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(54) IMAGE FORMING APPARATUS AND METHOD FOR THE SAME

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(57) **ABSTRACT**

An image forming apparatus compares device identification information acquired from XML setting information received from a connected device with device identification information of the image forming apparatus, and determines an import level based on a comparison result. The image forming apparatus extracts a setting according to the import level using each module of a plurality of applications for the image forming apparatus, and stores the extracted setting in a storage that is used for control performed in each application. The device identification information that determines the import level includes at least one of firmware version, destination information, user editing information, accessory connection information, and license information, in addition to model management number and machine body management number.

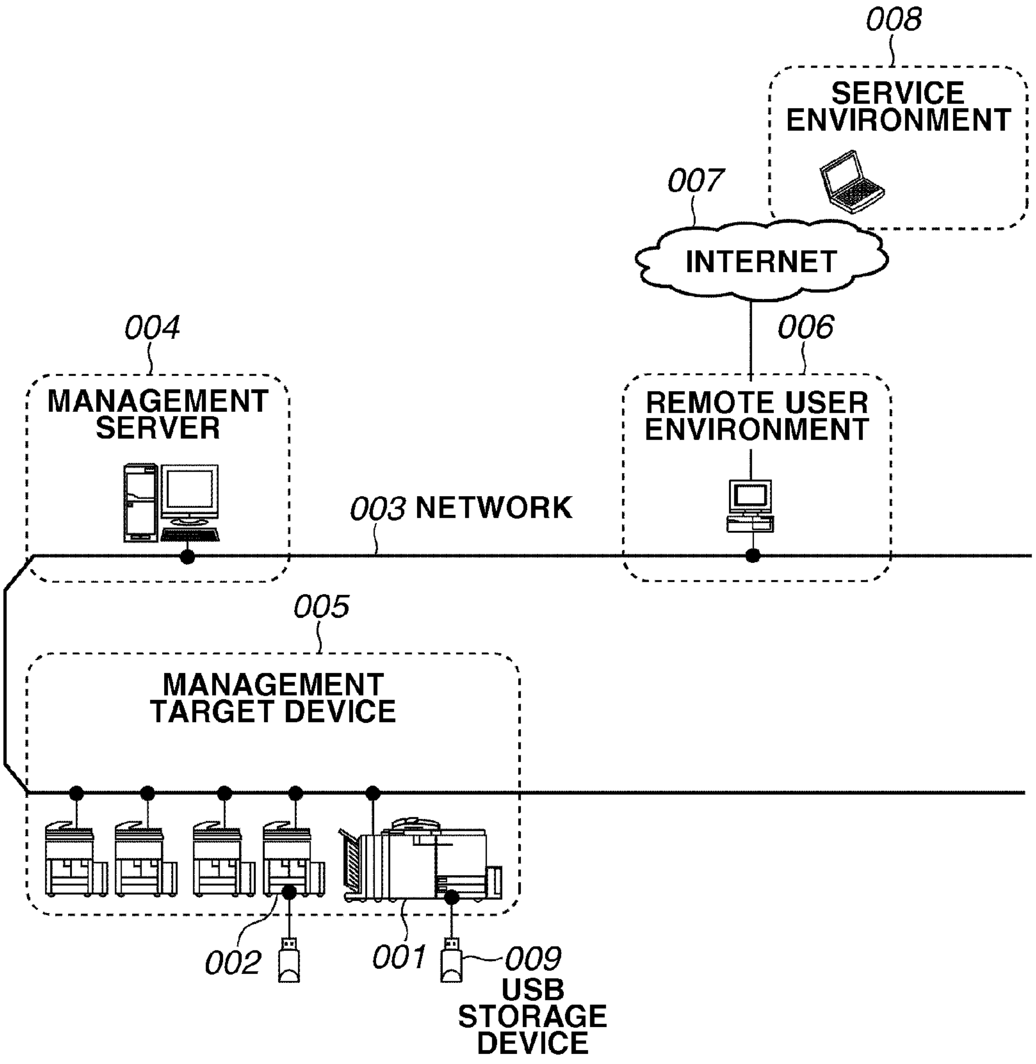


FIG.1

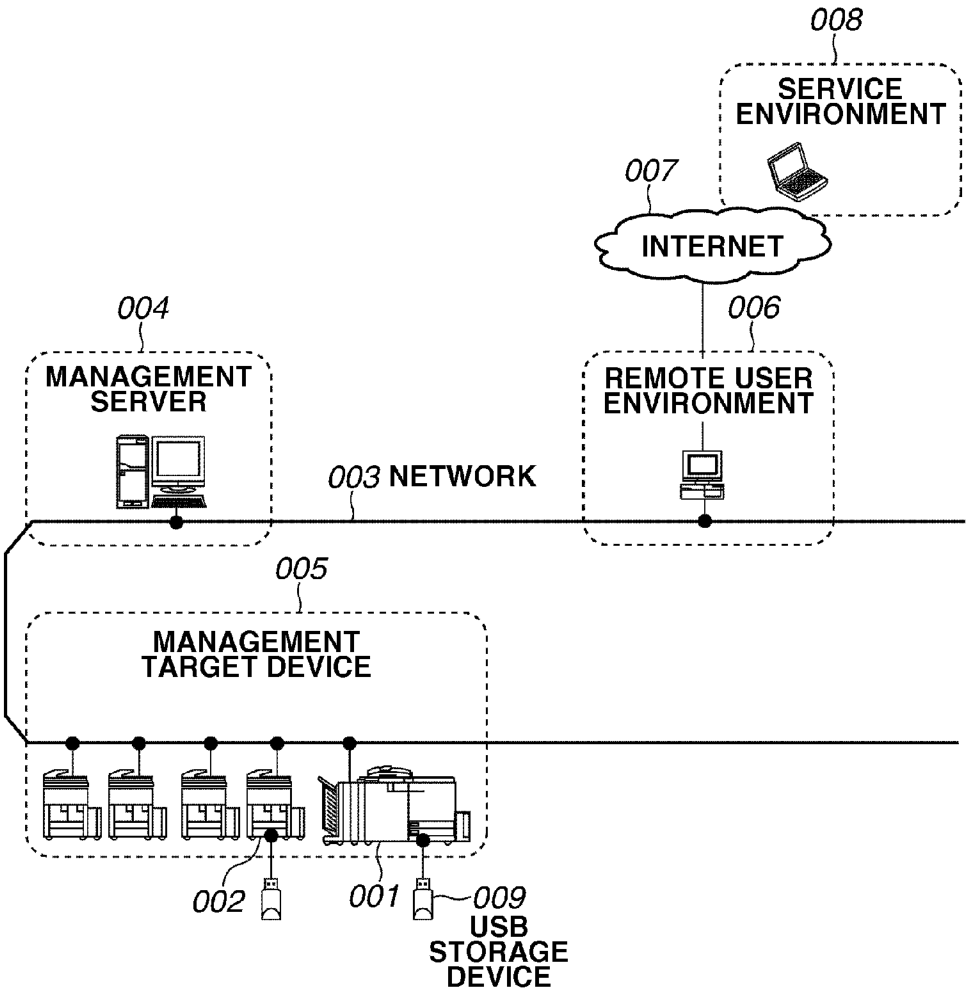

008
SERVICE ENVIRONMENT
007
INTERNET
004
MANAGEMENT SERVER
006
REMOTE USER ENVIRONMENT
003 NETWORK
005
MANAGEMENT TARGET DEVICE
002
001
009
USB STORAGE DEVICE

FIG.2

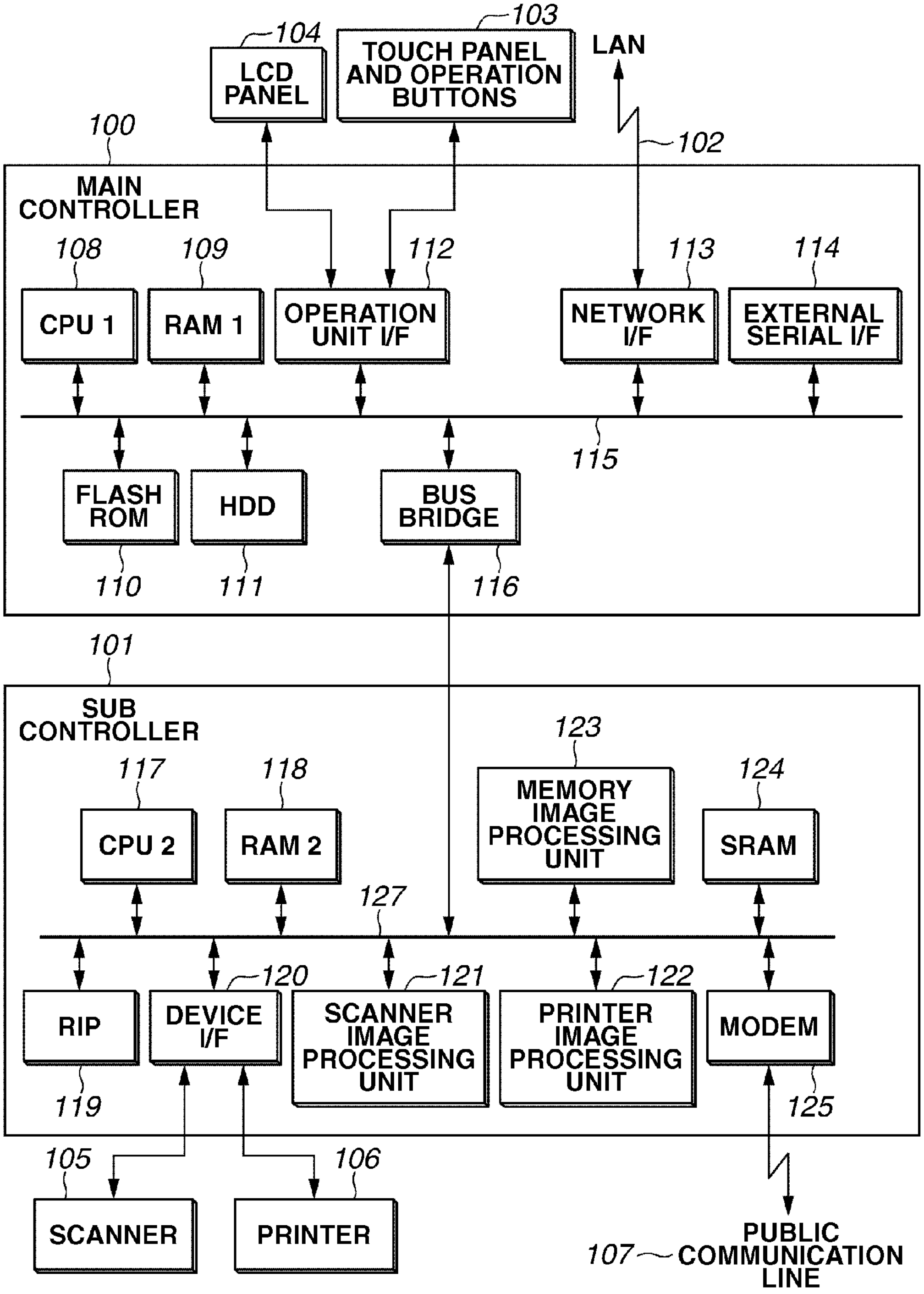

104
LCD PANEL
103
TOUCH PANEL AND OPERATION BUTTONS
LAN
102
100
MAIN CONTROLLER
108
CPU 1
109
RAM 1
112
OPERATION UNIT I/F
113
NETWORK I/F
114
EXTERNAL SERIAL I/F
115
FLASH ROM
HDD
BUS BRIDGE
110
111
116
101
SUB CONTROLLER
117
CPU 2
118
RAM 2
123
MEMORY IMAGE PROCESSING UNIT
124
SRAM
127
RIP
DEVICE I/F
120
SCANNER IMAGE PROCESSING UNIT
121
PRINTER IMAGE PROCESSING UNIT
122
MODEM
119
125
105
SCANNER
106
PRINTER
107
PUBLIC COMMUNICATION LINE

FIG.3

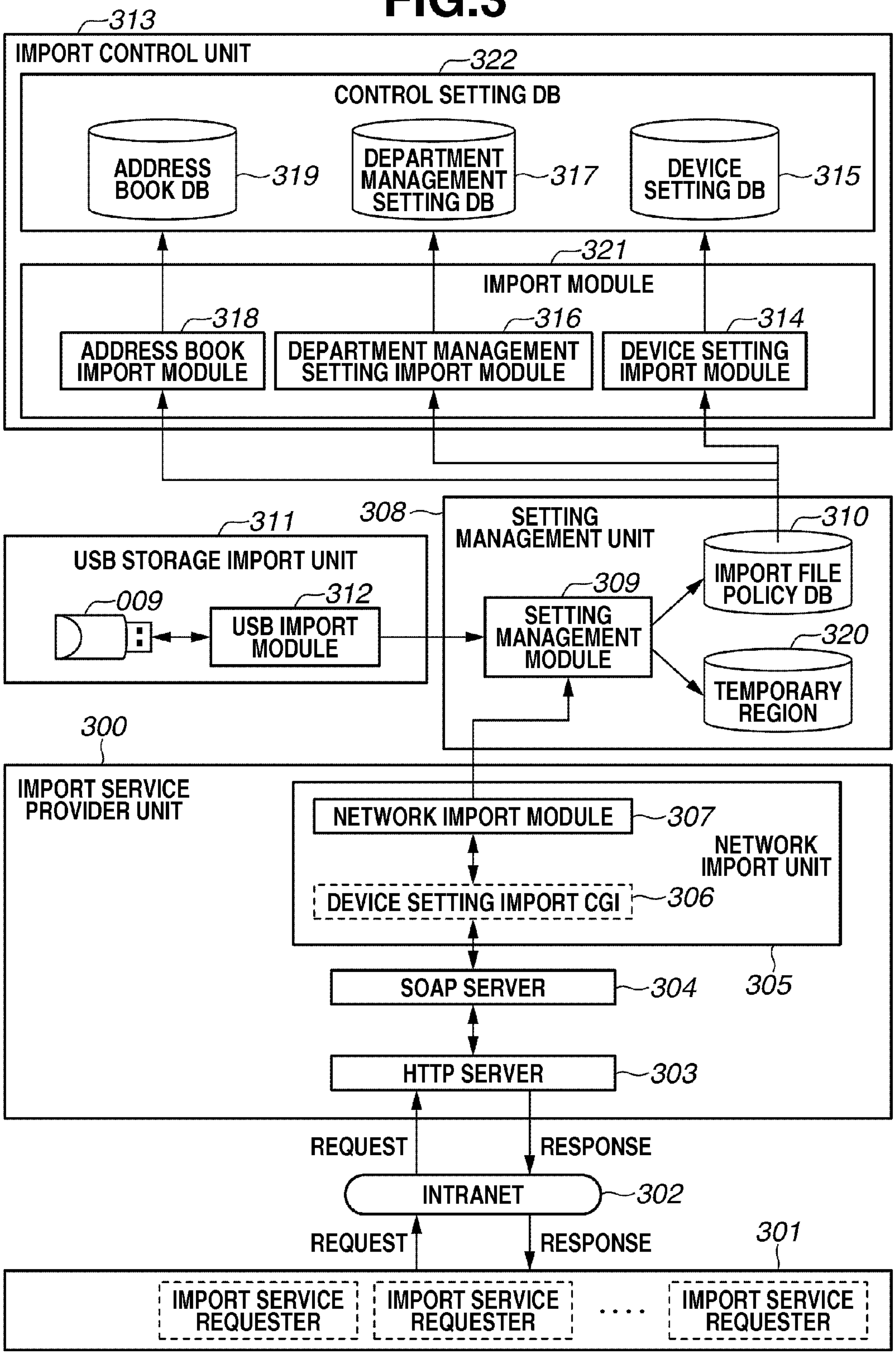

313
IMPORT CONTROL UNIT
322
CONTROL SETTING DB
ADDRESS BOOK DB
319
DEPARTMENT MANAGEMENT SETTING DB
317
DEVICE SETTING DB
315
321
IMPORT MODULE
318
ADDRESS BOOK IMPORT MODULE
316
DEPARTMENT MANAGEMENT SETTING IMPORT MODULE
314
DEVICE SETTING IMPORT MODULE
308
SETTING MANAGEMENT UNIT
310
IMPORT FILE POLICY DB
311
USB STORAGE IMPORT UNIT
009
312
USB IMPORT MODULE
309
SETTING MANAGEMENT MODULE
320
TEMPORARY REGION
300
IMPORT SERVICE PROVIDER UNIT
NETWORK IMPORT MODULE
307
NETWORK IMPORT UNIT
DEVICE SETTING IMPORT CGI
306
SOAP SERVER
304
305
HTTP SERVER
303
REQUEST
RESPONSE
INTRANET
302
REQUEST
RESPONSE
301
IMPORT SERVICE REQUESTER
IMPORT SERVICE REQUESTER
....
IMPORT SERVICE REQUESTER

FIG.4

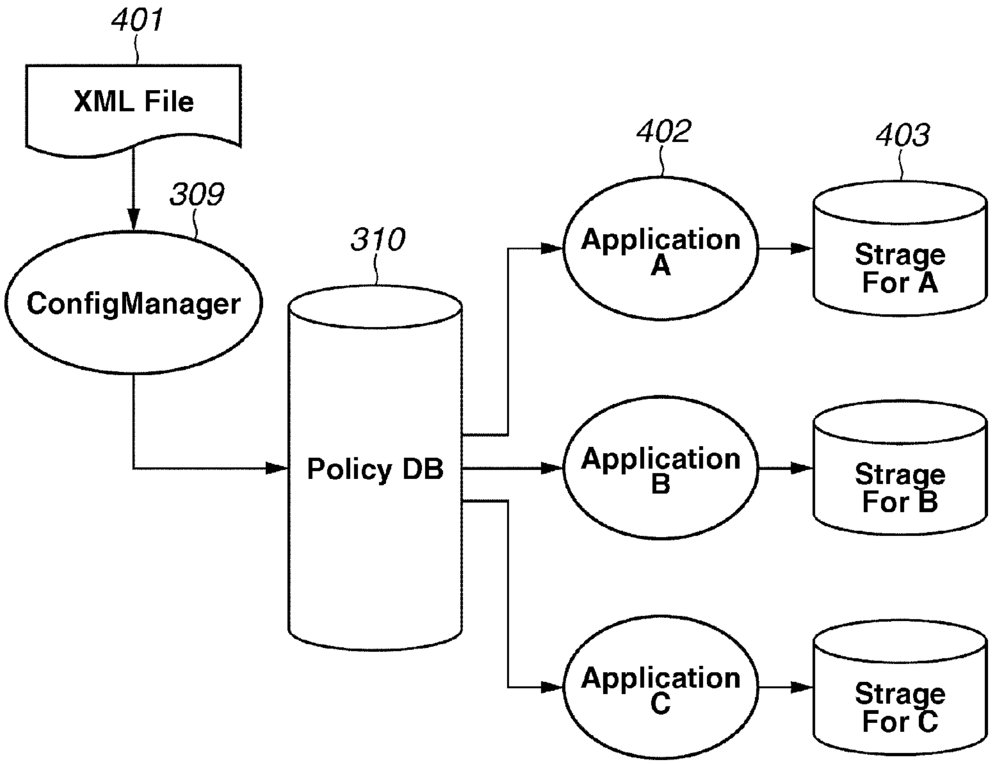

401
XML File
309
ConfigManager
310
Policy DB
402
Application A
Application B
Application C
403
Strage For A
Strage For B
Strage For C

FIG.5

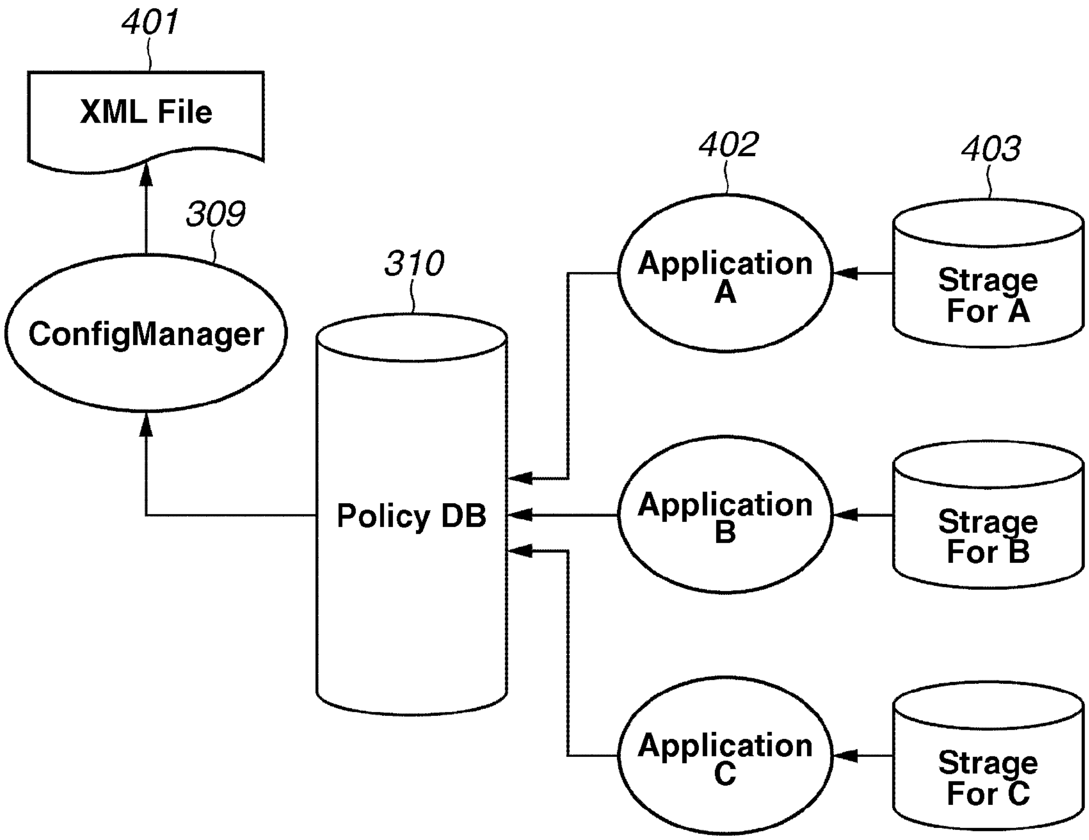

401
XML File
309
ConfigManager
310
Policy DB
402
Application A
Application B
Application C
403
Strage For A
Strage For B
Strage For C

FIG.6

CREATE TABLE KeyList (KeyID, ParentID, Name, Meta) ~601
CREATE TABLE ValueList (KeyID, Value, Size, Type)
CREATE TABLE ValueRange (KeyID, Min, Max)

602

KeyID	Name	ParentID	Meta
1	device_settings	NULL	0x00000000
2	address_book_settings	1	0x00000000
3	department_id_settings	1	0x00000000
4	common_setup	1	0x00000000
5	init_screen_setup	4	0x00008030
6	mmi_aclr_return	4	0x00008030
7	mmi_beep_onoff	4	0x00008030
8	inch_size_input	4	0x00008030
9	print_setup	4	0x00000000
10	cassette_sel	9	0x00008030

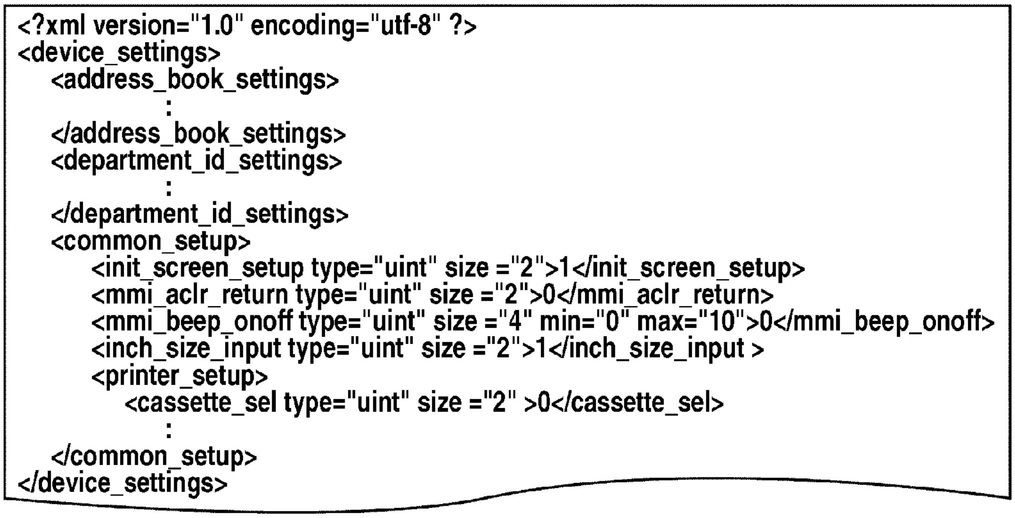
603

KeyID	Value	Size	Type
5	0	2	UINT
6	0	2	UINT
7	7	4	UINT
8	1	2	UINT
10	0	2	UINT

604

KeyID	min	max
7	0	10

605



```
<?xml version="1.0" encoding="utf-8" ?>
<device_settings>
   <address_book_settings>
              :
   </address_book_settings>
   <department_id_settings>
              :
   </department_id_settings>
   <common_setup>
      <init_screen_setup type="uint" size ="2">1</init_screen_setup>
      <mmi_aclr_return type="uint" size ="2">0</mmi_aclr_return>
      <mmi_beep_onoff type="uint" size ="4" min="0" max="10">0</mmi_beep_onoff>
      <inch_size_input type="uint" size ="2">1</inch_size_input >
      <printer_setup>
         <cassette_sel type="uint" size ="2" >0</cassette_sel>
              :
   </common_setup>
</device_settings>
```

606

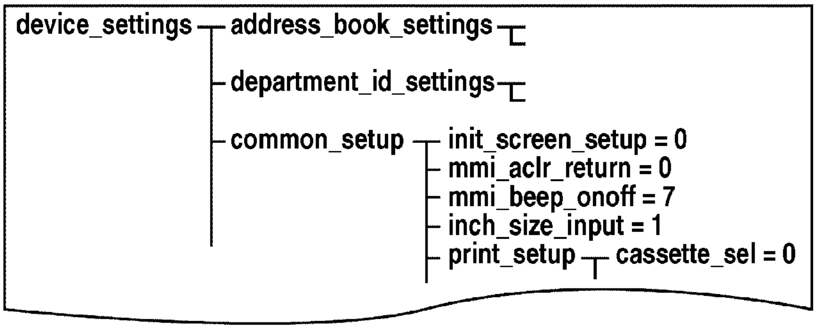


FIG.7

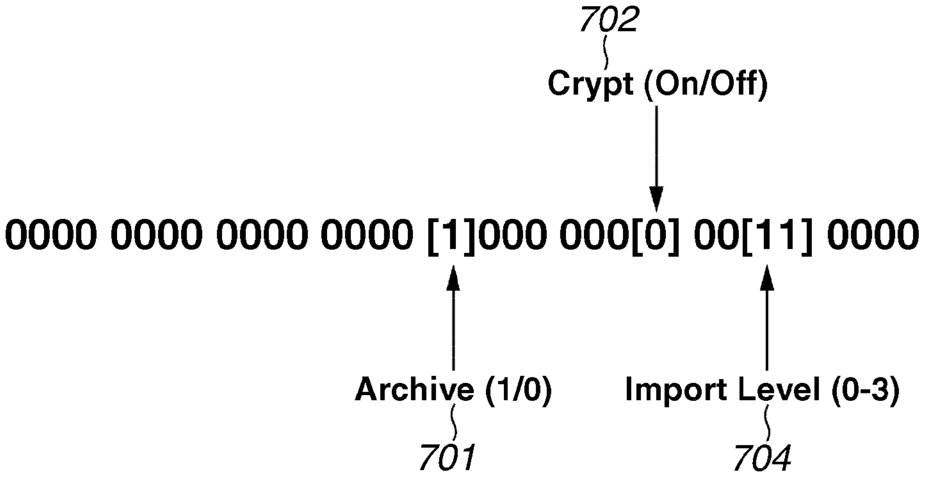

702
Crypt (On/Off)
0000 0000 0000 0000 [1]000 000[0] 00[11] 0000
Archive (1/0)
701
Import Level (0-3)
704

FIG.8

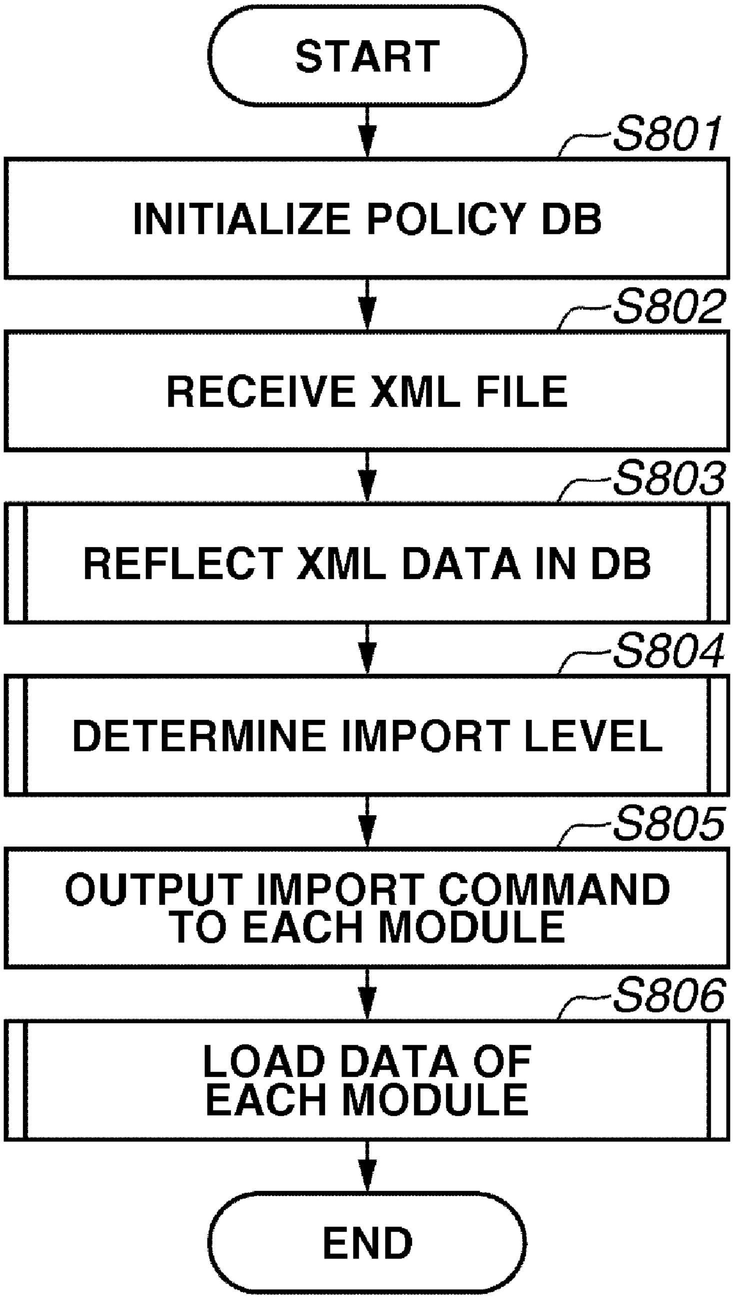

START
S801
INITIALIZE POLICY DB
S802
RECEIVE XML FILE
S803
REFLECT XML DATA IN DB
S804
DETERMINE IMPORT LEVEL
S805
OUTPUT IMPORT COMMAND TO EACH MODULE
S806
LOAD DATA OF EACH MODULE
END

FIG.9

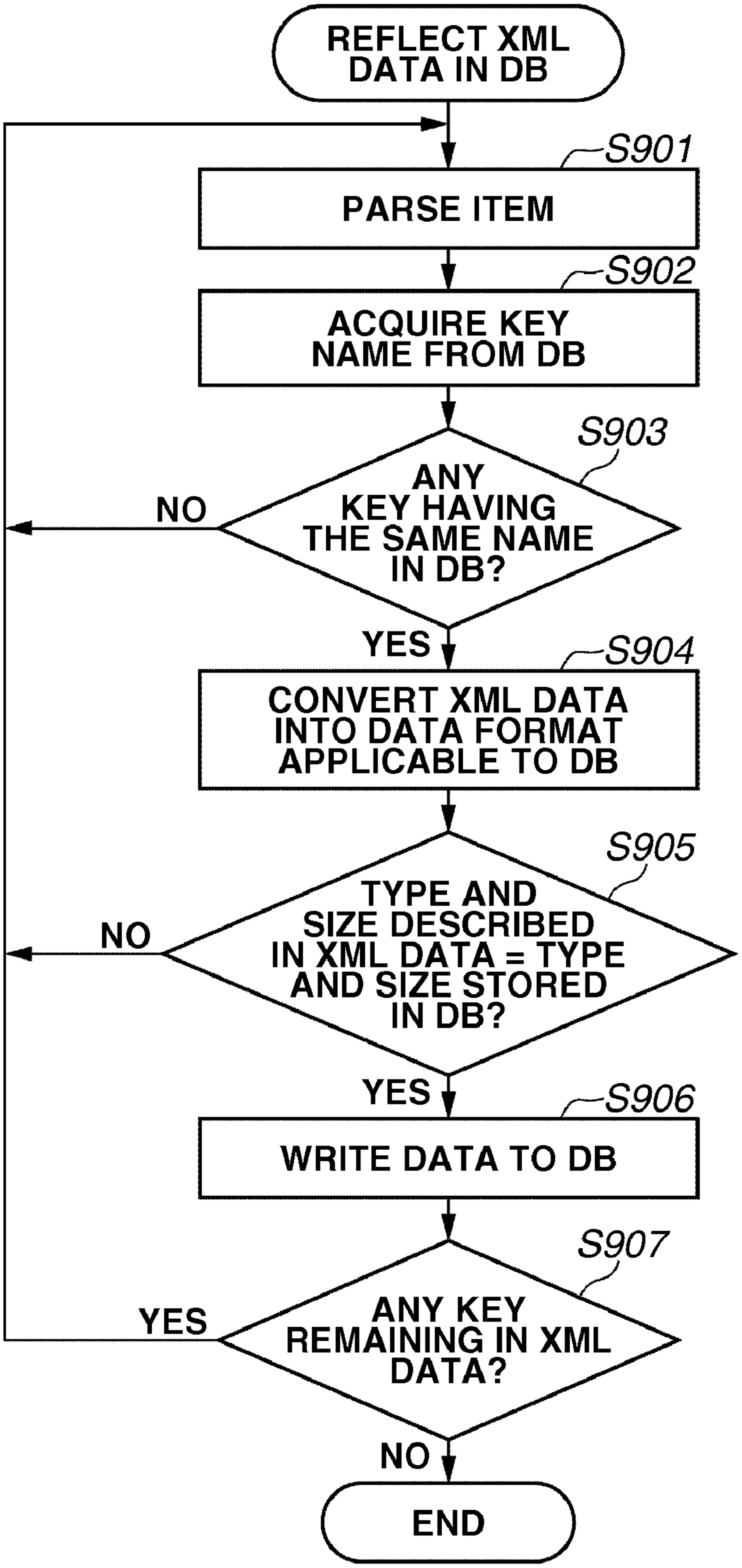

REFLECT XML DATA IN DB
S901
PARSE ITEM
S902
ACQUIRE KEY NAME FROM DB
S903
ANY KEY HAVING THE SAME NAME IN DB?
NO
YES
S904
CONVERT XML DATA INTO DATA FORMAT APPLICABLE TO DB
S905
TYPE AND SIZE DESCRIBED IN XML DATA = TYPE AND SIZE STORED IN DB?
NO
YES
S906
WRITE DATA TO DB
S907
ANY KEY REMAINING IN XML DATA?
YES
NO
END

FIG.10

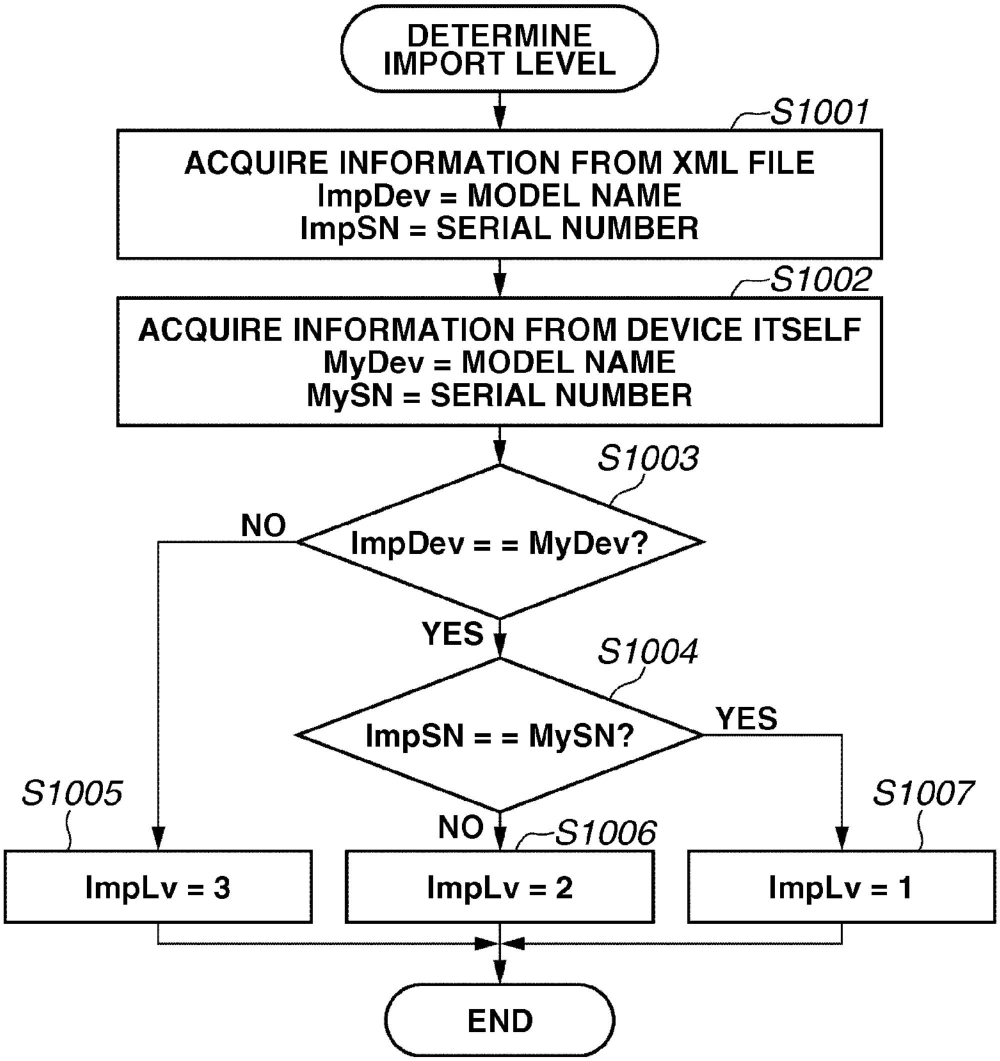

DETERMINE IMPORT LEVEL
S1001
ACQUIRE INFORMATION FROM XML FILE
ImpDev = MODEL NAME
ImpSN = SERIAL NUMBER
S1002
ACQUIRE INFORMATION FROM DEVICE ITSELF
MyDev = MODEL NAME
MySN = SERIAL NUMBER
S1003
ImpDev = = MyDev?
NO
YES
S1004
ImpSN = = MySN?
YES
NO
S1005
S1006
S1007
ImpLv = 3
ImpLv = 2
ImpLv = 1
END

FIG.11

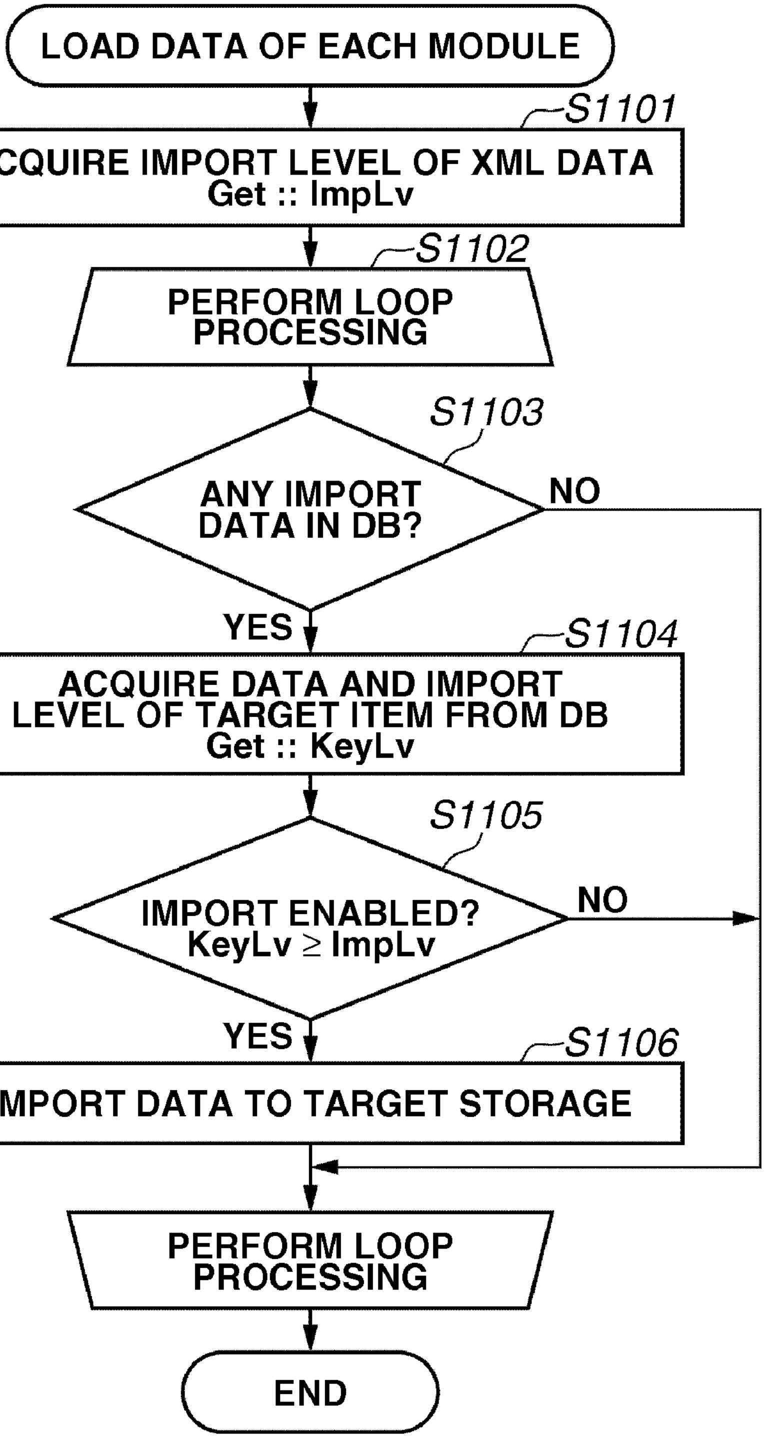

LOAD DATA OF EACH MODULE
S1101
ACQUIRE IMPORT LEVEL OF XML DATA
Get :: ImpLv
S1102
PERFORM LOOP PROCESSING
S1103
ANY IMPORT DATA IN DB?
NO
YES
S1104
ACQUIRE DATA AND IMPORT LEVEL OF TARGET ITEM FROM DB
Get :: KeyLv
S1105
IMPORT ENABLED?
KeyLv ≥ ImpLv
NO
YES
S1106
IMPORT DATA TO TARGET STORAGE
PERFORM LOOP PROCESSING
END

FIG.12

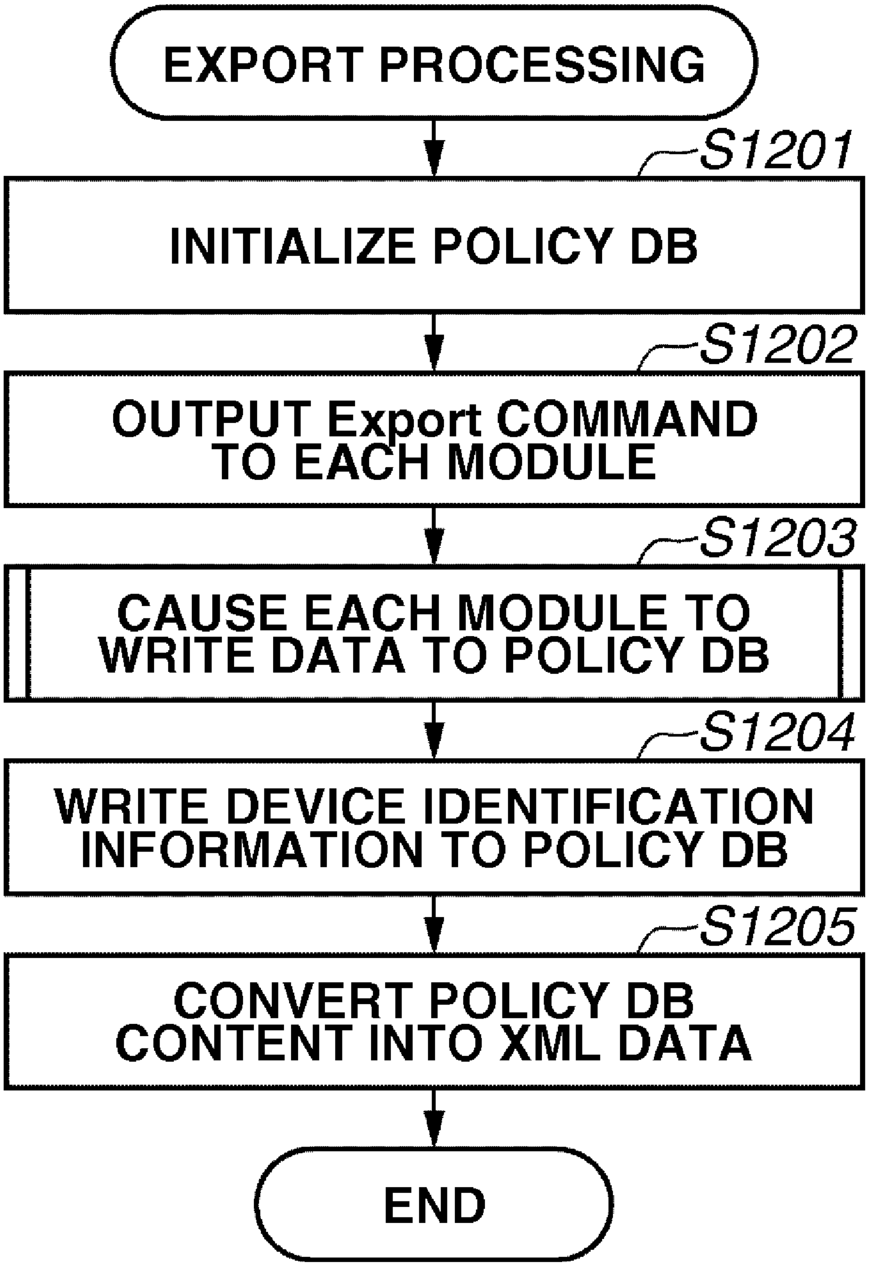

EXPORT PROCESSING
S1201
INITIALIZE POLICY DB
S1202
OUTPUT Export COMMAND TO EACH MODULE
S1203
CAUSE EACH MODULE TO WRITE DATA TO POLICY DB
S1204
WRITE DEVICE IDENTIFICATION INFORMATION TO POLICY DB
S1205
CONVERT POLICY DB CONTENT INTO XML DATA
END

FIG.13

DEVICE IDENTIFICATION INFORMATION (LEVEL DETERMINATION FACTOR)	DESCRIPTION
MODEL MANAGEMENT NUMBER (MODEL CODE)	SERIES NAME OF DEVICE
MACHINE BODY MANAGEMENT NUMBER (SN)	INDIVIDUAL IDENTIFICATION NUMBER
FIRMWARE VERSION	VERSION OF CONTROLLER DEDICATED TO RELATED DEVICE SERIES
DESTINATION INFORMATION	DESTINATION (COUNTRY/REGION, LANGUAGE) OF THE DEVICE
A/B/INCH INFORMATION	PAPER SIZE STANDARDS OF THE DEVICE (A SERIES, B SERIES, INCH SERIES)
POLICY DB VERSION	SCHEMA OF POLICY DB AND VERSION OF DATA
USER EDITING INFORMATION	INFORMATION INDICATING WHETHER DATA HAS BEEN REWRITTEN BY USER AFTER EXPORT
ACCESSORY CONNECTION INFORMATION	INFORMATION RELATING TO FINISHER AND PAPER FEEDING/ DISCHARGE CONFIGURATION
LICENSE	INFORMATION RELATING TO APPLIED LICENSE

FIG.14

	UserEdit	MODEL MANAGEMENT NUMBER	SN	FrimVer/DBVer	DESTINATION/ ABINCH		IMPORT LEVEL APPLIED
CASE 1	YES	–	–	–	–	→	Lv1
CASE 2	NO	NON-COINCIDENT	–	–	COINCIDENT	→	Lv3
CASE 3	NO	COINCIDENT	NON-COINCIDENT	NEWER THAN SPECIFIC VERSION	COINCIDENT	→	Lv2
CASE 4	NO	COINCIDENT	COINCIDENT	NEWER THAN SPECIFIC VERSION	COINCIDENT	→	Lv1
CASE 5	NO	COINCIDENT	–	OLDER THAN SPECIFIC VERSION	COINCIDENT	→	Lv3
CASE	NO	NO	–	–	NON-COINCIDENT	→	Lv0

FIG.15

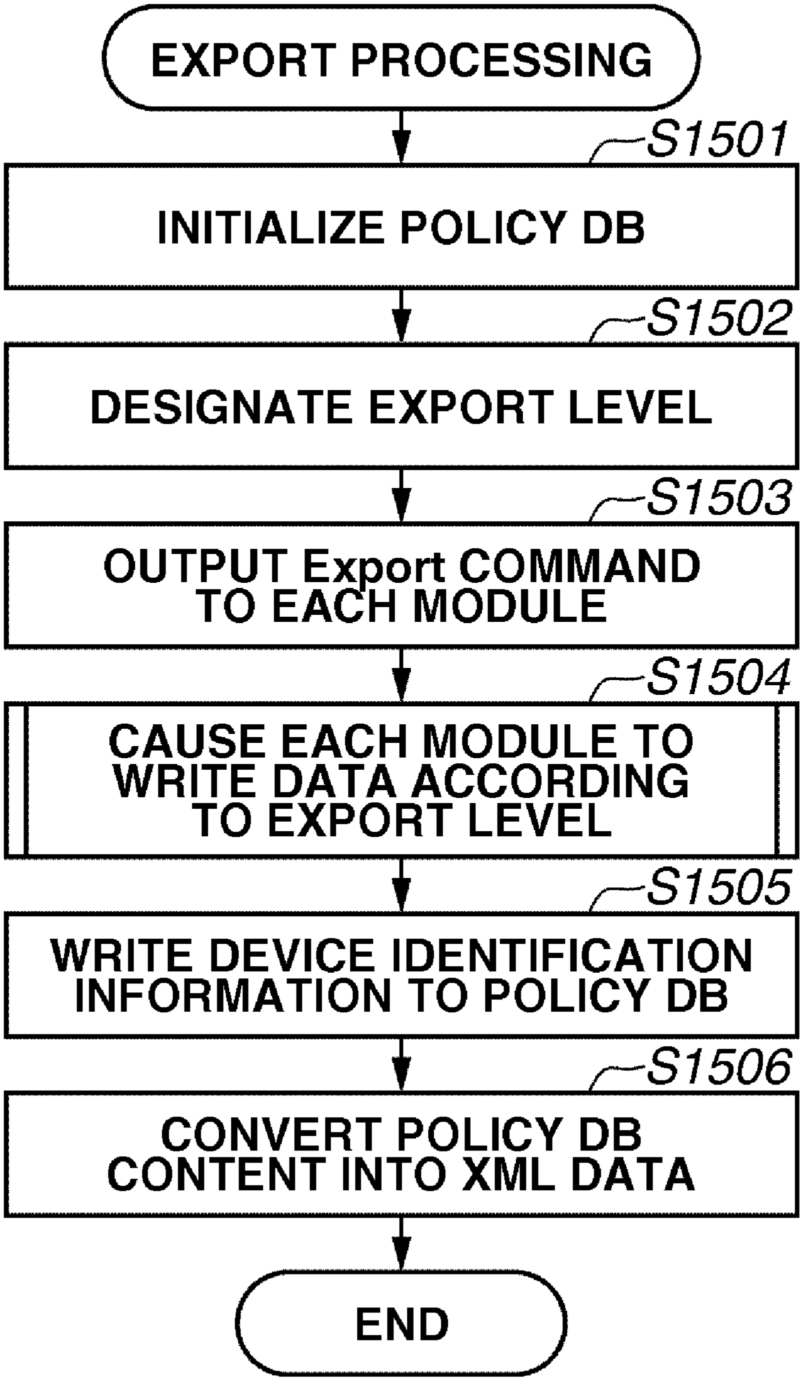

EXPORT PROCESSING
S1501
INITIALIZE POLICY DB
S1502
DESIGNATE EXPORT LEVEL
S1503
OUTPUT Export COMMAND TO EACH MODULE
S1504
CAUSE EACH MODULE TO WRITE DATA ACCORDING TO EXPORT LEVEL
S1505
WRITE DEVICE IDENTIFICATION INFORMATION TO POLICY DB
S1506
CONVERT POLICY DB CONTENT INTO XML DATA
END

FIG.16

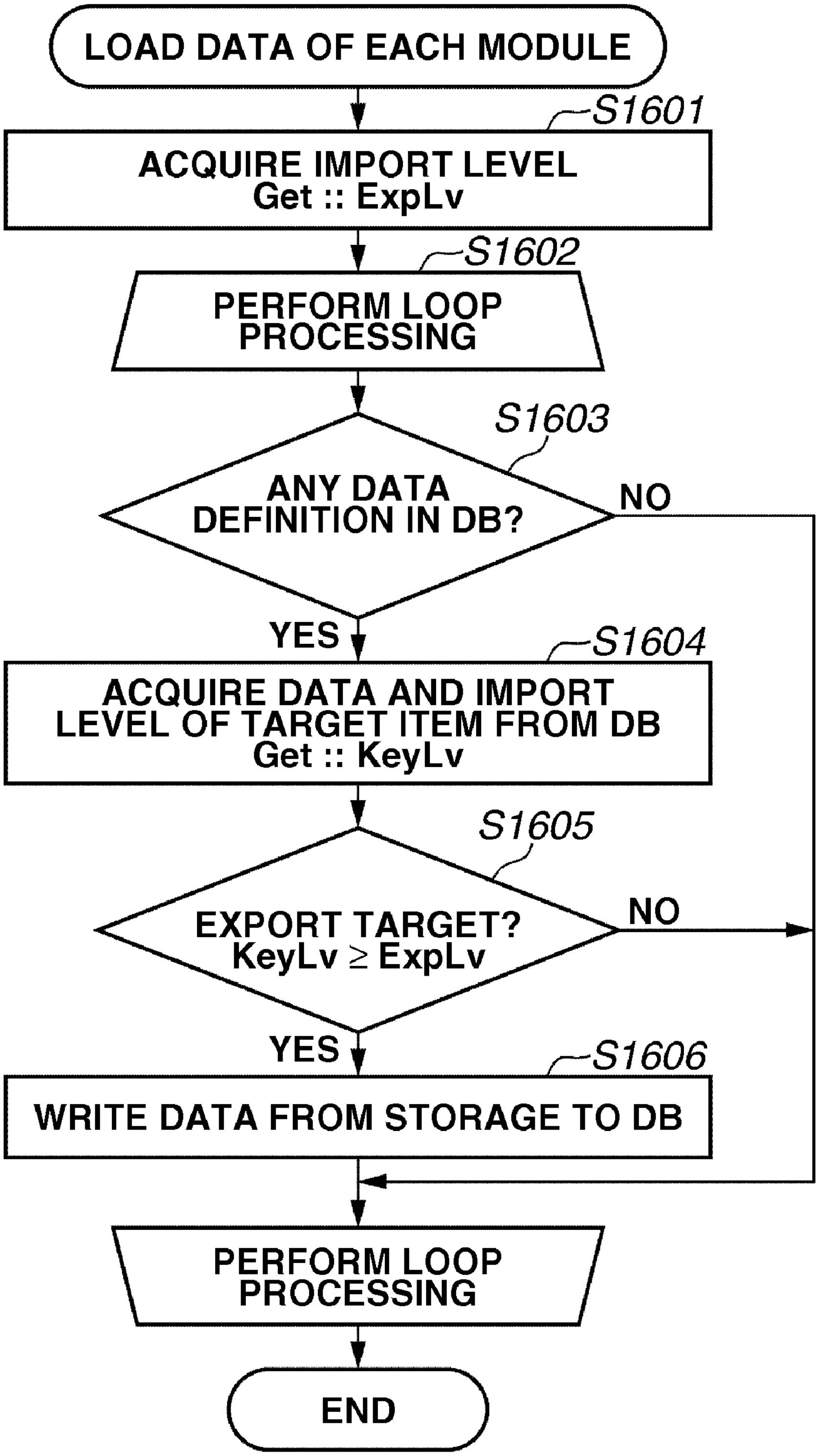

LOAD DATA OF EACH MODULE
S1601
ACQUIRE IMPORT LEVEL
Get :: ExpLv
S1602
PERFORM LOOP PROCESSING
S1603
ANY DATA DEFINITION IN DB?
NO
YES
S1604
ACQUIRE DATA AND IMPORT LEVEL OF TARGET ITEM FROM DB
Get :: KeyLv
S1605
EXPORT TARGET?
KeyLv ≥ ExpLv
NO
YES
S1606
WRITE DATA FROM STORAGE TO DB
PERFORM LOOP PROCESSING
END

IMAGE FORMING APPARATUS AND METHOD FOR THE SAME

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention relates to a technique capable of managing setting information of an image forming apparatus, such as a printer, a copying machine, or a multifunction peripheral having multiple functions.

[0003] 2. Description of the Related Art

[0004] A recent image forming apparatus has a plurality of functions prepared beforehand, and has the capability of additionally installing various applications. A user of the image forming apparatus can use these functions and applications directly or via a network. The setting information increases in the number of items to be set or adjusted if the total number of the functions increases. Thus, an initial setup of an image forming apparatus for office use takes a significant time.

[0005] Hence, prior to the delivery of the apparatus to an office system, a selling agent is required to perform preliminary kitting that includes a work for introducing and setting applications and options according to the system beforehand in a batch manner. More specifically, a worker performs a manual setting work considering setup conditions received beforehand from the delivery destination as well as setting information extracted from an existing device (e.g., a target machine to be replaced) of the delivery destination.

[0006] Hence, in a situation that the worker is forced to work concentratedly to deliver a large number of machines during a busy time, it will be difficult to secure a sufficient lead-time for the shipment. Further, even in a case where the adjustment and setting work has been completed before shipment, the delivered machine may not smoothly operate due to ambient conditions (e.g., vibrations during transportation, temperature difference, and humidity difference). In such a case, the worker may be requested to replace the delivered machine by a non-defective one. In this case, it is necessary to perform the setting work again for the delivered image forming apparatus. In such a case, it is desired that the setting values can be quickly reflected in the image forming apparatus.

[0007] As a conventional technique, it is feasible for an apparatus to acquire or distribute common setting items from or to another apparatus when the apparatus is connected to a network or a memory medium. For example, according to a management method discussed in Japanese Patent Application Laid-Open No. 2008-238799, setting information common to a plurality of models is discriminated from setting information effective only to a specific model and can be separately output to an external storage device. Further, it is feasible to select effective setting values exclusively from an external storage device and store the acquired setting values in an internal nonvolatile memory.

[0008] However, the setting information of a recent image forming apparatus is finely classified into a plurality of categories, such as setting information relating to image forming processing, setting information relating to image processing, setting information relating to installed applications, unique information relating to each device configuration only, and common information relating to initial values of common functions (including an address book) that are common to a plurality of models.

[0009] For example, unique setting information that is dependent on a device configuration is applicable to only an image forming apparatus that has the same device configuration. In an image forming apparatus having a different configuration, a setting item having a different format and the value thereof are used in management.

[0010] Further, setting information relating to license or security is information unique to each machine body due to operational reasons, and therefore cannot be equally used for another image forming apparatus even when the apparatus has the same configuration. As another example, unique setting information dependent on each application can be managed using setting items that have a format variable depending on each vendor that has designed the application.

[0011] Further, setting information relating to new functions of a brand-new model or functions relevant to updated specification is initially managed as unique setting information. However, these functions are gradually applied to all models as time goes on. Therefore, unique setting information is no longer new and will be classified into (or regarded as) common setting information as it becomes older.

[0012] Hence, according to the technique discussed in Japanese Patent Application Laid-Open No. 2008-238799, an update flag indicating transmission allowance and acceptance allowance is allocated to each setting item to manage the device information and a setting value of the update flag can be managed. In other words, the setting information is managed fixedly for each setting item using the update flag.

[0013] As described above, the setting information of each image forming apparatus is finely classified into a plurality of categories depending on the use of the information. Therefore, the management method discussed in Japanese Patent Application Laid-Open No. 2008-238799 is insufficient to realize satisfactory management. Further, if the above-described flag indicates that the transmission is disabled, the setting value cannot be transmitted to an external device. In such a case, if the above-described change to the common setting occurs, it is unable to transfer the setting value to another device flexibly.

SUMMARY OF THE INVENTION

[0014] The present invention is directed to a management technique in which various pieces of device identification information of an image forming apparatus are sufficiently taken into consideration to classify setting information of an image forming apparatus appropriately and transfer the setting information to another device flexibly.

[0015] According to an aspect of the present invention, an image forming apparatus configured to control a plurality of applications according to setting information includes a storage unit configured to store, in a temporary region, setting information, described in Extensible Markup Language (XML), that is received from a connected device, an acquisition unit configured to acquire device identification information from the setting information stored in the temporary region, a determination unit configured to compare the device identification information acquired by the acquisition unit with device identification information of the image forming apparatus and to determine an import level used to reflect each setting included in the setting information stored in the temporary region, and a storing unit configured to extract a setting to be reflected according to the import level from the stored setting information using each module of the plurality of applications, and to store the extracted setting in a storage that is used for control performed in each application, wherein the device identification information that determines the import level includes at least one of firmware version, destination information, user editing information, accessory connection information, and license information, in addition to model management number and machine body management number.

[0016] Further features and aspects of the present invention will become apparent from the following detailed description of exemplary embodiments with reference to the attached drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] The accompanying drawings, which are incorporated in and constitute a part of the specification, illustrate exemplary embodiments, features, and aspects of the invention and, together with the description, serve to explain the principles of the invention.

[0018] FIG. **1** illustrates an example configuration of a system including an image forming apparatus according to an exemplary embodiment of the present invention.

[0019] FIG. **2** is a block diagram illustrating a configuration of the image forming apparatus according to an exemplary embodiment of the present invention.

[0020] FIG. **3** schematically illustrates an example of a software module according to an exemplary embodiment of the present invention.

[0021] FIG. **4** is a data flow diagram schematically illustrating import processing according to an exemplary embodiment of the present invention.

[0022] FIG. **5** is a data flow diagram schematically illustrating export processing according to an exemplary embodiment of the present invention.

[0023] FIG. **6** illustrates a sample of database (DB) schema and a sample of Extensible Markup Language (XML) schema.

[0024] FIG. **7** illustrates a sample of meta-information stored in the DB.

[0025] FIG. **8** is a flowchart illustrating an example sequence of the import processing according to a first exemplary embodiment of the present invention.

[0026] FIG. **9** is a flowchart illustrating an example sequence of the import processing according to the first exemplary embodiment of the present invention.

[0027] FIG. **10** is a flowchart illustrating an example sequence of the import processing according to the first exemplary embodiment of the present invention.

[0028] FIG. **11** is a flowchart illustrating an example sequence of the import processing according to the first exemplary embodiment of the present invention.

[0029] FIG. **12** is a flowchart illustrating an example sequence of the import processing according to the first exemplary embodiment of the present invention.

[0030] FIG. **13** illustrates level determination factors according to a second exemplary embodiment of the present invention.

[0031] FIG. **14** is a table that can be used to determine a level based on level determination factors according to the second exemplary embodiment of the present invention.

[0032] FIG. **15** is a flowchart illustrating an example sequence of the export processing according to a third exemplary embodiment of the present invention.

[0033] FIG. **16** is a flowchart illustrating an example sequence of the export processing according to the third exemplary embodiment of the present invention.

DESCRIPTION OF THE EMBODIMENTS

[0034] Various exemplary embodiments, features, and aspects of the invention will be described in detail below with reference to the drawings.

[0035] FIG. **1** illustrates a general system configuration according to an exemplary embodiment of the present invention, which includes at least one image forming apparatus, such as a printing apparatus, a copying machine, or a multifunction peripheral having a plurality of functions. The system illustrated in FIG. **1** includes a copying machine **001** and a copying machine **002**, which can read an image of a document, perform image processing on the read document image, and output a copied product. Further, each copying machine serves as a printer that can output page-description language (PDL) data if the data is received via a network **003** from a client computer. On the other hand, image data read by the copying machine **001** can be transmitted to another apparatus, such as a file server or a mail server, via the network **003**. In a device group **005**, the copying machine **001** and the copying machine **002** are different from each other in device configuration.

[0036] A management server **004** is connected to the management target device group **005**, which includes the copying machine **001** and the copying machine **002**, via the network **003**. The management server **004** performs communications for device management, such as export and import setting information. The management server **004** can use a conventionally known protocol, such as Hyper Text Transfer Protocol (HTTP), Simple Object Access Protocol (SOAP), or File Transfer Protocol (FTP), in the communications.

[0037] A remote user environment **006** is similar to the management server **004** in functionality. The remote user environment **006** is connected to a remote operation terminal **008** via Internet **007**. The remote operation terminal **008** is a terminal dedicated to a remote maintenance service. Thus, the remote operation terminal **008** can communicate with the remote user environment **006** to cause the remote user environment **006** to export setting information of an image forming apparatus included in the management target device group **005**. The setting information can be stored and can be imported to another image forming apparatus included in the device group or a newly set image forming apparatus, or to an image forming apparatus in another client environment.

[0038] The image forming apparatus can directly export setting information to a universal serial bus (USB) storage device **009**, without using the management server **004**, in response to a predetermined operation performed on an operation panel. The setting information stored in the USB storage device **009** can be appropriately imported to another image forming apparatus.

[0039] FIG. **2** is a block diagram illustrating a hardware configuration of the image forming apparatus according to the present exemplary embodiment. The image forming apparatus illustrated in FIG. **2** includes a main controller **100** that can serve as an information processing unit of the image forming apparatus. Further, a sub controller **101** can serve as an image processing unit of the image forming apparatus. The main controller **100** includes a bus bridge **116**, via which a bus of the main controller **100** is connected to a bus of the sub controller **101**. The main controller **100** has the following constituent elements.

[0040] The main controller **100** includes a central processing unit (CPU) (**1**) **108** that can execute software stored in a flash read only memory (FLASH ROM) **110** or in a hard disk drive (HDD) **111**. The CPU (**1**) **108** can control various operations to be performed by respective devices connected to a system bus **115**. The FLASH ROM **110** or the HDD **111** is usable as a storage region that can store programs, image data, and user setting data. A random access memory (RAM) (**1**) **109** is functionally operable as a main memory or a work area for the CPU (**1**) **108**.

[0041] An operation unit interface (I/F) **112** can display an image on a liquid crystal display (LCD) panel **104** of the image forming apparatus. Further, the operation unit I/F **112** is connected to a touch panel and/or operation buttons **103**. The LCD panel **104** is integrally formed with the touch panel and/or operation buttons **103**, to control operator's instructions. A network interface card (NIC) **113** can transmit and receive various data to and from another network device or a file server bidirectionally via a local area network (LAN) **102**. An external serial interface **114** is connectable to an external apparatus, such as a memory medium reader or an integrated circuit (IC) card reader, to transmit and receive data bidirectionally.

[0042] The sub controller **101** has the following constituent elements. The sub controller **101** is connected to a printing unit (printer) **106**, which is capable of performing printing on a paper, for example, according to an electrophotographic method or an inkjet method. Further, the sub controller **101** is connected to an image reading unit (scanner) **105**, which is capable of reading an image printed on a paper. In many cases, the image reading unit **105** is equipped with an auto document feeder (not illustrated) as an optional device that can automatically read a plurality of pieces of document content. The sub controller **101** includes a CPU (**2**) **117**, which can transmit and receive a control signal via a device interface **120** to and from each of the printing unit **106** and the image reading unit **105**.

[0043] The CPU (**2**) **117** can control various operations to be performed by respective devices connected via a system bus **127**. A scanner image processing unit **121** receives an image from the image reading unit **105**. The readout image can be temporarily stored in a RAM (**2**) **118**. A memory image processing unit (IMAGEC) **123** can perform processing on an image of the RAM (**2**) **118** of the image forming apparatus and can output the processed image to the RAM (**2**) **118**. The image processing to be performed by the memory image processing unit **123** includes various (e.g., rotation, zooming, color space conversion, gray scale conversion, combination, coding, and decoding) processing.

[0044] After the memory image processing unit **123** completes the image processing on the image loaded on the RAM (**2**) **118**, the CPU (**2**) **117** transmits the processed image to the storage apparatus **110** or **111** of the main controller **100** via the bus bridge **116**. Further, the CPU (**2**) **117** can read an image from the storage apparatus **110** or **111** of the main controller **100** via the bus bridge **116** and load the read image into the RAM (**2**) **118**. Further, the CPU (**2**) **117** can output the read image to the printing unit **106** via a printer image processing unit **122**.

[0045] Processing to be performed by the scanner image processing unit **121** and the printer image processing unit **122** includes various (e.g., color space conversion, movement, color adjustment, density control, and delay amount control) processing. A raster image processor (RIP) **119** can rasterize a PDL code on the RAM (**2**) **118** into a bitmap image. The RIP **119** can output the rasterized bitmap image to the RAM (**2**) **118**. A static random access memory (SRAM) **124** can speedily input and output nonvolatile data from and to the CPU (**2**) **117**. A modulator/demodulator (MODEM) **125** is connected to a public communication line **107** and can perform modulation/demodulation to input and output FAX images.

[0046] FIG. **3** illustrates a system configuration of an import service that can be installed on the image forming apparatus according to the present exemplary embodiment. Example processing relating to network import service is described below. In the present exemplary embodiment, setting information to be imported includes address book data, department management data, and device setting data. An import service requester **301** can transmit setting information, and an import service provider **300** can receive the setting information.

[0047] The import service requester **301** can transmit a Simple Object Access Protocol (SOAP) message via an intranet **302** to communicate with the import service provider **300**. A HyperText Transfer Protocol (HTTP) server **303** and a SOAP server **304** can interpret the request message and can launch a Common Gateway Interface (CGI) **306** for the processing that corresponds to the received message. A network import module **307** can process a received request. The SOAP server **304** can launch a device setting import CGI **306** with reference to a service request.

[0048] The launched CGI causes the network import module **307** to store a setting file that includes the received setting information in a temporary region **320**. Then, the launched CGI waits for a response with respect to secondary storage completion. The setting file has a file format including a plurality of XML data compressed together. After completing the primary storage, the launched CGI requests a setting management unit **308** to perform secondary storage processing.

[0049] A setting management module **309** can read compression data from the temporary region **320** and can decompress the readout data. If the decompression processing has been successfully completed, the setting management module **309** initializes an import file policy database (DB) **310**. If the initialization processing has been successfully completed, the setting management module **309** starts processing for registering information corresponding to each setting item in the policy DB **310** while parsing XML data obtained after completing the decompression processing.

[0050] More specifically, the setting management module **309** acquires device identification information, such as machine body management number (serial number) and model management number (or series number), included in the XML data. If the device identification information acquisition has been successfully completed, the setting management module **309** acquires device identification information of an image forming apparatus that is currently executing an import service and determines an import level of the setting information that indicates a setting range to be imported. If the import level is determined, the setting management module **309** registers information relating to the remaining setting items included in the XML data in the policy DB **310**.

[0051] In the present exemplary embodiment, if there is any setting item that has not been reflected in the policy database, the setting management module **309** registers the non-reflected setting item in a reflection history (not illustrated). The setting management module **309** sends a notification together with setting reflection range (i.e., import level) to an import control unit **313** having been registered beforehand. The setting management module **309** returns a secondary storage completion response to the import request source.

[0052] When an import module group **321** of the import control unit **313** receives a notification from the setting management module **309**, the import module group **321** performs tertiary storage of setting information having been received together with the notification so that the setting information can be actually used in the control performed by the image forming apparatus. Each import module is prepared to manage setting information that is unique to a specific function of the image forming apparatus or prepared to manage setting information that is common to a plurality of functions of the apparatus.

[0053] These import modules extract a part of the setting information that is finally required in an import file. The extracted setting information is reflected in the image forming apparatus. In the present exemplary embodiment, each of the import modules **318**, **316**, and **314** acquires a part of the setting information that coincides with the setting item of the processing target from the secondarily stored policy DB **310**.

[0054] The setting information acquired in this case includes setting values and reflection policy. Each import module compares the reflection level notified from the setting management module **309** with the reflection policy. If it is determined that there is setting information to be reflected, each import module registers the setting information to be reflected in a control setting DB **322** so that the import module can be actually used by the image forming apparatus.

[0055] In the present exemplary embodiment, the device setting import module **314** reads only the items of the setting information relating to the device setting from the policy DB **310** one by one, and registers the readout setting information to a control device setting DB **315**. A department management setting import module **316** reads only the setting information relating to the department management from the policy DB **310** and registers the readout setting information to a control department management setting DB **317**. The address book import module **318** reads only the setting information relating to the address book setting from the policy DB **310** and registers the readout setting information to a control address book DB **319**.

[0056] Next, example processing for importing information from the USB storage is simply described. Like a network import unit **305**, a USB storage import unit **311** can perform processing for importing information from the USB storage device **009**. A USB import module **312** detects the presence of a setting file in the USB storage device **009**. The USB import module **312** stores the setting file in the temporary region **320**. Then, the USB import module **312** requests the setting management unit **308** to perform secondary storage processing. The remaining import operation is similar to the network import processing.

[0057] Further, each import module acquires meta-information from the secondarily stored policy DB **310**, in acquiring setting information corresponding to a setting item to be processed. The import module group **321** performs control relating to the registration method, which is designated by the meta-information, when the setting information is registered to the control setting DB. The control performed by the import module group **321** includes processing relating to encryption, processing for returning the value to the factory shipment value, and processing for prohibiting overwriting the present value.

[0058] If the import module group **321** completes the registration of the setting information to be managed to the control setting DB **322**, each import module notifies the setting management unit **308** of the completion of the tertiary storage processing. If the completion is notified from all of the import modules to the setting management unit **308**, then the setting management unit **308** reboots the image forming apparatus in such a way as to reflect the updated setting values in the next launching processing. The control setting DB **322** according to the present exemplary embodiment is, for example, a static random access memory (SRAM) device, or an HDD device, or a hybrid thereof. The control setting DB **322** is operable speedily and stably. However, the control setting DB **322** is lower in capacity per unit cost and is higher in capacitive constraint.

[0059] FIG. **4** is a data flow diagram schematically illustrating the flow of data that corresponds to the primary storage and the subsequent processing in the import processing illustrated in FIG. **3**. First, when the import service system starts the import processing, the import service system initializes the policy DB. If the network import module **307** or the USB import module **312** acquires an imported XML file **401** during the import processing, the setting management module **309** stores the acquired XML file **401** in the policy DB **301**.

[0060] In this case, key information having a name not described in the policy DB is not written to the policy DB **301** even if the description thereof is present in the XML file **401**. Further, in a case where size and type information described in the XML file is different from the size and type stored in the policy DB **301**, no information is written to the DB.

[0061] When the storage of the data into the policy DB **301** is completed, the setting management module **309** sends an import command to each application **402** (e.g., import modules **314**, **316**, and **318** illustrated in FIG. **3**) in the device. In this case, the setting management module **309** transmits an import level calculated based on the information described in the XML to each application **402**. An example calculation of the import level is described in detail below.

[0062] Each application **402** extracts its own data from the policy DB **301**, and compares the notified level with level information included in the meta-information described for each internal key of the policy DB **301**. As a result, only the writable one is written to a storage **403** (e.g., **315**, **317**, and **319** illustrated in FIG. **3**) that stores settings to be uses in actual controls.

[0063] FIG. **5** is a data flow diagram schematically illustrating the flow of data in the export processing. First, when the import service system starts the export processing, the import service system initializes the policy DB. If each application **402** receives an export instruction from the setting management module **309**, each application **402** reads setting information from the storage **403** and writes the readout setting information to the policy DB **310**. In this case, each application **402** writes all of the exportable setting items and the value thereof to the DB without considering any policy.

[0064] If all of the applications completes writing the setting information to the policy DB **301**, the setting management module **309** converts the setting information into XML format data. Further, in this case, the setting management module **309** acquires device identification information of the apparatus itself and writes the acquired information as additional information to the XML file **401**. The additional information can be used to determine an import level when the setting information is imported to other apparatus. The XML file **401** including all of the written information can be extracted from the device and exported, as the input XML file described with reference to FIG. **4**.

[0065] FIG. **6** illustrates an internal schema of the policy DB **310** and an example description of the XML file **401**. A conceptual structure **606** of the setting information is constituted by a key having a hierarchy structure, in which each leaf has data, which can be expressed using the DB and the XML.

[0066] As a table schema of the DB, a relational DB structure having a KeyID **601** as a relation key is provided. A KeyList table **602** indicates a relationship between a key structure and meta-information. The KeyList table **602** includes descriptions relating to key name definition and meta-information. To realize a tree structure that expresses a hierarchy structure, the KeyList table **602** includes ParentID that indicates a parent hierarchy. According to the illustrated example, the meta-information is expressed as 32-bit bit stream data. In the present exemplary embodiment, the meta-information is regulated using a bit assign format, such as level information.

[0067] A ValueList table **603** (i.e., a table which indicates data contents) includes a "Value" field in which actual data is described, a "Size" field in which data size is described, and a "Type" field in which data type is described. In the present invention, no value is described in the "Value" field in an initial state. Further, a ValueRange table **604** includes value range information with respect to the data settable in the "Value" field, as complementary information. An XML file **605** includes tags and elements that are created based on the information described in the ValueRange table **604**. As understood from the above-described example, information stored in the DB can be directly expressed as XML data.

[0068] FIG. **7** illustrates an operational example of meta-information that is defined in the KeyList table **602**. The example illustrated in FIG. **7** regulates a 4-byte (i.e., 32-bit) region, in which a 4-bit region is used in the present invention.

[0069] An Archive bit **701** is a dynamic meta-information flag that is raised when data is written in the import or export processing. The Archive bit **701** can be referred to when XML data to be exported is generated or can be used as a flag to determine whether data is included when XML data is read from the policy DB. A Crypt bit **702** is a static meta-information flag indicating whether to perform data encryption. If the flag is raised with respect to the Crypt bit **702**, the data is encrypted in the XML data description. Further, decoding is performed in the data writing from the XML to the policy DB.

[0070] Finally, an Import Level **704** is static meta-information to which 2-bit data is assigned so that four types 0 to 3 can be defined. For example, the type "0" indicates that the import/export is disabled. The type "1" indicates that only the backup re-storage for the same model and the same machine is enabled. The type "2" indicates that the import/export between different machines of the same model is enabled. The type "3" indicates that the import/export between different models is enabled. As described in the following sequence, the determined level can be referred to in determining whether to perform the import processing.

[0071] Next, sequential processing including reception of an XML file and completion of the import is described below with reference to flowcharts illustrated in FIG. **8** to FIG. **11**.

[0072] FIG. **8** is a flowchart illustrating a sequence of import processing. In step **S801**, the import service system initializes the policy DB. More specifically, the import service system resets all of the values having been written to the DB and further resets the Archive bit **701**. The initialized policy DB includes only key name, type, size, and statically defined meta-information and does not include any value.

[0073] In step **S802**, the import service system stores an XML file. In step **S803**, the import service system parses the content of the XML file and performs secondary storage processing for writing the parsed data in the policy DB. Subsequently, in step **S804**, the import service system determines an import level with reference to additional information of the receive XML file and information relating to the apparatus that is currently performing the import operation. Subsequently, in step **S805**, the import service system outputs an import instruction together with the determined import level to each module (see **402**). Then, in step **S806**, the import service system performs a storage (see **403**) reflection work for actual use in various control operations of the apparatus.

[0074] An example procedure for storing the XML data into the policy DB (i.e., the processing to be performed in step **S803**) is described below in detail with reference to a flowchart illustrated in FIG. **9**. In step **S901**, the import service system sequentially parses (analyzes) the XML file. As described above with reference to FIG. **6**, the XML file **605** has a key expression including tags having values constitute a hierarchy structure.

[0075] In step **S902**, the import service system interprets one key as a target to be analyzed. Then, in step **S903**, the import service system confirms whether there is any key having the same name in the policy DB. If the key having the same name is not present (NO in step **S903**), the processing returns to step **S901** to parse the next item. If the key having the same name is present in the policy DB (YES in step **S903**), then in step **S904**, the import service system acquires a value defined for the corresponding key from the XML file. Then, the import service system converts the acquired value into a data having a format that can be written to the policy DB.

[0076] In step **S905**, the import service system determines whether the data structure is coincident with the size already defined in the DB. If the data structure is not coincident with the size defined in the DB (NO in step **S905**), the import service system does not perform writing for the item. The processing returns to step **S901** to parse the next item.

[0077] On the other hand, if coincidence is confirmed in type and size information (YES in step **S905**), the processing proceeds to step **S906**. In step **S906**, the import service system writes the value of the item into the policy DB. In this case, the Archive bit of the meta-information changes to 1. Subsequently, in step **S907**, the import service system determines whether the writing processing for all items has been completed. If there is not any item value to be written to the policy DB (NO in step **S907**), the import service system terminates the processing of the flowchart illustrated in FIG. **9**. If any item value to be written is present (YES in step **S907**), the processing returns to step **S901** to parse the next item and continues to write data into the policy DB.

[0078] An example of the processing for determining the import level (i.e., the processing to be performed in step **S804**) is described below in detail with reference to a flowchart illustrated in FIG. **10**. In step **S1001**, the import service system acquires device identification information (e.g., model management number (or model code) and machine body management number (or serial number)) of the apparatus that has performed the export processing, with reference to the additional information of the XML file.

[0079] In step S**1002**, the import service system reads and acquires device identification information (e.g., model management number and machine body management number) of the apparatus itself. The import service system determines an import level based on the device identification information acquired in step S**1001** and step S**1002**, in the following manner.

[0080] In step S**1003**, the import service system determines whether the model management number described in the XML file is coincident with the model management number of the apparatus itself. If the model management number described in the XML file is not coincident with the model management number of the apparatus itself (NO in step S**1003**), the import service system determines that the import has been performed from another model. Then, in step S**1005**, the import service system sets the import level to 3.

[0081] If coincidence is confirmed in the model management number (YES in step S**1003**), the import service system determines that the model is the same. Then, the processing proceeds to step S**1004**. Subsequently, in step S**1004**, the import service system compares the machine body management number described in the XML file with the machine body management number of the apparatus itself. If coincidence is not confirmed in the machine body management number (NO in step S**1004**), the import service system determines that the setting information has been acquired from a same model apparatus having another machine body number. Then, in step S**1006**, the import service system sets the import level to 2. If coincidence is confirmed in the machine body management number (YES in step S**1004**), the import service system determines that the processing is for backup re-storage of its own model. Then, in step S**1007**, the import service system sets the import level to 1.

[0082] An example of the data loading processing (i.e., the processing to be performed in step S**806**) is described below in detail with reference to a flowchart illustrated in FIG. **11**. The processing illustrated in FIG. **11** can be called as one of sequentially performed processing in a single task or can be executed simultaneously for a plurality of tasks. The number of executions with respect to the processing illustrated in FIG. **11** is equal to the number of applications (**402**) that are present in the device.

[0083] First, in step S**1101**, the import service system confirms the import level determined in the processing described with reference to FIG. **9**. Then, the module corresponding to each application in the apparatus itself repeats the processing of step S**1102** and subsequent steps to import a setting to be reflected, which is included in the XML file (i.e., the setting information) together with its value.

[0084] In step S**1103**, the module corresponding to each application inquires the DB about an arbitrary item to check the presence of a secondarily stored setting stored in the policy DB. More specifically, the module determines whether the Archive bit **701** is raised. If the presence of any secondarily stored setting is not confirmed (NO in step S**1103**), the module checks the next item. If the presence of the secondarily stored setting is confirmed (YES in step S**1103**), then in step S**1104**, the module acquires the setting and confirms level information included in the meta-information of its key defined in the policy DB.

[0085] In step S**1105**, the module compares the import level confirmed in step S**1101** with the key level of its key and determines whether the setting is importable. For example, if the meta-information defined for the key is key level 1 (i.e., backup re-storage for the same machine is enabled) and import level 3 (i.e., an import from a different model), the import is not feasible. Therefore, the module checks the next item without importing any setting.

[0086] Further, for example, if the defined meta-information is key level 3 (i.e., import/export between different models is enabled) and import level 1 (i.e., backup re-storage for the same machine is enabled), reflecting the imported setting is feasible. Therefore, the processing proceeds to step S**1106**, in which the module writes the setting to the storage.

[0087] An example of the export processing is described below in detail with reference to a flowchart illustrated in FIG. **12**, which corresponds to details of the operation in the above-mentioned data flow diagram illustrated in FIG. **5**. First, in step S**1201**, the system initializes the policy DB **310**. Thus, no value is written in the "Value" field.

[0088] In step S**1202**, an export instruction is sent to the module **402** of each application. In step S**1203**, each module extracts setting information from the storage **403** and writes the extracted information to the policy DB **310**. In this case, the module writes all of the related data to the policy DB **310** without considering the level added in the import processing. In step S**1204**, the module extracts device identification information of the apparatus itself and writes the extracted information to the policy DB. The device identification information includes model management number and machine body management number (SN). In step S**1205**, the module converts the setting information written to the policy DB into XML format data and generates the XML file **401**.

[0089] A second exemplary embodiment of the present invention is characterized in that a further unique determination is performed in the above-mentioned import level determination processing (see step S**804**). More specifically, in the import of the setting information, the present exemplary embodiment intends to import setting information appropriately considering device identification information other than the model management number (or model code) and the machine body management number (or serial number).

[0090] FIG. **13** illustrates a list of information usable as determination factors of the import level in the present exemplary embodiment. More specifically, the determination factors of the import level includes various information relating to the image forming apparatus, such as firmware version, destination information, paper size standards information, policy DB version, user editing information, accessory connection information, and license information.

[0091] FIG. **14** is a table that illustrates examples with respect to the import level determination based on the determination factors illustrated in FIG. **13**. In the table illustrated in FIG. **14**, an item indicated using a hyphen "-" is a "Don't Care" item whose content is not cared. In the second exemplary embodiment, the system determines the import level with reference to the table illustrated in FIG. **14**. The table illustrated in FIG. **14** indicates that an appropriate import level is determined based on each combination of a plurality of determination factors.

[0092] In the present exemplary embodiment, the meaning of the import level is similar to that described in the first exemplary embodiment. More specifically, level 0 indicates that the import is disabled, and level 1 indicates that the backup re-storage for the same apparatus is enabled. Further, level 2 indicates that an import from the same model is enabled, and level 3 indicates that an import from a different model is enabled.

[0093] In case 1, the user editing information is "YES." In this case, the import level is set to "1" regardless of the state of other determination factors. The import level "1" expresses the policy that information edited by a user is accepted entirely. In case 2, the user editing information is "NO" and the destination information is "coincident with" that of the device that is performing an import operation. Further, the model management number is "not coincident with" that of the import executing device. In the case 2, the import level is set to "3." The case 2 indicates a behavior similar to the import from a different model described in the first exemplary embodiment.

[0094] In case 3, the user editing information is "NO" and the destination information is "coincident with" that of the import executing device. Further, the model management number is "coincident with" that of the import executing device. The machine body management number (SN) is "not coincident with" that of the import executing device. Further, the firmware version is "newer than the specific version." In the case 3, the import level is set to "2." The case 3 indicates a behavior similar to the import from a different machine of the same model described in the first exemplary embodiment.

[0095] In case 4, the user editing information is "NO" and the destination information is "coincident with" that of the import executing device. Further, the model management number is "coincident with" that of the import executing device. The machine body management number (SN) is "coincident with" that of the import executing device. Further, the firmware version is "newer than the specific version." In the case 4, the import level is set to "1." The case 4 indicates a behavior similar to the import from a different machine of the same model described in the first exemplary embodiment.

[0096] In case 5, the user editing information is "NO" and the destination information is "coincident with" that of the import executing device. Further, the model management number is "coincident with" that of the import executing device. Further, the firmware version is "older than the specific version." In the case 5, the import level is set to "3." The case 5 expresses a policy that causes a behavior comparable to a different model because the firmware is old although the model is the same.

[0097] In case 6, the user editing information is "NO" and the destination information is "not coincident with" that of the import executing device. In the case 6, the import level is set to "0." In other words, no import can be accepted in the case 6.

[0098] The settings of the table illustrated in FIG. **14** are arbitrarily settable considering various policies. For example, regarding the firmware version (i.e., one of the determination factors referred to in the cases 3, 4, and 5), setting information to be operated may be differentiated due to the different in the firmware version even if the model is the same. More specifically, in a case where the specification is greatly changed due to version-up, importing information having been backed-up when the firmware is an older version to the same model of a new version is regarded as an import from a different model.

[0099] Further, regarding the user editing information that has been changed by a user using the application (see case 1), flag information indicating that editing has been performed by the user is used as a setting attribute in an XML file. If the flag is raised, the import level is set to "1" so that the setting information can be imported unconditionally. Thus, it is feasible to prevent a control that blocks the user's intended editing (i.e., a control that prevents the user's intended editing from being reflected).

[0100] Further, it is useful that information relating to an accessory connected to the apparatus itself, which can be identified based on accessory connection information, or the license operated by the apparatus itself that can be identified based on license information, is taken into consideration if it is desired to realize an importing method including removing unnecessary settings, extracting only necessary settings, and reflecting the extracted settings. In the present exemplary embodiment, the import level can be determined appropriately. Similar to the first exemplary embodiment, it is feasible to determine whether to perform the import processing actually while comparing the determined import level with level information of each key defined in the policy DB **310**.

[0101] A third exemplary embodiment of the present invention is characterized in performing filter processing in the export of the setting information. The processing according to the third exemplary embodiment is described below with reference to flowcharts illustrated in FIG. **15** and FIG. **16**.

[0102] FIG. **15** is a flowchart illustrating example export processing according to the present exemplary embodiment. First, in step **S1501**, the system initializes the policy DB **310**. In step **S1502**, the system determines an export level in response to a user's instruction. More specifically, the system enables a user to select a desired one of different model oriented/same model oriented/backup re-storage with respect to the usage of the setting information to be exported, and determines the export level based on the user's selection.

[0103] In step **S1503**, an export instruction is sent to the module **402** of each application. If the export instruction is received, then in step **S1504**, each module extracts setting information from the storage **403** and writes the extracted information to the policy DB **310**. In this case, the present exemplary embodiment is different from the above-mentioned exemplary embodiment in that the export level is referred to in extracting the necessary setting and writing the extracted setting to the policy DB. Subsequently, in step **S1505**, the system extracts device identification information and writes the extracted information to the policy DB. In step **S1506**, the system converts the information to be written into XML format data and generates the XML file **401**.

[0104] FIG. **16** is a flowchart illustrating details of the above-mentioned processing to be performed in step **S1504**. In step **S1601**, in response to the export instruction, each module confirms the export level determined in step **S1502**. In step **S1602**, the module of each application repeats the processing in the following steps for the setting items relating to the application thereof. If the processing of all items is completed, the system completes the loop processing and terminates the processing of step **S1504**.

[0105] In step **S1603**, the system determines whether the definition of the setting item to be exported is present in the policy DB **310**. If the definition of the setting item is not present, the system checks the next item. If the definition of the setting item is present, then in step **S1604**, the system acquires a key level defined in the policy DB **310**. In step **S1605**, the system compares the export level with the key level and determines whether the key level corresponds to the present export level. If it is determined that the key level corresponds to the present export level (YES in step **S1605**), then in step S**1606**, the system writes the setting item and its value from the storage **403** to the policy DB **310**.

[0106] The present exemplary embodiment is different from the other exemplary embodiments in that only the necessary setting information is exported. Thus, the amount of data movement between the export of the data from one apparatus and the import of the data in another apparatus can be reduced. Further, the amount of data to be analyzed in the import processing can be reduced. Thus, the import processing can be performed efficiently.

[0107] Aspects of the present invention can also be realized by a computer of a system or apparatus (or devices such as a CPU or MPU) that reads out and executes a program recorded on a memory device to perform the functions of the above-described embodiment (s), and by a method, the steps of which are performed by a computer of a system or apparatus by, for example, reading out and executing a program recorded on a memory device to perform the functions of the above-described embodiment (s). For this purpose, the program is provided to the computer for example via a network or from a recording medium of various types serving as the memory device (e.g., computer-readable medium).

[0108] While the present invention has been described with reference to exemplary embodiments, it is to be understood that the invention is not limited to the disclosed exemplary embodiments. The scope of the following claims is to be accorded the broadest interpretation so as to encompass all modifications, equivalent structures, and functions.

[0109] This application claims priority from Japanese Patent Application No. 2011-095180 filed Apr. 21, 2011, which is hereby incorporated by reference herein in its entirety.

What is claimed is:

1. An image forming apparatus configured to control a plurality of applications according to setting information, the image forming apparatus comprising:

a storage unit configured to store, in a temporary region, setting information, described in Extensible Markup Language (XML), that is received from a connected device;

an acquisition unit configured to acquire device identification information from the setting information stored in the temporary region;

a determination unit configured to compare the device identification information acquired by the acquisition unit with device identification information of the image forming apparatus and to determine an import level used to reflect each setting included in the setting information stored in the temporary region; and

a storing unit configured to extract a setting to be reflected according to the import level from the stored setting information using each module of the plurality of applications, and to store the extracted setting in a storage that is used for control performed in each application,

wherein the device identification information that determines the import level includes at least one of firmware version, destination information, user editing information, accessory connection information, and license information, in addition to model management number and machine body management number.

2. The image forming apparatus according to claim **1**, further comprising:

a second determination unit configured to determine an export level based on an input by a user, and

a writing unit configured to extract a required setting according to the determined export level from the setting information included in the storage that is used for control performed in each application, using each module of the plurality of applications, and to write the extracted setting into a database that manages setting information to be exported.

3. The image forming apparatus according to claim **1**, wherein the connected device includes a universal serial bus (USB) storage device.

4. A method for an image forming apparatus configured to control a plurality of applications according to setting information, the method comprising:

storing, in a temporary region, setting information received from a connected device;

acquiring device identification information from the setting information stored in the temporary region;

comparing the acquired device identification information with device identification information of the image forming apparatus and determining an import level used to reflect each setting included in the setting information stored in the temporary region; and

extracting a setting to be reflected according to the import level from the stored setting information using each module of the plurality of applications, and storing the extracted setting in a storage that is used for control performed in each application,

wherein the device identification information that determines the import level includes at least one of firmware version, destination information, user editing information, accessory connection information, and license information, in addition to model management number and machine body management number.

5. A non-transitory computer-readable storage medium storing a computer program that causes a computer to execute a method for an image forming apparatus configured to control a plurality of applications according to setting information, the method comprising:

storing, in a temporary region, setting information received from a connected device;

acquiring device identification information from the setting information stored in the temporary region;

comparing the acquired device identification information with device identification information of the image forming apparatus and determining an import level used to reflect each setting included in the setting information stored in the temporary region; and

extracting a setting to be reflected according to the import level from the stored setting information using each module of the plurality of applications, and storing the extracted setting in a storage that is used for control performed in each application,

wherein the device identification information that determines the import level includes at least one of firmware version, destination information, user editing information, accessory connection information, and license information, in addition to model management number and machine body management number.

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