Method and apparatus for removable, IDE-ATA or SCSI flash memory based data storage in a portable computer device

FIELD OF THE INVENTION

The present invention relates to a method and apparatus for a portable computer device to be fitted with a first storage medium device comprising a non-volatile, flash data storage unit, and a second storage medium device comprising of a magnetic data storage unit, where first storage medium will store portable computer device operating system and application software, and second said storage medium to store additional software and files. The present invention may also comprise routines to allow a designated swap file size to be resident on the first or second storage medium, or a combination thereof.

The present invention attempts to solve the fundamental problem of electric power consumption on portable computing devices such as personal laptop computers.

One prominent device that consumes a significant amount of battery power is the computer hard disk (or commonly called hard drive), due to the electric motor that is in operation in order to rotate the disk platter assembly in the hard disk.

One common technique incorporated into many computer operating systems allow for a hard disk to stop spinning once a predetermined time period of inactivity is detected, thus saving battery power and lengthening the computer operating time.

Already, there are product vendors that are producing non-volatile flash memory devices that are connected to hard disk drive controllers that can easily replace existing hard disk systems that reply on mechanical disk platters.

Due to cost considerations, such products are mainly utilized in industrial, military and high specialized applications where the data storage medium must be rugged and be capable of withstanding large mechanical shocks that existing mechanical disk platter type of hard disks may encounter reliability and performance problems.

Such flash-based hard disks, if installed onto portable computers, will significantly increase the battery life of existing portable computing devices and will be generally be more reliable due to the lack of mechanical parts.

There is also a need for hard disks of portable computer devices to be removable in a user-friendly manner to accommodate the security of data stored on such computer devices especially when travelling.

There is a need for a means to allow the hard disk of a portable computer to be easily removed, be stored in a compact storage bag or enclosure, and be subsequently reattached when its operation is required.

This feature may also allow for separate users to make use of the same portable computer without any remote possibility of data privacy compromises, opening up the possibility for portable computer devices to be rented out, or be safely shared in a public environment such as a café.

The same feature may also allow for multiple operating systems to be utilized on the same portable computer device.

SUMMARY OF THE INVENTION

It is object of the present invention to provide for a method and apparatus for a non-volatile flash memory storage unit to be connected to a hard disk drive controller interface unit, thus constituting a flash memory data storage device, and further be connected to a portable computer device.

The data storage device can be accessed and removable from the portable computer device, and may also comprise of software that can transfer the contents of the data storage device to another suitable second data storage device by first copying the contents of the first data storage device to a intermediate data storage medium, allowing the first data storage device to be removed, and transferring the contents from the intermediate data storage medium to the second data storage device once the second said device is inserted into the portable computer device.

In the first embodiment of the present invention, a non-volatile flash-based data storage device (with may already be incorporated with a hard disk controller interface unit), is constructed within a suitable enclosure that is designed and suitable for frequent removal from a portable computer device.

In the second preferred embodiment of the present invention, the enclosure is designed to be extremely rugged and be physically sealed to prevent water, debris, and dirt from any contact with the flash memory units, the hard disk controller interface unit, and related electronic components that is connected and in communication with either the interface or memory units.

The enclosure may further seal the flash-based storage device and its controller interface unit from elements such as water, dirt etc.

The enclosure may also be designed with a sealed enclosed volume to contain the flash memory semiconductor elements, its electronic circuitry, and its hard drive controller interface unit.

The enclosure may also be designed with a second and separately enclosed volume to contain electrical contact points that facilitate the supply of electrical power, and data signal contact points.

The separate first and second enclosed volumes thus allow for a very durable and rugged enclosure construction, since the first enclosure may be sealed securely to be highly resistant to dirt, water and debris, while the second enclosed volume contains electric contact points, which, in an event where replacement is required, may be taken apart and be replaced with a similar second enclosure unit.

In the third preferred embodiment of the present invention, a flash-based storage drive device (equipped with an IDE interface) is coupled and in communication with a magnetic-based mass storage device (commonly called a hard disk drive), and may be connected to a single IDE interface, prior to being connected to a portable computer system.

In such a configuration, the flash-based component of this coupled permanent storage device will store the contents of the operating system and pre-loaded software applications and any system related software and code (such as swap files and temporary files).

The magnetic-based storage device component will store user-designated files such as documents, photos and additional software applications that the user may choose to install.

Using this configuration, the operation of the magnetic hard drive is minimized (since it will only be used during times where user files are to be worked on, saved, or written to).

The bulk of loading, reading and writing files to and from the system memory will be implemented on the flash-based component of the present invention.

Because the flash-based component of the present invention does not involve moving parts and is generally consuming less power than the magnetic hard drive, the overall power requirement of the portable computer will be lower than of a portable computer that makes use of a magnetic based hard disk drive system as its principle data storage device.

System performance of the present invention is also better since the swap (or temporary files) commonly used by the operating system of the portable computer is now stored on the flash-based storage component of the present invention.

Another advantage of the present invention is the ability to have the magnetic-based storage device to be swapped with another similar drive once the storage capacity of the magnetic drive is utilized its fullest without the need to transfer or move the portable computer's operating system and perhaps some of its core software applications along.

Currently, for most portable computer users, once the capacity of their computer's primary hard disk is reached, a new replacement hard drive must be obtained, and its entire contents including the portable computer's operating

system and applications be copied onto the new hard drive.

This takes up a lot of time and is generally not productive and may also risk the loss of user preferences and computer settings such as preferred email passwords etc.

The present invention therefore attempts to solve the problem of power consumption while at the same time improving overall performance of the portable computer since write and read access speeds on flash-based drives are generally faster than magnetic-based hard drive systems.

In the forth preferred embodiment of the present invention, a flash-based memory storage device is connected to a IDE interface and a magnetic-based storage device is also connected to the same IDE interface, allowing both devices to function as a single primary storage device, then allowing the combined devices with the same IDE interface to a portable computer allowing for the portable computer's operating system and preferred applications to be stored on the flash memory device, while allowing other user documents and files and additional software applications to be stored on the magnetic storage device component of the present invention.

The operating system related temporary files such as swap files and other transient files or session specific files may be also designed to be stored on the flash-memory device component of the present invention.

This implementation will also allow for the minimization of the use of the magnetic-based storage device component of the present invention, while at the same time allowing for performance to be improved over primary magnetic drives since the use of devices with moving parts will be minimized.

The general access read-write speed of the portable computer with the present invention will be improved.

BRIEF DESCRIPTION OF THE DRAWINGS

Illustrative embodiments of the present invention will now be described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 illustrates a magnetic hard drive connected to an IDE controller unit, and a flash-based memory storage device connected to the same. The IDE controller is then connected and in communication with a portable computer, which recognize the magnetic hard drive and memory storage device as a single mass storage system.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

According to a first embodiment of the present invention, a non-volatile flash-based data storage device (with may already be incorporated with a hard disk controller interface unit), is constructed within a suitable enclosure that is designed and suitable for frequent removal from a portable computer device.

In the second preferred embodiment of the present invention, the enclosure is designed to be extremely rugged and be physically sealed to prevent water, debris, and dirt from any contact with the flash memory units, the hard disk controller interface unit, and related electronic components that is connected and in communication with either the interface or memory units.

The enclosure may further seal the flash-based storage device and its controller interface unit from elements such as water, dirt etc.

The enclosure may also be designed with a sealed enclosed volume to contain the flash memory semiconductor elements, its electronic circuitry, and its hard drive controller interface unit.

The enclosure may also be designed with a second and separately enclosed volume to contain electrical contact points that facilitate the supply of electrical power, and data signal contact points.

The separate first and second enclosed volumes thus allow for a very durable

and rugged enclosure construction, since the first enclosure may be sealed securely to be highly resistant to dirt, water and debris, while the second enclosed volume contains electric contact points, which, in an event where replacement is required, may be taken apart and be replaced with a similar second enclosure unit.

In the third preferred embodiment of the present invention, a flash-based storage drive device (equipped with an IDE interface) is coupled and in communication with a magnetic-based mass storage device (commonly called a hard disk drive), and may be connected to a single IDE interface, prior to being connected to a portable computer system.

In such a configuration, the flash-based component of this coupled permanent storage device will store the contents of the operating system and pre-loaded software applications and any system related software and code (such as swap files and temporary files).

The magnetic-based storage device component will store user-designated files such as documents, photos and additional software applications that the user may choose to install.

Using this configuration, the operation of the magnetic hard drive is minimized (since it will only be used during times where user files are to be worked on, saved, or written to).

The bulk of loading, reading and writing files to and from the system memory will be implemented on the flash-based component of the present invention.

Because the flash-based component of the present invention does not involve moving parts and is generally consuming less power than the magnetic hard drive, the overall power requirement of the portable computer will be lower than of a portable computer that makes use of a magnetic based hard disk drive system as its principle data storage device.

System performance of the present invention is also better since the swap (or temporary files) commonly used by the operating system of the portable

computer is now stored on the flash-based storage component of the present invention.

Another advantage of the present invention is the ability to have the magnetic-based storage device to be swapped with another similar drive once the storage capacity of the magnetic drive is utilized its fullest without the need to transfer or move the portable computer's operating system and perhaps some of its core software applications along.

Currently, for most portable computer users, once the capacity of their computer's primary hard disk is reached, a new replacement hard drive must be obtained, and its entire contents including the portable computer's operating system and applications be copied onto the new hard drive.

This takes up a lot of time and is generally not productive and may also risk the loss of user preferences and computer settings such as preferred email passwords etc.

The present invention therefore attempts to solve the problem of power consumption while at the same time improving overall performance of the portable computer since write and read access speeds on flash-based drives are generally faster than magnetic-based hard drive systems.

In the forth preferred embodiment of the present invention, a flash-based memory storage device is connected to a IDE interface and a magnetic-based storage device is also connected to the same IDE interface, allowing both devices to function as a single primary storage device, then allowing the combined devices with the same IDE interface to a portable computer allowing for the portable computer's operating system and preferred applications to be stored on the flash memory device, while allowing other user documents and files and additional software applications to be stored on the magnetic storage device component of the present invention.

The operating system related temporary files such as swap files and other transient files or session specific files may be also designed to be stored on the flash-memory device component of the present invention.

This implementation will also allow for the minimization of the use of the magnetic-based storage device component of the present invention, while at the same time allowing for performance to be improved over primary magnetic drives since the use of devices with moving parts will be minimized.

The general access read-write speed of the portable computer with the present invention will be improved.

Modifications within the spirit and scope of the invention may readily be effected by persons skilled in the art. It is to be understood, therefore, that this invention is not limited to the particular embodiments described by way of example hereinabove.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A method and apparatus for a portable computer to be installed with a first solid state data storage device, and a second data storage device, first storage device storing at least the operating system software of the portable computer, and the second storage device storing other user designated software files

2. A method and apparatus for a data storage device comprising a first solid state data storage device, and a second magnetic data storage device, where first and second storage devices are connected to a common mass data storage drive interface controller circuit

3. A method and apparatus for a data storage device comprising a first solid state data storage device, and a second magnetic data storage device, first and second device in communication with a common interface controller circuit

4. A method and apparatus as claimed in claim 3, first storage device storing operating system software files, hardware and/or software drivers, and pre-loaded computer application software files, second storage device storing additional computer application software files, user designated files

5. A method and apparatus as claimed in claims 1, 3 and 4, where first storage device will also allow storage of temporary or session resident software and/or files required by the operating system software of the portable computer

6. A method and apparatus for a data storage device comprising a first solid state data storage device (flash-based data storage), and a second magnetic data storage device, both first and second devices connected and in communication with a integrated drive electronics (IDE/ATA) controller circuit

7. A method and apparatus as claimed in claim 6, where first device will store operating system software files, hardware and/or software driver files, computer implemented software application files, and session specific temporary files such as a swap file

8. A method and apparatus as claimed in claim 6, where second device will store user designated files, additional user installed application files, user created documents

9. A method and apparatus as claimed in claims 1 to 8, where a computer is installed with a data storage device comprising a first solid state data storage device, and a second magnetic storage device, first and second devices are connected and in communication with a common IDE/ATA

controller, and first data storage device storing operating system files, hardware/software driver files, and temporary swap files of the computer, and second data storage device storing additional files installed by user of the said computer