

5 Technical Field

Background Art

25 ISO/IEC7816-4 specifies the concept of EF
 (Elementary File) as a data structure for accesses via
 commands. A record type structure, a linear structure,

and a cyclic structure have been defined for EF.

ISO/IEC7816-4(2005) has a new additional concept of EF for a data object structure. That is, ISO/IEC7816-4(2005) has the additional basic concept of a data object structure composed of several data of a TVL data structure composed of a tag section, a length section, and a value section. The tag section describes a tag (identification information) indicating the type of data. The length section stores the data length of the data stored in the value section. The value section stores the process target data (write or read data). A data object is normally retrieved by specifying the value of the tag.

For example, a technique for the retrieval of a data object is disclosed in Jpn. Pat. Appln. KOKAI Publication No. 2004-178101. A summary of the technique disclosed in Jpn. Pat. Appln. KOKAI Publication No. 2004-178101 is provided below. An IC card reader reads a file recorded in a recording section of an IC card through communication with a main control section. The IC card reader registers a repetitive read execution command in association with registration numbers. To read information in which the position of data to be read is unspecified, from the IC card, the IC card reader receives, from the main control section, an interpreter execution command including a registration number and specification

information to be searched for. The IC card reader
uses the registered read execution command to search
for a data object in an IC card file having the
specification information. The IC card reader then
5 returns the data object to the main control section as
an interpreter execution response.

Disclosure of Invention

ISO/IEC7816 defines EF concepts as a method for
managing data in the memory in the IC card. Among the
10 EFs, particularly for the data object type EF, to
retrieve a data object, the value of the tag for the
data object is specified to retrieve the data object.

However, the method of specifying the value of the
tag to retrieve the data object is not so efficient
15 because the value of the tag is specified every time
the data object to be accessed is retrieved.

An object of the present invention is to solve
this problem to provide an information storage medium
and a medium processing system which enable efficient
20 data retrieval.

The information storage medium and medium
processing system according to the present invention
are configured as described below.

(1) The information storage medium (IC card)
25 according to the present invention comprises a card
main body in which a module is embedded, the module
comprising storage means for storing first data

comprising a data structure (TLV structure data)
including identification information (tag) which
identifies process target data, length information
(length) indicating data length of the process target
5 data, and the process target data (value), second data
succeeding the first data and comprising the same data
structure as that of the data structure of the first
data, and third data succeeding the second data and
comprising the same data structure as that of the data
10 structure of the first data, communication means for
communicating with a medium processing device
(reader/writer), and data processing means for
accessing the process target data included in the
second data on the basis of a first command received
15 via the communication means, the first command
specifying the identification information included in
the second data and ordering processing of the process
target data included in the second data, and
subsequently the process target data included in the
20 first data on the basis of a second command received
via the communication means, the second command
including a preceding specification and ordering
processing of the process target data.

(2) The information storage medium according to
25 the present invention comprises a card main body in
which a module is embedded, the module comprising
storage means for storing first data comprising a data

structure including identification information which identifies process target data, length information indicating data length of the process target data, and the process target data, second data succeeding the first data and comprising the same data structure as that of the data structure of the first data, third data included in the process target data in the second data and comprising the same data structure as that of the data structure of the first data, fourth data included in the process target data in the second data and succeeding the third data, the fourth data comprising the same data structure as that of the data structure of the first data, and fifth data succeeding the second data and comprising the same data structure as that of the data structure of the first data, communication means for communicating with a medium processing device, and data processing means for accessing the process target data included in the third data on the basis of a first command received via the communication means, the first command specifying the identification information included in the third data and ordering processing of the process target data included in the third data, and subsequently the process target data included in the fifth data on the basis of a second command received via the communication means, the second command including a succeeding specification and ordering processing of the

process target data.

(3) The information storage medium according to the present invention comprises a card main body in which a module is embedded, the module comprising

5 storage means for storing first data comprising a data structure including identification information which identifies process target data, length information indicating data length of the process target data, and the process target data, second data succeeding the

10 first data and comprising the same data structure as that of the data structure of the first data, third data included in the process target data in the second data and comprising the same data structure as that of the data structure of the first data, fourth data

15 included in the process target data in the second data and succeeding the third data, the fourth data comprising the same data structure as that of the data structure of the first data, and fifth data succeeding the second data and comprising the same data structure as that of the data structure of the first data,

20 communication means for communicating with a medium processing device, and data processing means for accessing the process target data included in the first data on the basis of a first command received via the

25 communication means, the first command specifying the identification information included in the first data and ordering processing of the process target data

included in the first data, subsequently accessing the process target data included in the third data on the basis of a second command received via the communication means, the second command including a succeeding specification and ordering processing of the process target data, and subsequently the process target data included in the fourth data on the basis of a third command received from the communication means, the fourth command including a succeeding specification and ordering processing of the process target data, the data processing means, after the process of the third command, inhibiting an access to the process target data included in the fifth data based on a fourth command received via the communication means, the fourth command including a succeeding specification and ordering processing of the process target data, and after the process of the first command, inhibiting an access to the process target data included in the first data based on a fifth command received via the communication means, the fifth command including a preceding specification and ordering processing of the process target data.

(4) The medium processing system according to the present invention comprises an information storage medium comprising a card main body in which a module is embedded and a medium processing device which records data in the information storage medium and which reads

data stored in the information storage medium, the module of the information storage medium comprising storage means for storing first data comprising a data structure including identification information which
5 identifies process target data, length information indicating data length of the process target data, and the process target data, second data succeeding the first data and comprising the same data structure as that of the data structure of the first data, and third
10 data succeeding the second data and comprising the same data structure as that of the data structure of the first data, first communication means for communicating with the medium processing device, and data processing means for accessing the process target data included in
15 the second data on the basis of a first command received via the first communication means, the first command specifying the identification information included in the second data and ordering processing of the process target data included in the first data, and
20 subsequently the process target data included in the first data on the basis of a second command received via the first communication means, the second command including a preceding specification and ordering processing of the process target data, the medium
25 processing device comprising command generating means for generating the first and second commands and second communication means for communication with the

information storage medium to input the first and second commands to the information storage medium.

(5) The medium processing system according to the present invention comprises an information storage medium comprising a card main body in which a module is embedded and a medium processing device which records data in the information storage medium and which reads data stored in the information storage medium, the module of the information storage medium comprising storage means for storing first data comprising a data structure including identification information which identifies process target data, length information indicating data length of the process target data, and the process target data, second data succeeding the first data and comprising the same data structure as that of the data structure of the first data, third data included in the process target data in the second data and comprising the same data structure as that of the data structure of the first data, fourth data included in the process target data in the second data and succeeding the third data, the fourth data comprising the same data structure as that of the data structure of the first data, and fifth data succeeding the second data and comprising the same data structure as that of the data structure of the first data, first communication means for communicating with the medium processing device, and data processing means for

accessing the process target data included in the third data on the basis of a first command received via the communication means, the first command specifying the identification information included in the third data and ordering processing of the process target data included in the third data, and subsequently the process target data included in the fifth data on the basis of a second command received via the communication means, the second command including a succeeding specification and ordering processing of the process target data, the medium processing device comprising command generating means for generating the first and second commands and second communication means for communication with the information storage medium to input the first and second commands to the information storage medium.

(6) The medium processing system according to the present invention comprises an information storage medium comprising a card main body in which a module is embedded and a medium processing device which records data in the information storage medium and which reads data stored in the information storage medium, the module of the information storage medium comprising storage means for storing first data comprising a data structure including identification information which identifies process target data, length information indicating data length of the process target data, and

the process target data, second data succeeding the first data and comprising the same data structure as that of the data structure of the first data, third data included in the process target data in the second data and comprising the same data structure as that of the data structure of the first data, fourth data included in the process target data in the second data and succeeding the third data, the fourth data comprising the same data structure as that of the data structure of the first data, and fifth data succeeding the second data and comprising the same data structure as that of the data structure of the first data, first communication means for communicating with the medium processing device, and data processing means for accessing the process target data included in the first data on the basis of a first command received via the first communication means, the first command specifying the identification information included in the first data and ordering processing of the process target data included in the first data, subsequently accessing the process target data included in the third data on the basis of a second command received via the communication means, the second command including a succeeding specification and ordering processing of the process target data, and subsequently the process target data included in the fourth data on the basis of a third command received from the communication means,

the third command including a succeeding specification and ordering processing of the process target data, the data processing means, after the process of the third command, inhibiting an access to the process target data included in the fifth data based on a fourth command received via the first communication means, the fourth command including a succeeding specification and ordering processing of the process target data, and after the process of the first command, inhibiting an access to the process target data included in the first data based on a fifth command received via the first communication means, the fifth command including a preceding specification and ordering processing of the process target data, the medium processing device comprising command generating means for generating the first, second, third, fourth, and fifth commands and second communication means for communication with the information storage medium to input the first, second, third, fourth, and fifth commands to the information storage medium.

Brief Description of Drawings

FIG. 1 is a block diagram schematically showing the configuration of an IC card system (medium processing system) according to an embodiment of the present invention;

FIG. 2 is a block diagram schematically showing the configuration of a card reader/writer according to

an embodiment of the present invention;

FIG. 3 is a block diagram schematically showing the configuration of an IC card according to an embodiment of the present invention;

5 FIG. 4 is a diagram showing a first example of EF for a data object structure stored in a nonvolatile memory;

FIG. 5A is a diagram showing a second example of EF for a data object structure stored in the
10 nonvolatile memory;

FIG. 5B is a diagram showing a third example of EF for a data object structure stored in the nonvolatile memory;

FIG. 6 is a state transition diagram showing an
15 example of an access to the EF data shown in FIG. 4; and

FIG. 7 is a diagram illustrating movement in a constructed TLV structure.

Best Mode for Carrying Out the Invention

20 An embodiment of the present invention will be described below with reference to the drawings.

FIG. 1 is a block diagram schematically showing the configuration of an IC card system (media processing system) according to an embodiment of the present invention. As shown in FIG. 1, the IC card system is composed of a terminal 1 and an IC card 2.
25 The terminal 1 comprises a main body 11, a display 12,

a keyboard 13, and a card reader/writer 14. The terminal 1 is configured to be communicable with the IC card 2. The terminal 1 transmits and receives data to and from the IC card 2.

5 The main body 11 executes applications and inputs and outputs data. The display 12 displays results of communications with the IC card 2. The keyboard 13 inputs characters, numbers, and the like to the main body 11. The card reader/writer 14 communicates with
10 the IC card 2.

FIG. 2 is a block diagram schematically showing the configuration of a card reader/writer according to an embodiment of the present invention. As shown in FIG. 2, the card reader/writer 14 comprises a contact
15 section 141, a control section 142, RAM 143, ROM 144, and a nonvolatile memory 145.

FIG. 3 is a block diagram schematically showing the configuration of an IC card according to an embodiment of the present invention. As shown in
20 FIG. 3, the IC card 2 comprises a contact section 21, a control section 22 having a control element such as CPU, RAM 23, ROM 24, and a nonvolatile memory 25 such as EEPROM, FRAM, or a flash memory.

The contact section 141 of the card reader/writer
25 14 is an interface connected to the contact section 21 of the IC card 2 to transmit data between the card reader/writer 14 and the IC card 2. The control

section 142 generates various commands on the basis of instructions from the main body 11. RAM 143 temporarily stores, for example, data transmitted by the IC card 2. ROM 144 stores control programs to be executed by the control section 142. The nonvolatile memory 145 is a memory that can hold data even after power supply has been cut off.

The control section 22 of the IC card 2 controls a writing operation and a reading operation on the basis of various commands transmitted by the card reader/writer 14. RAM 23 temporarily stores, for example, the results of processes executed by the control section 22. ROM 24 stores control programs to be executed by the control section 22. The nonvolatile memory 25 is a memory that can hold data even after power supply has been cut off.

FIG. 4 is a diagram showing a first example of EF for a data object structure stored in the nonvolatile memory 25. As shown in FIG. 4, the nonvolatile memory 25 stores, for example, first data 251, second data 252, and third data 253. The first data 251 includes identification information (T1) that identifies process target data, length information (L1) indicating the data length of the process target data, and the process target data (V1). Similarly, the second data 252 includes identification information (T2) that identifies process target data, length information (L2)

indicating the data length of the process target data,
and the process target data (V2). Similarly, the third
data 253 includes identification information (T3) that
identifies process target data, length information (L3)
5 indicating the data length of the process target data,
and the process target data (V3). The second data 252
succeeds the first data 251. Furthermore, the third
data 253 succeeds the second data 252. For example,
the identification information may be assigned to the
10 data such that the sequential relationship between the
first data 251 and the second data 252 and the third
data 253 can be determined from values (the magnitude
of the values) for the identification information (T1),
the identification information (T2), and the
15 identification information (T3).

Now, with reference to FIG. 6, an access to data
in EF shown in FIG. 4 will be described. As shown in
FIG. 6, a folder structure having MF (Master File), DF
belonging to MF, and EF1, EF2, EF3, ... belonging to DF
20 is constructed in the IC card 2. The card
reader/writer 14 uses SelectEF to retrieve EF for a
data object structure. For example, it is assumed that
EF1 is a data object type structure and that the data
structure of EF1 is as shown in FIG. 4.

25 First, a preceding specification will be
described.

First, the card reader/writer 14, for example,

specifies T2 and uses a PutData command to order processing of data d1 (for example, biometric authentication data) . Thus, the IC card 2 accesses V2 and records the data d1 in V2 (V2=d1). At this time, a
5 current pointer is set at a leading address of T2.

Subsequently, the card reader/writer 14, for example, uses the PutData command (preceding specification) to order processing of data d2 (for example, biometric authentication data) (the preceding
10 specification is made using a parameter of the PutData command). Thus, the IC card 2 accesses V1 to record the data 2 in V1 (V1=d2). That is, the IC card 2 accesses V1 positioned backward with reference to the current pointer set at the leading address of T2. At
15 this time, the current pointer is moved and set at a leading address of T1.

Second, a succeeding specification will be described.

First, the card reader/writer 14, for example,
20 specifies T2 and uses the PutData command to order processing of the data d1 to be processed. Thus, the IC card 2 accesses V2 and records data d1 in V2 (V2=d1). At this time, the current pointer is set at the leading address of T2.

25 Subsequently, the card reader/writer 14, for example, uses the PutData command (succeeding specification (a specification from a parent to a

child)) to order processing of the data d2 (the succeeding specification is made using the parameter of the PutData command). Thus, the IC card 2 accesses V3 to record the data 2 in V3 (V3=d2). That is, the IC
5 card 2 accesses V3 positioned backward with reference to the current pointer set at the leading address of T2. At this time, the current pointer is moved to and set at a leading address of T3.

Thus, numbers are added to the recorded data d2 in
10 order of registration or in order of increasing or decreasing Tag value. Thus, the data d2 already written using the PutData command can be accessed by specifying any of the numbers.

In this manner, the series of data can be
15 efficiently accessed.

FIG. 5A is a diagram showing a second example of FE for a data object structure stored in the nonvolatile memory 25. As shown in FIG. 5A, the nonvolatile memory 25 stores, for example, first data
20 251, second data 252, third data 253, fourth data 254, and fifth data 255. The first data 251 includes identification information (T1) identifying process target data, length information (L1) indicating the data length of the process target data, and the process
25 target data (V1). Similarly, the second data 252 includes identification information (T2) identifying process target data, length information (L2) indicating

the data length of the process target data, and the process target data (V2). It should be noted that the process target data (V2) includes the third data 253 and the fourth data 254. Such second data 252 is
5 called a constructed TLV structure. The third data 253 includes identification information (T3) identifying process target data, length information (L3) indicating the data length of the process target data, and the process target data (V3). The fourth data 254 includes
10 identification information (T4) identifying process target data, length information (L4) indicating the data length of the process target data, and the process target data (V4). The fifth data 255 includes identification information (T5) identifying process
15 target data, length information (L5) indicating the data length of the process target data, and the process target data (V5). The second data 252 succeeds the first data 251. Furthermore, the fifth data 253 succeeds the second data 252. The positional
20 relationship among the first data 251, the second data 252, the third data 253, the fourth data 254, and the fifth data 255 can be determined from, for example, values (the magnitudes of the values) for the identification information (T1), the identification
25 information (T2), the identification information (T3), the identification information (T4), and the identification information (T5). The identification

information (T2) belonging to the constructed TLV structure is called a parent tag. The identification information (T3) is called a child tag. The identification information (T4) is called a child tag.

5 Now, an access to the data in EF shown in FIG. 5A will be described.

 First, a succeeding specification will be described.

 First, the card reader/writer 14, for example,
10 specifies T1 and uses the PutData command to order processing of the data d1 (for example, biometric authentication data). Thus, the IC card 2 accesses V1 and records the data d1 in V1 (V1=d1). At this time, the current pointer is set at the leading address of
15 T1.

 Subsequently, the card reader/writer 14, for example, uses the PutData command (succeeding specification) to order processing of the data d2 (for example, biometric authentication data) (the succeeding
20 specification is made using the parameter of the PutData command). Thus, the IC card 2 accesses V2 to record the data 2 in V2 (V2=d2). That is, the IC card 2 accesses V2 positioned backward with reference to the current pointer set at the leading address of T1. At
25 this time, the current pointer is moved and set at the leading address of T2.

 Moreover, the card reader/writer 14, for example,

uses the PutData command (succeeding specification (a specification from a parent to a child)) to order processing of data d3 (for example, biometric authentication data) (the succeeding specification is made using the parameter of the PutData command).
Thus, the IC card 2 accesses V3 to record the data 3 in V3 (V3=d3). That is, the IC card 2 accesses V3 positioned backward with reference to the current pointer set at the leading address of T2. At this time, the current pointer is moved to and set at the leading address of T3.

Moreover, the card reader/writer 14, for example, uses the PutData command (succeeding specification (a specification for data external to the constructed TLV structure)) to order processing of data d4 (for example, biometric authentication data) (the succeeding specification is made using the parameter of the PutData command). Thus, the IC card 2 accesses V5 to record the data 4 in V5 (V5=d4). That is, the IC card 2 accesses V5 positioned backward with reference to the current pointer set at the leading address of T3. At this time, the current pointer is moved to and set at a leading address of T5.

In the case described above, the succeeding specification is used to access the data in order of V1→V2 (parent)→V3 (child)→V5. However, the succeeding specification may be used to access the data

in order of V1→V2 (parent)→V3 (child)→V4 (child)→V5.

Second, a preceding specification will be described.

First, the card reader/writer 14, for example,
5 specifies T4 and uses the PutData command to order processing of the data d1 (for example, biometric authentication data). Thus, the IC card 2 accesses V4 and records the data d1 in V4 (V4=d1). At this time, the current pointer is set at a leading address of T4.

10 Subsequently, the card reader/writer 14, for example, uses the PutData command (preceding specification (a specification from a child to a child) to order processing of the data d2 (for example, biometric authentication data) (the preceding
15 specification is made using the parameter of the PutData command). Thus, the IC card 2 accesses V3 to record the data 2 in V3 (V3=d2). That is, the IC card 2 accesses V3 positioned backward with reference to the current pointer set at the leading address of T4. At
20 this time, the current pointer is moved and set at the leading address of T3.

Moreover, the card reader/writer 14, for example, uses the PutData command (preceding specification (constructed TLV structure)) to order processing of the
25 data d3 (for example, biometric authentication data) (the preceding specification is made using the parameter of the PutData command). Thus, the IC card 2

accesses V1 to record the data 3 in V1 ($V1=d3$). That is, the IC card 2 accesses V1 positioned backward with reference to the current pointer set at the leading address of T3. At this time, the current pointer is
5 moved and set at the leading address of T1.

Thus, the recorded data d1, d2, and d3 are numbered in order of registration or in order of increasing or decreasing Tag value. Thus, the data d1, d2, and d3 already written using the PutData command
10 can be accessed by specifying any of the numbers.

In the case described above, the preceding specification is used to access the data in order of V4 (child)→V3 (child)→V1. However, the preceding specification may be used to access the data in order
15 of V4 (child)→V3 (child)→V2 (parent)→V1.

Third, a succeeding specification (restricted type) will be described.

First, the card reader/writer 14, for example, specifies T3 and uses the PutData command to order
20 processing of the data d1 (for example, biometric authentication data). Thus, the IC card 2 accesses V3 and records the data d1 in V3 ($V3=d1$). At this time, the current pointer is set at the leading address of T3.

25 Subsequently, the card reader/writer 14, for example, uses the PutData command (succeeding specification (a specification from a child to a

child)) to order processing of the data d2 (for example, biometric authentication data) (the succeeding specification is made using the parameter of the PutData command). Thus, the IC card 2 accesses V4 to
5 record the data 2 in V4 (V4=d2). That is, the IC card 2 accesses V4 positioned backward with reference to the current pointer set at the leading address of T3. At this time, the current pointer is moved and set at a leading address of T4.

10 Moreover, the card reader/writer 14, for example, uses the PutData command (a specification for data external to the constructed TLV structure) to order processing of the data d3 (for example, biometric authentication data) (the succeeding specification is
15 made using the parameter of the PutData command). In this case (restricted case), the IC card 2 inhibits V5 from being accessed. That is, the IC card 2 inhibits the data external to the second data 252 (constructed TLV structure) from being accessed. This makes it
20 possible to enhance security.

Fourth, a preceding specification (restricted type) will be described.

First, the card reader/writer 14, for example, specifies T4 and uses the PutData command to order
25 processing of the data d1 (for example, biometric authentication data). Thus, the IC card 2 accesses V4 and records the data d1 in V4 (V4=d1). At this time,

the current pointer is set at the leading address of T4.

Subsequently, the card reader/writer 14, for example, uses the PutData command (preceding specification (a specification from a child to a child)) to order processing of the data d2 (for example, biometric authentication data) (the preceding specification is made using the parameter of the PutData command). Thus, the IC card 2 accesses V3 to record the data 2 in V3 (V3=d2). That is, the IC card 2 accesses V3 positioned backward with reference to the current pointer set at the leading address of T4. At this time, the current pointer is moved and set at a leading address of T3.

Moreover, the card reader/writer 14, for example, uses the PutData command (preceding specification (a specification for data external to the constructed TLV structure) to order processing of the data d3 (for example, biometric authentication data) (the preceding specification is made using the parameter of the PutData command). In this case (restricted case), the IC card 2 inhibits V1 from being accessed. That is, the IC card 2 inhibits the data external to the second data 252 (constructed TLV structure) from being accessed. This makes it possible to enhance security.

Now, a variation of the preceding specification will be described.

With the IC card 2 accessing V4 (child), that is, with the current pointer moved and set at the leading address of T4, the card reader/writer 14, for example, uses the PutData command (preceding specification (a
5 specification from a child to a parent)) to order processing of data dn (for example, biometric authentication data) (the preceding specification is made using the parameter of the PutData command). Thus, the IC card 2 accesses V2 (parent) to record the
10 data dn in V2 (V2=dn). That is, the IC card 2 accesses V2 (parent) positioned backward with reference to the current pointer set at the leading address of T4. At this time, the current pointer is moved and set at the leading address of T2.

15 Now, with reference to FIG. 5B, description will be given of a third example of EF for a data object structure stored in the nonvolatile memory 25.

As shown in FIG. 5B, the nonvolatile memory 25 stores, for example, the first data 251, the second
20 data 252, the third data 253, the fourth data 254, the fifth data 255, sixth data 256. The first data 251 includes identification information (T1) identifying process target data, length information (L1) indicating the data length of the process target data, and the
25 process target data (V1). Similarly, the second data 252 includes identification information (T2) identifying process target data, length information

(L2) indicating the data length of the process target data, and the process target data (V2). Moreover, the process target data (V2) includes the third data 253 and the fifth data 255. Such second data 252 is called
5 a constructed TLV structure. The third data 253 includes identification information (T3) identifying process target data, length information (L3) indicating the data length of the process target data, and the process target data (V3). The fifth data 255 includes
10 identification information (T5) identifying process target data, length information (L5) indicating the data length of the process target data, and the process target data (V5).

Moreover, the process target data (V3) includes
15 the fourth data 254. Such third data 253 is also called a constructed TLV structure. The fourth data 254 includes identification information (T4) identifying process target data, length information (L4) indicating the data length of the process target
20 data, and the process target data (V4).

The positional relationship among the first data 251, the second data 252, the third data 253, the fourth data 254, the fifth data 255, and the sixth data 256 can be determined from, for example, the values
25 (the magnitudes of the values) for the identification information (T1), the identification information (T2), the identification information (T3), the identification

information (T4), and the identification information (T5).

Here, the succeeding specifications for the data object structure shown in FIG. 5B are used to access
 5 the data in order of $V1 \rightarrow V2 \rightarrow V3 \rightarrow V4 \rightarrow V6$ or
 $V1 \rightarrow V2 \rightarrow V3 \rightarrow V4 \rightarrow V5 \rightarrow V6$. Furthermore, the preceding
 specifications are used to access the data in order of
 $V6 \rightarrow V4 \rightarrow V3 \rightarrow V2 \rightarrow V1$, $V6 \rightarrow V4 \rightarrow V2 \rightarrow V1$, $V6 \rightarrow V4 \rightarrow V1$,
 $V6 \rightarrow V5 \rightarrow V4 \rightarrow V3 \rightarrow V2 \rightarrow V1$, $V6 \rightarrow V5 \rightarrow V4 \rightarrow V2 \rightarrow V1$, or
 10 $V6 \rightarrow V5 \rightarrow V4 \rightarrow V1$.

The several succeeding and preceding specifications have been described. However, the
 present embodiments are not limited to this. For
 example, the constructed TLV structure can be moved as
 15 shown in FIG. 7.

As described above, the application of the current
 pointer enables the data object succeeding or preceding
 the current one to be efficiently accessed using the
 succeeding or preceding specification, respectively.

20 Furthermore, for the constructed data object,
 layered data objects and data objects written in a data
 section can each be efficiently specified and accessed.
 This increases access speed and write speed.
 Additionally, the data object can be specified without
 25 the need to specify the tag. Thus, advantageously,
 users can easily understand how to manipulate the data.

In the description of the case in FIG. 6, SelectEF

is used to retrieve EF before the tag is specified.
However, the present embodiment is not limited to this.
For example, the tag may be specified with DF selected.

5 The present invention is not limited to the above-
described embodiments. In implementation, many
variations may be made to the embodiments without
departing from the spirit of the present invention.
Any of the embodiments may be combined together if
possible. In this case, combined effects are exerted.
10 Moreover, each of the embodiments includes inventions
of various levels. Various inventions can thus be
extracted by appropriately combining a plurality of the
disclosed components together. For example, if the
problems described in the section "Problems to Be
15 Solved by the Invention" can be solved and the effects
described in the section "Effects of the Invention"
even when some of the components shown in the
embodiments are removed, the configuration with these
components removed can be extracted as an invention.

20 Industrial Applicability

The present invention can provide an information
storage medium and medium processing system which
enable efficient data retrieval.

C L A I M S

1. An information storage medium comprising a card main body in which a module is embedded, the information storage medium being characterized in that module

5 comprises:

storage means for storing first data comprising a data structure including identification information which identifies process target data, length information indicating data length of the process target data, and the
10 process target data, second data included in the process target data in the first data and comprising the same data structure as that of the data structure of the first data, third data included in the process target data in the first data and succeeding the second data, the third data
15 comprising the same data structure as that of the data structure of the first data, and fourth data succeeding the first data and comprising the same data structure as that of the data structure of the first data;

communication means for communicating with a medium
20 processing device; and

data processing means for accessing the process target data included in the second data on the basis of a first command received via the communication means, the first command specifying the identification information included
25 in the second data and ordering processing of the process target data included in the second data, and subsequently the process target data included in the fourth data on the

basis of a second command received via the communication means, the second command including a first succeeding specification and ordering processing of the process target data, characterized in that after the process of the first
5 command, the data processing means accesses the process target data included in the third data on the basis of a third command received via the communication means, the third command including a second succeeding specification and ordering processing of the process target data, and
10 accesses the process target data included in the fourth data on the basis of a fourth command received via the communication means, the fourth command including a succeeding specification and ordering processing of the process target data, and
15 the first succeeding specification includes an external specification.

2. The information storage medium according to claim 1, characterized in that after the process of the third command, the data processing means accesses the
20 process target data included in the first data on the basis of a fifth command received via the communication means, the fifth command including a preceding specification and ordering processing of the process target data.

3. The information storage medium according to
25 claim 1, characterized in that after the process of the third command, the data processing means accesses the process target data included in the first data on the basis

of a fifth command received via the communication means,
the fifth command including a preceding specification and
ordering processing of the process target data.

4. An information storage medium comprising a card
5 main body in which a module is embedded, the information
storage medium being characterized in that the module
comprises:

storage means for storing first data comprising a data
structure including identification information which
10 identifies process target data, length information
indicating data length of the process target data, and the
process target data, second data included in the process
target data in the first data and comprising the same data
structure as that of the data structure of the first data,
15 third data included in the process target data in the first
data and succeeding the second data, the third data
comprising the same data structure as that of the data
structure of the first data, and fourth data succeeding the
first data and comprising the same data structure as that
20 of the data structure of the first data;

communication means for communicating with a medium
processing device; and

data processing means for accessing the process target
data included in the first data on the basis of a first
25 command received via the communication means, the first
command specifying the identification information included
in the first data and ordering processing of the process

target data included in the first data, subsequently
accessing the process target data included in the second
data on the basis of a second command received via the
communication means, the second command including a first
5 succeeding specification and ordering processing of the
process target data, and subsequently the process target
data included in the third data on the basis of a third
command received from the communication means, the third
command including the first succeeding specification and
10 ordering processing of the process target data,

the data processing means, after the process of the
third command, inhibiting an access to the process target
data included in the fourth data based on a fourth command
received via the communication means, the fourth command
15 including a second succeeding specification and ordering
processing of the process target data, and after the
process of the second command, inhibiting an access to the
process target data included in the first data based on a
fifth command received via the communication means, the
20 fifth command including a preceding specification and
ordering processing of the process target data,

the second succeeding specification includes an
external specification, and

the preceding specification includes the external
25 specification.