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(54) **REMOVABLE MEMORY STORAGE DEVICE
WITH MULTIPLE AUTHENTICATION
PROCESSES**

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(57) **ABSTRACT**

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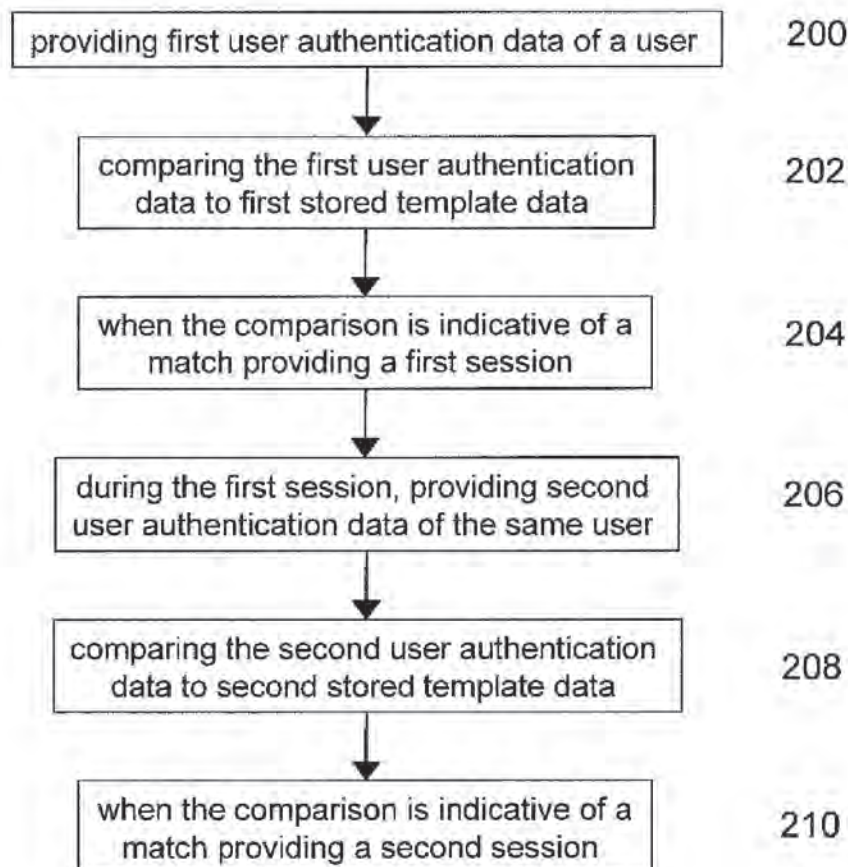
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A method comprises providing first user authentication data of a user and comparing the first user authentication data to first stored template data. When the comparison is indicative of a match, a first session is provided, which supports one of user access for retrieving first data that are stored within a peripheral memory storage device and user access for modifying a data content of the peripheral memory storage device. The first session does not support the other one of user access for retrieving first data that are stored within the peripheral memory storage device and user access for modifying a data content of the peripheral memory storage device. During the first session, second user authentication data of the same user is provided and compared to second stored template data. When the comparison is indicative of a match, a second session is provided, which does support the other one of user access for retrieving first data that are stored within the peripheral memory storage device and user access for modifying the data content of the peripheral memory storage device.



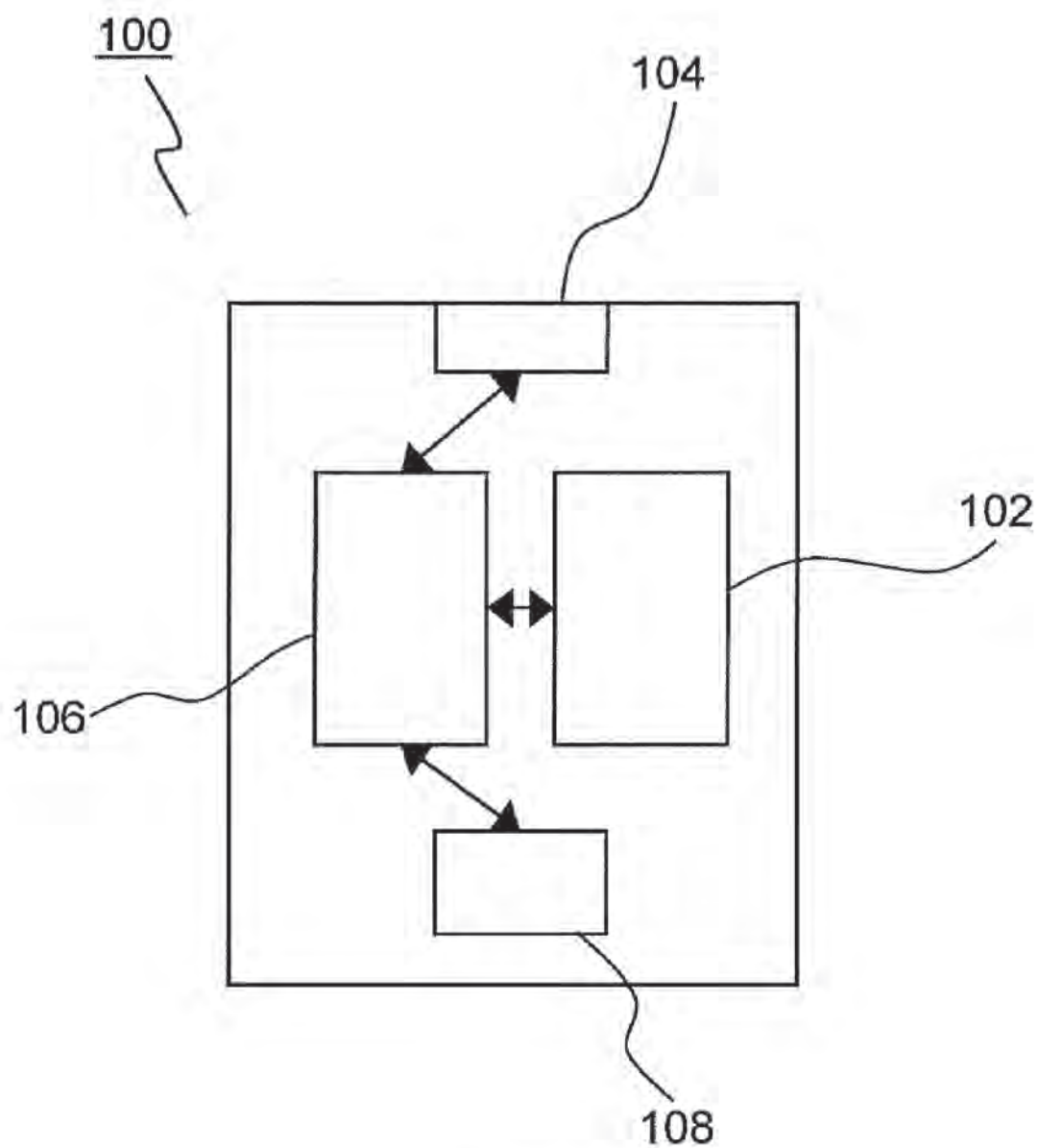


Fig. 1

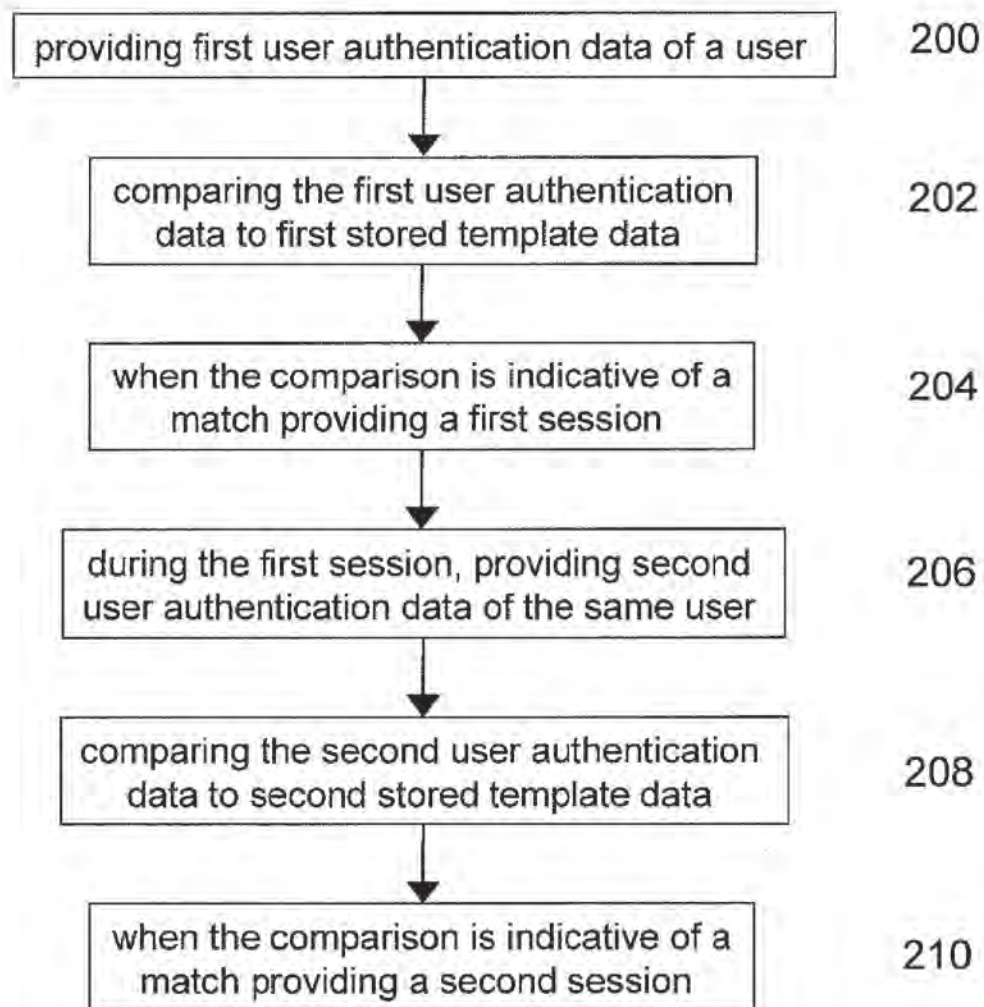


Fig. 2

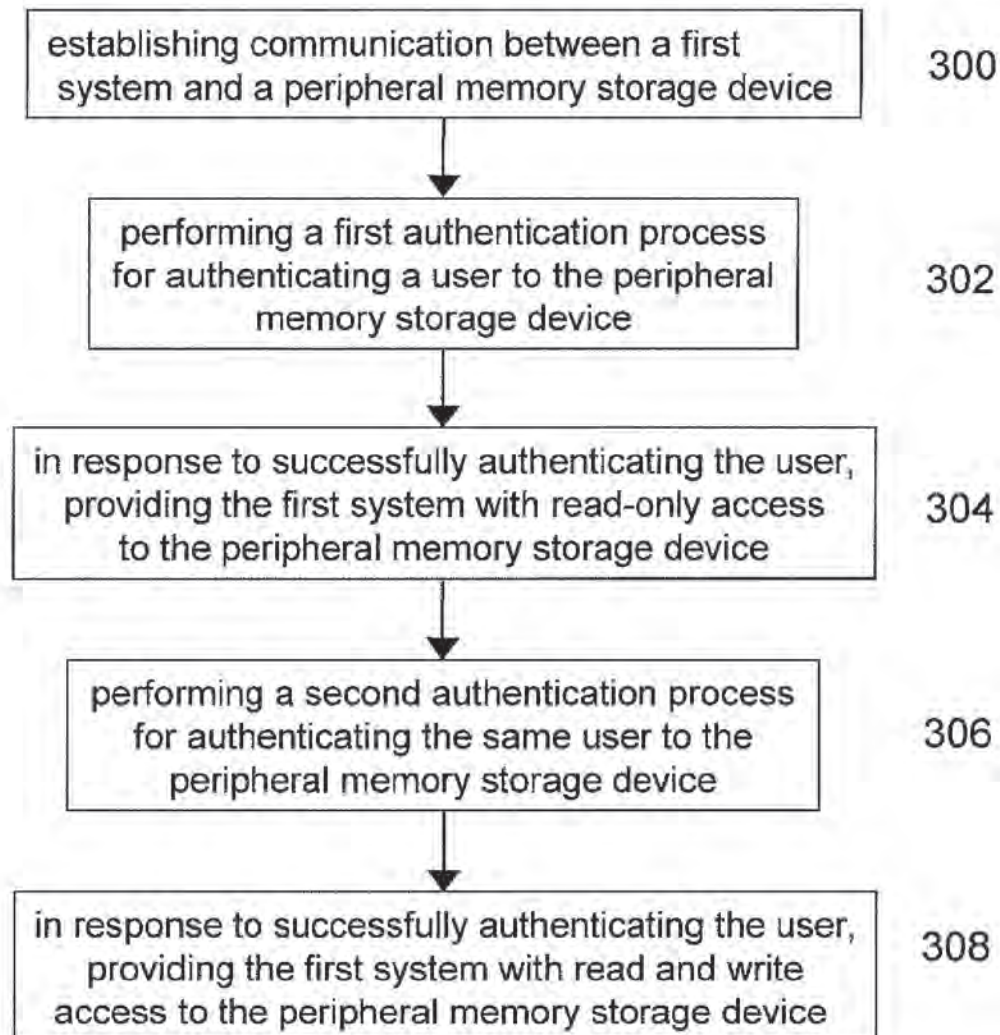


Fig. 3

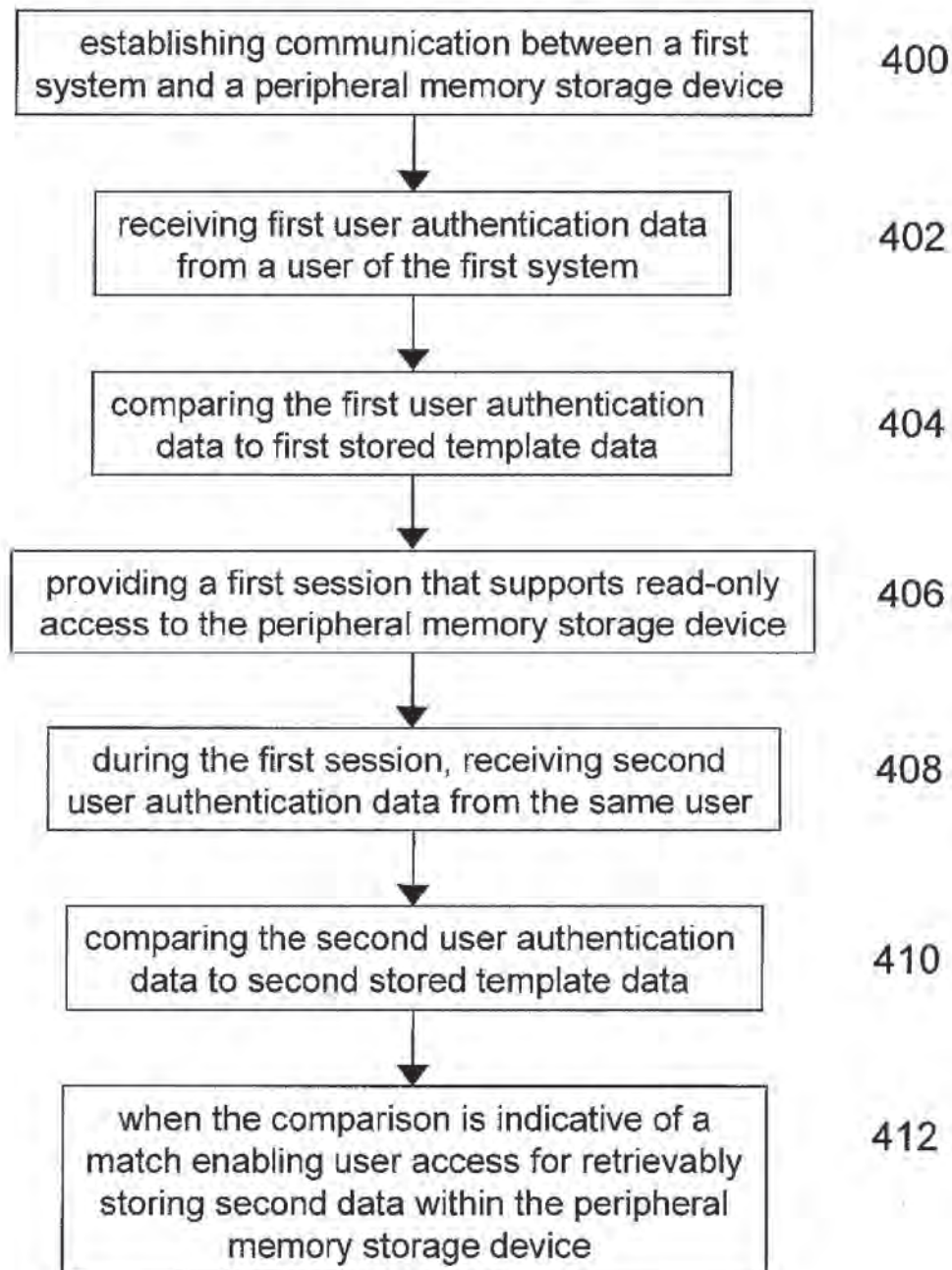


Fig. 4

REMOVABLE MEMORY STORAGE DEVICE WITH MULTIPLE AUTHENTICATION PROCESSES

FIELD OF THE INVENTION

[0001] The instant invention relates generally to data security, and more particularly to a system and method for supporting multiple authentication processes for controllably enabling read and/or write functionality of a removable memory storage device.

BACKGROUND OF THE INVENTION

[0002] It is increasingly common to share and exchange digital data using removable memory storage devices, which are referred to typically as "memory keys," "memory sticks," "flash drives," or "thumb drives." In general, this type of storage device is a NAND-type flash memory data storage device integrated with a USB (universal serial bus) interface. USB flash drives are typically removable and rewritable, and are supported by a wide range of portable and fixed electronic devices such as laptops, personal data analysers (PDAs), personal computers, etc. They are more compact, faster, hold much more data, have a more durable design, and are more reliable for lack of moving parts than previous removable media such as floppy discs, CD-ROM, and DVD-ROM. Storage capacities currently range from 512 MB to 32 GB, with steady improvements in size and price per gigabyte. Some allow 1 million write or erase cycles, have 10-year data retention, and are connected by USB 1.1 or USB 2.0 standard interfaces. Additionally, these types of storage devices use the USB mass storage standard supported natively by modern operating systems such as Windows, Mac OS X, Linux, and other Unix-like systems. Furthermore, their portability and optional embedding of biometric sensors and/or other authentication transducers for authenticating a user, coupled with an embedded processor for executing firmware, have made USB flash drives a common storage device for storing digital data, such as for instance digital documents, forms, applications, etc.

[0003] Of course, it is common to require some form of user authentication when private or sensitive data are stored on a USB flash drive. For instance, the user is required to provide authentication data in the form of a password or a biometric input after the USB flash drive is connected to a computer system or other electronic device. Once authenticated successfully, the user is able to read and write data from and to the USB flash drive. If the user is not authenticated successfully, then user access to the data that is stored on the USB flash drive is denied. Optionally, the USB flash drive is locked or otherwise disabled subsequent to registering a predetermined number of failed authentication attempts.

[0004] Unfortunately, even when a user is authenticated successfully, there are certain risks associated with the use of a USB flash drive for sharing digital data. For instance, the user may provide authentication data in order to allow access, by another user, to the data that is stored within the USB flash drive. Typically, this situation occurs when a manager, the first user, wishes to allow an employee, the second user, to have access to the data that is stored within the USB flash drive. In this case, the second user is trusted to use the data that is stored within the USB flash drive for a specific purpose. However, the second employee may either inadvertently or with malicious intent over-write the data that is stored within

the USB flash drive, or write additional data to the USB flash drive. The first user cannot prevent the unauthorized storage of data within the USB flash drive, since the first user has relinquished control of the USB flash drive to the second user subsequent to providing the necessary authentication data. Clearly, it is impractical to require the first user to constantly oversee the usage of all USB flash drives that are authenticated in this manner.

[0005] Accordingly, there is a need for a method and system that overcomes at least some of the above-mentioned limitations of the prior art.

SUMMARY OF THE INVENTION

[0006] In accordance with an aspect of the invention there is provided a method comprising: providing first user authentication data of a user; comparing the first user authentication data to first stored template data and when the comparison is indicative of a match providing a first session, the first session supporting one of user access for retrieving first data that are stored within a peripheral memory storage device and user access for modifying a data content of the peripheral memory storage device, the first session other than supporting the other one of user access for retrieving first data that are stored within the peripheral memory storage device and user access for modifying a data content of the peripheral memory storage device; during the first session, providing second user authentication data of the same user; and, comparing the second user authentication data to second stored template data and when the comparison is indicative of a match providing a second session, the second session supporting the other one of user access for retrieving first data that are stored within the peripheral memory storage device and user access for modifying the data content of the peripheral memory storage device.

[0007] In accordance with an aspect of the invention there is provided a method comprising: establishing communication between a first system and a peripheral memory storage device; performing a first authentication process for authenticating a user to the peripheral memory storage device; in response to successfully authenticating the user according to the first authentication process, providing the first system with one of read-only access to the peripheral memory storage device and write-only access to the peripheral memory storage device; performing a second authentication process for authenticating the same user to the peripheral memory storage device; and, in response to successfully authenticating the same user according to the second authentication process, providing the first system with read-and-write access to the peripheral memory storage device.

[0008] In accordance with an aspect of the invention there is provided a method comprising: establishing communication between a first system and a peripheral memory storage device; receiving first user authentication data from a user of the first system; comparing the first user authentication data to first stored template data and when a result of the comparison is indicative of a match providing a first session that supports one of read-only access to first data that are stored within the peripheral memory storage device and user access for retrievably storing second data within the peripheral memory storage device; during the first session, receiving second user authentication data from the same user; and, comparing the second user authentication data to second stored template data and when a result of the comparison is indicative of a match enabling the other one of read-only

access to the first data that are stored within the peripheral memory storage device and user access for retrievably storing second data within the peripheral memory storage device.

[0009] In accordance with an aspect of the invention there is provided a peripheral memory storage device, comprising: a memory element; a communication interface coupled to the memory element; and, a processor for receiving first user authentication data and second user authentication data relating to a same user, and for enabling one of user access for retrieving data stored in the memory element and user access for writing data to the memory element, in dependence upon authenticating the user based on only the first user authentication data, and for enabling the other one of user access for retrieving data stored in the memory element and user access for writing data to the memory element, in dependence upon authenticating the user based on both of the first user authentication data and the second user authentication data.

[0010] In accordance with an aspect of the invention there is provided a computer-readable storage medium having stored thereon computer-executable instructions for implementing a method, the method comprising: establishing communication between a first system and a peripheral memory storage device; performing a first authentication process for authenticating a user to the peripheral memory storage device; in response to successfully authenticating the user according to the first authentication process, providing the first system with one of read-only access to the peripheral memory storage device and write-only access to the peripheral memory storage device; performing a second authentication process for authenticating the same user to the peripheral memory storage device; and, in response to successfully authenticating the same user according to the second authentication process, providing the first system with read and write access to the peripheral memory storage device.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] Exemplary embodiments of the invention will now be described in conjunction with the following drawings, in which:

[0012] FIG. 1 shows a simplified block diagram of a removable memory storage device according to an embodiment of the instant invention;

[0013] FIG. 2 shows a simplified flow diagram of a method according to an embodiment of the instant invention;

[0014] FIG. 3 shows a simplified flow diagram of a method according to an embodiment of the instant invention; and,

[0015] FIG. 4 shows a simplified flow diagram of a method according to an embodiment of the instant invention.

DETAILED DESCRIPTION OF EMBODIMENTS OF THE INVENTION

[0016] The following description is presented to enable a person skilled in the art to make and use the invention, and is provided in the context of a particular application and its requirements. Various modifications to the disclosed embodiments will be readily apparent to those skilled in the art, and the general principles defined herein may be applied to other embodiments and applications without departing from the scope of the invention. Thus, the present invention is not intended to be limited to the embodiments disclosed, but is to be accorded the widest scope consistent with the principles and features disclosed herein.

[0017] Referring to FIG. 1, shown is a simplified block diagram of a peripheral memory storage device according to an embodiment of the instant invention. The peripheral memory storage device 100 comprises a memory element 102, a communication interface 104 coupled to the memory element 102, and a processor 106. The peripheral memory storage device 100 is housed within a suitable housing, thereby supporting portability and removability from host computer systems.

[0018] The memory element 102 comprises non-volatile memory such as for instance NAND flash memory. Alternatively, it comprises volatile random access memory (RAM) with an on-board power supply. Digital data is retrievably stored within the memory element, including digital documents, digital forms, digital media files, application data, firmware, etc. Collectively, the different forms of digital data are referred to as the data content of the peripheral memory storage device 100. User actions that write or store additional data within the memory element 102, or that erase or overwrite existing data that are stored within the memory element 102, are referred to as actions that modify the data content of the peripheral memory storage device 102.

[0019] The communication interface 104 is for supporting two-way communication between the peripheral memory storage device 100 and a first system (not shown), such as for instance one of a desktop computer, a laptop computer, a PDA, etc. By way of a specific and non-limiting example, the communication interface 104 is a universal serial bus (USB) interface. Optionally, the peripheral memory storage device 100 draws power from the first system via the communication interface 104.

[0020] The processor 106 is for receiving first user authentication data relating to a user and for receiving second user authentication data relating to the same user. Additionally, the processor 106 is for enabling user access for retrieving data that is stored in the memory element 102, in dependence upon successfully authenticating the user based only upon the first user authentication data. The processor 106 is also for enabling user access for writing data to the memory element 102 in dependence upon successfully authenticating the user based upon both of the first user authentication data and the second user authentication data. Writing data to the memory element 102 includes overwriting existing data that is stored within the peripheral memory storage device 100, updating firmware of the peripheral memory storage device 100, etc.

[0021] Optionally, the peripheral memory storage device 100 comprises an input portion 108 for receiving at least one of the first user authentication data and the second user authentication data. For instance, the input portion 108 comprises a biometric input transducer for receiving at least one of the first user authentication data and the second user authentication data in the form of biometric information. By way of a specific and non-limiting example, the biometric input transducer comprises a fingerprint reader.

[0022] During use, a user is provided with a peripheral memory storage device, upon which the user stores data. Optionally, the device contains some of application data, firmware, security data, etc. The device is set up initially with authentication data relating to the user that is associated therewith. For instance, password data for authenticating the user to the peripheral memory storage device is stored therein. Optionally, biometric information for authenticating the user to the peripheral memory storage device is stored therein, either in addition to or in place of the password data.

[0023] Communication is established between the peripheral memory storage device 100 and a first system, such as for instance by coupling the communication interface 104 to an available USB port of the first system. Once communication is established with the first system, the user is prompted to provide authentication data, such as for instance a password. The prompt optionally is in response to an attempt to read data from the peripheral memory storage device 100, or simply upon connecting the peripheral memory storage device 100 to the first system. Optionally, the user provides the authentication data without being prompted. Further optionally, the user provides the authentication data prior to establishing communication between the peripheral memory storage device 100 and the first system. In this case, the user provides authentication data via the input portion 108 of the peripheral memory storage device 100. When the user is authenticated successfully, a first session is provided for supporting user access for retrieving first data that are stored within the peripheral memory storage device 100, but other than for supporting user access for modifying the data content of the peripheral memory storage device. Accordingly, the user may read data or may set up the device to allow another user to read data, from the peripheral memory storage device 100, but no changes may be made to the data content of the peripheral memory storage device 100. Optionally, the first session is timed, expiring after a predetermined passage of time or after a predetermined number of read operations is completed. Alternatively, the first session is open ended, terminating for instance upon a user log-off, removal of the device 100 from the first system, or after a predetermined period of inactivity is detected.

[0024] In this way, the user may read data from the peripheral memory storage device 100 and be assured that data cannot be altered, either intentionally or accidentally, without additional authorization. Thus, the user when stepping away from their workstation need not be concerned that a co-worker will write data to or erase data from the peripheral memory storage device 100. Additionally, the user may retrieve files from the peripheral memory storage device 100 and modify the files, and not accidentally overwrite the original files by inadvertently selecting the "save" instead of the "save as" option.

[0025] Within the first session, the user provides additional authentication data in order to enable write/erase functionality of the peripheral memory storage device 100. For instance, after the user is authenticated successfully one time, the user is prompted to provide the additional authentication data. When the user is authenticated successfully based on the additional authentication data, a second session is provided for supporting user access for retrieving first data that are stored within the peripheral memory storage device 100, and for supporting user access for modifying the data content of the peripheral memory storage device. In this way, the user may read and write data, or may set up the device to allow another user to read and write data, from and to the peripheral memory storage device 100. Optionally, the prompt to provide the additional authentication data is provided in response to a user action requiring access to write data to or erase data from the peripheral memory storage device 100. Optionally, the user provides the additional authentication data without being prompted. Further optionally, the user provides the additional authentication data prior to establishing communication between the peripheral memory storage device 100 and the first system. In this case, the user provides the addi-

tional authentication data via the input portion 108 of the peripheral memory storage device 100. Optionally, the second session is timed, expiring after a predetermined passage of time or after a predetermined number of write/erase actions is completed. For instance, only one write/erase action is permitted without requiring re-authentication, or a plurality of write/erase actions is permitted. Alternatively, the second session is open ended, terminating for instance upon a user log-off, removal of the device 100 from the first system, or after a predetermined period of inactivity is detected.

[0026] The authentication data and the additional authentication data optionally are the same or different. For instance, one password is provided to start the first session and a different password is provided to start the second session, or one password is provided to start the first session and the same password is provided a second time to start the second session. Further optionally, a password is provided to start the first session, but biometric information is provided to start the second session. Other combinations using different types of authentication data are also envisaged.

[0027] Referring now to FIG. 2, shown is a simplified flow diagram of a method according to an embodiment of the instant invention. At 200, first user authentication data of a user are provided. For instance, the first user authentication data includes one or more of a password, a biometric sample and a security token. The first user authentication data is compared to first stored template data at 202. When the comparison is indicative of a match, then a first session is provided at 204. In particular, the first session supports user access for retrieving first data that are stored within a peripheral memory storage device, but does not support user access for modifying a data content of the peripheral memory storage device. During the first session, second user authentication data of the same user are provided at 206. For instance, the second user authentication data includes one or more of a password, a biometric sample and a security token, and is optionally the same as or different than the first user authentication data. The second user authentication data is compared to second stored template data at 208. When the comparison is indicative of a match, then a second session is provided at 210. In particular, the second session supports user access for modifying the data content of the peripheral memory storage device. Optionally, the second session is timed, expiring after a predetermined passage of time or after a predetermined number of write/erase actions is completed. For instance, only one write/erase action is permitted without requiring re-authentication, or a plurality of write/erase actions is permitted. Alternatively, the second session is open ended, terminating for instance upon a user log-off, removal of the peripheral memory storage device, or after a predetermined period of inactivity is detected, etc.

[0028] Referring now to FIG. 3, shown is a simplified flow diagram of a method according to an embodiment of the instant invention. At 300, communication is established between a first system and a peripheral memory storage device. For instance, communication is provided via a USB interface. A first authentication process is performed at 302 for authenticating a user to the peripheral memory storage device. The first system is provided at 304 with read-only access to the peripheral memory storage device, in response to successfully authenticating the user according to the first authentication process. A second authentication process is performed at 306 for authenticating the same user to the peripheral memory storage device a second time. Thereafter,

the first system is provided at 308 with both read and write access to the peripheral memory storage device, in response to successfully authenticating the same user according to the second authentication process during the first session. Optionally, the second session is timed, expiring after a predetermined passage of time or after a predetermined number of write/erase actions is completed. For instance, only one write/erase action is permitted without requiring re-authentication, or a plurality of write/erase actions is permitted. Alternatively, the second session is open ended, terminating for instance upon a user log-off, removal of the peripheral memory storage device, or after a predetermined period of inactivity is detected, etc.

[0029] Referring now to FIG. 4, shown is a simplified flow diagram of a method according to an embodiment of the instant invention. At 400, communication is established between a first system and a peripheral memory storage device. At 402, first user authentication data is received from a user of the first system. For instance, the first user authentication data includes one or more of a password, a biometric sample and a security token. The first user authentication data is compared to first stored template data at 404. When the comparison is indicative of a match, then a first session is provided at 406. In particular, the first session supports read-only access to the peripheral memory storage device, but does not support user access for modifying a data content of the peripheral memory storage device. During the first session, second user authentication data is received from the same user at 408. For instance, the second user authentication data includes one or more of a password, a biometric sample and a security token, and is optionally the same as or different than the first user authentication data. The second user authentication data is compared to second stored template data at 410. When a result of the comparison is indicative of a match, then user access is enabled at 412 for retrievably storing second data within the peripheral memory storage device. Optionally, the second session is timed, expiring after a predetermined passage of time or after a predetermined number of write/erase actions is completed. For instance, only one write/erase action is permitted without requiring re-authentication, or a plurality of write/erase actions is permitted. Alternatively, the second session is open ended, terminating for instance upon a user log-off, removal of the peripheral memory storage device, or after a predetermined period of inactivity is detected, etc.

[0030] Though in the above described embodiments, the first session supports read operation and the second session supports write, in an alternative embodiment, the first session supports write operation and the second session supports read operations. As such, access to data within a peripheral memory storage device is limited to the second session but storing of data on the peripheral memory storage device is supported in the first session. Optionally, when storage of data is supported absent read privileges, a processor within the peripheral memory storage device ensures that existing data is not overwritten. Further optionally, when storage of data is supported absent read privileges, a processor within the peripheral memory storage device ensures that no data is overwritten providing a user with access to the second session with access to any and all data stored within the peripheral memory storage device within a first session.

[0031] Optionally, prior to providing write-access to the peripheral memory storage device, the first system with which the device is to be interfaced is scanned to detect the

presence of computer viruses. The term "computer viruses" is to be broadly interpreted to include different types of malware, such as for instance true computer viruses, worms, trojan horses, rootkits, spyware, dishonest adware, crimeware and other malicious and unwanted software. If the first system is determined to be infected with any type of computer virus, then write-access to the peripheral memory storage device is denied. Conversely, write-access to the peripheral memory storage device is granted if no computer viruses are detected. Further optionally, during a session that supports either write-only access or read and write access to the peripheral memory storage device, the session is terminated upon receiving a signal indicative of the presence of a computer virus within the first system.

[0032] Numerous other embodiments may be envisaged without departing from the spirit or scope of the invention.

What is claimed is:

1. A method comprising:

providing first user authentication data of a user;
comparing the first user authentication data to first stored template data and when the comparison is indicative of a match providing a first session, the first session supporting one of user access for retrieving first data that are stored within a peripheral memory storage device and user access for modifying a data content of the peripheral memory storage device, the first session other than supporting the other one of user access for retrieving first data that are stored within the peripheral memory storage device and user access for modifying a data content of the peripheral memory storage device;
during the first session, providing second user authentication data of the same user; and,
comparing the second user authentication data to second stored template data and when the comparison is indicative of a match providing a second session, the second session supporting the other one of user access for retrieving first data that are stored within the peripheral memory storage device and user access for modifying the data content of the peripheral memory storage device.

2. A method according to claim 1, comprising establishing communication between the peripheral memory storage device and a first system.

3. A method according to claim 2, wherein at least one of providing first user authentication data and providing second user authentication data is performed prior to establishing communication between the peripheral memory storage device and the first system.

4. A method according to claim 2, wherein communication between the peripheral memory storage device and the first system is established using a universal serial bus (USB) protocol.

5. A method according to claim 1, wherein the first user authentication data and the second user authentication data are the same.

6. A method according to claim 1, wherein providing first user authentication data comprises providing at least one of a first password and first biometric information, and wherein providing second user authentication data comprises providing at least one of a second password and second biometric information.

7. A method according to claim 1, wherein modifying the data content of the peripheral memory storage device comprises at least one of retrievably storing second data within the

peripheral memory storage device and erasing at least a portion of the first data that are stored within the peripheral memory storage device.

8. A method according to claim 1, wherein comparing the second user authentication data to second stored template data is performed in response to one of a user request to retrieve first data that are stored within the peripheral memory storage device and a user request to modify the digital content of the peripheral memory storage device.

9. A method according to claim 1, wherein the second session is of a predetermined duration of time, so as to support plural user actions for the other one of retrieving first data that are stored within the peripheral memory storage device and modifying the data content of the peripheral memory storage device.

10. A method comprising:

establishing communication between a first system and a peripheral memory storage device;

performing a first authentication process for authenticating a user to the peripheral memory storage device;

in response to successfully authenticating the user according to the first authentication process, providing the first system with one of read-only access to the peripheral memory storage device and write-only access to the peripheral memory storage device;

performing a second authentication process for authenticating the same user to the peripheral memory storage device; and,

in response to successfully authenticating the same user according to the second authentication process, providing the first system with read-and-write access to the peripheral memory storage device.

11. A method according to claim 10, wherein communication between the first system and the peripheral memory storage device is established using a universal serial bus (USB) protocol.

12. A method according to claim 10, wherein performing the first authentication process comprises receiving at least one of a first password and first biometric information, and wherein performing the second authentication process comprises receiving at least one of a second password and second biometric information.

13. A method according to claim 10, wherein the first authentication process and the second authentication process are the same authentication processes.

14. A method according to claim 10, wherein the second authentication process is performed within a period of time during which the first system has the one of read-only access to the peripheral memory storage device and write-only access to the peripheral memory storage device.

15. A method according to claim 10, wherein the second authentication process is performed in response to a user request to one of retrieve data from the peripheral memory storage device and write data to the peripheral memory storage device.

16. A method according to claim 10, wherein the first system is provided with read and write access to the peripheral memory storage device for a predetermined duration of time, so as to support plural user actions for writing data to the peripheral memory storage device.

17. A method according to claim 10, comprising prior to providing the first system with write access to the peripheral memory storage device, scanning the first system for the presence of a computer virus and providing the first system

with write access to the peripheral memory storage device only when a result of scanning is other than indicative of the presence of a computer virus.

18. A method according to claim 10, comprising terminating a session supporting write-access to the peripheral memory storage device upon receipt of a signal that is indicative of the presence of a computer virus within the first system.

19. A method comprising:

establishing communication between a first system and a peripheral memory storage device;

receiving first user authentication data from a user of the first system;

comparing the first user authentication data to first stored template data and when a result of the comparison is indicative of a match providing a first session that supports one of read-only access to first data that are stored within the peripheral memory storage device and user access for retrievably storing second data within the peripheral memory storage device;

during the first session, receiving second user authentication data from the same user; and,

comparing the second user authentication data to second stored template data and when a result of the comparison is indicative of a match enabling the other one of read-only access to the first data that are stored within the peripheral memory storage device and user access for retrievably storing second data within the peripheral memory storage device.

20. A method according to claim 19, wherein the comparison steps are performed using an embedded processor of the peripheral memory storage device.

21. A method according to claim 19, wherein communication between the first system and the peripheral memory storage device is established using a universal serial bus (USB) protocol.

22. A method according to claim 19, wherein the first user authentication data comprises at least one of a first password and first biometric information, and wherein the second user authentication data comprises at least one of a second password and second biometric information.

23. A method according to claim 19, wherein the first user authentication data comprises a first password, and wherein the second user authentication data comprises a second password.

24. A method according to claim 23, wherein the first password and the second password are the same.

25. A method according to claim 19, wherein at least one of the first user authentication data and the second user authentication data is received via an authentication transducer of the removable memory storage device.

26. A method according to claim 19, wherein comparing the second user authentication data to second stored template data is performed in response to one of a user request to read the first data that are stored within the peripheral memory storage device and a user request to retrievably store the second data within the peripheral memory storage device.

27. A method according to claim 19, wherein the other one of read-only access to the first data that are stored within the peripheral memory storage device and user access for retrievably storing second data within the peripheral memory storage device is enabled for a predetermined duration of time, so as to support plural user actions for one of retrieving the first data that are stored within the peripheral memory storage

device and retrievably storing the second data to the peripheral memory storage device, respectively.

28. A peripheral memory storage device, comprising:

a memory element;

a communication interface coupled to the memory element; and,

a processor for receiving first user authentication data and second user authentication data relating to a same user, and for enabling one of user access for retrieving data stored in the memory element and user access for writing data to the memory element, in dependence upon authenticating the user based on only the first user authentication data, and for enabling the other one of user access for retrieving data stored in the memory element and user access for writing data to the memory element, in dependence upon authenticating the user based on both of the first user authentication data and the second user authentication data.

29. A peripheral memory storage device according to claim 28, comprising an input portion for receiving at least one of the first user authentication data and the second user authentication data.

30. A peripheral memory storage device according to claim 29, wherein the input portion comprises a biometric input transducer for receiving at least one of the first user authentication data and the second user authentication data in the form of biometric information.

31. A peripheral memory storage device according to claim 28, wherein the communication interface is a universal serial bus (USB) interface.

32. A computer-readable storage medium having stored thereon computer-executable instructions for implementing a method, the method comprising:

establishing communication between a first system and a peripheral memory storage device;

performing a first authentication process for authenticating a user to the peripheral memory storage device;

in response to successfully authenticating the user according to the first authentication process, providing the first system with one of read-only access to the peripheral memory storage device and write-only access to the peripheral memory storage device;

performing a second authentication process for authenticating the same user to the peripheral memory storage device; and,

in response to successfully authenticating the same user according to the second authentication process, providing the first system with read and write access to the peripheral memory storage device.

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