



US 20060156386A1

(19) **United States**(12) **Patent Application Publication****Jung et al.**(10) **Pub. No.: US 2006/0156386 A1**(43) **Pub. Date: Jul. 13, 2006**

(54) **INFORMATION STORAGE MEDIUM
STORING MANAGEMENT INFORMATION
OF APPLICATION EXECUTABLE FROM A
PLURALITY OF STORAGE MEDIA, AND
METHOD AND APPARATUS FOR
EXECUTING THE APPLICATION**

Publication Classification

(51) **Int. Cl.**
H04L 9/32 (2006.01)
(52) **U.S. Cl.** **726/2**

(75) Inventors: **Kil-soo Jung**, Hwaseong-si (KR);
Sung-wook Park, Seoul (KR);
Kwang-min Kim, Seoul (KR)

(57) **ABSTRACT**

Correspondence Address:
STEIN, MCEWEN & BUI, LLP
1400 EYE STREET, NW
SUITE 300
WASHINGTON, DC 20005 (US)

An information storage medium storing management information of an application executable from a plurality of information storage media, and a method and apparatus for executing the application based on the management information are provided. The method includes: if a new information storage medium is inserted into a reproducing apparatus during the execution of the application, reading information on an identifier of the new information storage medium; and determining whether to continuously execute the application based on the information and continuously executing the application according to a result obtained by the determination. The information on the identifier of the new information storage medium may be included in the application or in an application management table (AMT) of the information storage medium. A life cycle of a disc unbound application is managed so as to use an application that can be shared by different information storage media.

(73) Assignee: **Samsung Electronics Co., Ltd.**, Suwon-si (KR)

(21) Appl. No.: **11/330,129**

(22) Filed: **Jan. 12, 2006**

(30) **Foreign Application Priority Data**

Jan. 12, 2005 (KR) 2005-3008
Jun. 21, 2005 (KR) 2005-53609

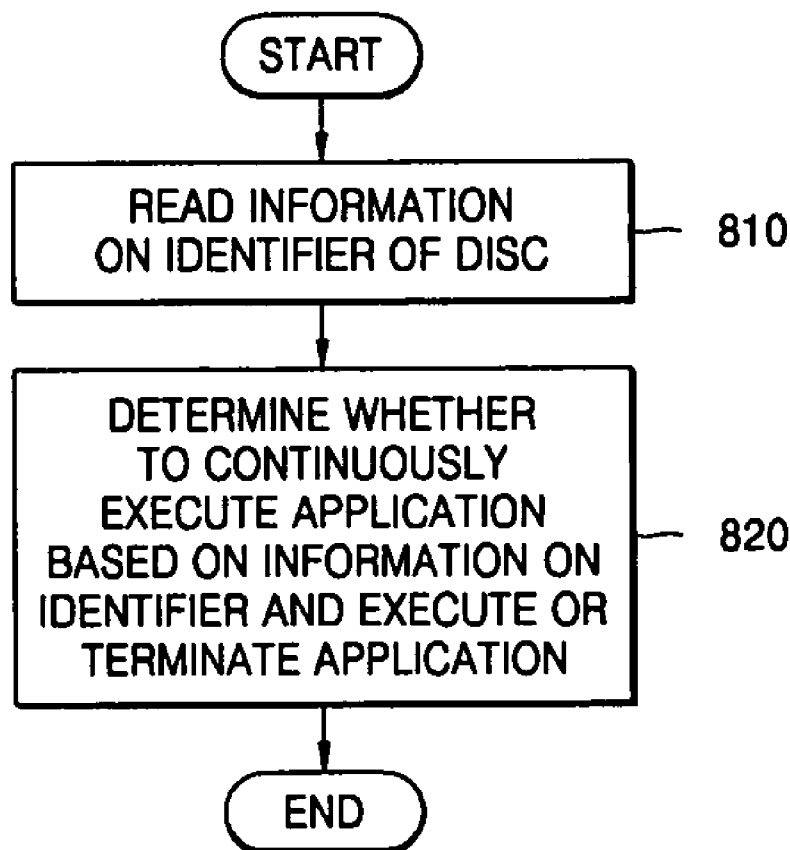


FIG. 1

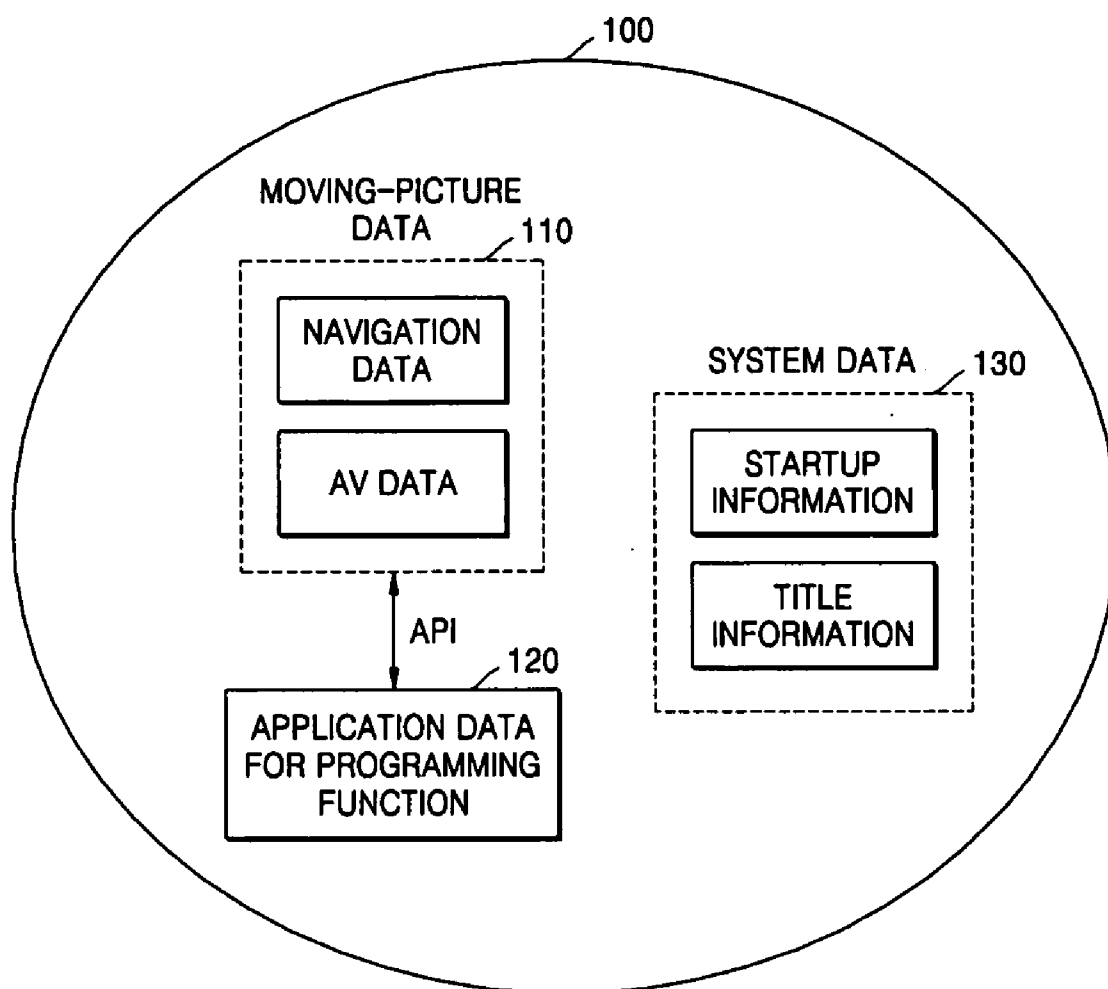


FIG. 2

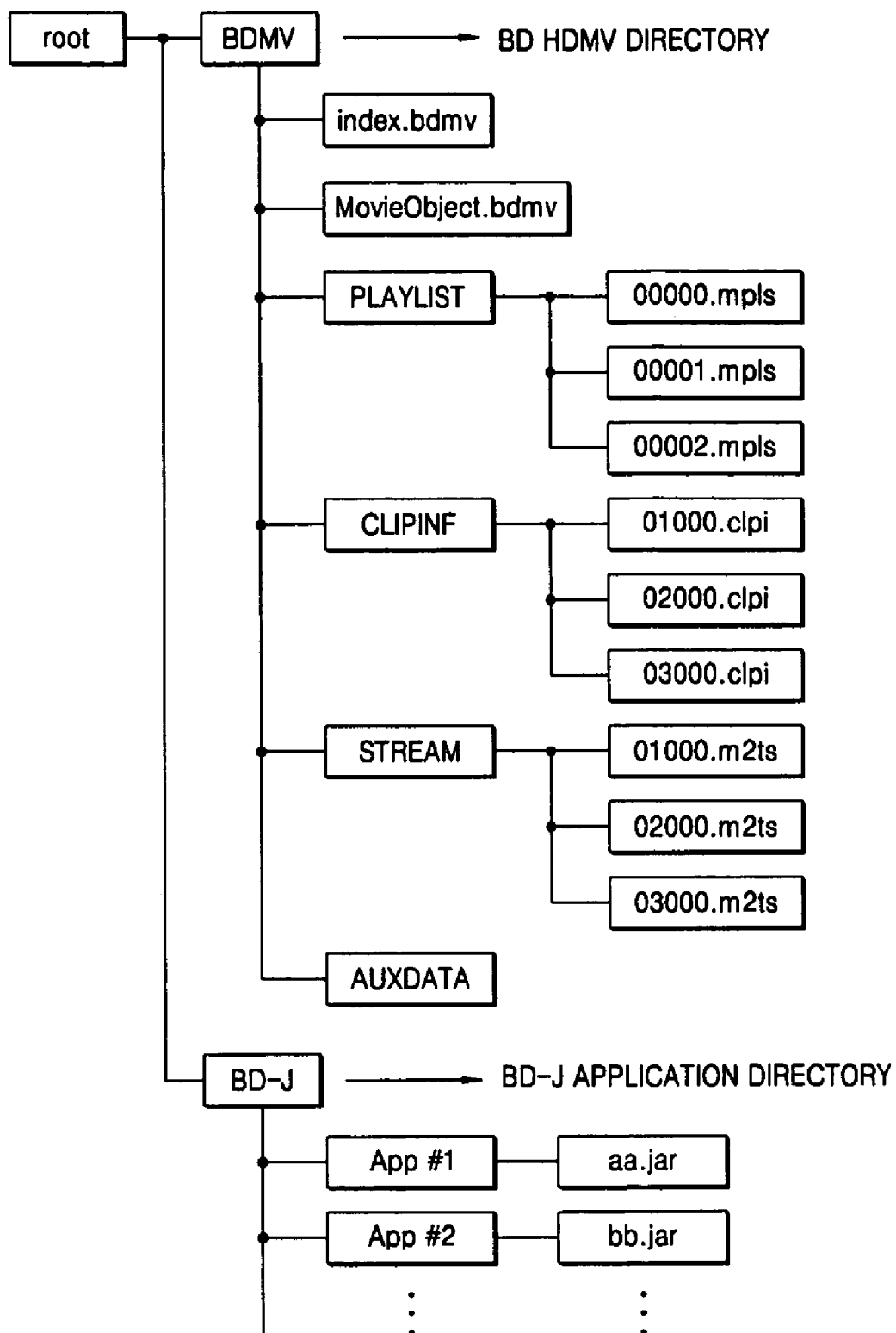


FIG. 3

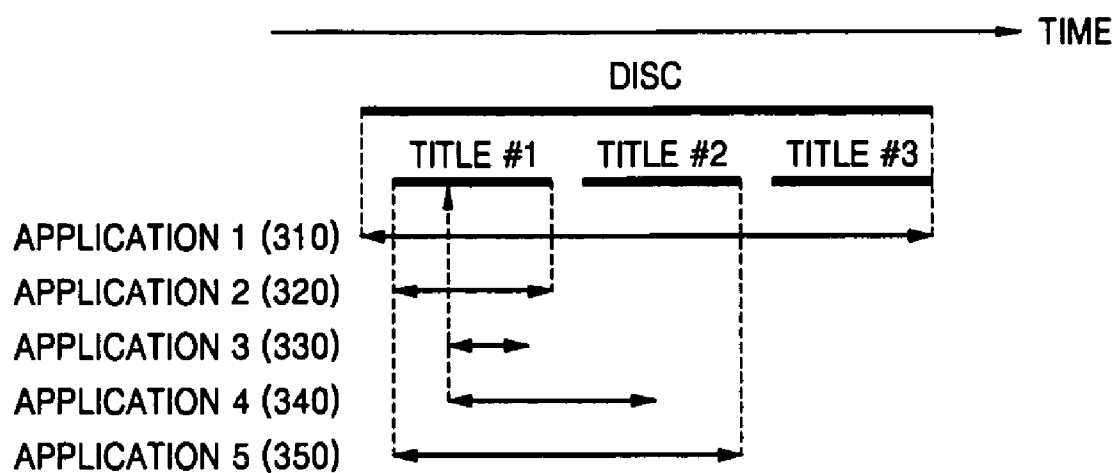


FIG. 4

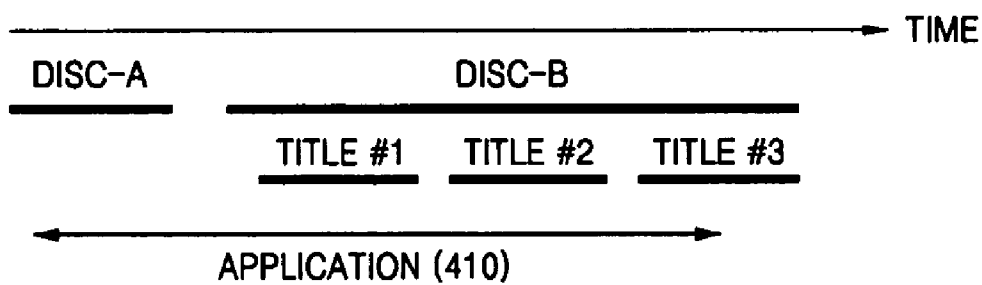


FIG. 5

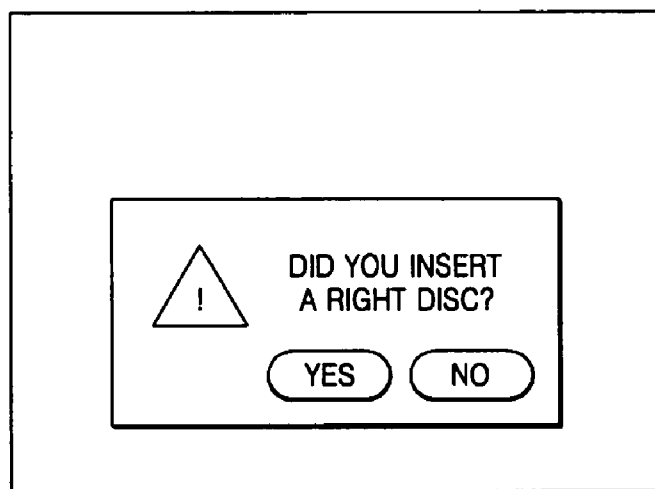


FIG. 6A

TITLE #1 AMT

| APPLICATION IDENTIFIERS | WHETHER APPLICATION IS DISC UNBOUND APPLICATION | DISC UNBOUND INFORMATION |
|-------------------------|---|--------------------------|
| APPLICATION #1 | YES | DISC_ID #2, DISC_ID #3 |
| APPLICATION #2 | NO | - |
| APPLICATION #3 | NO | - |

FIG. 6B

TITLE #1 AMT

| APPLICATION TYPES | APPLICATION IDENTIFIERS | UNBOUND INFORMATION |
|-------------------|-------------------------|------------------------|
| TITLE BOUND | APPLICATION #1 | - |
| | APPLICATION #2 | - |
| | APPLICATION #3 | - |
| TITLE UNBOUND | APPLICATION #4 | TITLE #1, TITLE #2 |
| DISC UNBOUND | APPLICATION #5 | DISC_ID #2, DISC_ID #3 |
| | APPLICATION #6 | DISC_ID #1, DISC_ID #3 |

FIG. 6C

TITLE #1 AMT

| APPLICATION IDENTIFIERS | WHETHER APPLICATION IS DISC UNBOUND APPLICATION |
|-------------------------|---|
| APPLICATION #1 | YES |
| APPLICATION #2 | NO |
| APPLICATION #3 | NO |

FIG. 7

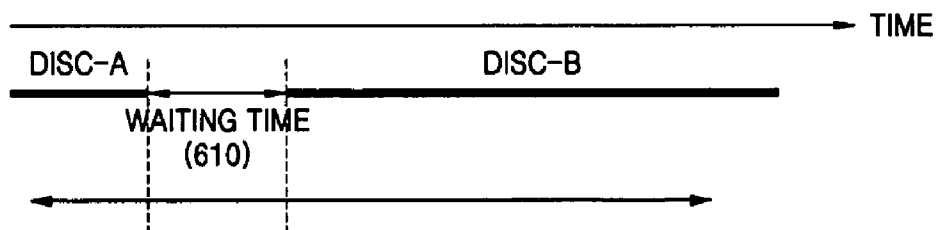


FIG. 8

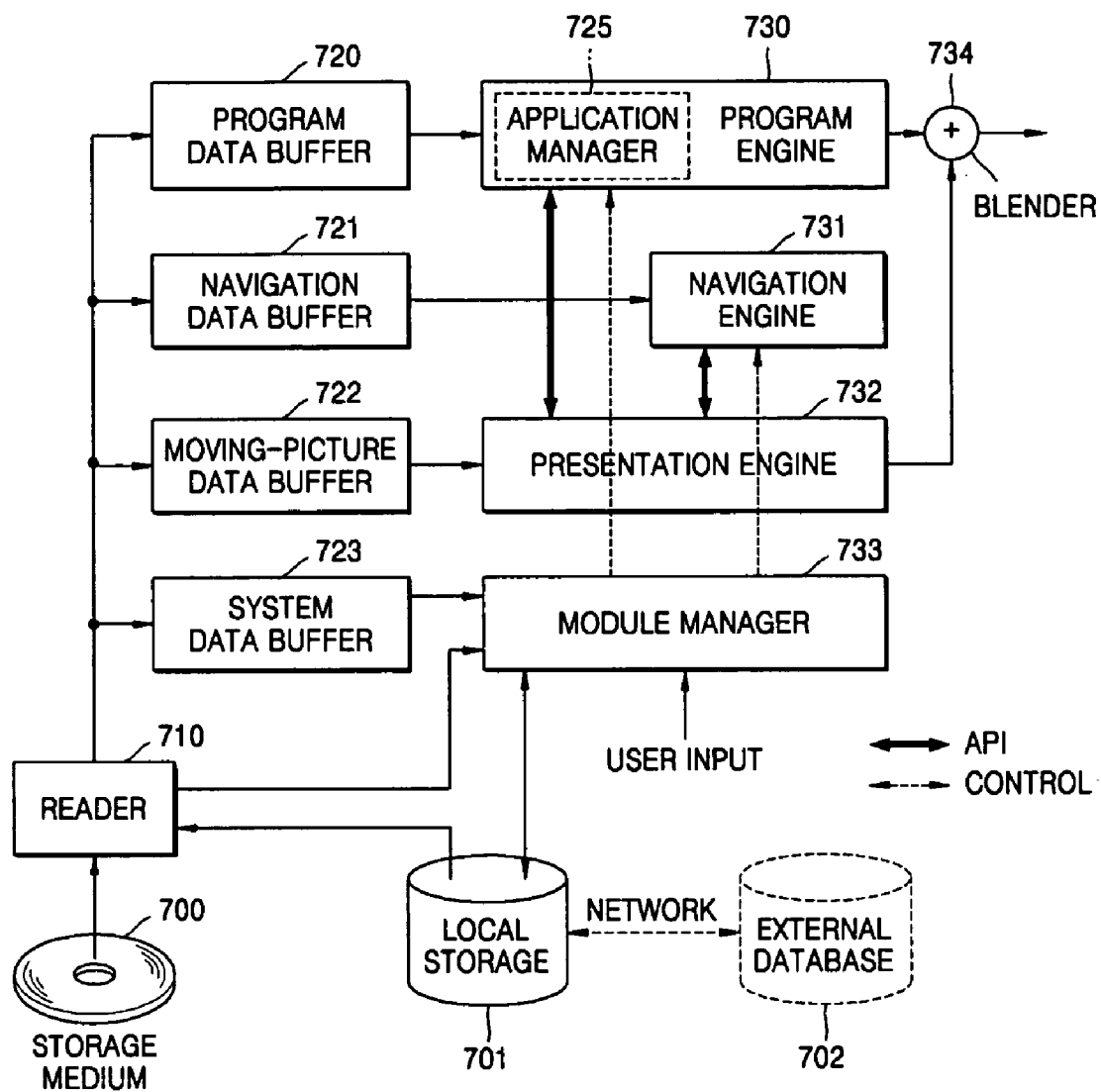
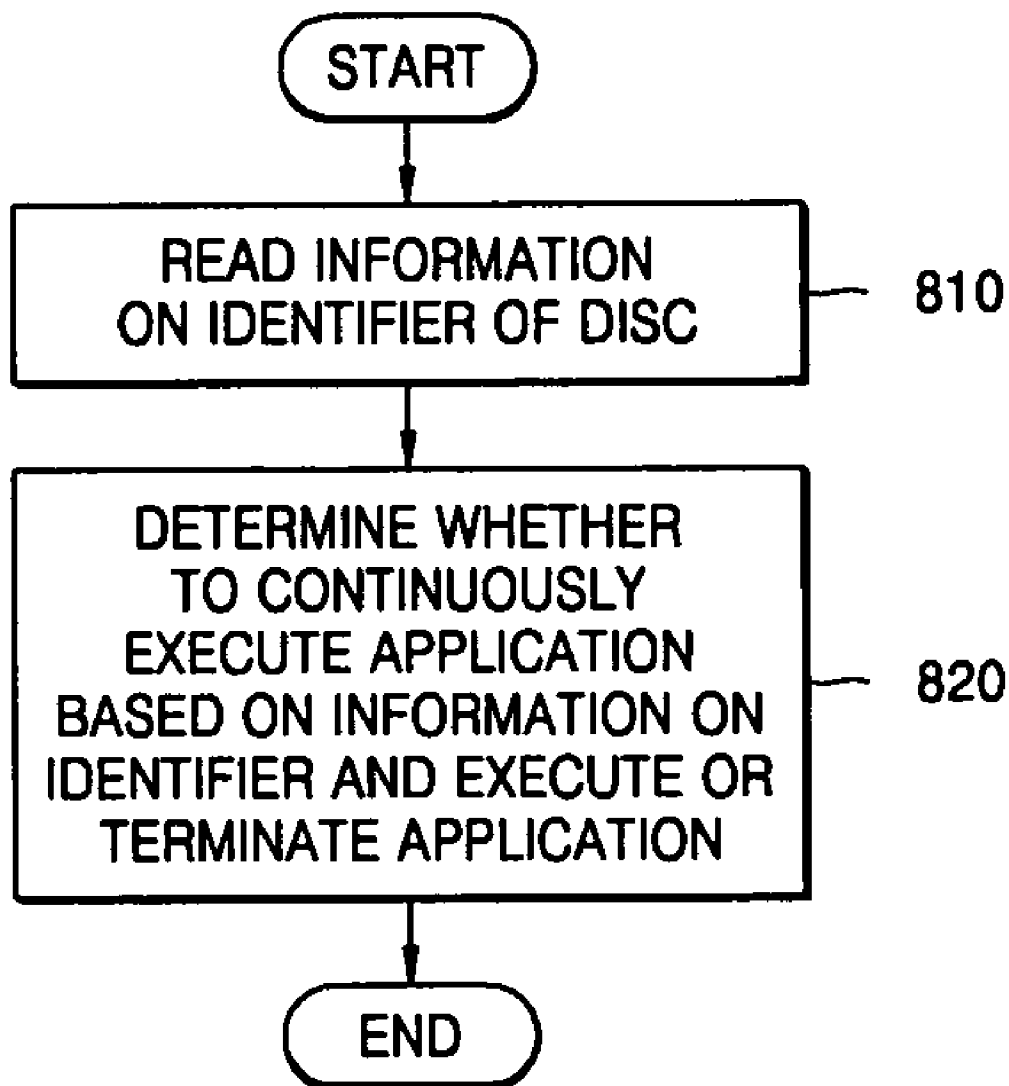


FIG. 9



**INFORMATION STORAGE MEDIUM STORING
MANAGEMENT INFORMATION OF
APPLICATION EXECUTABLE FROM A
PLURALITY OF STORAGE MEDIA, AND
METHOD AND APPARATUS FOR EXECUTING
THE APPLICATION**

**CROSS-REFERENCE TO RELATED
APPLICATIONS**

[0001] This application claims the benefit of Korean Application Nos. 2005-3008 and 2005-53609, filed Jan. 12, 2005 and Jun. 21, 2005, respectively, in the Korean Intellectual Property Office, the disclosures of which are incorporated herein by reference.

BACKGROUND OF THE INVENTION

[0002] 1. Field of the Invention

[0003] An aspect of the present invention relates to reproduction of multimedia data recorded on an information storage medium, and, more particularly, to an information storage medium storing management information of an executable application from a plurality of information storage media, and a method and apparatus to execute the application based on the management information.

[0004] 2. Description of the Related Art

[0005] Moving-picture data recorded on conventional recording media such as DVDs, BDs, etc., contains audio-visual (AV) data that is compression-encoded and navigation data that is needed to control the reproduction of AV data.

[0006] Specifically, AV data includes an AV stream composed of video, audio, and/or subtitles, which are encoded according to a motion picture experts group (MPEG) standard. AV data may further include additional information, such as encoding properties of an AV stream or an entry point for random access, and a play list, which is an object to arrange the order of reproducing moving-pictures.

[0007] Navigation data includes navigation commands to control the reproduction of AV data. Examples of the navigation commands include a command to reproduce a play list and a command to jump to another play list. AV data may be reproduced with reference to navigation information recorded in a storage medium. Thus, a user may watch a high-quality moving-picture such as a movie.

[0008] Also, application data providing a programming function in addition to moving-picture data is provided to allow for an interactive operation with a user. The application data may be executed in a title or a plurality of titles included in an information storage medium.

[0009] However, when content is too large to be stored in one information storage medium, the content is stored in a plurality of information storage media. For examples, games are separately stored in a plurality of information storage media using a series of contents or a plurality of stages. Therefore, it is necessary to execute an application from the plurality of information storage media and manage the application.

SUMMARY OF THE INVENTION

[0010] Aspects of the present invention provides an information storage medium storing management information of

an application executable from a plurality of information storage media, and a method and apparatus to execute the application based on the management information.

[0011] According to an aspect of the present invention, there is provided a method of executing an application from a plurality of information storage media, the method comprising: if a new information storage medium is inserted into a reproducing apparatus during the execution of the application, reading information on an identifier of the new information storage medium; and determining whether to continuously execute the application based on the information and continuously executing the application according to a result obtained by the determination.

[0012] The reading of the information on the identifier of the new information storage medium may comprise: extracting information on the identifier of the new information storage medium.

[0013] The application may comprise information on an identifier of an information storage medium capable of executing the application, while the determining whether to continuously execute the application comprises: comparing the information on the identifier of the information storage medium included in the application with the information on the identifier of the new information storage medium, and determining whether to continuously execute the application based on a result of the comparison.

[0014] The determining whether to continuously execute the application may further comprise: if the information on the identifier of the information storage medium included in the application is identical to the information on the identifier of the new information storage medium, maintaining the reproduction of the application.

[0015] The determining whether to continuously execute the application may further comprise: if the information on the identifier of the information storage medium included in the application is not identical to the information on the identifier of the new information storage medium, providing a user interface requiring reconfirmation of a user.

[0016] The determining whether to continuously execute the application may further comprise: separately managing information on the identifier of the information storage medium capable of executing the application with reference to an application management table (AMT) stored in the information storage medium, when the new information storage medium is inserted into the reproducing apparatus, comparing the identifier of the new information storage medium with the AMT, and determining whether to reproduce the application.

[0017] According to another aspect of the present invention, there is provided a method of executing an application from a plurality of information storage media, the method comprising: if a new information storage medium is inserted into a reproducing apparatus during the execution of the application, confirming whether the new information storage medium includes the same information on an identifier of an application as the executed application; and determining whether to continuously execute the application based on a result obtained by the confirmation and continuously executing the application according to a result obtained by the determination.

[0018] The determining whether to continuously execute the application may comprise: if the new information storage medium includes the same information on an identifier of an application as the executed application, continuously executing the application.

[0019] The determining whether to continuously execute the application may further comprise: if the new information storage medium does not include the same information on an identifier of an application as the executed application, providing a user interface requiring a reconfirmation of a user.

[0020] The determining whether to continuously execute the application may further comprise: if the new information storage medium does not include the same information on an identifier of an application as the executed application, terminating the application.

[0021] The confirming of whether the new information storage medium includes the same information may comprise: confirming that the new information storage medium includes the same information on the identifier of the application as information on an identifier of the executed application based on an AMT stored in the new information storage medium.

[0022] According to another aspect of the present invention, there is provided an application management table (AMT) to manage an application executed from a plurality of information storage media, the AMT comprises: an ID identifying the application; and information indicating whether the application is a disc unbound application executed from the plurality of information storage media.

[0023] The AMT may further comprise: information on an identifier of an information storage medium capable of executing the application.

[0024] According to another aspect of the present invention, there is provided an information storage medium storing an AMT to manage an application executed from a plurality of information storage media, wherein the AMT comprises: an ID identifying the application; and information indicating whether the application is a disc unbound application executed from the plurality of information storage media.

[0025] The AMT may further comprise: information on an identifier of an information storage medium capable of executing the application.

[0026] According to another aspect of the present invention, there is provided a reproducing apparatus for an information storage medium storing an application executed from a plurality of information storage media, the reproducing apparatus comprises: an application manager to manage the execution of the application, and to terminate the application when an information storage medium is ejected from the reproducing apparatus and a new information storage medium is not inserted into the reproducing apparatus within a predetermined time during the execution of the application.

[0027] The application manager may forcibly terminate the application if a new information storage medium is not inserted into the reproducing apparatus within a predetermined time by measuring a system clock after an information storage medium is ejected from the reproducing apparatus.

[0028] The reproducing apparatus may further comprise: a module manager providing a user interface so that a user may terminate the application while the information storage medium is not inserted in the reproducing apparatus, and to receive a user input through the user interface.

[0029] The module manager may further provide a termination key to execute a command input through the user interface.

[0030] The module manager may map the command input through the user interface to an existing key.

[0031] The module manager may mask keys included in the user interface relating to the application when no information storage medium is inserted into the reproducing apparatus.

[0032] The application manager may control the application not to access a local storage of the reproducing apparatus or a network while no information storage medium is inserted in the reproducing apparatus.

[0033] Additional and/or other aspects and advantages of the invention will be set forth in part in the description which follows and, in part, will be obvious from the description, or may be learned by practice of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0034] These and/or other aspects and advantages of the invention will become apparent and more readily appreciated from the following description of the embodiments, taken in conjunction with the accompanying drawings of which:

[0035] **FIG. 1** illustrates types of data recorded on an information storage medium according to an embodiment of the present invention;

[0036] **FIG. 2** illustrates a directory structure of the information storage medium of **FIG. 1**;

[0037] **FIG. 3** illustrates life cycles of BD-J applications being executed during the reproduction of titles;

[0038] **FIG. 4** illustrates a life cycle of a BD-J application being executed from a plurality of information storage media;

[0039] **FIG. 5** illustrates a message provided to a user when a new information storage medium is inserted into a reproducing apparatus during the execution of the BD-J application illustrated in **FIG. 4**;

[0040] **FIG. 6A** illustrates a structure of an application management table (AMT) according to an embodiment of the present invention;

[0041] **FIG. 6B** illustrates another structure of an AMT according to an embodiment of the present invention;

[0042] **FIG. 6C** illustrates another structure of an AMT according to an embodiment of the present invention;

[0043] **FIG. 7** illustrates a relationship between a waiting time from the ejection of a storage medium to the insertion of a new storage medium and the execution of the BD-J application;

[0044] **FIG. 8** is a block diagram of a reproducing apparatus according to an embodiment of the present invention; and

[0045] **FIG. 9** is a flowchart illustrating a method of executing an application according to an embodiment of the present invention.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0046] Reference will now be made in detail to the present embodiments of the present invention, examples of which are illustrated in the accompanying drawings, wherein like reference numerals refer to the like elements throughout. The embodiments are described below in order to explain the present invention by referring to the figures.

[0047] **FIG. 1** illustrates types of data recorded on an information storage medium **100** according to an embodiment of the present invention. Referring to **FIG. 1**, the information storage medium stores moving-pictures data **110**, application data **120** for a programming operation (hereinafter referred to as application data), and system data **130**.

[0048] The moving-pictures data **110** used in reproducing moving-pictures is referred to as core mode data or movie mode data. The moving-pictures data **110** includes AV data that is compression-encoded and navigation data to control the reproduction of AV data. Therefore, AV data may be reproduced with reference to the navigation data recorded on the storage medium, and a user may watch high-quality moving-pictures such as movies.

[0049] The application data **120** used to provide interactive operations with the user is referred to as full mode data. The application data **120** may provide a variety of applications offering games using moving-pictures, an operation to display a director's commentary while reproducing a portion of a moving-picture, an operation to display additional information while reproducing a portion of a moving-picture, or a chatting operation during a reproduction of a moving-picture.

[0050] If a movie has been recorded on the information storage medium, information related to the movie such as the latest news about actors/actresses starring in the movie, events related to the movie, or updated subtitles, which are stored on a web page or in a database, may be retrieved and reproduced together with the movie.

[0051] To execute an application program while reproducing a moving-picture, the application data **120** may include an application program interface (API) operation for a presentation engine that reproduces moving-picture information. The application data **120** is implemented using a program language such as C or JAVA. For example, the present invention will describe a JAVA application such as xlet.

[0052] The system data **130** includes start-up information, title information, and application management information **131**. Start-up information includes information on the position of data to be first reproduced by a reproducing apparatus. Title information includes information on entry and properties of data operated when each title is reproduced.

[0053] The information storage medium, according to an embodiment of the present invention, includes the application data **120** for the programming operation in addition to the moving-pictures data **110** to reproduce a moving-picture and to provide a variety of interactive operations to the user.

[0054] **FIG. 2** illustrates a directory structure of the information storage medium recording the data illustrated in **FIG. 1**. Referring to **FIG. 2**, a BDMV directory under a root directory stores the high quality moving-pictures data **110** and the system data **130** and includes an index table directory, a movie object directory, a play list directory, a clip information directory, a clip AV stream directory, and an auxiliary data directory. Also, a BD-J application directory under the root directory stores the application data **120** for the programming operation and includes application identification (ID) directories and actual data directories of application programs.

[0055] More specifically, the system data **130**, is stored under the filename "index.bdmv." A movie object including navigation data is stored under the filename "MovieObject.bdmv." Also, a play list that is a unit of reproduction of a moving-picture is stored under filenames having five numbers and an extension .mpls under the PLAYLIST directory. A clip AV stream is stored under a filename having five numbers and an extension .m2ts under the STREAM directory. In particular, a clip information file corresponding to the clip AV stream file has the same five numbers as the clip AV stream file and a different extension from the clip AV stream file. Auxiliary data such as a font file for a text subtitle is stored in the AUXDATA directory.

[0056] The application data **120** is stored with the filename "aa.jar" in the APP #1 directory indicating information on an identifier of an application. According to an embodiment of the invention, a plurality of applications may be stored with the filenames "aa.jar," "bb.jar," etc., in the APP #1 directory, and the APP #2, etc., indicating information on identifiers of the plurality of applications.

[0057] **FIG. 3** illustrates life cycles of BD-J applications being executed during the reproduction of titles. Referring to **FIG. 3**, a variety of applications, which are operated in a BD-J mode are separated in titles to be used as a reproduction unit in an information storage medium, are executed and terminated during the reproduction of the titles.

[0058] Life cycles of applications are managed in titles using an application management table (AMT). An application that is not defined in the AMT cannot be executed during the reproduction of a title. Therefore, an application having a life cycle in a specific title defined in the AMT is automatically terminated when the title is converted into another title.

[0059] However, an application **1** (**310**), an application **4** (**340**), and an application **5** (**350**) are continuously executed when titles that are currently being reproduced are converted into other titles. The application **1** (**310**), the application **4** (**340**), and the application **5** (**350**) are title unbound applications. Since the title unbound applications are registered in the AMT along with a plurality of titles, even when a title is terminated, the title unbound applications are continuously executed.

[0060] **FIG. 4** illustrates a life cycle of a BD-J application being executed in a plurality of information storage media.

According to **FIG. 4**, one piece of contents is recorded in a plurality of information storage media (e.g., discs) and, thereafter, an application is executed from the plurality of information storage media. The application is a disc unbound application. The disc unbound application is required to share one application from a plurality of information storage media which are correlated in view of contents.

[0061] For example, when one piece of moving-picture data is recorded in the plurality of discs, a game application is provided as an application of the moving-picture data. In this regard, when a disc 2 is necessarily reproduced while the game application is executed from a disc 1, processing the game application being executed is difficult.

[0062] The disc unbound application has the following problems, unlike the title unbound application, which does not have the problems. Referring to **FIG. 4**, an application 410 is the disc unbound application executed from a disc A and a disc B. In this regard, a cross-disc life cycle must be maintained to execute the application 410 from a plurality of authenticated information storage media. However, when the disc A is unchanged and the disc B is replaced by a new information storage medium that is erroneously inserted into the reproducing apparatus by the user, the application 410 is terminated and another application defined by the new information storage medium is executed. That is, reproduction of the disc unbound application is not guaranteed. Therefore, unlike the title unbound application, the disc unbound application must double-check whether an unexpectedly inserted information storage medium has been inserted into the reproducing apparatus.

[0063] **FIG. 5** illustrates a message provided to a user when a new information storage medium is inserted into a reproducing apparatus during the execution of the BD-J application illustrated in **FIG. 4**. Referring to **FIG. 5**, to address a problem of an unexpectedly inserted information storage medium into the reproducing apparatus, when the new information storage medium is inserted into the reproducing apparatus during the execution of a disc unbound application, a message is provided to the user without terminating the disc unbound application. Therefore, when information storage media are exchanged during the execution of the disc unbound application, reproduction of the disc unbound application is guaranteed.

[0064] More specifically, a variety of methods of providing the message to the user will now be described. A first method includes providing information to process the disc unbound application. A second method includes providing information to process the disc unbound application in an AMT of a disc.

[0065] The first method uses information on an identifier of the information storage medium. That is, a manufacturer inserts a specific program to process the disc unbound application in advance. When the new information storage medium is inserted into the reproducing apparatus during the execution of the disc unbound application, the disc unbound application reads unique information on an identifier of the new information storage medium, e.g., a disc ID. Also, the disc unbound application compares the read information on the identifier with unique information on an identifier of an information storage medium in which an application regis-

tered in the disc unbound application may be executed, and provides a user interface based on the result obtained by the comparison.

[0066] In detail, if the information on the identifiers of the information storage media are identical to each other, the user interface illustrated in **FIG. 5** is not provided to a user. Rather, the application is continuously reproduced. However, if the information on the identifiers of the information storage media are not identical to each other, the user interface illustrated in **FIG. 5** is provided to the user so as to prompt the user to insert the information storage medium in the reproducing apparatus.

[0067] The second method makes use of information on the identifier of the information storage medium or information on an identifier of an application as the information for processing the application. In detail, when the new information storage medium is inserted into the reproducing apparatus during the execution of the disc unbound application, it is determined whether to execute the disc unbound application based on the AMT according to the present invention, recorded in the information storage medium.

[0068] A variety of AMTs may be realized according to aspects of the present invention.

[0069] **FIG. 6A** illustrates a structure of an AMT according to an embodiment of the present invention. Referring to **FIG. 6A**, the AMT relating to one title includes information on identifiers of applications, information on whether applications are disc unbound applications, and, if the applications are the disc unbound applications, disc unbound information including information on identifiers of information storage media in which the disc unbound applications are effectively executed.

[0070] **FIG. 6B** illustrates another structure of an AMT according to another embodiment of the present invention. Referring to **FIG. 6B**, the AMT relating to one title includes information on types of applications, information on identifiers of applications, and titles effectively executing the application, or information on identifiers of discs. The information on types of applications refers to information on whether the applications are title dependent applications, title unbound applications, or disc unbound applications.

[0071] The embodiments illustrated in **FIGS. 6A and 6B** include unique information on identifiers of information storage media to effectively execute the disc unbound applications. Therefore, when the disc unbound applications are operated, a reproducing apparatus separately manages information on an identifier of an information storage medium effectively executing the application defined in the AMT. When a new information storage medium is inserted into the reproducing apparatus, the reproducing apparatus reads information on an identifier of a previously inserted information storage medium, and compares the read information with the information on the information storage medium on which the application may be effectively executed. If the information of the media are identical to each other, the reproducing apparatus does not provide a user interface to a user but continuously reproduces the disc unbound application. If the information of the media are not identical to each other, the reproducing apparatus provides the user interface illustrated in **FIG. 5** to the user.

[0072] Unlike the AMTs illustrated in **FIGS. 6A and 6B**, the information on the information storage medium effectively executing the disc unbound application is not included in an AMT.

[0073] **FIG. 6C** illustrates another structure of an AMT according to an embodiment of the present invention. Referring to **FIG. 6C**, the AMT relating to one title includes information on identifiers of applications, and information on whether applications are disc unbound applications. The AMT does not include information on an information storage medium on which a disc unbound application may be effectively executed.

[0074] When a new information storage medium is inserted into a reproducing apparatus during the execution of the disc unbound application, the reproducing apparatus reads information on the AMT recorded in the new information storage medium. The reproducing apparatus confirms whether the AMT includes information on an identifier of the same application as the disc unbound application. If the AMT includes information on the identifier of the same application as the disc unbound application, the reproducing apparatus continuously executes the application. If the AMT does not include information on the identifier of the same application as the disc unbound application, the reproducing apparatus provides the user interface illustrated in **FIG. 5** to a user or terminates the disc unbound application.

[0075] **FIG. 7** illustrates a relationship between a required waiting time **610** from the ejection of a storage medium to the insertion of a new storage medium and the execution of the BD-J application. Referring to **FIG. 7**, a disc unbound application requires a predetermined time, such as the waiting time **610**, to insert different information storage media into a reproducing apparatus. During the waiting time **610**, no information storage medium is inserted into the reproducing apparatus but a specific disc unbound application is executed. When, during the waiting time **610**, the executable disc unbound application accesses a local storage of the reproducing apparatus or a web site of a manufacturing company over a network, access security may not be secure. When the waiting time **610** is allowed to continue indefinitely, the application is continuously executed without requiring that an information storage medium be purchased by the user. Therefore, the reproducing apparatus according to aspects of the present invention may have the following operations.

[0076] First, if the waiting time **610** required to execute a specific application, without an information storage medium, exceeds a predetermined time, the disc unbound application may be terminated. To this end, an application manufacturer may program an automatic termination of the specific application if the waiting time **610** exceeds the predetermined time. Also, if a disc B is not inserted into the reproducing apparatus within a predetermined time by measuring a system clock after a disc A is ejected from the reproducing apparatus, the application manufacturer may program a forced termination of the specific application.

[0077] Second, a user input key used to forcibly terminate the disc unbound application and a user operation for the user input key are provided to a user input device of the reproducing apparatus. The user ejects the disc A and continuously executes the disc unbound application regardless of inserting a new information storage medium into the

reproducing apparatus. Also, when the user ejects the disc A and wishes to perform an application from an information storage medium not related to the disc unbound application, if the reproducing apparatus displays the user interface illustrated in **FIG. 5**, the user may not properly execute the new application.

[0078] Therefore, the user may terminate the application using the user input key to forcibly terminate the disc unbound application. In addition, according to an embodiment of the invention, instead of the user input key, the user input device may provide the user operation to terminate the application using an existing key. For example, the user may terminate the disc unbound application by pressing a stop key twice.

[0079] Third, the reproducing apparatus may prevent an executable disc unbound application, during the waiting time **610** when no information storage medium is inserted into the reproducing apparatus, from accessing the local storage of the reproducing apparatus and website of a specific manufacturer. If such regulation is not provided, access to the local storage of the reproducing apparatus and website of the specific manufacturer may be possible. Here, where an information storage medium comprises a bad disc unbound application, access security may not be secured. Therefore, when the disc unbound application requires materials of the local storage and the website, the reproducing apparatus confirms whether an information storage medium is inserted into the reproducing apparatus, and, if the information storage medium is not inserted into the reproducing apparatus, the request of the disc unbound application may be disregarded.

[0080] Fourth, the reproducing apparatus may mask keys included in the user interface and which are related to the executable disc unbound application during the waiting time **610** when no information storage medium is inserted into the reproducing apparatus, such that the user cannot operate the keys. This prevents a disc unbound application from accessing the local storage of the reproducing apparatus and website of the specific manufacturer using a bad information storage medium, or, when discs are exchanged during the execution of a game application including moving-picture data, prevents the game application from being terminated by an erroneous pressing of keys provided in the user interface.

[0081] **FIG. 8** is a block diagram of a reproducing apparatus according to an embodiment of the present invention. Referring to **FIG. 8**, the reproducing apparatus includes a reader **710** to read data from an information storage medium **700**, buffers **720** through **723** to temporarily store the read data, and reproducers **725** through **734**, which are engines to reproduce the buffered data.

[0082] The reproducers comprise a module manager **733** that controls a navigation engine **731** by reading system data and processing a title change made by an initial execution and a user selection or a navigation change, etc., a navigation engine **731** that controls the reproduction of moving-picture based on the content of navigation data, a presentation engine **732** that decodes moving-picture data and outputs the decoded moving-picture, and a program engine **730** that executes an application program. For example, a JAVA virtual machine executing a JAVA application and a browser engine executing a HTML application are required to reproduce both the JAVA and HTML applications.

[0083] The reproducers further include a blender 734 that overlays a result obtained by executing the application program of the program engine 730 and a result obtained by reproducing the moving-picture data of the presentation engine 732. The blender 734 then forms a screen. Further, the program engine 730 may include an application manager 725 that controls the execution of the application program using an application object so as to provide a program operation.

[0084] The application manager 725 manages the execution of the application, and terminates the application when an information storage medium is ejected from the reproducing apparatus and a new information storage medium is not inserted into the reproducing apparatus within a predetermined time during the execution of the application. The application manager 725 controls the application not to access a local storage of the reproducing apparatus or a network while the new information storage medium is not inserted in the reproducing apparatus. The detailed description is provided with reference to **FIGS. 4 through 7**.

[0085] The reproducing apparatus further comprises a local storage 701 that stores a program application downloaded from an information storage medium 700 or an external database 702. Therefore, the module manager 733 forms a virtual file system illustrated in **FIG. 5** using data read from the information storage medium 700 and the local storage 701 and transfers reproduction control information to the program engine 730 and the navigation engine 731.

[0086] The module manager 733 provides a user interface so that a user may terminate the application while the information storage medium 700 is not inserted in the reproducing apparatus. For example, the user interface may provide a termination key used to execute a command performing a user input, and to map the command to an existing key.

[0087] **FIG. 9** is a flowchart illustrating a method of executing an application according to an embodiment of the present invention. Referring to **FIG. 9**, a disc unbound application is reproduced, if a disc is ejected and a new disc is inserted, and information on an identifier of the new disc is read (operation 810). Based on the information, whether to continuously execute the disc unbound application is determined (operation 820). A method of determining whether to continuously execute the disc unbound application has been described with reference to **FIGS. 4 through 7**.

[0088] According to an aspect of the present invention, a life cycle of a disc unbound application is managed so as to use an application that can be stored on different information storage media.

[0089] An aspect of the present invention may also be embodied as computer readable code on a computer readable recording medium. The computer readable recording medium is any data storage device that stores data which may be thereafter read by a computer system. Examples of the computer readable recording medium include read-only memory (ROM), random-access memory (RAM), CD-ROMs, magnetic tapes, floppy disks, optical data storage devices, and carrier waves.

[0090] Although a few embodiments of the present invention have been shown and described, it would be appreciated

by those skilled in the art that changes may be made in these embodiments without departing from the principles and spirit of the invention, the scope of which is defined in the claims and their equivalents.

What is claimed is:

1. A method of executing an application from a plurality of information storage media, the method comprising:

if a new information storage medium is inserted into a reproducing apparatus during the execution of the application, reading information on an identifier of the new information storage medium; and

determining whether to continuously execute the application based on the information and continuously executing the application according to the determination.

2. The method of claim 1, wherein the reading of the information on the identifier of the new information storage medium comprises extracting information on the identifier of the new information storage medium.

3. The method of claim 2, wherein, where the application includes information on an identifier of an information storage medium capable of executing the application, determining whether to continuously execute the application comprises comparing the information on the identifier of the information storage medium included in the application with the information on the identifier of the new information storage medium, and determining whether to continuously execute the application based on a result of the comparison.

4. The method of claim 3, wherein the determining whether to continuously execute the application further comprises, if the information on the identifier of the information storage medium included in the application is identical to the information on the identifier of the new information storage medium, continuously executing the application.

5. The method of claim 3, wherein the determining whether to continuously execute the application further comprises, if the information on the identifier of the information storage medium included in the application is not identical to the information on the identifier of the new information storage medium, providing a user interface requiring a reconfirmation of a user.

6. The method of claim 1, wherein the determining whether to continuously execute the application further comprises separately managing information on the identifier of the information storage medium capable of executing the application with reference to an application management table (AMT) stored in the information storage medium, such that, when the new information storage medium is inserted into the reproducing apparatus, the identifier of the new information storage medium is comparable with the AMT, and whether to execute the application may be determined.

7. A method of executing an application from a plurality of information storage media, the method comprising:

if a new information storage medium is inserted into a reproducing apparatus during an execution of the application, confirming whether the new information storage medium includes the same information on an identifier of an application as the executed application; and

determining whether to continuously execute the application based on the confirmation and continuously executing the application according to the determination.

8. The method of claim 7, wherein the determining whether to continuously execute the application comprises, if the new information storage medium includes the same information on an identifier of an application as the executed application, continuously executing the application.

9. The method of claim 7, wherein the determining whether to continuously execute the application further comprises, if the new information storage medium does not include the same information on an identifier of an application as the executed application, providing a user interface requiring a reconfirmation of a user.

10. The method of claim 7, wherein the determining whether to continuously execute the application further comprises, if the new information storage medium does not include the same information on an identifier of an application as the executed application, terminating the application.

11. The method of claim 7, wherein the confirming of whether the new information storage medium includes the same information comprises confirming that the new information storage medium includes the same information on the identifier of the application as information on an identifier of the executed application based on an AMT stored in the new information storage medium.

12. An application management table (AMT) to manage an application executed from a plurality of information storage media, the AMT comprising:

an identification (ID) to identify the application; and

information indicating whether the application is a disc unbound application executed from the plurality of information storage media.

13. The AMT of claim 12, further comprising information on an identifier of an information storage medium capable of executing the application.

14. An information storage medium storing an application management table (AMT) to manage an application executed from a plurality of information storage media, wherein the AMT comprises:

an identification (ID) to identify the application; and

information indicating whether the application is a disc unbound application executed from the plurality of information storage media.

15. The information storage medium of claim 14, wherein the AMT further comprises information on an identifier of an information storage medium capable of executing the application.

16. A reproducing apparatus of an information storage medium storing an application executed from a plurality of information storage media, the reproducing apparatus comprising an application manager to manage the execution of the application, and to terminate the application when the information storage medium is ejected from the reproducing apparatus and a new information storage medium is not inserted into the reproducing apparatus within a predetermined time during the execution of the application.

17. The reproducing apparatus of claim 16, wherein the application manager forcibly terminates the application if a new information storage medium is not inserted into the reproducing apparatus within a predetermined time by measuring a system clock after an information storage medium is ejected from the reproducing apparatus.

18. The reproducing apparatus of claim 16, further comprising a module manager providing a user interface to allow a user to terminate the application while the information storage medium is not inserted in the reproducing apparatus, and to receive a user input through the user interface.

19. The reproducing apparatus of claim 18, wherein the module manager further comprises a termination key to execute a command input through the user interface.

20. The reproducing apparatus of claim 18, wherein the module manager maps the command input through the user interface to an existing key.

21. The reproducing apparatus of claim 18, wherein the module manager masks keys included in the user interface relating to the application when no information storage medium is inserted into the reproducing apparatus.

22. The reproducing apparatus of claim 18, wherein the application manager controls the application not to access a local storage of the reproducing apparatus or a network while no information storage medium is inserted in the reproducing apparatus.

23. A method of executing an application from a first information storage medium inserted into a reproducing apparatus where the first information storage medium is replaced by a second information storage medium during an execution of the application, the method comprising:

reading information on an identifier of the second information storage medium;

comparing the information on the identifier of the first information storage medium with the information on the identifier of the second information storage medium; and

continuously executing the application, if the information on the identifier of the second information storage medium is identical to the information on the identifier of the first information storage medium.

24. The method according to claim 23, further comprising providing a user interface to a user, if the information on the identifier of the second information storage medium is not identical to the information on the identifier of the first information storage medium, to notify the user that the information on the identifier of the second information storage medium is not identical to the information on the identifier of the first information storage medium.

25. A computer readable medium to execute the method according to claim 23.

26. A computer readable medium to execute the method according to claim 1.

27. A computer readable medium to execute the method according to claim 7.

* * * * *