1.217, 1.219 or 1.221.

The projected publication date is 03/14/2024.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/npfarmer/

UNITED STATES
PATENT AND TRADEMARK OFFICE

P.O. Box 1450
Alexandria, VA 22313 - 1450
www.uspto.gov

# ELECTRONIC ACKNOWLEDGEMENT RECEIPT

| APPLICATION # | RECEIPT DATE / TIME | ATTORNEY DOCKET # |
|---|---|---|
| **17/716,275** | **01/10/2024 09:36:24 AM Z ET** | **980.0023C2** |

## Title of Invention

DATA STORAGE DEVICE WITH CONFIGURABLE POLICY-BASED STORAGE DEVICE BEHAVIOR

## Application Information

| | | | |
|---|---|---|---|
| APPLICATION TYPE | Utility - Nonprovisional Application under 35 USC 111(a) | PATENT # | - |
| CONFIRMATION # | 7982 | FILED BY | Melissa Eichten |
| PATENT CENTER # | 63898055 | FILING DATE | 04/08/2022 |
| CUSTOMER # | 76444 | FIRST NAMED INVENTOR | Joshua Johnson |
| CORRESPONDENCE ADDRESS | - | AUTHORIZED BY | David Setter |

## Documents

**TOTAL DOCUMENTS: 1**

| DOCUMENT | PAGES | DESCRIPTION | SIZE (KB) |
|---|---|---|---|
| 980.0023c2 Issue Fee Trans.pdf | 1 | Issue Fee Payment (PTO-85B) | 138 KB |

## Digest

| DOCUMENT | MESSAGE DIGEST(SHA-512) |
|---|---|
| 980.0023c2 Issue Fee Trans.pdf | 85B5C3C6610D414F0575A15E2883EC68EF217FBF4E21277B73CBA9D15C1B5578C7CB91F3E18D2433E84B0947FEF1EA9E8CE785FA4EBBB529266576F38B42035E |

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized

by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

**New Applications Under 35 U.S.C. 111**

If a new application is being filed and the application includes the necessary components for filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

**National Stage of an International Application under 35 U.S.C. 371**

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

**New International Application Filed with the USPTO as a Receiving Office**

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

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# ELECTRONIC PAYMENT RECEIPT

| APPLICATION # | RECEIPT DATE / TIME | ATTORNEY DOCKET # |
|---|---|---|
| 17/716,275 | 01/10/2024 09:36:24 AM Z ET | 980.0023C2 |

## Title of Invention

DATA STORAGE DEVICE WITH CONFIGURABLE POLICY-BASED STORAGE DEVICE BEHAVIOR

## Application Information

| | | | |
|---|---|---|---|
| APPLICATION TYPE | Utility - Nonprovisional Application under 35 USC 111(a) | PATENT # | - |
| CONFIRMATION # | 7982 | FILED BY | Melissa Eichten |
| PATENT CENTER # | 63898055 | AUTHORIZED BY | David Setter |
| CUSTOMER # | 76444 | FILING DATE | 04/08/2022 |
| CORRESPONDENCE ADDRESS | - | FIRST NAMED INVENTOR | Joshua Johnson |

## Payment Information

| PAYMENT METHOD | PAYMENT TRANSACTION ID | PAYMENT AUTHORIZED BY |
|---|---|---|
| CARD / 1006 | E202410036568969 | Melissa Eichten |

| FEE CODE | DESCRIPTION | ITEM PRICE($) | QUANTITY | ITEM TOTAL($) |
|---|---|---|---|---|
| 2501 | UTILITY ISSUE FEE | 480.00 | 1 | 480.00 |
| | | | TOTAL AMOUNT: | $480.00 |

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

**New Applications Under 35 U.S.C. 111**

If a new application is being filed and the application includes the necessary components for filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application

**National Stage of an International Application under 35 U.S.C. 371**

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage

submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

**New International Application Filed with the USPTO as a Receiving Office**

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

## PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), by mail or fax, or via EFS-Web.

By mail, send to: Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

By fax, send to: (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications. **Because electronic patent issuance may occur shortly after issue fee payment, any desired continuing application should preferably be filed prior to payment of this issue fee in order not to jeopardize copendency.**

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

76444 7590 10/13/2023
Setter Roche Smith & Shellenberger LLP
1860 Blake Street
Suite 500
Denver, CO 80202

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

**Certificate of Mailing or Transmission**

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being transmitted to the USPTO via EFS-Web or by facsimile to (571) 273-2885, on the date below.

| | |
|---|---|
| Melissa Eichten | (Typed or printed name) |
| /Melissa Eichten/ | (Signature) |
| January 10, 2024 | (Date) |

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 17/716,275 | 04/08/2022 | Joshua Johnson | 980.0023C2 | 7982 |

TITLE OF INVENTION: DATA STORAGE DEVICE WITH CONFIGURABLE POLICY-BASED STORAGE DEVICE BEHAVIOR

| APPLN. TYPE | ENTITY STATUS | ISSUE FEE DUE | PUBLICATION FEE DUE | PREV. PAID ISSUE FEE | TOTAL FEE(S) DUE | DATE DUE |
|---|---|---|---|---|---|---|
| nonprovisional | SMALL | $480 | $0.00 | $0.00 | $480 | 01/16/2024 |

| EXAMINER | ART UNIT | CLASS-SUBCLASS |
|---|---|---|
| LANE, JOHN A | 2139 | 711-170000 |

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

❑ Change of correspondence address (or Change of Correspondence Address form PTO/AIA/122 or PTO/SB/122) attached.

❑ "Fee Address" indication (or "Fee Address" Indication form PTO/AIA/47 or PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 _____
2 _____
3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE: Gaea LLC

(B) RESIDENCE: (CITY and STATE OR COUNTRY): Niwot, Colorado

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ☒ Corporation or other private group entity ❑ Government

4a. Fees submitted: ☒ Issue Fee ❑ Publication Fee (if required)

4b. Method of Payment: *(Please first reapply any previously paid fee shown above)*

☒ Electronic Payment via Patent Center or EFS-Web ❑ Enclosed check ❑ Non-electronic payment by credit card (Attach form PTO-2038)

❑ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. _____

5. **Change in Entity Status** (from status indicated above)

❑ Applicant certifying micro entity status. See 37 CFR 1.29

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

☒ Applicant asserting small entity status. See 37 CFR 1.27

NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

❑ Applicant changing to regular undiscounted fee status.

NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature /David J. Setter/ Date January 10, 2024

Typed or printed name David J. Setter Registration No. 78,758



PTOL-85 Part B (08-18) Approved for use through 01/31/2020 OMB 0651-0033 U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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| APPLICATION NO. | ISSUE DATE | PATENT NO. | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 17/716,275 | 02/20/2024 | 11907553 | 980.0023C2 | 7982 |

76444 7590 01/31/2024

Setter Roche Smith & Shellenberger LLP
1860 Blake Street
Suite 500
Denver, CO 80202

# ISSUE NOTIFICATION

The projected patent number and issue date are specified above. The patent will issue electronically. The electronically issued patent is the official patent grant pursuant to 35 U.S.C. § 153. The patent may be accessed on or after the issue date through Patent Center at https://patentcenter.uspto.gov/. The patent will be available in both the public and the private sides of Patent Center. Further assistance in electronically accessing the patent, or about Patent Center, is available by calling the Patent Electronic Business Center at 1-888-217-9197.

The USPTO is implementing electronic patent issuance with a transition period, during which period the USPTO will mail a ceremonial paper copy of the electronic patent grant to the correspondence address of record. Additional copies of the patent (i.e., certified and presentation copies) may be ordered for a fee from the USPTO's Certified Copy Center at https://certifiedcopycenter.uspto.gov/index.html. The Certified Copy Center may be reached at (800)972-6382.

**Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)**
(application filed on or after May 29, 2000)

The Patent Term Adjustment is 0 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Center (https://patentcenter.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Patents Stakeholder Experience (OPSE), Stakeholder Support Division (SSD) at (571)-272-4200.

INVENTOR(s) (Please see PATENT CENTER site https://patentcenter.uspto.gov for additional inventors):

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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 17/716,275 | 04/08/2022 | Joshua Johnson | 980.0023C2 | 7982 |

76444 7590 02/20/2024

Setter Roche Smith & Shellenberger LLP
1860 Blake Street
Suite 500
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| EXAMINER | |
|---|---|
| LANE, JOHN A | |

| ART UNIT | PAPER NUMBER |
|---|---|
| 2139 | |

| NOTIFICATION DATE | DELIVERY MODE |
|---|---|
| 02/20/2024 | ELECTRONIC |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

uspto@setterroche.com

PTOL-90A (Rev. 04/07)

| APPLICATION NO. | ISSUE DATE | PATENT NO. |
|---|---|---|
| 17/716,275 | 20-Feb-2024 | 11907553 |

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Denver, CO 80202

# EGRANT NOTIFICATION

Your electronic patent grant (eGrant) is now available, which can be accessed via Patent Center at https://patentcenter.uspto.gov

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| APPLICATION NUMBER | FILING OR 371(C) DATE | FIRST NAMED APPLICANT | ATTY. DOCKET NO./TITLE |
|---|---|---|---|
| 17/716,275 | 04/08/2022 | Joshua Johnson | 980.0023C2 |

**CONFIRMATION NO. 7982**

76444
Setter Roche Smith & Shellenberger LLP
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**PUBLICATION NOTICE**

*OC000000069685458*

Date Mailed: 03/14/2024

**Title:**DATA STORAGE DEVICE WITH CONFIGURABLE POLICY-BASED STORAGE DEVICE BEHAVIOR

**Publication No.**US-2024-0086094-A9
**Publication Date:**03/14/2024

## NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

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In addition, information on the status of the application, including the mailing date of Office actions and the dates of receipt of correspondence filed in the Office, may also be accessed via the Internet through the Patent Electronic Business Center at www.uspto.gov using the public side of the Patent Application Information and Retrieval (PAIR) system. The direct link to access this status information is currently https://portal.uspto.gov/pair/PublicPair. Prior to publication, such status information is confidential and may only be obtained by applicant using the private side of PAIR.

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Office of Data Managment, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

AO 120 (Rev. 08/10)

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☐ Trademarks or ☑ Patents. ( ☐ the patent action involves 35 U.S.C. § 292.):

| DOCKET NO. | DATE FILED | U.S. DISTRICT COURT |
|---|---|---|
| 4:26-cv-00348-P | 3/26/2026 | Northern District of Texas |

| PLAINTIFF | DEFENDANT |
|---|---|
| GAEA, LLC | Meta Platforms, Inc. |

| | PATENT OR TRADEMARK NO. | DATE OF PATENT OR TRADEMARK | HOLDER OF PATENT OR TRADEMARK |
|---|---|---|---|
| 1 | 10,776,023 | 9/15/2020 | GAEA, LLC |
| 2 | 11,327,669 | 5/10/2022 | GAEA, LLC |
| 3 | 11,907,553 | 2/20/2024 | GAEA, LLC |
| 4 | 12,265,715 | 4/1/2025 | GAEA, LLC |
| 5 | | | |

In the above—entitled case, the following patent(s)/ trademark(s) have been included:

| DATE INCLUDED | INCLUDED BY ☐ Amendment ☐ Answer ☐ Cross Bill ☐ Other Pleading | | |
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| | PATENT OR TRADEMARK NO. | DATE OF PATENT OR TRADEMARK | HOLDER OF PATENT OR TRADEMARK |
| 1 | | | |
| 2 | | | |
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| 4 | | | |
| 5 | | | |

In the above—entitled case, the following decision has been rendered or judgement issued:

| DECISION/JUDGEMENT |
|---|
| |

| CLERK | (BY) DEPUTY CLERK | DATE |
|---|---|---|
| Karen Mitchell | s/Wendy Camargo | 03/26/2026 |

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☐ Trademarks or ☑ Patents. ( ☐ the patent action involves 35 U.S.C. § 292.):

| DOCKET NO. | DATE FILED | U.S. DISTRICT COURT |
|---|---|---|
| 2:26-cv-264 | 3/23/2026 | Eastern District of Texas |

| PLAINTIFF | DEFENDANT |
|---|---|
| Gaea, LLC | Samsung Electronics Co., Ltd. and Samsung Electronics America, Inc. |

| | PATENT OR TRADEMARK NO. | DATE OF PATENT OR TRADEMARK | HOLDER OF PATENT OR TRADEMARK |
|---|---|---|---|
| 1 | 10,776,023 | 9/15/2020 | Gaea, LLC |
| 2 | 11,327,669 | 5/10/2022 | Gaea, LLC |
| 3 | 11,907,553 | 2/20/2024 | Gaea, LLC |
| 4 | 12,265,715 | 4/1/2025 | Gaea, LLC |
| 5 | | | |

In the above—entitled case, the following patent(s)/ trademark(s) have been included:

| DATE INCLUDED | INCLUDED BY ☐ Amendment ☐ Answer ☐ Cross Bill ☐ Other Pleading | |
|---|---|---|
| PATENT OR TRADEMARK NO. | DATE OF PATENT OR TRADEMARK | HOLDER OF PATENT OR TRADEMARK |
| 1 | | |
| 2 | | |
| 3 | | |
| 4 | | |
| 5 | | |

In the above—entitled case, the following decision has been rendered or judgement issued:

| DECISION/JUDGEMENT |
|---|
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