US008773694B2

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Takagi et al.

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(45) **Date of Patent: Jul. 8, 2014**

(54) **MANAGING A PRINT JOB USING PRINT SETTING INFORMATION**

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(73) Assignee: **Canon Kabushiki Kaisha**, Tokyo (JP)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 146 days.

(21) Appl. No.: **13/224,243**

(22) Filed: **Sep. 1, 2011**

(65) **Prior Publication Data**

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(30) **Foreign Application Priority Data**

Sep. 30, 2010 (JP) 2010-222434
Jun. 20, 2011 (JP) 2011-136712

(51) **Int. Cl.**
G06K 15/02 (2006.01)

(52) **U.S. Cl.**
USPC **358/1.15**

(58) **Field of Classification Search**
CPC G06F 15/00; G06F 9/46; G06K 15/02; H04N 1/00
USPC 358/1.15
See application file for complete search history.

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Primary Examiner — Qian Yang
(74) *Attorney, Agent, or Firm* — Fitzpatrick, Cella, Harper & Scinto

(57) **ABSTRACT**

A print server comprises: storage unit configured to store the print job of the intermediate format received from an information processing apparatus; setting change receiving unit configured to receive, from a printing apparatus, a print setting information change instruction for the print job of the intermediate format stored in the storage unit; update unit configured to update print setting information of the print job in accordance with the print setting information change instruction; print request receiving unit configured to receive a print request from the printing apparatus; and job transmission unit configured to generate a print job of a format printable by the printing apparatus based on the print job of the intermediate format and the print setting information updated in accordance with the print request, and to transmit the generated print job to the printing apparatus.

17 Claims, 24 Drawing Sheets

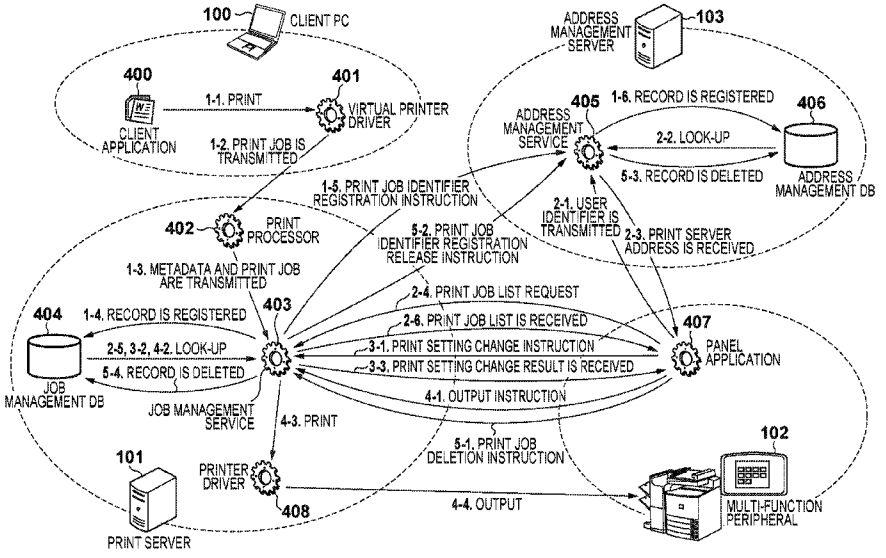


FIG. 1

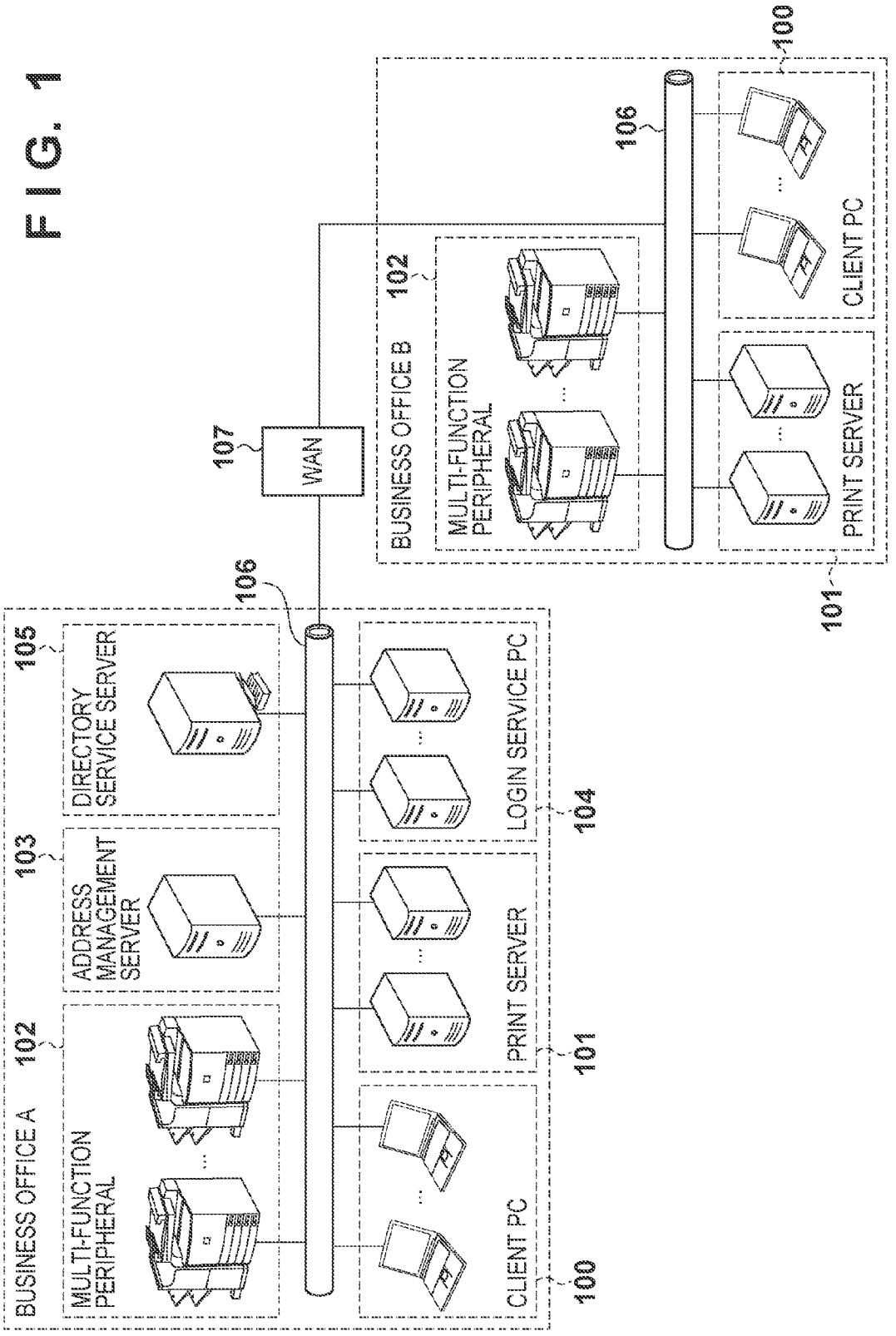

BUSINESS OFFICE A
102
MULTI-FUNCTION PERIPHERAL
ADDRESS MANAGEMENT SERVER
103
DIRECTORY SERVICE SERVER
105
CLIENT PC
100
PRINT SERVER
101
LOGIN SERVICE PC
104
106
107
WAN
BUSINESS OFFICE B
102
MULTI-FUNCTION PERIPHERAL
106
CLIENT PC
100
PRINT SERVER
101

FIG. 2

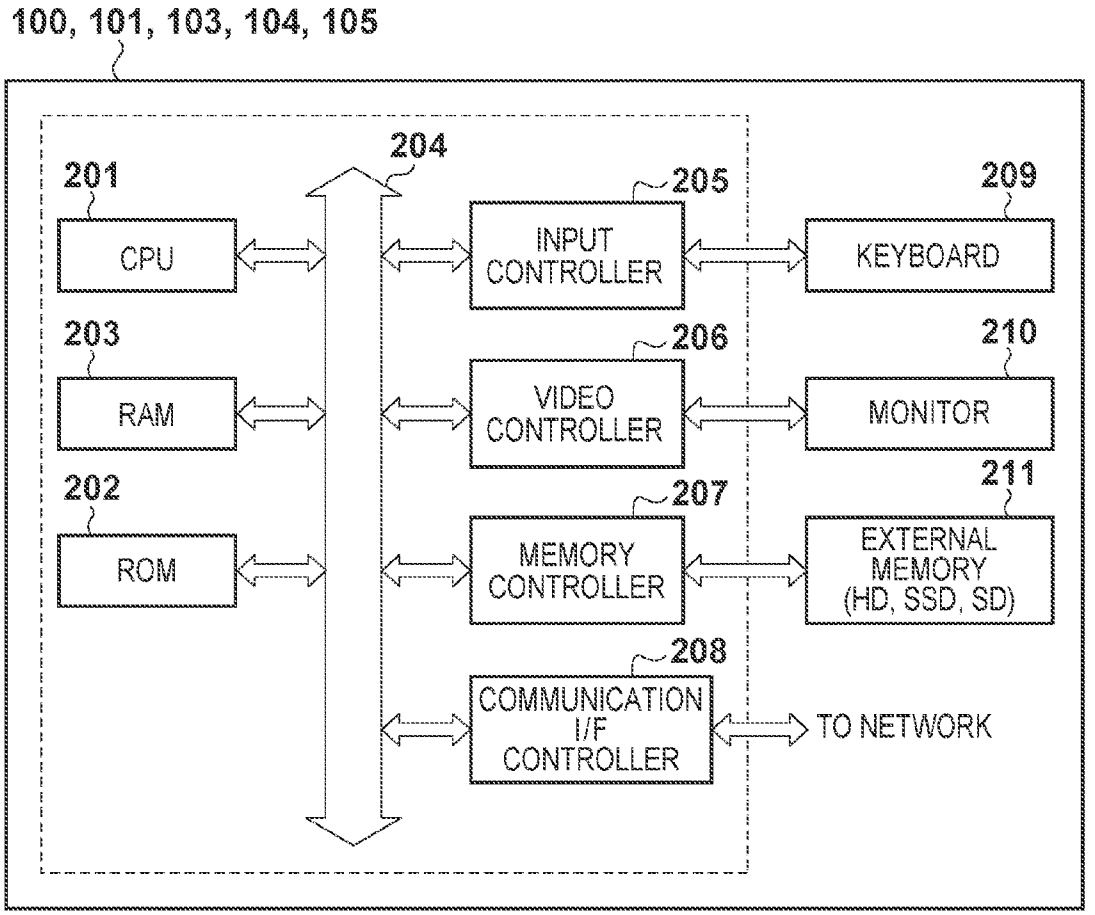

100, 101, 103, 104, 105
204
201
CPU
205
INPUT CONTROLLER
209
KEYBOARD
203
RAM
206
VIDEO CONTROLLER
210
MONITOR
202
ROM
207
MEMORY CONTROLLER
211
EXTERNAL MEMORY (HD, SSD, SD)
208
COMMUNICATION I/F CONTROLLER
TO NETWORK

FIG. 3

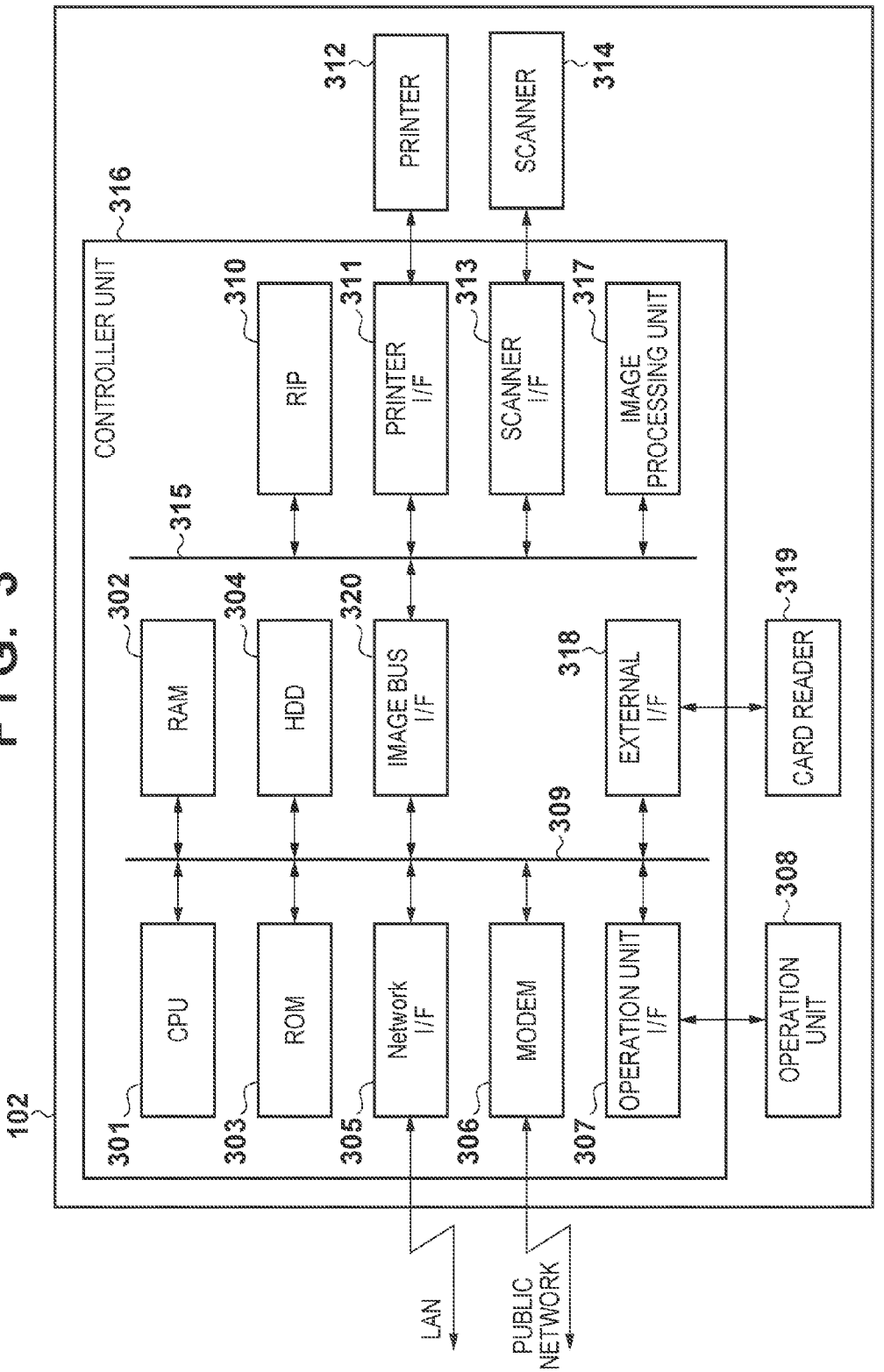

102
CONTROLLER UNIT
316
CPU
301
ROM
303
Network I/F
305
MODEM
306
OPERATION UNIT I/F
307
OPERATION UNIT
308
309
RAM
302
HDD
304
IMAGE BUS I/F
320
EXTERNAL I/F
318
CARD READER
319
315
RIP
310
PRINTER I/F
311
SCANNER I/F
313
IMAGE PROCESSING UNIT
317
PRINTER
312
SCANNER
314
LAN
PUBLIC NETWORK

FIG. 4

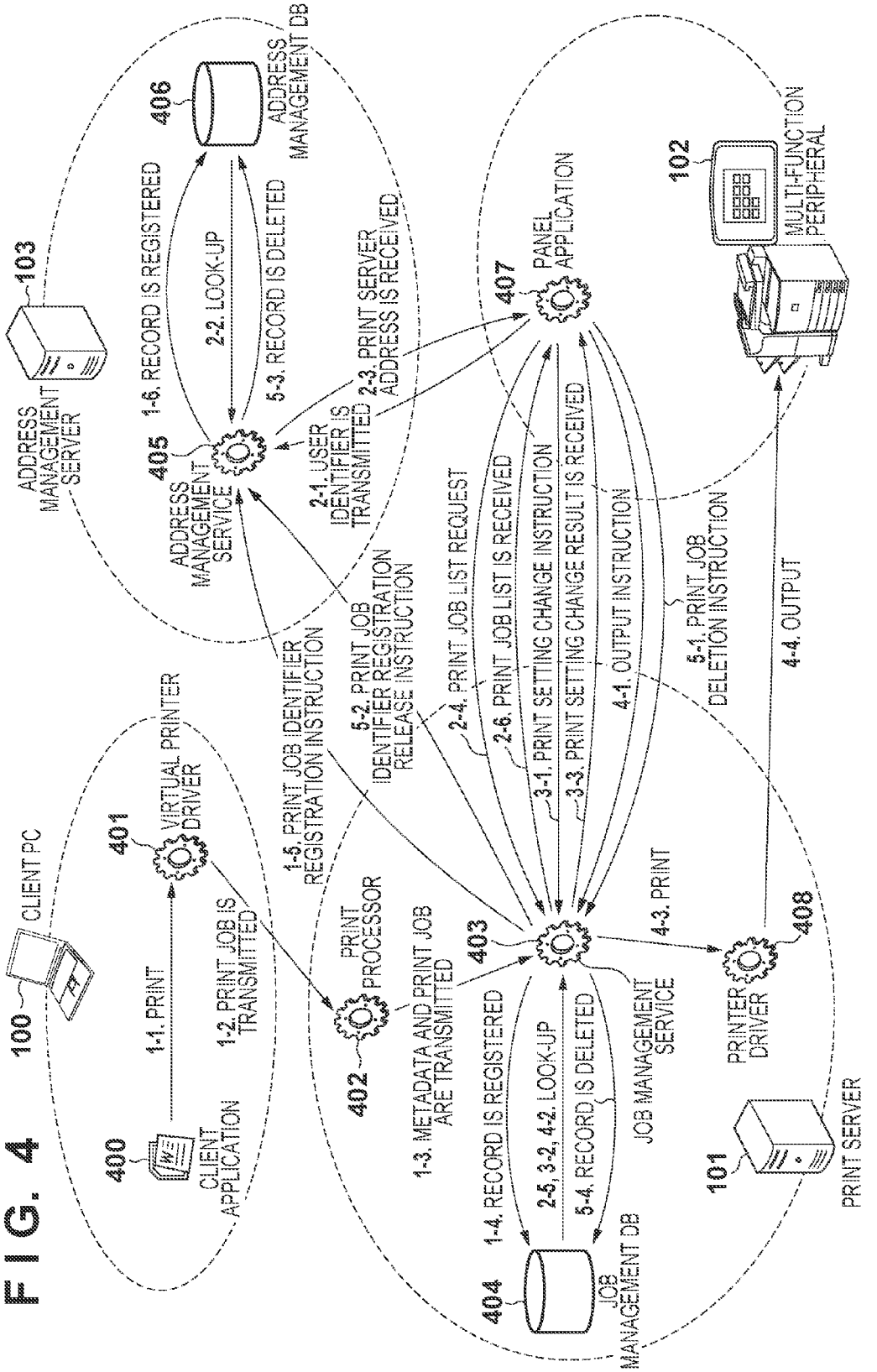

CLIENT PC
100
CLIENT APPLICATION
400
VIRTUAL PRINTER DRIVER
401
PRINT PROCESSOR
402
JOB MANAGEMENT SERVICE
403
JOB MANAGEMENT DB
404
ADDRESS MANAGEMENT SERVICE
405
ADDRESS MANAGEMENT DB
406
PANEL APPLICATION
407
PRINTER DRIVER
408
ADDRESS MANAGEMENT SERVER
103
MULTI-FUNCTION PERIPHERAL
102
PRINT SERVER
101
1-1. PRINT
1-2. PRINT JOB IS TRANSMITTED
1-3. METADATA AND PRINT JOB ARE TRANSMITTED
1-4. RECORD IS REGISTERED
1-5. PRINT JOB IDENTIFIER REGISTRATION INSTRUCTION
1-6. RECORD IS REGISTERED
2-1. USER IDENTIFIER IS TRANSMITTED
2-2. LOCK-UP
2-3. PRINT SERVER ADDRESS IS RECEIVED
2-4. PRINT JOB LIST REQUEST
2-5, 3-2, 4-2. LOCK-UP
2-6. PRINT JOB LIST IS RECEIVED
3-1. PRINT SETTING CHANGE INSTRUCTION
3-3. PRINT SETTING CHANGE RESULT IS RECEIVED
4-1. OUTPUT INSTRUCTION
4-3. PRINT
4-4. OUTPUT
5-1. PRINT JOB DELETION INSTRUCTION
5-2. PRINT JOB IDENTIFIER RELEASE INSTRUCTION
5-3. RECORD IS DELETED
5-4. RECORD IS DELETED

FIG. 5A

SIGN IN FIG. 4	TRANSMISSION SOURCE	TRANSMISSION DESTINATION	TRANSMISSION DATA
1-1	CLIENT APPLICATION 400	VIRTUAL PRINTER DRIVER 401	DDI
1-2	VIRTUAL PRINTER DRIVER 401	PRINT PROCESSOR 402	EMFSPOOL
1-3	PRINT PROCESSOR 402	JOB MANAGEMENT SERVICE 403	EMFSPOOL
			GUID
			JOB NAME
			USER NAME
			DEVMODE
			LOGICAL PRINTER NAME OF VIRTUAL PRINTER DRIVER
1-4	JOB MANAGEMENT SERVICE 403	JOB MANAGEMENT DB 404	EMFSPOOL FILE PATH
			GUID
			JOB NAME
			USER NAME
			DEVMODE
			LOGICAL PRINTER NAME OF VIRTUAL PRINTER DRIVER
			USER TOKEN
			DATE & TIME
1-5	JOB MANAGEMENT SERVICE 403	ADDRESS MANAGEMENT SERVICE 405	GUID
			USER NAME
1-6	ADDRESS MANAGEMENT SERVICE 405	ADDRESS MANAGEMENT DB 406	GUID
			USER NAME
			IP ADDRESS
2-1	PANEL APPLICATION 407	ADDRESS MANAGEMENT SERVICE 405	USER NAME
2-2	ADDRESS MANAGEMENT DB 406	ADDRESS MANAGEMENT SERVICE 405	IP ADDRESS
2-3	ADDRESS MANAGEMENT SERVICE 405	PANEL APPLICATION 407	IP ADDRESS
2-4	PANEL APPLICATION 407	JOB MANAGEMENT SERVICE 403	USER NAME
2-5	JOB MANAGEMENT DB 404	JOB MANAGEMENT SERVICE 403	GUID
			JOB NAME
			DEVMODE
			LOGICAL PRINTER NAME OF VIRTUAL PRINTER DRIVER
			USER TOKEN
			DATE & TIME

FIG. 5B

2-6	JOB MANAGEMENT SERVICE 403	PANEL APPLICATION 407	GUID
			JOB NAME
			COPY COUNT
			DUPLEXING
			COLOR MODE
			PAGES PER SHEET
			DATE & TIME
3-1	PANEL APPLICATION 407	JOB MANAGEMENT SERVICE 403	GUID
			COPY COUNT
			DUPLEXING
			COLOR MODE
			PAGES PER SHEET
			MODEL NAME OF MULTI-FUNCTION PERIPHERAL
3-2	JOB MANAGEMENT DB 404	JOB MANAGEMENT SERVICE 403	DEVMODE
3-3	JOB MANAGEMENT SERVICE 403	PANEL APPLICATION 407	GUID
			COPY COUNT
			DUPLEXING
			COLOR MODE
			PAGES PER SHEET
4-1	PANEL APPLICATION 407	JOB MANAGEMENT SERVICE 403	GUID
			MODEL NAME OF MULTI-FUNCTION PERIPHERAL
4-2	JOB MANAGEMENT DB 404	JOB MANAGEMENT SERVICE 403	EMFSPOOL FILE PATH
			DEVMODE
			USER TOKEN
4-3	JOB MANAGEMENT SERVICE 403	PRINTER DRIVER 408	EMFSPOOL
			DEVMODE
4-4	PRINTER DRIVER 408	MULTI-FUNCTION PERIPHERAL 102	PDL JOB DATA
5-1	PANEL APPLICATION 407	JOB MANAGEMENT SERVICE 403	GUID
5-2	JOB MANAGEMENT SERVICE 403	ADDRESS MANAGEMENT SERVICE 405	GUID
5-3	ADDRESS MANAGEMENT SERVICE 405	ADDRESS MANAGEMENT DB 406	
5-4	JOB MANAGEMENT SERVICE 403	JOB MANAGEMENT DB 404	

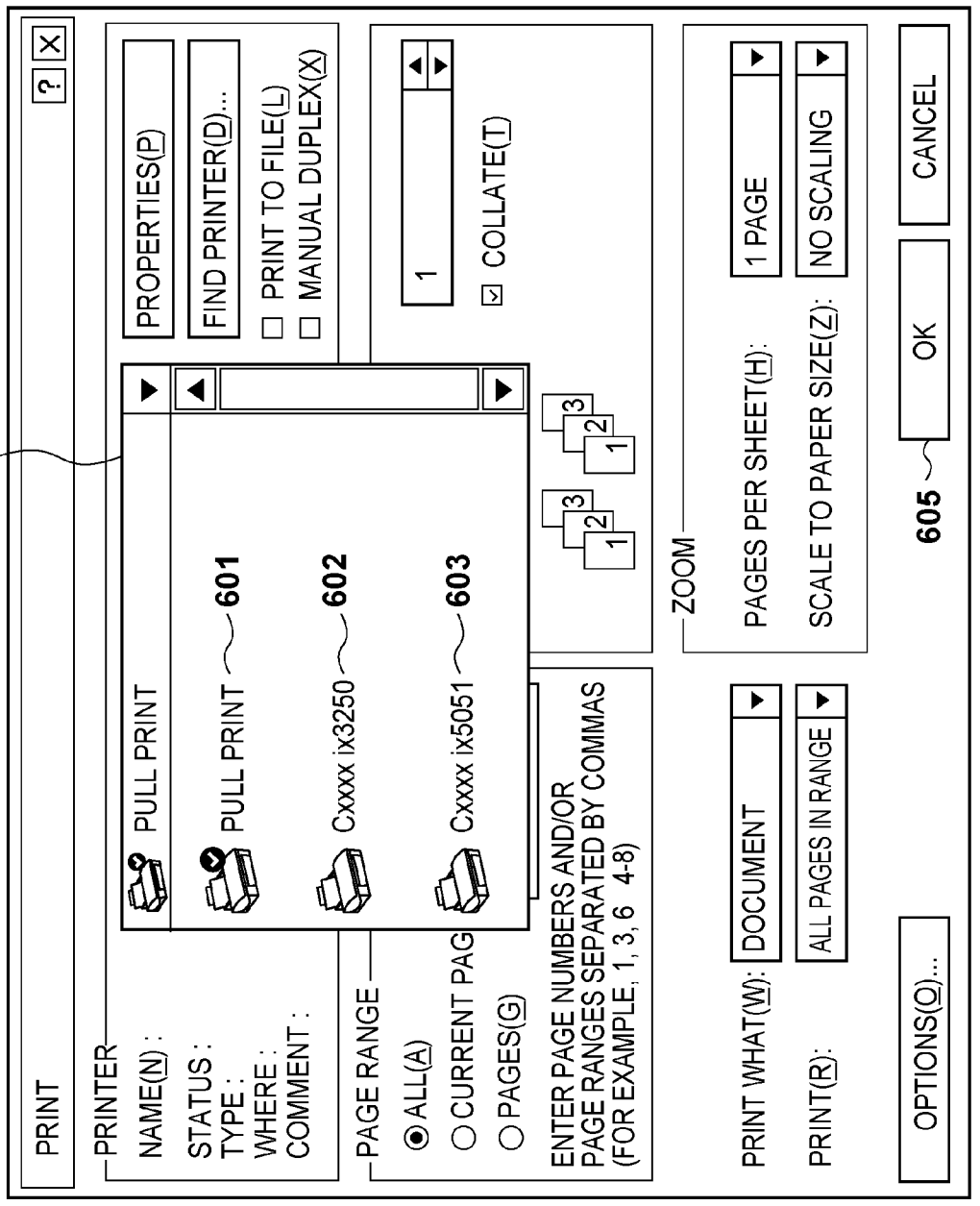

610
PRINT
PRINTER
NAME(N) :
STATUS :
TYPE :
WHERE :
COMMENT :
PULL PRINT
PULL PRINT
Cxxxx ix3250
Cxxxx ix5051
601
602
603
PROPERTIES(P)
FIND PRINTER(D)...
PRINT TO FILE(L)
MANUAL DUPLEX(X)
1
COLLATE(T)
PAGE RANGE
ALL(A)
CURRENT PAG
PAGES(G)
ENTER PAGE NUMBERS AND/OR
PAGE RANGES SEPARATED BY COMMAS
(FOR EXAMPLE, 1, 3, 6 4-8)
ZOOM
PAGES PER SHEET(H):
1 PAGE
SCALE TO PAPER SIZE(Z):
NO SCALING
PRINT WHAT(W):
DOCUMENT
PRINT(R):
ALL PAGES IN RANGE
OPTIONS(O)...
OK
CANCEL
605

FIG. 6

FIG. 7A

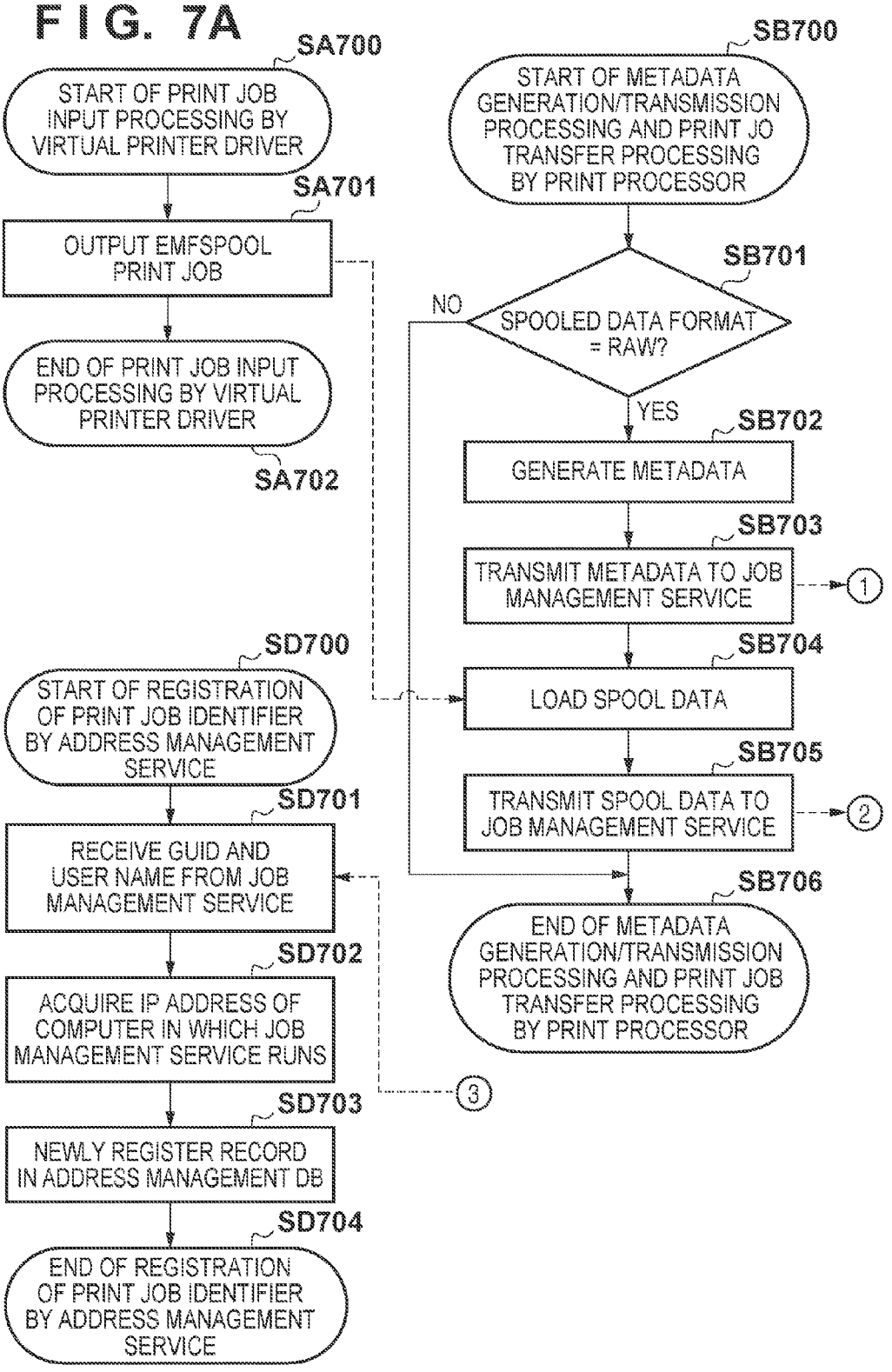

SA700
START OF PRINT JOB INPUT PROCESSING BY VIRTUAL PRINTER DRIVER
SA701
OUTPUT EMFSPOOL PRINT JOB
END OF PRINT JOB INPUT PROCESSING BY VIRTUAL PRINTER DRIVER
SA702
SB700
START OF METADATA GENERATION/TRANSMISSION PROCESSING AND PRINT JO TRANSFER PROCESSING BY PRINT PROCESSOR
SB701
SPOOLED DATA FORMAT = RAW?
NO
YES
SB702
GENERATE METADATA
SB703
TRANSMIT METADATA TO JOB MANAGEMENT SERVICE
1
SB704
LOAD SPOOL DATA
SB705
TRANSMIT SPOOL DATA TO JOB MANAGEMENT SERVICE
2
SB706
END OF METADATA GENERATION/TRANSMISSION PROCESSING AND PRINT JOB TRANSFER PROCESSING BY PRINT PROCESSOR
SD700
START OF REGISTRATION OF PRINT JOB IDENTIFIER BY ADDRESS MANAGEMENT SERVICE
SD701
RECEIVE GUID AND USER NAME FROM JOB MANAGEMENT SERVICE
SD702
ACQUIRE IP ADDRESS OF COMPUTER IN WHICH JOB MANAGEMENT SERVICE RUNS
SD703
NEWLY REGISTER RECORD IN ADDRESS MANAGEMENT DB
SD704
END OF REGISTRATION OF PRINT JOB IDENTIFIER BY ADDRESS MANAGEMENT SERVICE
3

FIG. 7B

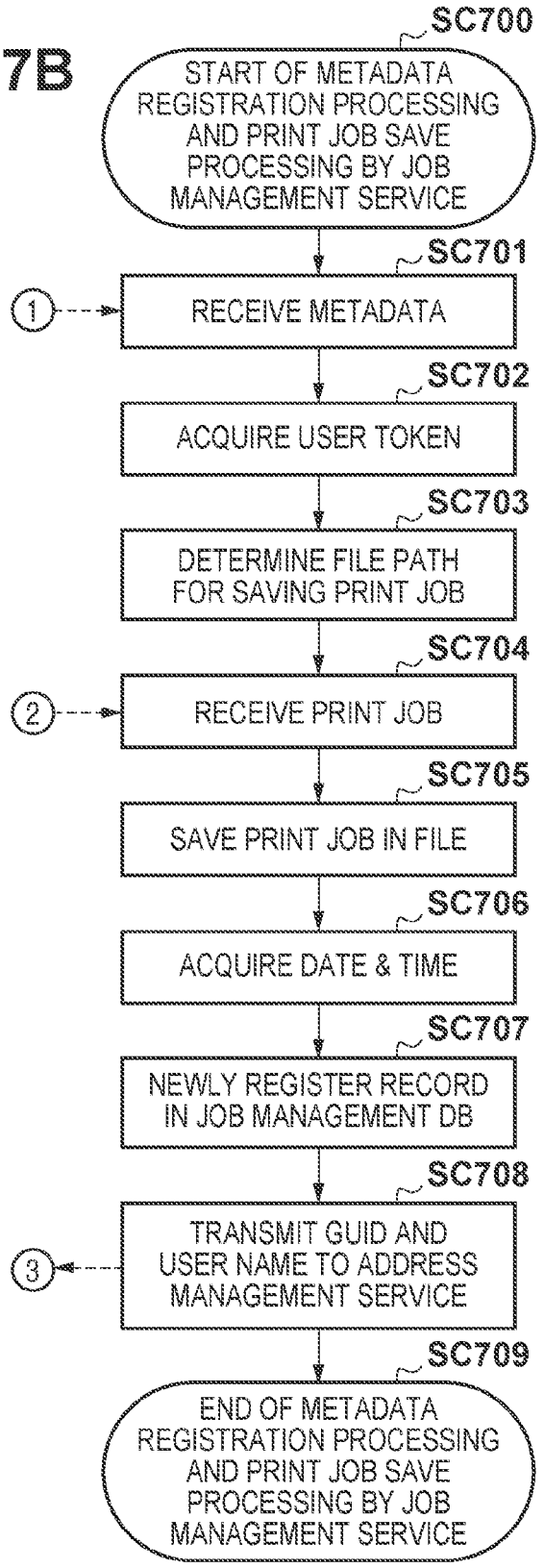

SC700
START OF METADATA REGISTRATION PROCESSING AND PRINT JOB SAVE PROCESSING BY JOB MANAGEMENT SERVICE
SC701
RECEIVE METADATA
SC702
ACQUIRE USER TOKEN
SC703
DETERMINE FILE PATH FOR SAVING PRINT JOB
SC704
RECEIVE PRINT JOB
SC705
SAVE PRINT JOB IN FILE
SC706
ACQUIRE DATE & TIME
SC707
NEWLY REGISTER RECORD IN JOB MANAGEMENT DB
SC708
TRANSMIT GUID AND USER NAME TO ADDRESS MANAGEMENT SERVICE
SC709
END OF METADATA REGISTRATION PROCESSING AND PRINT JOB SAVE PROCESSING BY JOB MANAGEMENT SERVICE
1
2
3

FIG. 8A

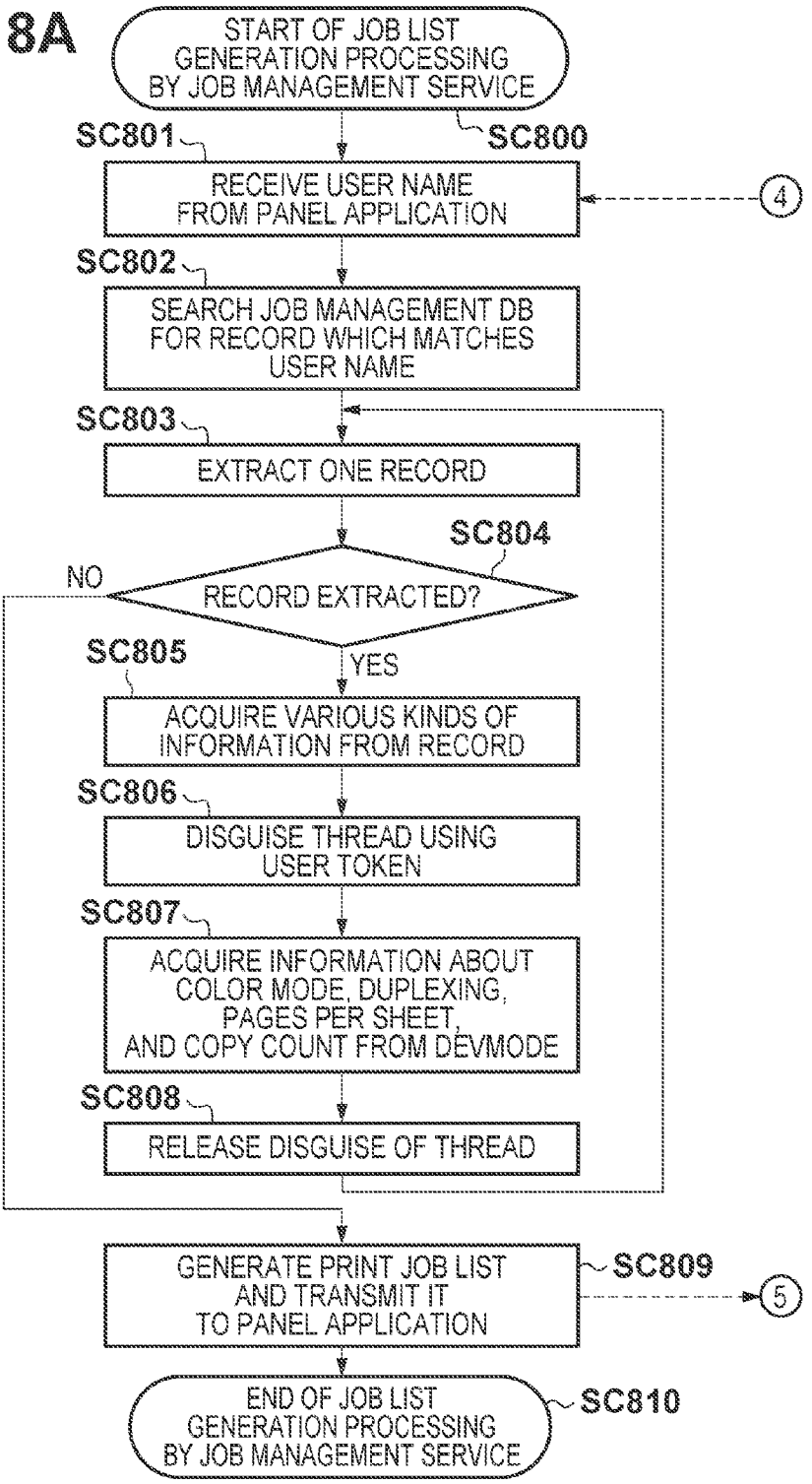

START OF JOB LIST GENERATION PROCESSING BY JOB MANAGEMENT SERVICE
SC800
SC801
RECEIVE USER NAME FROM PANEL APPLICATION
4
SC802
SEARCH JOB MANAGEMENT DB FOR RECORD WHICH MATCHES USER NAME
SC803
EXTRACT ONE RECORD
SC804
RECORD EXTRACTED?
NO
YES
SC805
ACQUIRE VARIOUS KINDS OF INFORMATION FROM RECORD
SC806
DISGUISE THREAD USING USER TOKEN
SC807
ACQUIRE INFORMATION ABOUT COLOR MODE, DUPLEXING, PAGES PER SHEET, AND COPY COUNT FROM DEVMODE
SC808
RELEASE DISGUISE OF THREAD
GENERATE PRINT JOB LIST AND TRANSMIT IT TO PANEL APPLICATION
SC809
5
END OF JOB LIST GENERATION PROCESSING BY JOB MANAGEMENT SERVICE
SC810

FIG. 8B

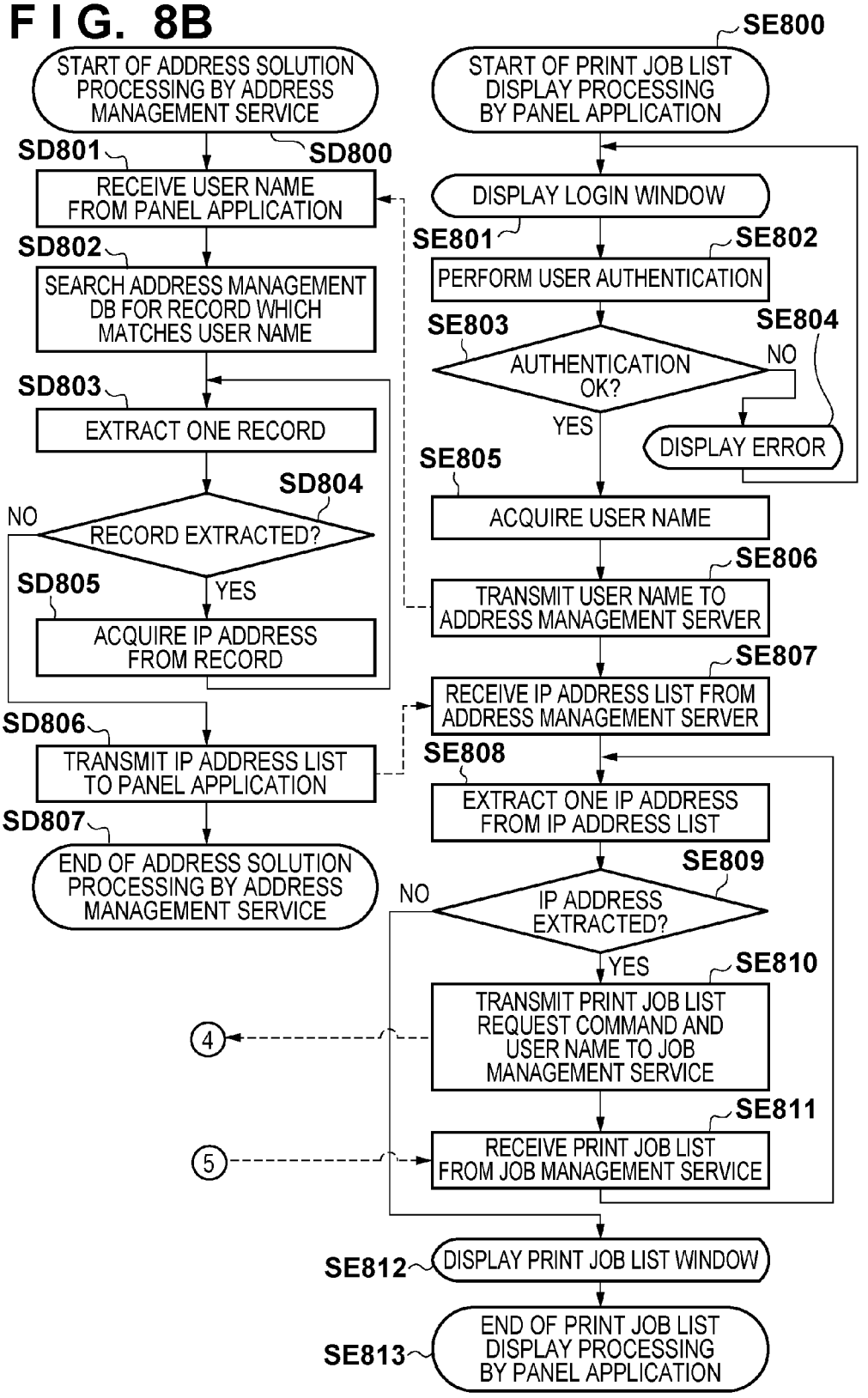

START OF ADDRESS SOLUTION PROCESSING BY ADDRESS MANAGEMENT SERVICE
SD800
SD801
RECEIVE USER NAME FROM PANEL APPLICATION
SD802
SEARCH ADDRESS MANAGEMENT DB FOR RECORD WHICH MATCHES USER NAME
SD803
EXTRACT ONE RECORD
SD804
RECORD EXTRACTED?
NO
YES
SD805
ACQUIRE IP ADDRESS FROM RECORD
SD806
TRANSMIT IP ADDRESS LIST TO PANEL APPLICATION
SD807
END OF ADDRESS SOLUTION PROCESSING BY ADDRESS MANAGEMENT SERVICE
SE800
START OF PRINT JOB LIST DISPLAY PROCESSING BY PANEL APPLICATION
DISPLAY LOGIN WINDOW
SE801
SE802
PERFORM USER AUTHENTICATION
SE803
AUTHENTICATION OK?
SE804
NO
YES
DISPLAY ERROR
SE805
ACQUIRE USER NAME
SE806
TRANSMIT USER NAME TO ADDRESS MANAGEMENT SERVER
SE807
RECEIVE IP ADDRESS LIST FROM ADDRESS MANAGEMENT SERVER
SE808
EXTRACT ONE IP ADDRESS FROM IP ADDRESS LIST
SE809
IP ADDRESS EXTRACTED?
NO
YES
SE810
TRANSMIT PRINT JOB LIST REQUEST COMMAND AND USER NAME TO JOB MANAGEMENT SERVICE
SE811
RECEIVE PRINT JOB LIST FROM JOB MANAGEMENT SERVICE
4
5
SE812
DISPLAY PRINT JOB LIST WINDOW
SE813
END OF PRINT JOB LIST DISPLAY PROCESSING BY PANEL APPLICATION

FIG. 9A

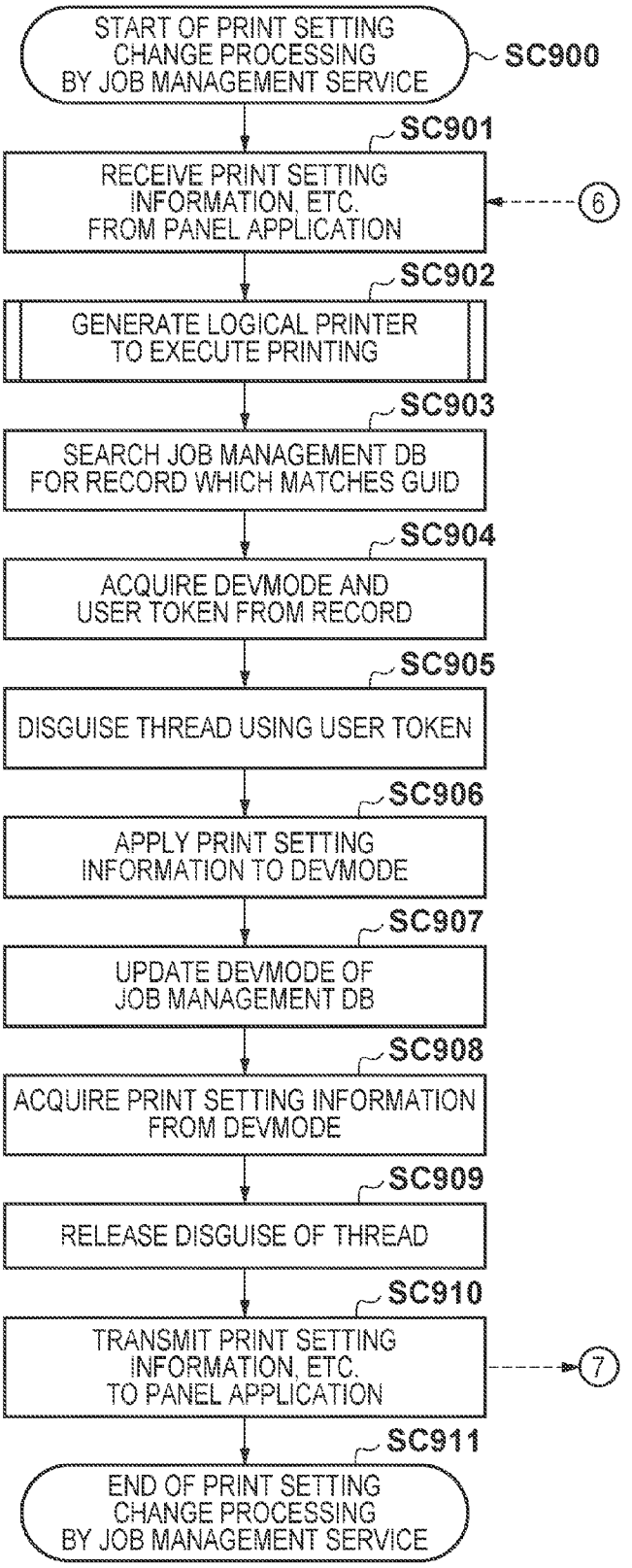

START OF PRINT SETTING CHANGE PROCESSING BY JOB MANAGEMENT SERVICE
SC900
SC901
RECEIVE PRINT SETTING INFORMATION, ETC. FROM PANEL APPLICATION
6
SC902
GENERATE LOGICAL PRINTER TO EXECUTE PRINTING
SC903
SEARCH JOB MANAGEMENT DB FOR RECORD WHICH MATCHES GUID
SC904
ACQUIRE DEVMODE AND USER TOKEN FROM RECORD
SC905
DISGUISE THREAD USING USER TOKEN
SC906
APPLY PRINT SETTING INFORMATION TO DEVMODE
SC907
UPDATE DEVMODE OF JOB MANAGEMENT DB
SC908
ACQUIRE PRINT SETTING INFORMATION FROM DEVMODE
SC909
RELEASE DISGUISE OF THREAD
SC910
TRANSMIT PRINT SETTING INFORMATION, ETC. TO PANEL APPLICATION
7
SC911
END OF PRINT SETTING CHANGE PROCESSING BY JOB MANAGEMENT SERVICE

FIG. 9B

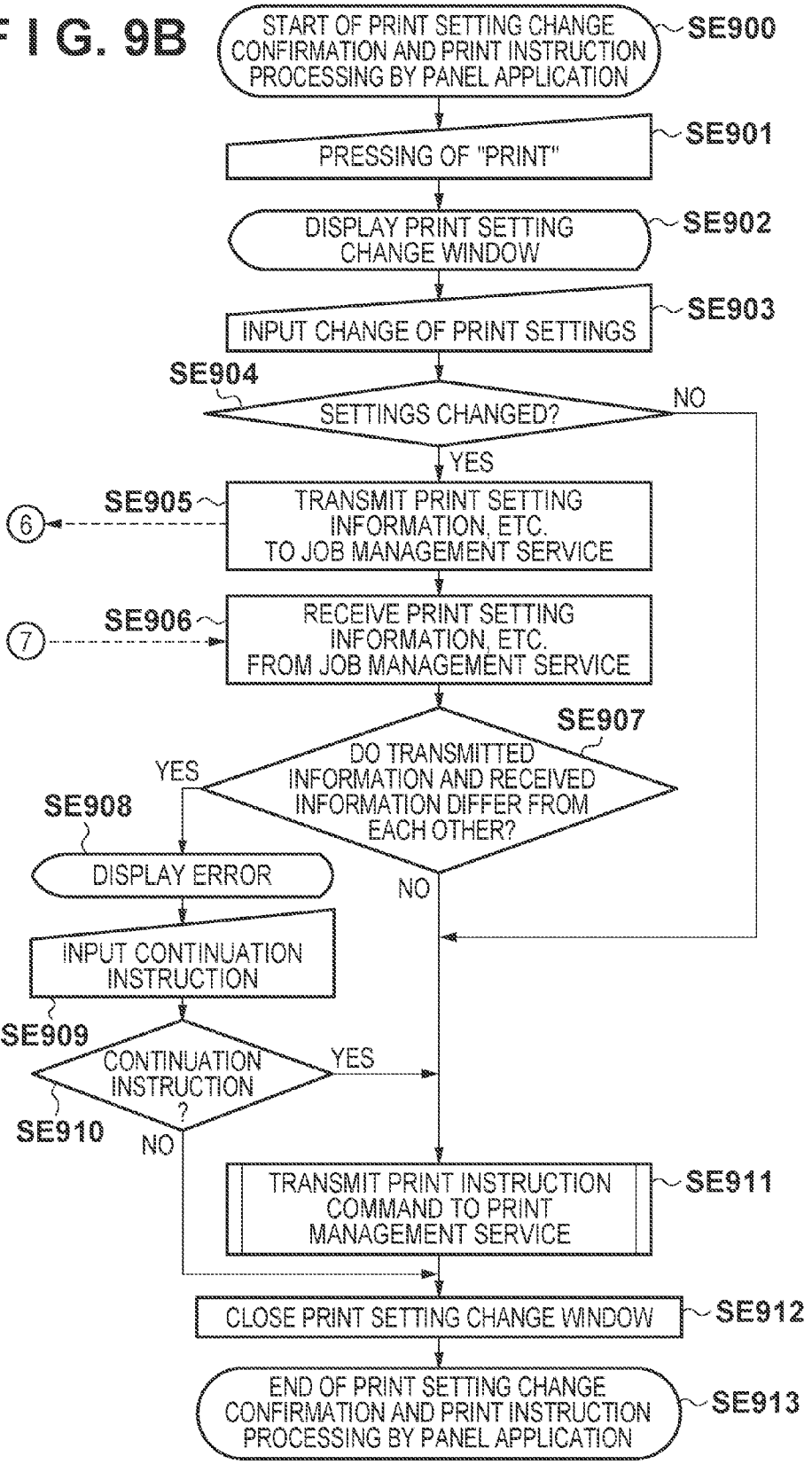

START OF PRINT SETTING CHANGE CONFIRMATION AND PRINT INSTRUCTION PROCESSING BY PANEL APPLICATION
SE900
PRESSING OF "PRINT"
SE901
DISPLAY PRINT SETTING CHANGE WINDOW
SE902
INPUT CHANGE OF PRINT SETTINGS
SE903
SE904
SETTINGS CHANGED?
NO
YES
SE905
6
TRANSMIT PRINT SETTING INFORMATION, ETC. TO JOB MANAGEMENT SERVICE
SE906
7
RECEIVE PRINT SETTING INFORMATION, ETC. FROM JOB MANAGEMENT SERVICE
SE907
DO TRANSMITTED INFORMATION AND RECEIVED INFORMATION DIFFER FROM EACH OTHER?
YES
SE908
DISPLAY ERROR
NO
INPUT CONTINUATION INSTRUCTION
SE909
CONTINUATION INSTRUCTION ?
YES
SE910
NO
TRANSMIT PRINT INSTRUCTION COMMAND TO PRINT MANAGEMENT SERVICE
SE911
CLOSE PRINT SETTING CHANGE WINDOW
SE912
END OF PRINT SETTING CHANGE CONFIRMATION AND PRINT INSTRUCTION PROCESSING BY PANEL APPLICATION
SE913

FIG. 10

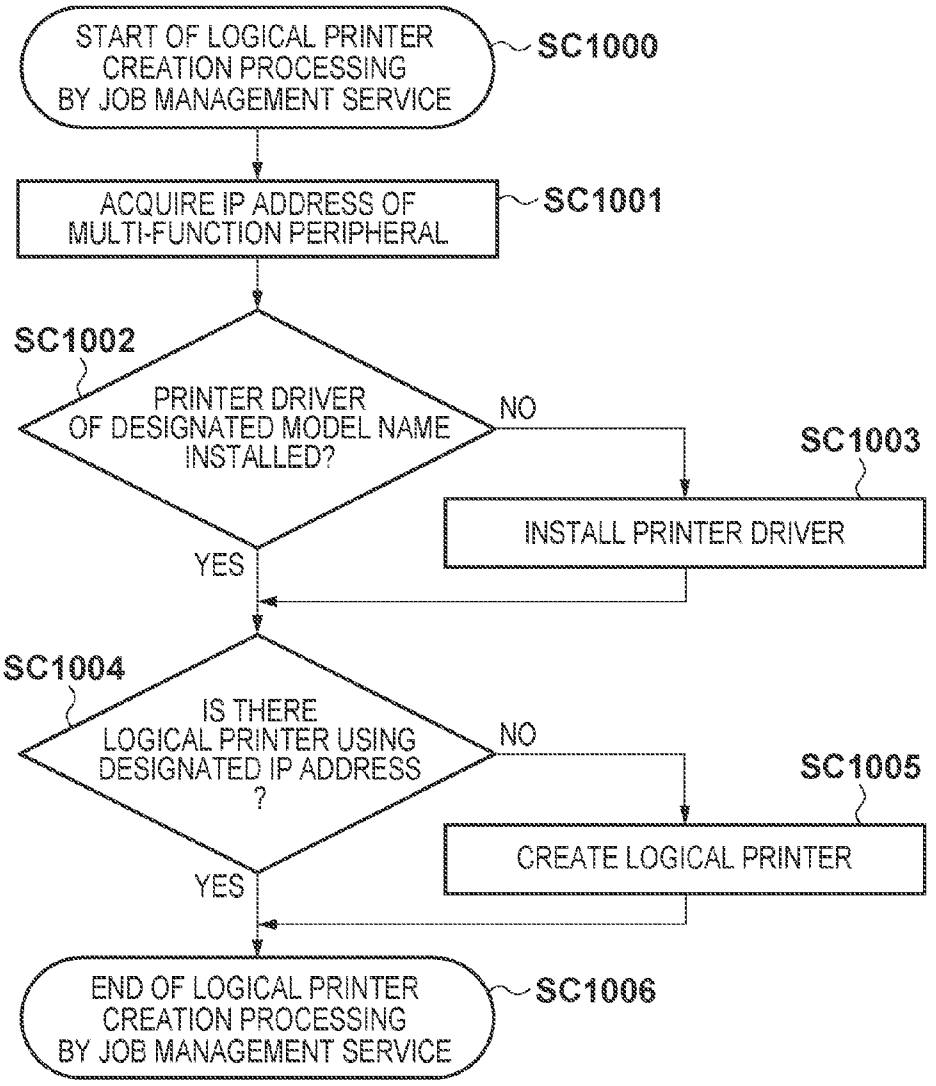

START OF LOGICAL PRINTER CREATION PROCESSING BY JOB MANAGEMENT SERVICE
SC1000
ACQUIRE IP ADDRESS OF MULTI-FUNCTION PERIPHERAL
SC1001
SC1002
PRINTER DRIVER OF DESIGNATED MODEL NAME INSTALLED?
NO
SC1003
INSTALL PRINTER DRIVER
YES
SC1004
IS THERE LOGICAL PRINTER USING DESIGNATED IP ADDRESS ?
NO
SC1005
CREATE LOGICAL PRINTER
YES
END OF LOGICAL PRINTER CREATION PROCESSING BY JOB MANAGEMENT SERVICE
SC1006

FIG. 11

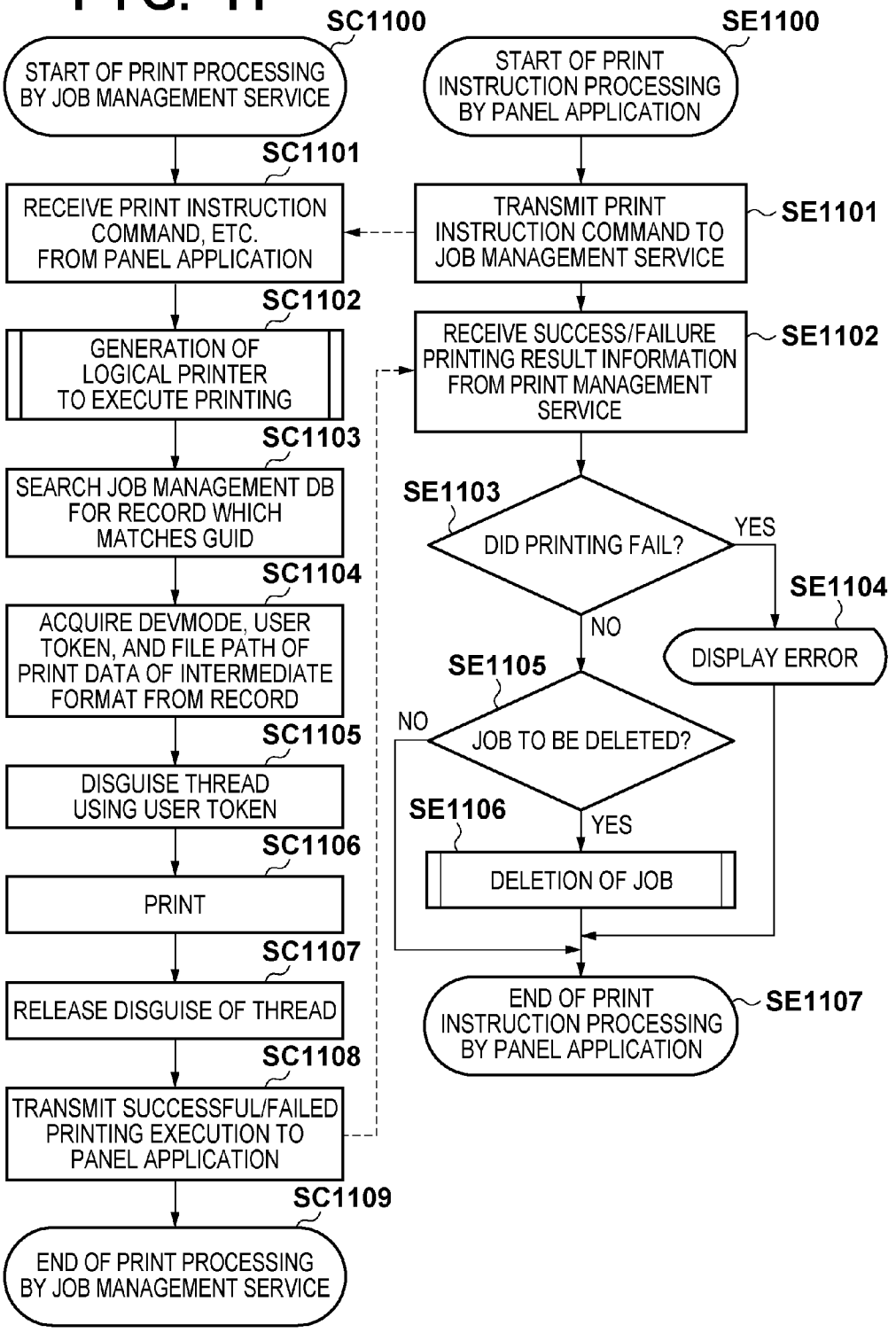

SC1100
START OF PRINT PROCESSING BY JOB MANAGEMENT SERVICE
SC1101
RECEIVE PRINT INSTRUCTION COMMAND, ETC. FROM PANEL APPLICATION
SC1102
GENERATION OF LOGICAL PRINTER TO EXECUTE PRINTING
SC1103
SEARCH JOB MANAGEMENT DB FOR RECORD WHICH MATCHES GUID
SC1104
ACQUIRE DEVMODE, USER TOKEN, AND FILE PATH OF PRINT DATA OF INTERMEDIATE FORMAT FROM RECORD
SC1105
DISGUISE THREAD USING USER TOKEN
SC1106
PRINT
SC1107
RELEASE DISGUISE OF THREAD
SC1108
TRANSMIT SUCCESSFUL/FAILED PRINTING EXECUTION TO PANEL APPLICATION
SC1109
END OF PRINT PROCESSING BY JOB MANAGEMENT SERVICE
SE1100
START OF PRINT INSTRUCTION PROCESSING BY PANEL APPLICATION
SE1101
TRANSMIT PRINT INSTRUCTION COMMAND TO JOB MANAGEMENT SERVICE
SE1102
RECEIVE SUCCESS/FAILURE PRINTING RESULT INFORMATION FROM PRINT MANAGEMENT SERVICE
SE1103
DID PRINTING FAIL?
YES
NO
SE1104
DISPLAY ERROR
SE1105
JOB TO BE DELETED?
NO
YES
SE1106
DELETION OF JOB
SE1107
END OF PRINT INSTRUCTION PROCESSING BY PANEL APPLICATION

FIG. 12

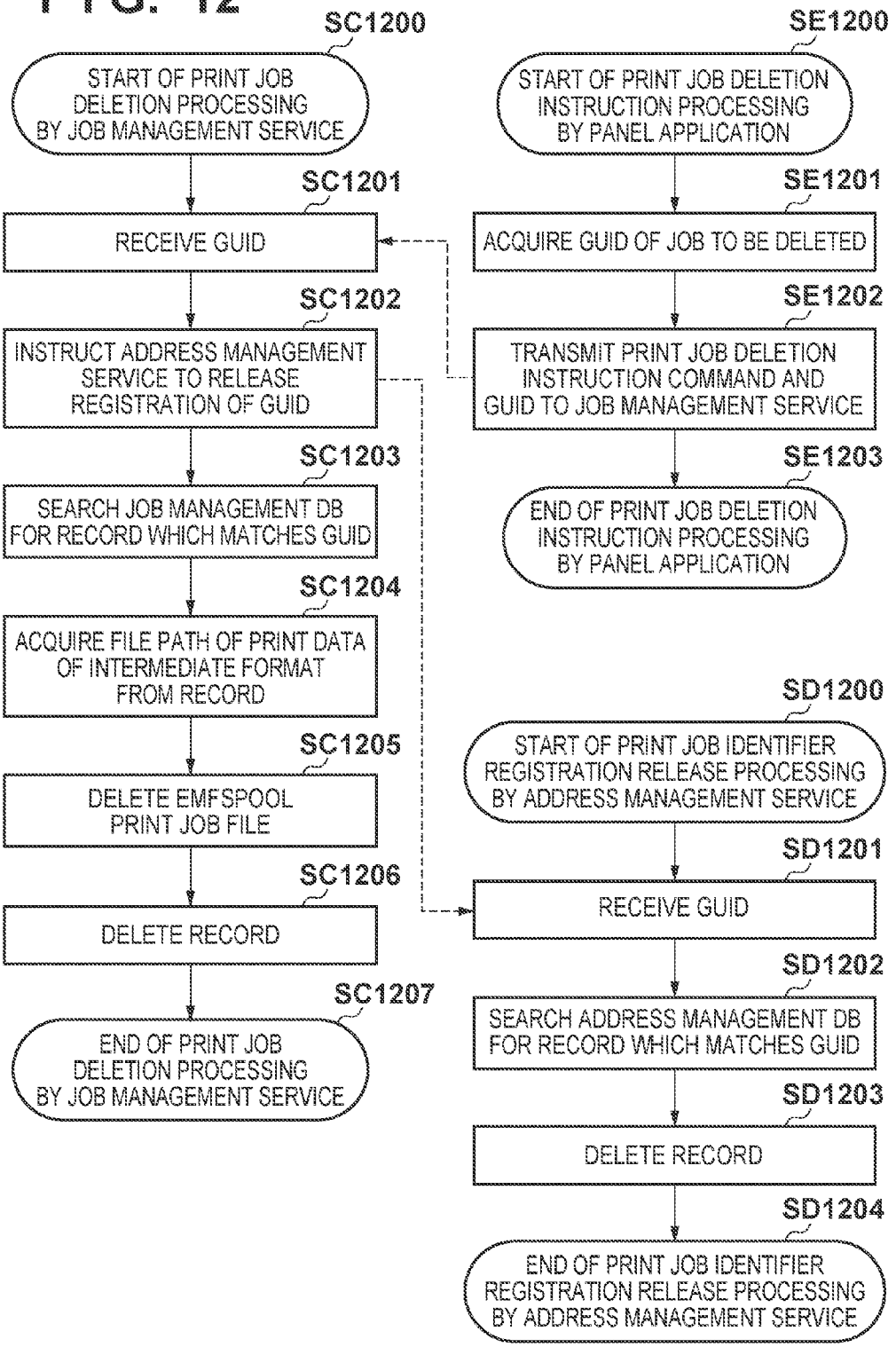

SC1200
START OF PRINT JOB DELETION PROCESSING BY JOB MANAGEMENT SERVICE
SC1201
RECEIVE GUID
SC1202
INSTRUCT ADDRESS MANAGEMENT SERVICE TO RELEASE REGISTRATION OF GUID
SC1203
SEARCH JOB MANAGEMENT DB FOR RECORD WHICH MATCHES GUID
SC1204
ACQUIRE FILE PATH OF PRINT DATA OF INTERMEDIATE FORMAT FROM RECORD
SC1205
DELETE EMFSPOOL PRINT JOB FILE
SC1206
DELETE RECORD
SC1207
END OF PRINT JOB DELETION PROCESSING BY JOB MANAGEMENT SERVICE
SE1200
START OF PRINT JOB DELETION INSTRUCTION PROCESSING BY PANEL APPLICATION
SE1201
ACQUIRE GUID OF JOB TO BE DELETED
SE1202
TRANSMIT PRINT JOB DELETION INSTRUCTION COMMAND AND GUID TO JOB MANAGEMENT SERVICE
SE1203
END OF PRINT JOB DELETION INSTRUCTION PROCESSING BY PANEL APPLICATION
SD1200
START OF PRINT JOB IDENTIFIER REGISTRATION RELEASE PROCESSING BY ADDRESS MANAGEMENT SERVICE
SD1201
RECEIVE GUID
SD1202
SEARCH ADDRESS MANAGEMENT DB FOR RECORD WHICH MATCHES GUID
SD1203
DELETE RECORD
SD1204
END OF PRINT JOB IDENTIFIER REGISTRATION RELEASE PROCESSING BY ADDRESS MANAGEMENT SERVICE

FIG. 13A

```
<?xml version="1.0" encoding="utf-8"?>
<JobInfo
    Guid="{93DEBE22-682C-4806-AC24-CC8A4589A26F}"
    JobName="STATEMENT OF ACCOUNTS"
    UserName="Taro Yamada"
    PrintQueueName="PULL PRINT"
    >
      <DocumentSettings
          DevmodeSnapshot="QwBhAG4AbwBuACAAaQB..."
      />
</JobInfo>
```

FIG. 13B

```
<?xml version="1.0" encoding="utf-8"?>
<JobInfo
    Guid="{93DEBE22-682C-4806-AC24-CC8A4589A26F}"
    DeviceModelName="Cxxx ix6000"
    >
      <DocumentSettings
          CopyCount="1"
          Duplexing="TwoSidedLongEdge"
          OutputColor="Color"
          PagesPerSheet="1"
      />
</JobInfo>
```

FIG. 13C

```
<?xml version="1.0" encoding="utf-8"?>
<JobInfo Guid="{93DEBE22-682C-4806-AC24-CC8A4589A26F}">
  <DocumentSettings
      CopyCount="1"
      Duplexing="OneSided"
      OutputColor="Color"
      PagesPerSheet="1"
  />
</JobInfo>
```

FIG. 14A

```
<?xml version="1.0" encoding="utf-8"?>
<JobList>
  <JobInfo Guid="{93DEBE22-682C-4806-AC24-CC8A4589A26F}"JobName="STATEMENT OF ACCOUNTS">
    <DocumentSettings
      CopyCount="1"
      Duplexing="OneSided"
      OutputColor="Color"
      PagesPerSheet="1"
      DateTime="2010-1-14T10:19:00+09:00"
    />
  </JobInfo>
  <JobInfo Guid="{D00AE377-4771-41c4-9A30-46BB3955367F}" JobName="ESTIMATE">
    <DocumentSettings
      CopyCount="5"
      Duplexing="OneSided"
      OutputColor="Monochrome"
      PagesPerSheet="1"
      DateTime="2010-1-14T10:19:00+09:00"
    />
  </JobInfo>
  <JobInfo Guid="{12258253-96CF-4896-8039-82627ADACB9A}" JobName="LEAVE OF ABSENCE APPLICATION">
    <DocumentSettings
      CopyCount="1"
      Duplexing="TwoSidedLongEdge"
      OutputColor="Monochrome"
      PagesPerSheet="1"
      DateTime="2010-1-14T10:19:00+09:00"
    />
  </JobInfo>
  <JobInfo Guid="{08DF859D-00F8-4619-A867-CD95330B6083}" JobName="PROJECT PROPOSAL">
    <DocumentSettings
      CopyCount="1"
      Duplexing="OneSided"
      OutputColor="Color"
      PagesPerSheet="1"
      DateTime="2010-1-14T10:20:00+09:00"
```

FIG. 14B

```
    />
  </JobInfo>
  <JobInfo Guid="{586B8D3F-9CDC-4f9c-A642-B5067FF357E6}" JobName="111111111122222222233333333344444444444">
    <DocumentSettings
      CopyCount="1"
      Duplexing="OneSided"
      OutputColor="Monochrome"
      PagesPerSheet="1"
      DateTime="2010-1-14T10:20:00+09:00"
    />
  </JobInfo>
  <JobInfo Guid="{985908C2-D27E-479d-89F5-E02A41715817}" JobName="ABCDEFGHIJKLMN">
    <DocumentSettings
      CopyCount="1"
      Duplexing="OneSided"
      OutputColor="Monochrome"
      PagesPerSheet="1"
      DateTime="2010-1-14T10:21:00+09:00"
    />
  </JobInfo>
  <JobInfo Guid="{050AE3B0-5D19-4036-B3CE-FD5FACFBCC0C}" JobName="MEETING MATERIALS">
    <DocumentSettings
      CopyCount="1"
      Duplexing="OneSided"
      OutputColor="Color"
      PagesPerSheet="2"
      DateTime="2010-1-14T10:21:00+09:00"
    />
  </JobInfo>
</JobList>
```

FIG. 15A

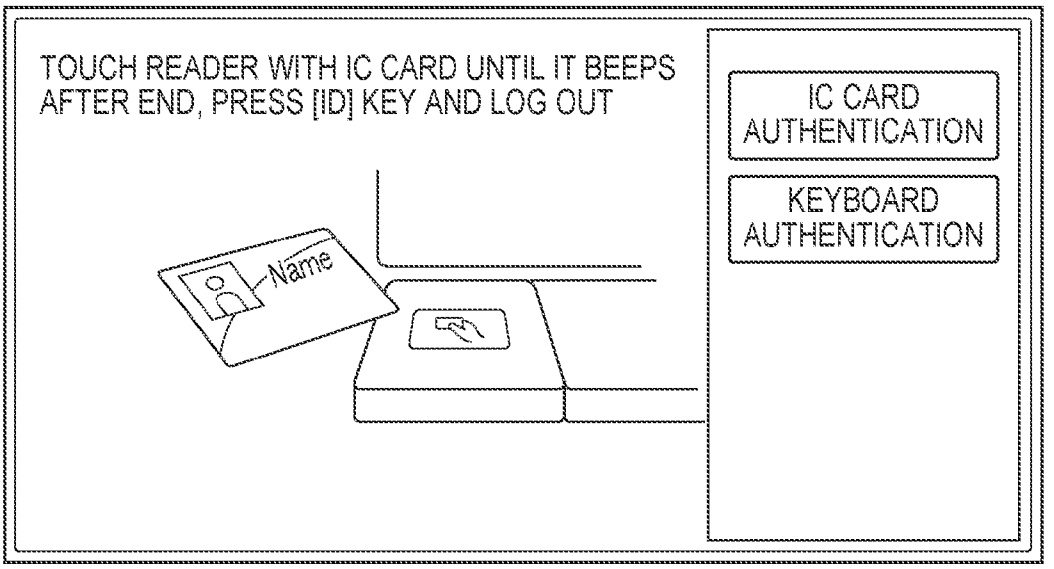


FIG. 15B

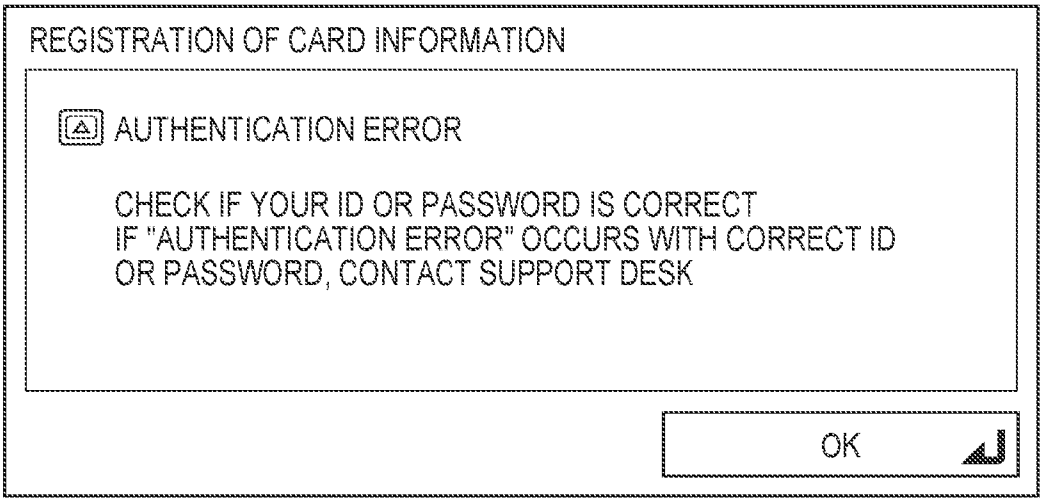


FIG. 15C

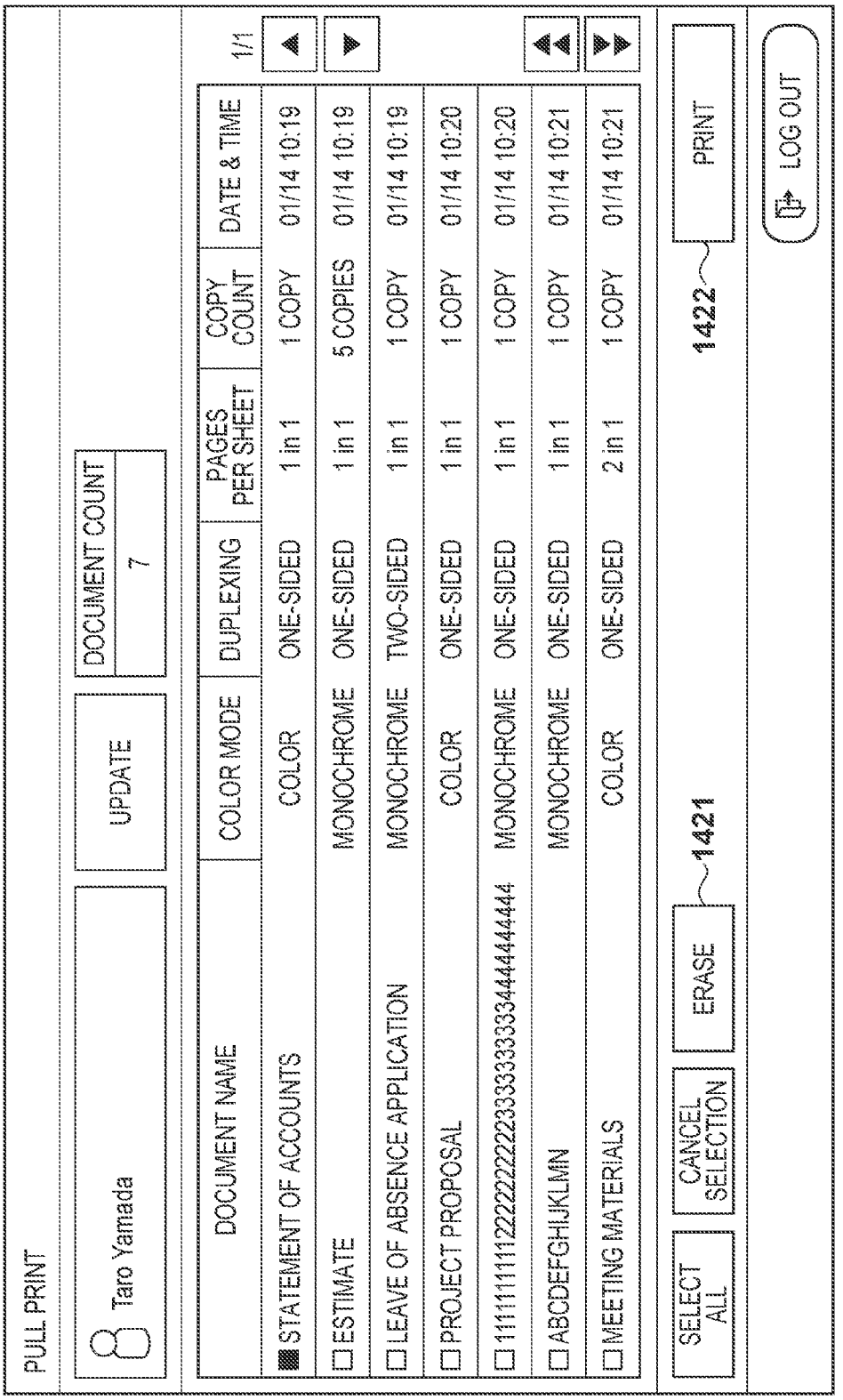

PULL PRINT
Taro Yamada
UPDATE
DOCUMENT COUNT
7
DOCUMENT NAME
COLOR MODE
DUPLEXING
PAGES PER SHEET
COPY COUNT
DATE & TIME
1/1
STATEMENT OF ACCOUNTS
COLOR
ONE-SIDED
1 in 1
1 COPY
01/14 10:19
ESTIMATE
MONOCHROME
ONE-SIDED
1 in 1
5 COPIES
01/14 10:19
LEAVE OF ABSENCE APPLICATION
MONOCHROME
TWO-SIDED
1 in 1
1 COPY
01/14 10:19
PROJECT PROPOSAL
COLOR
ONE-SIDED
1 in 1
1 COPY
01/14 10:20
1111111111222222222233333333344444444444
MONOCHROME
ONE-SIDED
1 in 1
1 COPY
01/14 10:20
ABCDEFGHIJKLMN
MONOCHROME
ONE-SIDED
1 in 1
1 COPY
01/14 10:21
MEETING MATERIALS
COLOR
ONE-SIDED
2 in 1
1 COPY
01/14 10:21
SELECT ALL
CANCEL SELECTION
ERASE
1421
1422
PRINT
LOG OUT

FIG. 16A

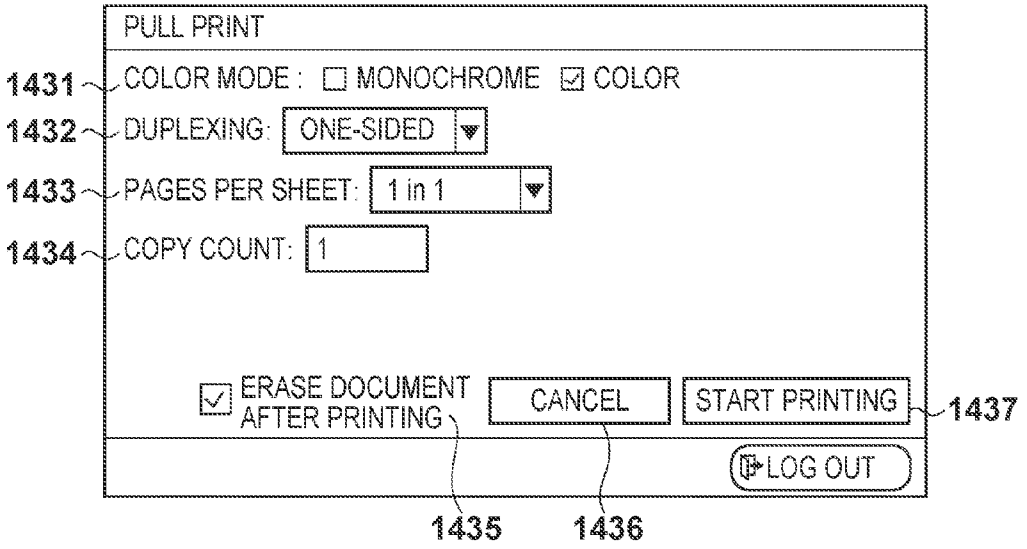


FIG. 16B

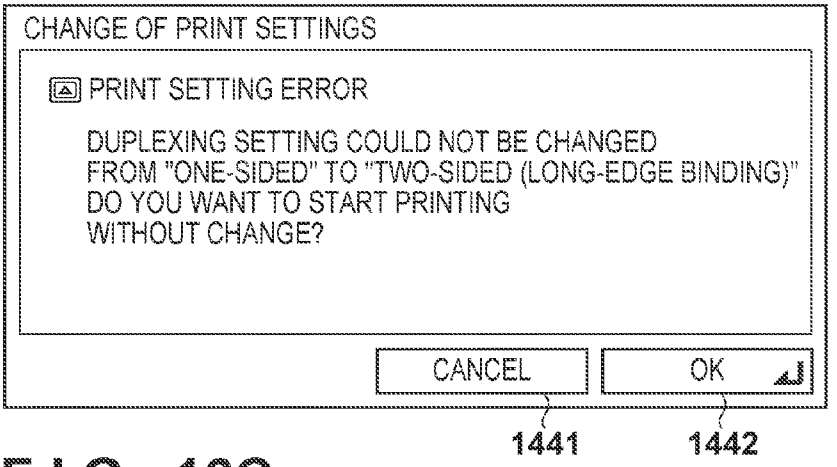


FIG. 16C

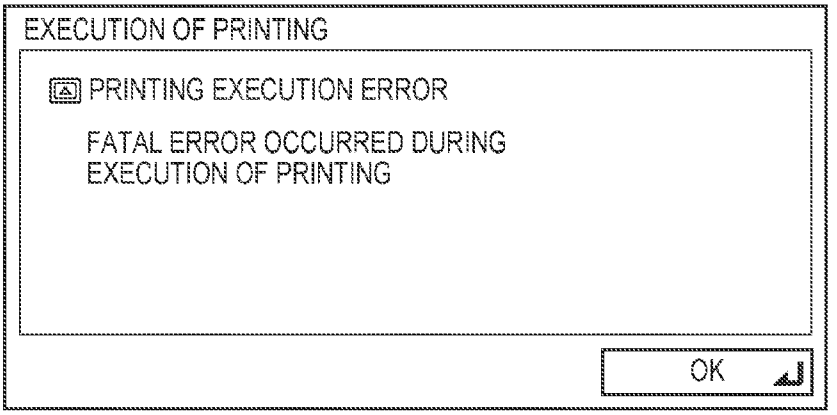
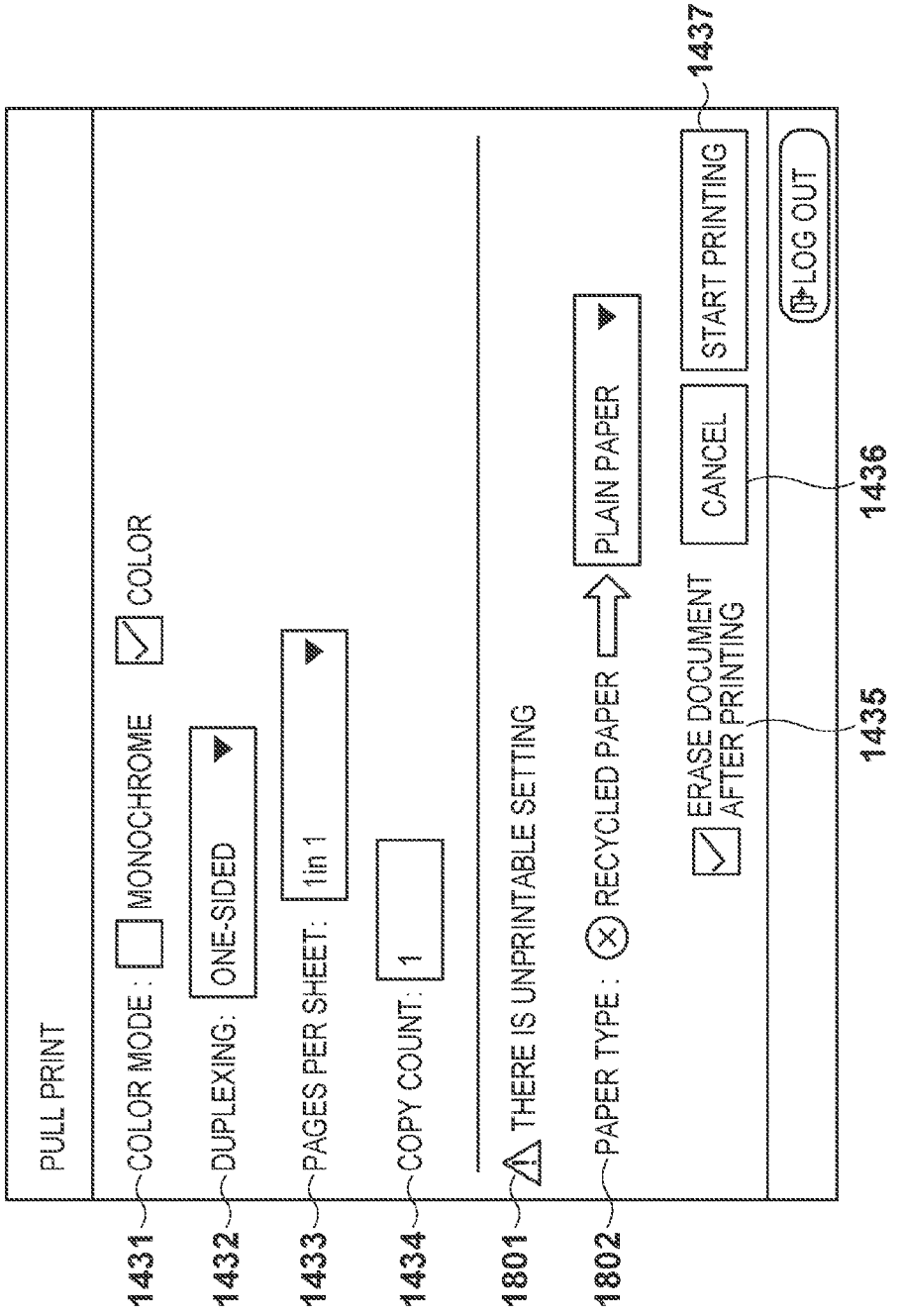


FIG. 17

```
<?xml version="1.0" encoding="UTF-8" ?>
<psf:PrintDisableItems version="1"
  xmlns:psf="http://schemas.microsoft.com/windows/2003/08/printing/printschemaframework"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema"
  xmlns:psk="http://schemas.microsoft.com/windows/2003/08/printing/printschemakeywords"
  xmlns:ns0000="http://www.canon.com/ns/printschema/oip/v100">

  <psf:Feature name="psk:PageMediaType">
    <psf:Property name="psk:DisplayName">
      <psf:Value xsi:type="xsd:string">PAPER TYPE</psf:Value>
    </psf:Property>
    <psf:DisableItem name="ns0000:Recycled" constrained="psk:None">
      <psf:Property name="psk:DisplayName">
        <psf:Value xsi:type="xsd:string">RECYCLED PAPER</psf:Value>
      </psf:Property>
    </psf:DisableItem>
    <psf:Property name="psf:SelectionType">
      <psf:Value xsi:type="xsd:QName">psk:PickOne</psf:Value>
    </psf:Property>
    <psf:Option name="psk:Plain" constrained="psk:None">
      <psf:Property name="psk:DisplayName">
        <psf:Value xsi:type="xsd:string">PLAIN PAPER(64~105g/m2)</psf:Value>
      </psf:Property>
    </psf:Option>
    <psf:Option name="ns0000:Color" constrained="psk:None">
      <psf:Property name="psk:DisplayName">
        <psf:Value xsi:type="xsd:string">COLORED PAPER</psf:Value>
      </psf:Property>
    </psf:Option>
    <psf:Option name="psk:None" constrained="psk:None">
      <psf:Property name="psk:DisplayName">
        <psf:Value xsi:type="xsd:string">UNDESIGNATED</psf:Value>
      </psf:Property>
    </psf:Option>
  </psf:Feature>
</psf:PrintDisableItems>
```

FIG. 18


PULL PRINT
COLOR MODE : MONOCHROME COLOR
DUPLEXING: ONE-SIDED
PAGES PER SHEET: 1in 1
COPY COUNT: 1
THERE IS UNPRINTABLE SETTING
PAPER TYPE : RECYCLED PAPER
PLAIN PAPER
ERASE DOCUMENT AFTER PRINTING
CANCEL
START PRINTING
LOG OUT
1431
1432
1433
1434
1801
1802
1435
1436
1437

MANAGING A PRINT JOB USING PRINT SETTING INFORMATION

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a printing system, printing method, print server, control method, and computer-readable medium for performing pull print control.

2. Description of the Related Art

There has conventionally been proposed a so-called "pull print" printing system capable of outputting print data from a printing apparatus when the user issues a print request to the printing apparatus for print data temporarily stored in a server (see, for example, Japanese Patent No. 4033857). In printing from an application, the user can output print data not from a specific printing apparatus but from a printing apparatus of his choice.

As a re-printing method for a printout the user did not intend, the following system is proposed (see, for example, Japanese Patent Laid-Open No. 2007-304881). More specifically, the UI (User Interface) of a printer driver running on a client PC is displayed on the panel of a printing apparatus. The user operates the UI to designate re-print settings and re-printing.

It is difficult for the conventional method to designate a change of print setting information when the user issues a print request from the printing apparatus for print data temporarily stored in the server. Print data temporarily stored in the server has a PDL (Page Description Language) format dependent on the printing apparatus. Hence, PDL data has to be edited according to a print setting information change instruction. For example, assume that the user designates a print setting to impose four pages on one page (to be referred to as 4in1) when he issues a print request from the printing apparatus for print data temporarily stored in the server. At this time, PDL print data temporarily stored in the server needs to be changed to match 4in1. If PDL is a raster format dependent on the resolution of the printing apparatus, a raster image is reduced to implement 4in1, causing various problems of quality degradation such as loss of a thin line. Since PDL has a variety of specifications, much labor is required to cope with these PDL specifications. In the first place, if a PDL specification is not open to the public, no PDL can be changed.

As a method of designating a change of print setting information by the user from the printing apparatus, the UI of a printer driver running on a client PC is displayed on the panel of the printing apparatus. However, it is hard to apply this method to a pull print system. A printing apparatus to output has not been finalized yet when the user designates printing on the client PC to execute pull print. The functions of a printer driver UI for use have to be general-purpose ones independent of the printing apparatus. A printing apparatus to output is finalized only after the user goes to the printing apparatus and operates the panel of the printing apparatus. The functions of the pull print printer driver UI displayed on the panel of the printing apparatus are merely general-purpose ones. In other words, functions specific to the printing apparatus cannot be used, limiting print settable functions.

SUMMARY OF THE INVENTION

According to one aspect of the present invention, there is provided a printing system comprising an information processing apparatus including a virtual printer driver which generates a print job of an intermediate format, a print server which manages the print job, and a printing apparatus, the print server including: storage unit configured to store the print job of the intermediate format received from the information processing apparatus; setting change receiving unit configured to receive, from the printing apparatus, a print setting information change instruction for the print job of the intermediate format stored in the storage unit; update unit configured to update print setting information of the print job in accordance with the print setting information change instruction; print request receiving unit configured to receive a print request from the printing apparatus; and job transmission unit configured to generate a print job of a format printable by the printing apparatus based on the print job of the intermediate format and the print setting information updated by the update unit in accordance with the print request, and to transmit the generated print job to the printing apparatus, the printing apparatus including: selection unit configured to select a print job; setting change transmission unit configured to transmit the print setting information change instruction for the print job selected by the selection unit; print request transmission unit configured to transmit the print request to the print server for the print job; and printing unit configured to print the print job transmitted by the job transmission unit.

According to another aspect of the present invention, there is provided a printing method in a printing system including an information processing apparatus including a virtual printer driver which generates a print job of an intermediate format, a print server which manages the print job, and a printing apparatus, comprising in the print server: a storage step of storing, in a storage unit, the print job of the intermediate format received from the information processing apparatus; a setting change receiving step of receiving, from the printing apparatus, a print setting information change instruction for the print job of the intermediate format stored in the storage unit; an update step of updating print setting information of the print job in accordance with the print setting information change instruction; a print request receiving step of receiving a print request from the printing apparatus; and a job transmission step of generating a print job of a format printable by the printing apparatus based on the print job of the intermediate format and the print setting information updated in the update step in accordance with the print request, and transmitting the generated print job to the printing apparatus, and comprising in the printing apparatus: a selection step of selecting a print job; a setting change transmission step of transmitting the print setting information change instruction for the print job selected in the selection step; a print request transmission step of transmitting the print request to the print server for the print job; and a printing step of printing the print job transmitted in the job transmission step.

According to another aspect of the present invention, there is provided a print server which communicates with an information processing apparatus including a virtual printer driver which generates a print job of an intermediate format, and a printing apparatus, comprising: storage unit configured to store the print job of the intermediate format received from the information processing apparatus; setting change receiving unit configured to receive, from the printing apparatus, a print setting information change instruction for the print job of the intermediate format stored in the storage unit; update unit configured to update print setting information of the print job in accordance with the print setting information change instruction; print request receiving unit configured to receive a print request from the printing apparatus; and job transmission unit configured to generate a print job of a format printable by the printing apparatus based on the print job of the

intermediate format and the print setting information updated by the update unit in accordance with the print request, and transmitting the generated print job to the printing apparatus.

According to another aspect of the present invention, there is provided a method of controlling a print server which communicates with an information processing apparatus including a virtual printer driver which generates a print job of an intermediate format, and a printing apparatus, comprising: a storage step of storing, in a storage unit, the print job of the intermediate format received from the information processing apparatus; a setting change receiving step of receiving, from the printing apparatus, a print setting information change instruction for the print job of the intermediate format stored in the storage unit; an update step of updating print setting information of the print job in accordance with the print setting information change instruction; a print request receiving step of receiving a print request from the printing apparatus; and a job transmission step of generating a print job of a format printable by the printing apparatus based on the print job of the intermediate format and the print setting information updated in the update step in accordance with the print request, and transmitting the generated print job to the printing apparatus.

According to another aspect of the present invention, there is provided a storage medium storing a program for causing a computer to function as storage unit configured to store a print job of an intermediate format received from an information processing apparatus, setting change receiving unit configured to receive, from a printing apparatus, a print setting information change instruction for the print job of the intermediate format stored in the storage unit, update unit configured to update print setting information of the print job in accordance with the print setting information change instruction, print request receiving unit configured to receive a print request from the printing apparatus, and job transmission unit configured to generate a print job of a format printable by the printing apparatus based on the print job of the intermediate format and the print setting information updated by the update unit in accordance with the print request, and to transmit the generated print job to the printing apparatus.

According to the present invention, when the user issues a print request from a printing apparatus for print data temporarily stored in a server, he can designate a change of print settings. A program which runs on the printing apparatus and designates a change of print settings requests not a client PC but a printer driver suited to the printing apparatus in the server to change print settings. Print settings can therefore be changed appropriately.

Further features of the present invention will become apparent from the following description of exemplary embodiments (with reference to the attached drawings).

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a view exemplifying the configuration of a printing system;

FIG. **2** is a block diagram showing the hardware configuration of each apparatus;

FIG. **3** is a block diagram exemplifying the configuration of the controller unit of a multi-function peripheral;

FIG. **4** is a schematic view for explaining an overall pull print sequence in the printing system;

FIGS. **5**A and **5**B are tables showing details of each data sequence;

FIG. **6** is a schematic view exemplifying the print window of an application program;

FIGS. **7**A and **7**B are flowcharts exemplifying the first control processing in the printing system;

FIGS. **8**A and **8**B are flowcharts exemplifying the second control processing in the printing system;

FIGS. **9**A and **9**B are flowcharts exemplifying the third control processing in the printing system;

FIG. **10** is flowchart generating a logical printer in the printing system;

FIG. **11** is a flowchart exemplifying the fourth control processing in the printing system;

FIG. **12** is a flowchart exemplifying the fifth control processing in the printing system;

FIGS. **13**A, **13**B, and **13**C are views showing details of data;

FIGS. **14**A and **14**B are views showing details of data;

FIGS. **15**A, **15**B, and **15**C are schematic views each showing a window displayed on the display unit of the operation unit of the multi-function peripheral;

FIGS. **16**A, **16**B, and **16**C are schematic views each showing a window displayed on the display unit of the operation unit of the multi-function peripheral;

FIG. **17** is a view showing details of data; and

FIG. **18** is a schematic view showing a window displayed on the display unit of the operation unit of the multi-function peripheral.

DESCRIPTION OF THE EMBODIMENTS

System Configuration

Embodiments of the present invention will now be described with reference to the accompanying drawings. FIG. **1** is a view exemplifying the configuration of a printing system to which an information processing apparatus, print server, address management server, and printing apparatus according to the present invention are applicable. Like "business office A" in FIG. **1**, the printing system of the embodiment is configured by connecting one or a plurality of client PCs **100**, one or a plurality of print servers **101**, one or a plurality of multi-function peripherals **102**, an address management server **103**, one or a plurality of login service PCs **104**, and a directory service server **105** via a local area network (LAN) **106**.

A virtual printer driver is installed in the client PC **100**. The virtual printer driver generates a print job of an intermediate format independent of a specific multi-function peripheral based on data received from a client application, and transmits it to the print server **101**. Note that a print job of an intermediate format indicates print data of a format which has common format specifications open to the public and facilitates reediting. Examples are EMFSPOOL (Enhanced Metafile Spool Format) and XPS (XML Paper Specification). The embodiment will adopt the EMFSPOOL format, but print data of another intermediate format such as XPS or PDF is also available.

The print server **101** stores the received print job in a predetermined storage location. The print server **101** includes a job management database (to be referred to as job management DB), and stores metadata regarding the print job in the job management DB. The print server **101** generates print job list information (print job list data) from the metadata stored in the job management DB, and transfers it to the multi-function peripheral **102**. The print server **101** updates print setting information using the metadata stored in the job management DB and print setting information received from the multi-function peripheral **102**. The print server **101** transfers the updated print setting information to the multi-function

peripheral **102**. The print server **101** generates PDL (Page Description Language) from the print job saved in the predetermined storage location and the metadata which is recorded and managed in the job management DB. The print server **101** transfers the generated PDL data to the multi-function peripheral **102**.

The address management server **103** includes an address management database (to be referred to as address management DB). When executing "pull print" processing in the embodiment, the address management server **103** stores address information (to be referred to as address) of the print server **101** which manages a print job, and a user identifier in the address management DB. In response to a print job list request from the multi-function peripheral **102**, the address management server **103** transmits, to the multi-function peripheral **102**, the address of a print server **101** corresponding to a user identifier received from the multi-function peripheral **102**.

As a login service for the multi-function peripheral **102**, the login service PC **104** performs authentication processing based on the login user name and password of the client PC **100** (for example, the login user name and password of Microsoft Windows®) that are stored in the directory service server **105**. An example of the authentication processing is SSO (Single Sign-ON). An example of the login service PC **104** is a personal computer in which Security Agent available from CANON is installed.

The directory service server **105** stores information about hardware resources such as a server, client, and printer on a network, and the attributes, access rights, and the like (including the login user name and password of the client PC **100**) of users of these hardware resources. An example of the directory service server **105** is a server having an active directory function.

In "business office B", one or a plurality of client PCs **100**, one or a plurality of print servers **101**, and one or a plurality of multi-function peripherals **102** are connected via the LAN **106**. The printing system of the embodiment may be configured by connecting "business office A" having the above configuration and one or a plurality of "business office B"s via a WAN **107**.

As the function of each server, one apparatus may implement the functions of a plurality of servers, or a plurality of apparatuses may implement one function in cooperation with each other.

[Information Processing Apparatus]

The hardware configuration of an information processing apparatus applicable to the client PC **100**, print server **101**, address management server **103**, login service PC **104**, and directory service server **105** shown in FIG. **1** will be explained with reference to FIG. **2**. FIG. **2** is a block diagram showing the hardware configuration of the information processing apparatus applicable to the client PC **100**, print server **101**, address management server **103**, login service PC **104**, and directory service server **105** shown in FIG. **1**.

Referring to FIG. **2**, a CPU **201** comprehensively controls respective devices and controllers connected to a system bus **204**. A ROM **202** or external memory **211** stores a BIOS (Basic Input/Output System) and operating system program (to be referred to as OS) serving as control programs of the CPU **201**, various programs necessary to implement functions to be executed by each server or each PC, and the like. A RAM **203** functions as a main memory, work area, and the like for the CPU **201**. The CPU **201** loads, from the ROM **202** or external memory **211** into the RAM **203**, programs and the like necessary to execute processing, and executes the loaded programs, implementing various operations. An input controller **205** controls inputs from a keyboard **209**, a pointing device such as a mouse (not shown), and the like.

A video controller **206** controls display on a monitor **210**. In general, the monitor **210** is a display device such as a liquid crystal display or CRT. The administrator uses such a display device, as needed. A memory controller **207** controls access to the external memory **211** such as a hard disk (HD), SSD (Solid State Drive), or SD memory card which stores a boot program, various applications, edit files, various data, and the like. A communication I/F controller **208** connects/communicates with an external device via a network (for example, the LAN **106** shown in FIG. **1**), and executes network communication control processing. For example, communication using TCP/IP is possible. Note that the CPU **201** enables display on the monitor **210** by executing, for example, outline font rasterization processing to a display information area in the RAM **203**.

The CPU **201** enables a user instruction with a mouse cursor (not shown) on the monitor **210**. Various programs (to be described later) for implementing the present invention are recorded in the external memory **211**, and if necessary, loaded into the RAM **203** and executed by the CPU **201**. The external memory **211** additionally stores definition files, various information tables, and the like used to execute the programs, which will also be described in detail later.

[Controller Unit]

The hardware configuration of a controller unit which controls the multi-function peripheral **102** shown in FIG. **1** will be explained with reference to FIG. **3**. FIG. **3** is a block diagram exemplifying the hardware configuration of the controller unit of the multi-function peripheral **102** shown in FIG. **1**. Referring to FIG. **3**, a controller unit **316** is connected to a scanner **314** functioning as an image input device and a printer **312** functioning as an image output device. In addition, the controller unit **316** is connected to a LAN (for example, the LAN **106** shown in FIG. **1**) and a public line (WAN) (for example, PSTN or ISDN) to input/output image data and device information. In the controller unit **316**, a CPU **301** is a processor which controls the overall system. A RAM **302** is a system work memory necessary for the CPU **301** to run, and is also a program memory for recording programs and an image memory for temporarily recording image data. A ROM **303** stores a boot program and various control programs for the system. A hard disk drive (HDD) **304** stores various programs for controlling the system, image data, and the like. In the embodiment, the HDD or save area **304** saves a PDL job.

An operation unit interface (I/F) **307** is an interface with an operation unit (UI) **308**, and outputs, to the operation unit **308**, image data to be displayed on the operation unit **308**. Also, the operation unit I/F **307** notifies the CPU **301** of information (for example, user information) input by the system user via the operation unit **308**. Note that the operation unit **308** includes a display unit having a touch panel. The user presses (touches with his finger or the like) a button displayed on the display unit to input various instructions. A network interface (I/F) **305** is connected to a network (LAN) to input/output data. A modem **306** is connected to a public line to perform data input/output such as FAX transmission/reception. An external interface (I/F) **318** receives an external input via a USB, IEEE1394, printer port, RS-232C, or the like. In the embodiment, a card reader **319** is connected to the external I/F **318** to read an IC card necessary for authentication. The CPU **301** controls reading of information from the IC card by the card reader **319** via the external I/F **318**, and can acquire the information read from the IC card. These devices are arranged on a system bus **309**.

An image bus interface (I/F) **320** is a bus bridge which connects the system bus **309** and an image bus **315** for transferring image data at high speed, and converts the data structure. The image bus **315** is formed from a PCI bus or IEEE1394 bus. The following devices are connected to the image bus **315**. A raster image processor (RIP) **310** rasterizes vector data such as a PDL code into a bitmap image. A printer interface (I/F) **311** connects the printer **312** and controller unit **316**, and performs synchronous/asynchronous conversion of image data. A scanner interface (I/F) **313** connects the scanner **314** and controller unit **316**, and performs synchronous/asynchronous conversion of image data. An image processing unit **317** performs correction, processing, and editing for input image data, and performs printer correction, resolution conversion, and the like for printout image data. In addition, the image processing unit **317** rotates image data, and compresses/decompresses multi-valued image data by JPEG or binary image data by JBIG, MMR, MH, or the like.

The scanner **314** illuminates an image on a document sheet, and scans it with a CCD line sensor to convert it into an electrical signal as raster image data. The user sets document sheets in the tray of a document feeder, and designates the start of reading from the operation unit **308**. Then, the CPU **301** gives an instruction to the scanner **314**, and the feeder feeds the document sheets one by one to read document images. The printer **312** converts raster image data into an image on a sheet. The method of the printer **312** is, for example, an electrophotographic method using a photosensitive drum or photosensitive belt, or an inkjet method of discharging ink from a small nozzle array to directly print an image on a sheet. The type of apparatus is arbitrary as long as the present invention is applicable. The print operation starts in response to an instruction from the CPU **301**. Note that the printer **312** includes a plurality of paper feed stages and corresponding paper cassettes so that different paper sizes or different orientations can be selected.

The operation unit **308** includes an LCD display unit, and a touch panel sheet is adhered onto the LCD. The operation unit **308** displays a system operation window, and when the user presses a displayed key, notifies the CPU **301** via the operation unit I/F **307** of the position information. The operation unit **308** includes various operation keys such as a start key, stop key, ID key, and reset key. The start key of the operation unit **308** is used to, for example, start a document image reading operation. An LED of two, green and red colors is arranged at the center of the start key, and the color represents whether the start key is usable. The stop key of the operation unit **308** is used to stop a running operation. The ID key of the operation unit **308** is used to input the user ID. The reset key is used to initialize settings from the operation unit.

The card reader **319** reads information stored in an IC card (for example, FeliCa® available from Sony) under the control of the CPU **301**, and notifies the CPU **301** via the external I/F **318** of the read information. With this configuration, the multi-function peripheral **102** can transmit image data scanned by the scanner **314** to the LAN **106**, and use the printer **312** to print out print data received from the LAN **106**. Also, the multi-function peripheral **102** can FAX-send image data scanned by the scanner **314** to the public line via the modem **306**, and use the printer **312** to output image data FAX-received from the public line.

[Pull Print Processing Sequence]

An overall pull print sequence in the printing system according to the embodiment will be explained with reference to FIG. **4**. Before this, preconditions to execute pull print in the embodiment will be explained first. A virtual printer driver for implementing pull print in the embodiment is installed as a shared printer in the print server **101**. The virtual printer driver has a function of generating print data based on designated printing or output of a rendering instruction from a client application **400**. Further, the virtual printer driver has a function (user interface) of receiving setting of print setting information to control the functions of the printer driver and printer, and a function of storing the print setting information in an external storage device for each installed logical printer. The print setting information is stored in a DEVMODE structure for Windows® available from Microsoft, USA. The DEVMODE structure is defined by Microsoft, USA to store various settings including default operation conditions regarding a logical printer, such as functions usable by a printer, layout setting, finishing setting, paper feed/discharge setting, and print quality setting. This information is stored in the external storage device for each installed logical printer. Each client PC **100** downloads a virtual printer driver from the print server **101** by point & print or the like, and installs it, thereby adding the logical printer of a virtual printer driver **401**.

The overall pull print sequence according to the embodiment will be described. FIG. **4** is a schematic view for explaining the overall sequence of Pull Print® in the printing system according to the embodiment. As shown in FIG. **4**, the user first logs into the client PC **100**, and inputs a print instruction from the client application **400** executed by the client PC **100** to a logical printer corresponding to the virtual printer driver **401** (**1-1**). At this time, the user can set print setting information using the virtual printer driver. Note that print setting information settable here is not one specialized to a specific printing apparatus and is limited to general-purpose contents. For example, the print setting information is one all printers can cope with. In accordance with the print instruction, the client application **400** of the client PC **100** transmits data to the virtual printer driver **401** via a graphic engine. The virtual printer driver **401** of the client PC **100** generates a device-independent EMFSPOOL print job based on the data received from the client application via the graphic engine (not shown). The client PC **100** transmits the generated EMFSPOOL print job to the print server **101** (**1-2**).

In the print server **101**, a print processor **402** reads the EMFSPOOL print job transmitted from the virtual printer driver **401**, and generates metadata of the print job. The print processor **402** transmits the metadata and the print job to a job management service **403** (**1-3**). The job management service **403** saves the EMFSPOOL print job in a predetermined storage location in the print server **101**. Further, the job management service **403** registers the metadata in a job management DB **404** (built in the external storage device of the print server **101**) (**1-4**). At this time, the print server **101** only saves the EMFSPOOL print job in the predetermined storage location without transmitting it to the printing apparatus. Further, the print server **101** transmits a print job identifier and user identifier to register them in an address management service **405** in the address management server **103** (**1-5**).

Upon receiving the print job identifier and user identifier from the job management service **403**, the address management service **405** registers them in an address management DB **406** in addition to the address of the print server **101** (**1-6**). In the embodiment, the address management DB **406** is built in the external storage device of the address management server **103**. Note that the embodiment uses an IP address as an address for discriminating a device. The embodiment uses a GUID (Global Unique Identifier) as the job identifier.

When the multi-function peripheral **102** detects an IC card readable by the card reader **319**, it reads individual authentication information in the IC card, and transmits the read

individual authentication information as an authentication request to an authentication server (not shown). The individual authentication information is information used for authentication and may be the serial number of the IC card. The individual authentication information is not particularly limited as long as it can uniquely identify a user. Upon receiving the individual authentication information from the multi-function peripheral **102**, the authentication server performs authentication processing for the individual authentication information based on an IC card authentication table stored in the external storage device of the authentication server, and sends back the authentication result to the multi-function peripheral **102**. Assume that the authentication server transmits the user identifier of the client PC **100** as the authentication result if the authentication processing is successful. A device having this function is arbitrary as long as the authentication server function can be implemented, and may reside in, for example, the address management server **103**.

A panel application **407** in the multi-function peripheral **102** receives the authentication result (login user identifier of the client PC **100**) indicating that authentication is successful. The embodiment uses a user name as the user identifier. Needless to say, the method for identifying a user may be the serial number of an IC card or the like.

The panel application **407** requests a print job list of the print server **101**. Before this, the panel application **407** executes preprocessing to acquire the IP address of the print server **101** in order to acquire a print job list. First, the panel application **407** transmits a user identifier to the address management service **405** in the address management server **103** (**2-1**). This implements an address solution instruction unit. The address management service **405** acquires, from the address management DB **406**, the address of a print server **101** corresponding to the received user name (**2-2**). Then, the address management service **405** sends back the address of the print server **101** to the panel application **407** (**2-3**). By receiving the address, the panel application **407** implements an address reception unit.

Upon receiving the address of the print server **101** from the address management service **405**, the panel application **407** requests a print job list of the job management service **403** in the print server **101** based on the acquired address (**2-4**). Accordingly, the panel application **407** implements a list request transmission unit. By receiving the print job list request, the job management service **403** implements a list request receiving unit. The job management service **403** looks up the job management DB **404** (**2-5**), generates a print job list corresponding to the user name, and sends back the print job list to the panel application **407** (**2-6**). This implements a list transmission unit. By receiving the print job list, the panel application **407** implements a list receiving unit. Upon receiving the print job list from the job management service **403**, the panel application **407** displays the print job list on the UI of the operation unit **308**.

When the user selects a print job and issues a print setting information change instruction and print instruction, the panel application **407** transmits print setting information of the selected print job to the job management service **403** (**3-1**). This implements a setting change transmission unit. By receiving the change of print setting information, the job management service **403** implements a setting change receiving unit. Upon receiving the print setting information from the panel application **407**, the job management service **403** looks up the job management DB **404** (**3-2**). The job management service **403** changes general-purpose print setting information set in the client PC to the print setting information received from the panel application **407**, and sends back the changed print setting information to the panel application **407** (**3-3**). This implements a setting transmission unit. By receiving the transmitted print setting information, the panel application **407** implements a setting receiving unit. The panel application **407** compares the transmitted print setting information with the received one to determine whether the print setting information has been changed correctly. If the print setting information has not been changed correctly, the panel application **407** displays a message to this effect on the UI of the operation unit **308**.

The panel application **407** issues again a print request (output instruction) to the job management service **403** (**4-1**). This implements a print request transmission unit. By receiving the print request, the job management service **403** implements a print request receiving unit. Upon receiving the print instruction from the panel application **407**, the job management service **403** looks up the job management DB **404** and acquires information necessary to print (**4-2**). Then, the job management service **403** acquires an EMFSPOOL print job based on the information acquired from the job management DB **404** to execute print processing based on the print instruction. The job management service **403** issues, to the printer driver, an instruction about PDL conversion processing or the like for the print job (**4-3**). In this case, the job management service **403** instructs, about PDL conversion processing, the printer driver of the printer which has issued the print request. This specification assumes that the printer driver of each device has been installed in advance in the print server, but the present invention is not limited to this.

After that, the printer driver **408** transmits the PDL job to the multi-function peripheral **102**, and the multi-function peripheral **102** prints (**4-4**). This implements a job transmission unit. Note that the PDL job is a job obtained by converting an EMFSPOOL print job into the printable PDL format. The job converted into the PDL format can be output by the multi-function peripheral **102**.

Finally, when the user designates deletion of a print job, the panel application **407** instructs the job management service **403** to delete the designated print job (**5-1**). Upon receiving the print job deletion request from the panel application **407**, the job management service **403** instructs the address management service **405** to delete a registered print job identifier (**5-2**). Upon receiving the print job identifier registration release request from the job management service **403**, the address management service **405** deletes a corresponding record from the address management DB **406** (**5-3**). The job management service **403** deletes a corresponding record from the job management DB (**5-4**), and deletes an EMFSPOOL print job file as well.

The overall sequence of the printing system has been described. FIGS. **5**A and **5**B show details of data in the printing system of FIG. **4** in the table form. Processing will be described in detail with reference to flowcharts. At this time, the description will be complemented with reference to FIGS. **5**A and **5**B.

[Print Instruction Operation]

A print instruction in the client application **400** running on the client PC **100** shown in FIG. **1** will be explained. FIG. **6** is a schematic view exemplifying the print window of the client application **400** running on the client PC **100** shown in FIG. **1**. The display unit displays the print window under the control of the CPU of the client PC **100**. A printer selection field **610** allows the user to select a logical printer to print from logical printers set in the client PC **100**.

In the printer selection field **610**, "pull print" **601** is a logical printer corresponding to a virtual printer driver set for pull print in the embodiment. Further in the printer selection

field **610**, "Cxxxx ix3250" **602** and "Cxxxx ix5051" **603** are logical printers corresponding to normal printer drivers. The user selects one logical printer in the printer selection field **610**, and designates an OK button **605** with a pointing device (not shown). Then, the client application **400** transmits print data via the graphic engine to a printer driver corresponding to the logical printer selected in the printer selection field **610**. The operation of the virtual printer driver when the user selects the "pull print" **601** in the printer selection field **610** and issues a print instruction will be explained.

[First Control Processing]

FIGS. **7**A and **7**B are flowcharts exemplifying the first control processing sequence in the printing system according to the present invention. This sequence corresponds to the processing sequence from **1-1** to **1-6** shown in FIG. **4**. In the flowchart shown in FIGS. **7**A and **7**B, solid arrows indicate the sequence of processes, and broken arrows indicate data transmission/reception between apparatuses.

Steps SA**700** to SA**702** correspond to print job input processing by the virtual printer driver **401** shown in FIG. **4**. These flowchart processes are implemented by loading a program stored in the external memory into the RAM and executing it by the CPU of the client PC **100** shown in FIG. **1**.

Steps SB**700** to SB**706** correspond to metadata generation/transmission processing and print job transfer processing by the print processor **402** shown in FIG. **4**. These flowchart processes are implemented by loading a program stored in the external memory into the RAM and executing it by the CPU of the print server **101** shown in FIG. **1**.

Steps SC**700** to SC**709** correspond to metadata registration processing and print job save processing by the job management service **403** shown in FIG. **4**. These flowchart processes are implemented by loading a program stored in the external memory into the RAM and executing it by the CPU of the print server **101** shown in FIG. **1**.

Steps SD**700** to SD**704** correspond to print job identifier registration processing by the address management service **405** shown in FIG. **4**. These flowchart processes are implemented by loading a program stored in the external memory into the RAM and executing it by the CPU of the address management server **103** shown in FIG. **1**.

First, print job input processing by the virtual printer driver **401** of the client PC **100** will be explained. In step SA**700**, processing by the virtual printer driver **401** starts. In step SA**701**, the virtual printer driver **401** outputs data input from the client application **400** in FIG. **4** as an EMFSPOOL print job. This corresponds to **1-1** and **1-2** in FIG. **4**. For Windows® available from Microsoft, USA, input to the printer driver is executed by a function call by the OS (Operating System) which is called DDI (Device Driver Interface).

The virtual printer driver **401** interprets a parameter transferred at the same time as the DDI call, generates an EMFSPOOL print job, and outputs the generated job to a spooler managed by the OS. In general, the role of the printer driver is to generate and output a print job dependent on an output device. In the embodiment, it is important to generate and output a print job of an intermediate format independent of the multi-function peripheral **102**. Hence, even if the configuration of the multi-function peripheral **102** is changed, that of the virtual printer driver **401** does not change in the printing system of the present invention. That is, a function unique to the multi-function peripheral can be easily used in the pull print system. In step SA**702**, the process ends.

Next, metadata generation/transmission processing and print job transfer processing by the print processor **402** of the print server **101** will be explained. For Windows® available from Microsoft, USA, internal processing by a PrintDocumentOnPrintProcessor function called when the OS requests the print processor to process a print job will be described. In step SB**700**, the print processor **402** starts processing on the print server **101**. In step SB**701**, the print processor **402** acquires information about the format of a print job which has been output from the virtual printer driver **401** and managed by the OS. The print processor **402** determines whether the type of job output to the spooler of the OS is the RAW format. The RAW format indicates a print job output from the printer driver. Since the virtual printer driver **401** has output the print job in step SA**701**, it is determined that the job type is the RAW format, and the process advances to step SB**702**. If it is determined that the job type is not the RAW format, the process advances to step SB**706** and ends. In step SB**702**, the print processor **402** generates metadata.

Metadata includes the GUID (Global Unique Identifier), job name, user name, DEVMODE, and logical printer name of the virtual printer driver on the "transmission data" column on the "**1-3**" row in FIGS. **5**A and **5**B. More specifically, the metadata is expressed in the XML format as shown in FIG. **13**A. The Guid attribute of the JobInfo element describes a print job identifier which is unique in the printing system of the present invention. The JobName attribute of the JobInfo element describes the name of a job designated in process **1-1** of FIG. **4**. The UserName attribute of the JobInfo element describes the name of a user who printed in process **1-1** of FIG. **4**. The PrintQueueName attribute of the JobInfo element describes the name of a logical printer used in process **1-1** of FIG. **4**. The DEVMODESnapshot attribute of the DocumentSettings element describes print setting information (DEVMODE) of the first page designated in process **1-1** of FIG. **4**. Note that the DEVMODE is a binary format, and is converted into a text by a Base64 method to describe data by XML.

In step SB**703**, the print processor **402** transmits the metadata generated in step SB**702** to the job management service **403**. For Windows® available from Microsoft, USA, a named pipe can be used as a transmission protocol efficiently. The use of the named pipe is convenient even for acquisition of a user token (to be described later). In step SB**704**, the print processor **402** loads spool data from the spooler of the OS. The spool data corresponds to the EMFSPOOL print job output from the virtual printer driver **401**. In step SB**705**, the print processor **402** transmits the loaded spool data to the job management service **403**. In step SB**706**, the process ends.

Metadata registration processing and print job save processing by the job management service **403** will be described. In step SC**700**, the job management service **403** starts processing on the print server **101**. In step SC**701**, the job management service **403** functions as a named pipe server and receives the metadata transmitted from the print processor **402** in step SB**703** in the XML format as shown in FIG. **13**A. When establishing a connection with the print processor **402**, the job management service **403** acquires the user token of a named pipe client (that is, the print processor **402**) (step SC**702**). The usage of the user token will be described later.

In step SC**703**, the job management service **403** determines a file path for saving the print job. In step SC**704**, the job management service **403** receives the EMFSPOOL print job transmitted from the print processor **402** in step SB**705**. In step SC**705**, the job management service **403** saves the received EMFSPOOL print job with the file name determined in step SC**703**. In step SC**706**, the job management service **403** generates the current date & time as the print job input time.

In step SC**707**, the job management service **403** registers, as a new record in the job management DB **404** of FIG. **4**, the metadata received in step SC**701**, the user token acquired in

step SC**702**, the file name determined in step SC**703**, and the date & time generated in step SC**706**. In step SC**708**, the job management service **403** transmits a print job identifier registration command to the address management service **405**. At this time, the job management service **403** transmits even the GUID and user name contained in the metadata received in step SC**701**. In step SC**709**, the process ends.

Next, print job identifier registration processing by the address management service **405** will be explained. In step SD**700**, the address management service **405** starts processing on the address management server **103**. In step SD**701**, the address management service **405** receives the GUID and user name transmitted from the job management service **403** in step SC**708**. When establishing a connection with the job management service **403**, the address management service **405** acquires the IP address of the print server **101** (step SD**702**). In step SD**703**, the address management service **405** registers, as a new record in the address management DB **406** of FIG. **4**, the GUID and user name received in step SD**701** and the IP address acquired in step SD**702**. In step SD**704**, the process ends.

[Second Control Processing]

FIGS. **8**A and **8**B are flowcharts exemplifying the second control processing sequence in the printing system according to the present invention. This sequence corresponds to the processing sequence from **2**-**1** to **2**-**6** shown in FIG. **4**. In the flowcharts shown in FIGS. **8**A and **8**B, solid arrows indicate the sequence of processes, and broken arrows indicate data transmission/reception between apparatuses.

Steps SE**800** to SE**813** correspond to print job list display processing by the panel application **407** shown in FIG. **4**. These flowchart processes are implemented by loading a program stored in the external memory into the RAM and executing it by the CPU of the multi-function peripheral **102** shown in FIG. **1**.

Steps SD**800** to SD**807** correspond to address solution processing by the address management service **405** shown in FIG. **4**. These flowchart processes are implemented by loading a program stored in the external memory into the RAM and executing it by the CPU of the address management server **103** shown in FIG. **1**.

Steps SC**800** to SC**810** correspond to print job list generation processing by the job management service **403** shown in FIG. **4**. These flowchart processes are implemented by loading a program stored in the external memory into the RAM and executing it by the CPU of the print server **101** shown in FIG. **1**.

First, print job list display processing by the panel application **407** will be explained. In step SE**800**, processing by the panel application **407** starts. In step SE**801**, the panel application **407** controls to display a login display window (FIG. **15**A) on the operation unit **308**. In step SE**802**, the panel application **407** performs user authentication based on an IC card or the like. In the embodiment, user authentication is not an important process, so a detailed description of an authentication card detection method, an IC card identification ID acquisition method, and authentication processing by an authentication server will be omitted.

In step SE**803**, the panel application **407** determines the authentication result. If the authentication result indicates an authentication error in step SE**803**, the panel application **407** controls in step SE**804** to display an error display window (FIG. **15**B) on the display unit of the operation unit **308**. If the panel application **407** receives pressing of the OK button on the error display window, it returns to step SE**801** and controls to display the login display window again. If the panel application **407** determines in step SE**803** that authentication is successful, the process advances to step SE**805**. In step SE**805**, the panel application **407** acquires the name of a user who has been authenticated successfully. In step SE**806**, the panel application **407** transmits a user name to the address management service **405**. In step SE**807**, the panel application **407** receives the IP address list of the print server **101** from the address management service **405**. More specifically, the panel application **407** requests the address management service **405** to narrow down target print jobs based on the user name, and send back IP addresses of job management service at which the print jobs are held.

Subsequent steps SE**808** to SE**811** are loop processing of listing IP addresses from the IP address list. In step SE**808**, the panel application **407** extracts an IP address from the IP address list. In step SE**809**, the panel application **407** determines whether an IP address has been extracted. If an IP address has been extracted, the process advances to step SE**810**, and the panel application **407** transmits a print job list request command to the job management service **403**. At this time, the user name is also transmitted. In step SE**811**, the panel application **407** receives a print job list from the job management service **403**.

The print job list includes the GUID, job name, copy count, duplexing, color mode, pages per sheet, and date & time on the "transmission data" column on the "**2**-**6**" row in FIGS. **5**A and **5**B. More specifically, the print job list is expressed as print job list information in the XML format as shown in FIGS. **14**A and **14**B. The JobList element holds JobInfo child elements by the number of jobs. The Guid attribute of the JobInfo element is the same as Guid described with reference to FIG. **13**A. The JobName attribute of the JobInfo element is also the same as JobName described with reference to FIG. **13**A. However, various attributes held by the DocumentSettings element greatly differ from those in FIG. **13**A.

The CopyCount attribute designates the number of copies. The Duplexing attribute designates which of one-sided printing and two-sided printing is used. More specifically, a description "OneSided" designates one-sided printing. A description "TwoSidedLongEdge" designates two-sided (long-edge binding). A description "TwoSidedShortEdge" designates two-sided (short-edge binding). The OutputColor attribute designates an output method regarding color. A description "Color" designates color. A description "Monochrome" designates monochrome. The PagesPerSheet attribute designates the number of pages which can be selected for printing on one surface of a sheet. The DateTime attribute designates the job input time.

After the panel application **407** ends extraction of an IP address from the IP address list in steps SE**808** to SE**811**, the process advances to step SE**812**. In step SE**812**, the panel application **407** controls to display a print job list display window (FIG. **15**C) on the display unit of the operation unit **308**. In step SE**813**, the process ends.

Next, address solution processing by the address management service **405** will be explained. In step SD**800**, processing by the address management service **405** starts. In step SD**801**, the address management service **405** receives the user name transmitted from the panel application **407** in step SE**806**. In step SD**802**, the address management service **405** searches the address management DB **406** in FIG. **4** for a record which matches the user name received in step SD**801**. In step SD**803**, the address management service **405** extracts one record from detected records. In step SD**804**, the address management service **405** determines whether the record has been extracted. If the record has been extracted, the process advances to step SD**805**, and the address management service **405** extracts, from the record, the IP address of the print server

101 in which the job management service 403 runs. After the end of extracting IP addresses from all detected records in steps SD803 to SD805, the process advances to step SD806, and the address management service 405 sends back the IP address list to the panel application 407. In step SD807, the process ends.

Print job list generation processing by the job management service 403 will be explained. In step SC800, processing by the job management service 403 starts. In step SC801, the job management service 403 receives the print job list request transmitted from the panel application 407 in step SE810. At this time, the job management service 403 receives the user name, too. In step SC802, the job management service 403 searches the job management DB 404 in FIG. 4 for a record which matches the user name received in step SC801. In step SC803, the job management service 403 extracts one record from detected records.

In step SC804, the job management service 403 determines whether the record has been extracted. If the record has been extracted, the process advances to step SC805, and the job management service 403 extracts a GUID, a job name, a DEVMODE, the logical printer name of a virtual printer driver, a user token, and date & time from the record. In step SC806, the job management service 403 "disguises" its thread using the user token extracted in step SC805. While the thread is disguised, it is executed in the security context of a user who printed using the client application 400 in FIG. 4. That is, "disguise" indicates executing a thread with user authority using the security context of the user. "Thread" indicates a thread generated upon a change of print setting information.

In step SC807, the job management service 403 extracts pieces of information such as the color mode, duplexing, pages per sheet, and copy count from the DEVMODE extracted in step SC805. The DEVMODE is a printer driver-specific data format managed by the printer driver. To extract pieces of information from the DEVMODE, an inquiry need to be made to a printer driver which has generated the DEVMODE. Since the logical printer name of the virtual printer driver has been acquired in step SC807, pieces of information are extracted from the DEVMODE using the logical printer.

In general, pieces of information are extracted from the DEVMODE via an original expansion interface which is arranged in the printer driver to operate the DEVMODE. Recently, there is a method using an XML print setting storage format called a print ticket defined by Microsoft, USA. If the printer driver supports the print ticket, it is also possible to convert the DEVMODE into a print ticket and extract pieces of information from the print ticket.

In step SC808, the job management service 403 releases the disguise of the thread. After the end of extracting pieces of print setting information from all detected records in steps SC803 to SC808, the process advances to step SC809, and the job management service 403 generates a print job list (FIGS. 14A and 14B). The job management service 403 sends back the print job list to the panel application 407. In step SC810, the process ends.

[Third Control Processing]

FIGS. 9A and 9B are flowcharts exemplifying the third control processing sequence in the printing system according to the present invention. This sequence corresponds to the processing sequence from 3-1 to 3-3 shown in FIG. 4. In the flowchart shown in FIGS. 9A and 9B, solid arrows indicate the sequence of processes, and broken arrows indicate data transmission/reception between apparatuses.

Steps SE900 to SE913 correspond to print setting information change confirmation and print instruction processing by the panel application 407 shown in FIG. 4. These flowchart processes are implemented by loading a program stored in the external memory into the RAM and executing it by the CPU of the multi-function peripheral 102 shown in FIG. 1.

Steps SC900 to SC911 correspond to print setting information change processing by the job management service 403 shown in FIG. 4. These flowchart processes are implemented by loading a program stored in the external memory into the RAM and executing it by the CPU of the print server 101 shown in FIG. 1.

First, print setting information change confirmation and print instruction processing by the panel application 407 will be explained. In step SE900, processing by the panel application 407 starts. In step SE812 of FIG. 8B, the panel application 407 controls to display the print job list display window (FIG. 15C) on the display unit of the operation unit 308.

In step SE901, the panel application 407 receives selection of a print job and pressing of a print button 1422 from the user. In step SE902, the panel application 407 controls to display a print setting information change window (FIG. 16A) on the display unit of the operation unit 308. A setting 1431 in FIG. 16A indicates designation of the color mode, and allows the user to check either monochrome or color. A setting 1432 in FIG. 16A indicates designation of two-sided/one-sided, and allows the user to select one imposition from one-sided, two-sided (long-edge binding), and two-sided (short-edge binding). A setting 1433 in FIG. 16A indicates designation of pages per sheet, and allows the user to select one of 1in1, 2in1, 4in1, 6in1, 8in1, 9in1, and 16in1. A setting 1434 in FIG. 16A indicates designation of the copy count, and allows the user to designate a value of 1 to 9,999. FIG. 16A exemplifies a change of print setting information upon receiving selection of a print job with a document name "statement of accounts" in FIG. 15C and pressing of the print button 1422.

In step SE903, the panel application 407 receives a change of print setting information from the user. Assume that the user has changed one-sided/two-sided designation at the setting 1432 in FIG. 16A from one-sided to two-sided (long-edge binding). In step SE904, the panel application 407 determines whether the print setting information has been changed. If no print setting information has been changed, the process skips subsequent print setting information change confirmation processing and advances to step SE911. If the print setting information has been changed, the process advances to step SE905. In step SE905, the panel application 407 transmits the print setting information to the job management service 403. The print setting information includes the GUID, copy count, duplexing, color mode, pages per sheet, and model name of the multi-function peripheral on the "transmission data" column on the "3-1" row in FIG. 5B.

More specifically, the print setting information is expressed in the XML format as shown in FIG. 13B. The Guid attribute of the JobInfo element is the same as Guid described with reference to FIG. 13A. The DeviceModelName attribute of the JobInfo element describes the model name of the multi-function peripheral 102 in FIG. 1. Various attributes held by the DocumentSettings element are the same as those described with reference to FIGS. 14A and 14B. However, one-sided has been changed to two-sided (long-edge binding) in step SE903, so the Duplexing attribute becomes "TwoSidedLongEdge". In step SE906, the panel application 407 receives, from the job management service 403, print setting information which reflects the print setting information change instruction. The print setting information includes the GUID, copy count, duplexing, color mode, and pages per sheet on the "transmission data" column on the "3-3" row in FIG. 5B. More specifically, the print setting information is

expressed in the XML format as shown in FIG. **13**C. The contents are almost the same as those in FIG. **13**B, and a description thereof will not be repeated.

In step SE**907**, the panel application **407** compares the print setting information transmitted in step SE**905** with one received in step SE**906**. As described above, the Duplexing attribute in the print setting information transmitted in step SE**905** designates "TwoSidedLongEdge". However, assume that the Duplexing attribute in the print setting information received in step SE**906** is "OneSided". Such a mismatch between transmitted and received settings is highly likely to occur in principle.

Setting information which is not changed in step SE**903** is, for example, the paper size. Assume that the paper size is "postcard" in **1**-**1** of FIG. **4**. As a print setting information prohibition condition, assume that two-sided/one-sided designation allows selection of only one-sided for paper "postcard". Further, the preferential order to apply the prohibition condition is higher for paper size designation than for two-sided/one-sided designation. Thus, the Duplexing attribute has to be always "OneSided". If the same advanced prohibition processing as that of the printer driver is implemented in the panel application **407**, a change of duplexing designation can be prohibited in input of a setting change in FIG. **16**A. However, this greatly complicates implementation of the panel application. It is therefore easy and versatile to inquire of the printer driver whether a change is possible every time print setting information is changed, without performing print setting information prohibition processing by the panel application **407**, like the embodiment.

If the print setting information transmitted in step SE**905** and one received in step SE**906** are identical as a result of comparison, the process advances to step SE**911**. If they are different, the process advances to step SE**908**, and the panel application **407** controls to display an error display window (FIG. **16**B) on the display unit of the operation unit **308**. Since the Duplexing attribute of the print setting information received in step SE**906** is "OneSided", the error display in FIG. **16**B represents that a change from "one-sided" to "two-sided (long-edge binding)" has failed. In step SE**909**, the panel application **407** receives input of a print continuation instruction. In step SE**910**, the panel application **407** receives pressing of an OK button **1442**, and the process advances to step SE**911**. Print instruction processing in step SE**911** will be described later. After that, the process advances to step SE**912**. If the panel application **407** receives pressing of a cancel button **1441** via the error display window in FIG. **16**B, the process advances to step SE**912**, and the panel application **407** closes the error display window in FIG. **16**B and the print setting information change window in FIG. **16**A. In step SE**913**, the process ends.

Next, print setting information change processing by the job management service **403** will be explained. In step SC**900**, processing by the job management service **403** starts. In step SC**901**, the job management service **403** receives print setting information transmitted from the panel application **407** in step SE**905** in the XML format, as shown in FIG. **13**B. In step SC**902**, the job management service **403** creates a logical printer to change print setting information. Details of this processing will be described later with reference to FIG. **10**.

In step SC**903**, the job management service **403** searches the job management DB **404** in FIG. **4** for a record which matches the GUID received in step SC**901**. In step SC**904**, the job management service **403** acquires a DEVMODE and user token from the detected record. In step SC**905**, the job management service **403** disguises its thread using the user token acquired in step SC**904**. While the thread is "disguised", it is executed in the security context of a user who printed using the client application **400** in FIG. **4**. In step SC**906**, the job management service **403** applies pieces of print setting information received in step SC**901** to the DEVMODE acquired in step SC**904**. The DEVMODE is a printer driver-specific data format managed by the printer driver. To apply pieces of information to the DEVMODE, a printer driver which has generated the DEVMODE is requested to update the DEVMODE.

The logical printer has been generated in step SC**902** of FIG. **9**A and can be used to apply pieces of information to the DEVMODE. In general, pieces of information are applied to the DEVMODE via an original expansion interface which is arranged in the printer driver to operate the DEVMODE. Recently, there is a method using an XML print setting storage format called a print ticket defined by Microsoft, USA. If the printer driver supports the print ticket, it is also possible to convert the DEVMODE into a print ticket, apply pieces of information to the print ticket, and convert the print ticket into a DEVMODE.

In step SC**907**, the job management service **403** updates the DEVMODE saved in the job management DB **404** using the DEVMODE changed in step SC**906**. In step SC**908**, the job management service **403** extracts pieces of information such as the color mode, duplexing, pages per sheet, and copy count from the DEVMODE updated in step SC**906**. Extraction of pieces of information is the same as that in step SC**807** of FIG. **8**A. In step SC**909**, the job management service **403** releases the disguise of the thread. In step SC**910**, the job management service **403** sends back, to the panel application **407**, the print setting information which has been changed into the XML format, as shown in FIG. **13**C. In step SC**911**, the process ends.

[Logical Printer Creation Processing]

FIG. **10** is a flowchart showing logical printer creation processing called in step SC**902** of FIG. **9**A. In step SC**1000**, processing by the job management service **403** starts. In step SC**1001**, the job management service **403** acquires the IP address of the multi-function peripheral **102** in FIG. **1**. The IP address of the multi-function peripheral **102** is acquired when a data transmission/reception connection with the panel application **407** is established. In step SC**1002**, the job management service **403** determines whether a printer driver which supports the model name of the multi-function peripheral **102** in FIG. **1** has been installed in the print server **101**. If no such printer driver has been installed, the process advances to step SC**1003**, and the job management service **403** installs, in the print server **101**, a printer driver which supports the model name of the multi-function peripheral **102** in FIG. **1**. As a result, the print job can be converted into a format outputtable by a multi-function peripheral having the model name. The process then advances to step SC**1004**. If the job management service **403** determines in step SC**1002** that such a printer driver has been installed, the process advances to step SC**1004**. At this stage, the installed printer driver is the printer driver **408** in FIG. **4**.

In step SC**1004**, the job management service **403** determines whether a logical printer which is formed from the installed printer driver and has the IP address acquired in step SC**1001** as an output port exists in the print server **101**. If no such logical printer exists, the process advances to step SC**1005**. In step SC**1005**, the job management service **403** creates, by using the installed printer driver, a logical printer which has the IP address acquired in step SC**1001** as an output port. The process then advances to step SC**1006**. If the job management service **403** determines in step SC**1004** that such

a logical printer exists, the process advances to step SC1006. In step SC1006, the process ends.

[Fourth Control Processing]

FIG. 11 is a flowchart exemplifying the fourth control processing sequence in the printing system according to the present invention, and is also a flowchart showing print instruction processing called in step SE911 of FIG. 9B. This sequence corresponds to the processing sequence from 4-1 to 4-4 shown in FIG. 4. In the flowchart shown in FIG. 11, solid arrows indicate the sequence of processes, and broken arrows indicate data transmission/reception between apparatuses.

Steps SE1100 to SE1107 correspond to print instruction processing by the panel application 407 shown in FIG. 4. These flowchart processes are implemented by loading a program stored in the external memory into the RAM and executing it by the CPU of the multi-function peripheral 102 shown in FIG. 1.

Steps SC1100 to SC1109 correspond to print processing by the job management service 403 shown in FIG. 4. These flowchart processes are implemented by loading a program stored in the external memory into the RAM and executing it by the CPU of the print server 101 shown in FIG. 1.

First, print instruction processing by the panel application 407 will be explained. In step SE1100, processing by the panel application 407 starts. In step SE1101, the panel application 407 transmits a print instruction request command, the GUID of a selected print job, and the model name of the multi-function peripheral 102 to the job management service 403. In step SE1102, the panel application 407 receives a printing execution result (success/failure) from the job management service 403. In step SE1103, the panel application 407 determines whether execution of printing is successful. If execution of printing has failed, the process advances to step SE1104, and the panel application 407 controls to display an error display window (FIG. 16C) on the display unit of the operation unit 308. The process then advances to step SE1107. If the panel application 407 determines in step SE1103 that execution of printing is successful, the process advances to step SE1105.

In step SE1105, the panel application 407 determines whether a printed document erase check box 1435 in FIG. 16A has been checked. If deletion after printing is designated, the process advances to step SE1106, and the panel application 407 deletes the print job. Details of this processing will be described later with reference to FIG. 12. The process then advances to step SE1107. In step SE1107, the process ends.

Next, print processing by the job management service 403 will be explained. In step SC1100, processing by the job management service 403 starts. In step SC1101, the job management service 403 receives the print instruction command transmitted from the panel application 407 in step SE1101. At this time, the job management service 403 also receives the GUID of the target print job and the model name of the multi-function peripheral 102. In step SC1102, the job management service 403 creates a logical printer to change execution of printing. The processing contents are the same as those in step SC902 of FIG. 9A. Details of this processing have been described with reference to FIG. 10. In step SC1103, the job management service 403 searches the job management DB 404 in FIG. 4 for a record which matches the GUID received in step SC1101. In step SC1104, the job management service 403 acquires an EMFSPOOL file name, DEVMODE, and user token from the detected record. Note that the DEVMODE acquired here is print setting information set using the window in FIG. 16A.

In step SC1105, the job management service 403 disguises its thread using the user token acquired in step SC1104. While the thread is disguised, it is executed in the security context of a user who printed using the client application 400 in FIG. 4. In step SC1106, the job management service 403 renders the EMFSPOOL and DEVMODE acquired in step SC1104 for the logical printer created in step SC1102, and executes print processing. In the job management service 403, the printer driver which forms the logical printer generates PDL and transmits it to the multi-function peripheral 102. In step SC1107, the job management service 403 releases the disguise of the thread. In step SC1108, the job management service 403 sends back a printing execution result (success/failure) to the panel application 407. In step SC1109, the process ends.

[Fifth Control Processing]

FIG. 12 is a flowchart exemplifying the fifth control processing sequence in the printing system according to the present invention. This sequence corresponds to the processing sequence from 5-1 to 5-4 shown in FIG. 4. In the flowchart shown in FIG. 12, solid arrows indicate the sequence of processes, and broken arrows indicate data transmission/reception between apparatuses.

Steps SE1200 to SE1203 correspond to print job deletion instruction processing by the panel application 407 shown in FIG. 4. These flowchart processes are implemented by loading a program stored in the external memory into the RAM and executing it by the CPU of the multi-function peripheral 102 shown in FIG. 1.

Steps SC1200 to SC1207 correspond to print job deletion processing by the job management service 403 shown in FIG. 4. These flowchart processes are implemented by loading a program stored in the external memory into the RAM and executing it by the CPU of the print server 101 shown in FIG. 1.

Steps SD1200 to SD1204 correspond to print job identifier registration release processing by the address management service 405 shown in FIG. 4. These flowchart processes are implemented by loading a program stored in the external memory into the RAM and executing it by the CPU of the address management server 103 shown in FIG. 1.

First, print job deletion instruction processing by the panel application 407 will be explained. In step SE1200, processing by the panel application 407 starts. As described above, step SE1200 is called in step SE1106 of FIG. 11. This step is also called when pressing of an erase button 1421 in FIG. 15C is received from the user. In step SE1201, the panel application 407 acquires the GUID of a print job to be deleted. In step SE1202, the panel application 407 transmits a print job deletion instruction command to the job management service 403. At this time, the panel application 407 also transmits the GUID acquired in step SE1201. In step SE1203, the process ends.

Next, print job deletion processing by the job management service 403 will be explained. In step SC1200, processing by the job management service 403 starts. In step SC1201, the job management service 403 receives the print job deletion instruction command transmitted from the panel application 407 in step SE1202. At this time, the job management service 403 also receives the GUID of the print job to be deleted. In step SC1202, the job management service 403 transmits, to the address management service 405, a print job identifier registration release command. At this time, the job management service 403 also transmits the GUID received in step SC1201.

In step SC1203, the job management service 403 searches the job management DB 404 in FIG. 4 for a record which matches the GUID received in step SC1201. In step SC1204, the job management service 403 acquires an EMFSPOOL file

name from the detected record. In step SC**1205**, the job management service **403** deletes an EMFSPOOL file based on the acquired file name. In step SC**1206**, the job management service **403** deletes, from the job management DB **404** in FIG. **4**, the record detected in step SC**1203**. In step SC**1207**, the process ends.

Print job identifier registration release processing by the address management service **405** will be explained. In step SD**1200**, processing by the address management service **405** starts. In step SD**1201**, the address management service **405** receives the print job identifier registration release command and the GUID serving as a target print job identifier that have been transmitted from the job management service **403** in step SC**1202**. In step SD**1202**, the address management service **405** searches the address management DB **406** in FIG. **4** for a record which matches the GUID received in step SD**1201**. In step SD**1203**, the address management service **405** deletes the record detected in step SD**1202** from the job management DB **404** in FIG. **4**. In step SD**1204**, the process ends.

[Sixth Control Processing]

In step SE**902** of FIG. **9**B, the print setting change window (FIG. **16**A) is displayed on the display unit of the operation unit **308**. Control processing when an error occurs in a print setting made by the user in printing will be described below.

The print setting made by the user is a print setting made by him using a UI provided by the virtual printer driver **401** when the virtual printer driver **401** shown in FIG. **4** receives a print instruction from the user. The user designates printing via the client PC **100**, goes to the multi-function peripheral **102** which actually outputs data, and operates a panel attached to the multi-function peripheral **102**. Then, the user designates print data and outputs it. At this time, if the user designates, as a print setting, a function not supported by the device (multi-function peripheral **102**) which actually outputs data, the print setting becomes contradictory.

For example, when paper types supported by the output device are "plain paper" and "colored paper" and the user designates "recycled paper" as a print setting, printing cannot be done with this paper type and the print setting becomes contradictory. The generated contradiction is called an error. Control processing to solve this error will be explained below.

First, upon receiving a print instruction from the panel application **407** of the multi-function peripheral **102**, the job management service **403** of the print server **101** extracts print settings from designated metadata and a print job. The job management service **403** transfers the print settings to the printer driver **408** corresponding to the output device. The printer driver **408** receives the print settings, and if a contradictory print item exists in the received print settings, creates print error data containing the item and a printable setting value list for the item. The printer driver **408** sends back the created print error data to the calling job management service **403**.

Note that the printer driver may not be synchronized with the device option of the device which actually outputs data. Hence, the printer driver can communicate with the device, acquire the latest device option information, and then create print error data. When the printer driver **408** does not support this processing, the job management service **403** can create print error data using a general-purpose I/F such as Windows API.

FIG. **17** exemplifies detailed print error data. However, FIG. **17** does not limit the print error data description method. It suffices to describe a print item having an error, a setting value, and a selection list for avoiding the error.

The job management service **403** receives print error data as shown in FIG. **17** from the printer driver **408**, and then transmits it to the panel application **407**. The panel application **407** adds the received print error data when creating the print setting change window (FIG. **16**A), and controls to display it on the operation unit **308** of the multi-function peripheral **102**.

FIG. **18** exemplifies a print error data-added print setting change window displayed on the operation unit **308**. A message **1801** in FIG. **18** is an error message which notifies the user that a print item having an error exists in print settings made in advance by the user. A setting **1802** in FIG. **18** displays a print item ("paper type") actually having an error, a unprintable setting value ("recycled paper"), and a setting value list ("plain paper") capable of avoiding the error. The "plain paper" column presented at the setting **1802** allows the user to select a setting value. In the print error data example shown in FIG. **17**, the user can select one of three values "plain paper", "colored paper", and "undesignated". The setting value "undesignated" indicates invalidating the setting value (recycled paper) of the print setting.

A method of displaying building elements **1431** to **1437** of the print setting change window shown in FIG. **18**, and control processing have been described in [Third Control Processing], and a description thereof will not be repeated. Note that the window arrangement of FIG. **18** is merely an example, and does not limit the layout, display form, and the like.

According to the present invention, when the user issues a print request from the printing apparatus for print data temporarily stored in the server, he can designate a change of print setting information. A program which runs on the printing apparatus and designates a change of print setting information requests not a client PC but a printer driver suited to the printing apparatus in the server to change print setting information. Print setting information can be changed appropriately.

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 (for example, computer-readable medium).

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 such modifications and equivalent structures and functions.

This application claims the benefit of Japanese Patent Application No. 2010-222434, filed Sep. 30, 2010, and No. 2011-136712, filed Jun. 20, 2011, which are hereby incorporated by reference herein in their entirety.

What is claimed is:

1. A printing system comprising an information processing apparatus including a virtual printer driver which generates a print job of an intermediate format, a print server which manages the print job, and a printing apparatus,

said print server including:

a storage unit configured to store the print job of the intermediate format received from said information processing apparatus;

a setting change receiving unit configured to receive, from said printing apparatus, a print setting information change instruction for the print job of the intermediate format stored in said storage unit;

an update unit configured to update print setting information of the print job in accordance with the print setting information change instruction;

a print request receiving unit configured to receive a print request from said printing apparatus; and

a job transmission unit configured to generate a print job of a format printable by said printing apparatus based on the print job of the intermediate format and the print setting information updated by said update unit in accordance with the print request, and to transmit the generated print job to said printing apparatus,

said printing apparatus including:

a selection unit configured to select a print job;

a setting changing unit configured to change the print setting information for the print job selected by said selection unit;

an inquiry unit configured to inquire, to the print server, whether the print setting information changed by said setting changing unit is applicable to the print job selected by said selection unit;

a display control unit configured to display a warning window, in a case where a response to an inquiry by said inquiry unit indicates that the print setting information changed by said setting changing unit is not applicable to the print job selected by said selection unit;

a print request transmission unit configured to transmit the print request to said print server for the print job, in a case where a response to an inquiry by said inquiry unit indicates that the print setting information changed by said setting changing unit is applicable to the print job selected by said selection unit; and

a printing unit configured to print the print job transmitted by said job transmission unit.

2. The system according to claim **1**, wherein said update unit of said print server changes a setting using a user token received from said information processing apparatus.

3. The system according to claim **1**, wherein the print setting information change instruction includes a change of at least one of a copy count, imposition, color mode, and pages per sheet.

4. The system according to claim **1**, wherein when the print job is to be converted into a format outputtable by a predetermined printing apparatus in accordance with the print request and a printer driver which corresponds to the predetermined printing apparatus and can convert the print job into the outputtable format is not installed, said job transmission unit of said print server newly installs the printer driver corresponding to the predetermined printing apparatus.

5. A printing method in a printing system including an information processing apparatus including a virtual printer driver which generates a print job of an intermediate format, a print server which manages the print job, and a printing apparatus, comprising in the print server:

a storage step of storing, in a storage unit, the print job of the intermediate format received from the information processing apparatus;

a setting change receiving step of receiving, from the printing apparatus, a print setting information change instruction for the print job of the intermediate format stored in the storage unit;

an update step of updating print setting information of the print job in accordance with the print setting information change instruction;

a print request receiving step of receiving a print request from the printing apparatus; and

a job transmission step of generating a print job of a format printable by the printing apparatus based on the print job of the intermediate format and the print setting information updated in the update step in accordance with the print request, and transmitting the generated print job to the printing apparatus, and comprising in the printing apparatus:

a selection step of selecting a print job;

a setting changing step of changing the print setting information for the print job selected in the selection step;

an inquiry step of inquiring, to the print server, whether the print setting information changed in the setting changing step is applicable to the print job selected in the selection step;

a display control step of displaying a warning window, in a case where a response to an inquiry in the inquiry step indicates that the print setting information changed in the setting changing step is not applicable to the print job selected in the selection step;

a print request transmission step of transmitting the print request to the print server for the print job, in a case where a response to an inquiry in the inquiry step indicates that the print setting information changed in the setting changing step is applicable to the print job selected in the selection step; and

a printing step of printing the print job transmitted in the job transmission step.

6. A printing apparatus which is communicable with a print server which manages a print job, the printing apparatus comprising:

a display unit configured to display a selection window for a print job managed by the print server;

a selection unit configured to select a print job in accordance with an instruction input via the selection window;

a setting changing unit configured to change print setting information for the print job selected by the selection unit;

an inquiry unit configured to inquire, to the print server, whether the print setting information changed by the setting changing unit is applicable to the print job selected by the selection unit;

a display control unit configured to display a warning window, in a case where a response to an inquiry by the inquiry unit indicates that the print setting information changed by the setting changing unit is not applicable to the print job selected by the selection unit;

a print request transmission unit configured to transmit a print request to the print server for the print job, in a case where a response to an inquiry by the inquiry unit indicates that the print setting information changed by the setting changing unit is applicable to the print job selected by the selection unit; and

a printing unit configured to print the print job transmitted in accordance with the print request.

7. The apparatus according to claim **6**, wherein the setting changing unit changes two-sided printing to one-sided printing or the one-sided printing to the two-sided printing.

8. The apparatus according to claim **6**, wherein the warning window is displayed in a case where a paper size of the selected print job is a post card and one-sided printing is changed to two-sided printing.

9. The apparatus according to claim 6, wherein the print setting information of the print job managed by the print server is displayed on the selection window.

10. A method of controlling a printing apparatus which is communicable with a print server which manages a print job, comprising:

displaying a selection window for a print job managed by the print server;

selecting a print job in accordance with an instruction input via the selection window;

changing print setting information for the selected print job;

inquiring, to the print server, whether the changed print setting information is applicable to the selected print job;

in a case where a response to the inquiring indicates that the changed print setting information is not applicable to the selected print job, displaying a warning window;

in a case where a response to the inquiring indicates that the changed printing setting information is applicable to the selected print job, transmitting a print request to the print server for the print job; and

printing the print job transmitted in accordance with the print request.

11. The method according to claim 10, wherein, for the print setting information for the selected print job, two-sided printing is changed to one-sided printing, or the one-sided printing is changed to the two-sided printing.

12. The method according to claim 10, wherein the warning window is displayed in a case where a paper size of the selected print job is a post card and one-sided printing is changed to two-sided printing.

13. The method according to claim 10, wherein the print setting information of the print job managed by the print server is displayed on the selection window.

14. A non-transitory computer-readable medium storing a program comprising computer-executable instructions, which when executed implement a method of controlling a printing apparatus which is communicable with a print server which manages a print job, the method comprising:

displaying a selection window for a print job managed by the print server;

selecting a print job in accordance with an instruction input via the selection window;

changing print setting information for the selected print job;

inquiring, to the print server, whether the changed print setting information is applicable to the selected print job;

in a case where a response to the inquiring indicates that the changed print setting information is not applicable to the selected print job, displaying a warning window;

in a case where a response to the inquiring indicates that the changed print setting information is applicable to the selected print job, transmitting a print request to the print server for the print job; and

printing the print job transmitted in accordance with the print request.

15. The medium according to claim 14, for the print setting information for the selected print job, two-sided printing is changed to one-sided printing, or the one-sided printing is changed to the two-sided printing.

16. The medium according to claim 14, wherein the warning window is displayed in a case where a paper size of the selected print job is a post card and one-sided printing is changed to two-sided printing.

17. The medium according to claim 14, wherein the print setting information of the print job managed by the print server is displayed on the selection window.

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