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Inventor(s)	Hanai; Hiroaki

Information processing apparatus, method for controlling information processing apparatus, and nonvolatile storage medium

Abstract

An application to be stored in a nonvolatile storage medium according to an embodiment of the present invention is a print setting application to be installed in an information processing apparatus, the application when executed on the information processing apparatus causes the information processing apparatus to: acquire a printing method of a printer; acquire, in a case where the acquired printing method is a first method, printer information regarding a predetermined item; and display an object based on the acquired printer information on a display, wherein, in a case where the acquired printing method is a second method, the information processing apparatus does not acquire the printer information regarding the predetermined item.

Inventors:	Hanai; Hiroaki (Chiba, JP)
Applicant:	CANON KABUSHIKI KAISHA (Tokyo, JP)
Family ID:	1000008765567
Assignee:	Canon Kabushiki Kaisha (Tokyo, JP)
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Primary Examiner: Vo; Quang N

Attorney, Agent or Firm: Canon U.S.A., Inc. IP Division

Background/Summary

CROSS-REFERENCE TO RELATED APPLICATIONS (1) This application is a Continuation of U.S. patent application Ser. No. 18/463,972, filed on Sep. 8, 2023, which claims the benefit of Japanese Patent Application No. 2022-143536, filed on Sep. 9, 2022, both of which are hereby incorporated by reference herein in their entirety.

BACKGROUND OF THE INVENTION

Field of the Invention

(1) The present invention relates to an information processing apparatus, a method for controlling the information processing apparatus, and a nonvolatile storage medium in which an application to be installed in the information processing apparatus is stored.

Description of the Related Art

(2) Recent general-purpose printer drivers (local printer drivers) communicate with printers using an industry-standard protocol, such as an Internet printing protocol (IPP). General-purpose printer drivers (cloud printer drivers) that communicate with a cloud print service have also been proposed.

(3) General-purpose printer drivers are capable of communicating with printers of a plurality of printer vendors, and users can execute printing by transmitting print data to printers or a cloud print service without installing vendor-specific printer drivers.

(4) The general-purpose printer drivers (local printer drivers and cloud printer drivers) deal with the print jobs of printers of various vendors and therefore have limitations in available print setting items and functions. To cope with this issue, Japanese Patent Laid-Open No. 2021-124791 proposes associating a general-purpose printer driver with a print setting extension app to display a print setting screen for setting items that cannot be set only with the general-purpose printer driver. The print setting extension app acquires printer information from a server or a printer and displays a print setting screen based on the acquired information.

(5) The general-purpose printer driver can support both ink-jet printers and electrophotographic printers. The print setting extension app may also support various types of printers including ink-jet printers and electrophotographic printers.

(6) The print setting screen that the print setting extension app displays changes between a case where the general-purpose printer driver is associated with an ink-jet printer and a case where it is associated with an electrophotographic printer. For example, in the case where the general-purpose printer driver is associated with an electrophotographic printer, the print setting extension app displays objects for finishing settings, such as stapling and punching, on the print setting screen in accordance with the hardware configuration of the printer. In contrast, in the case where the general-purpose printer driver is associated with an ink-jet printer, the display of the above items is not needed.

(7) Thus, the printer information displayed by the print setting extension app changes according to the type of the printer associated with the general-purpose printer driver.

SUMMARY OF THE INVENTION

(8) An application according to an aspect of the present invention is a print setting application to be installed in an information processing apparatus, the application when executed on the information processing apparatus causes the information processing apparatus to: acquire a printing method of a printer; acquire, in a case where the acquired printing method is a first method, printer information regarding a predetermined item; and display an object based on the acquired printer information on a display, wherein, in a case where the acquired printing method is a second method, the information processing apparatus does not acquire the printer information regarding the predetermined item.

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

Description

BRIEF DESCRIPTION OF THE DRAWINGS

(1) FIG. 1 is a diagram of a printing system in cloud printing in an embodiment.

(2) FIGS. 2A to 2F are block diagrams illustrating the hardware configuration of an information processing apparatus and an image forming apparatus in an embodiment.

(3) FIGS. 3A and 3B are sequence charts showing a process for installing a print setting extension app in an embodiment.

(4) FIG. 4 is a diagram illustrating an example of a screen displayed on a client terminal in an embodiment.

(5) FIG. 5A is a diagram illustrating an example of capability information stored in an ink-jet printer in an embodiment.

(6) FIG. 5B is a diagram illustrating an example of capability information stored in an electrophotographic printer in an embodiment.

(7) FIGS. 6A-1 and 6A-2 are diagrams illustrating an example of device capability information in an initial state included in an OS in an embodiment.

(8) FIGS. 6B-1 to 6B-4 are diagrams illustrating an example of device capability information

extended using information acquired from a cloud print service in an embodiment.

(9) FIG. 7 is a diagram illustrating an example of an extension setup information file acquired from an online support service in an embodiment.

(10) FIGS. 8A and 8B illustrate a sequence chart of the print setting extension app showing an example of a process from print setting to transmission of print data in an embodiment.

(11) FIGS. 9A to 9D are diagrams illustrating examples of a print setting screen displayed in the case where the print setting extension app is not installed in an embodiment.

(12) FIGS. 10A to 10D are examples of an extended-printing setting screen displayed in the case where the print setting extension app is installed and a print queue corresponding to an electrophotographic printer is selected in an embodiment.

(13) FIG. 11 is a diagram illustrating an example of a print setting screen displayed by a document generation app in an embodiment.

(14) FIGS. 12A to 12D are diagrams illustrating examples of a status screen displayed by the print setting extension app in an embodiment.

(15) FIGS. 13A and 13B are diagrams illustrating examples of paper types displayed by the print setting extension app in an embodiment.

(16) FIG. 14 is a flowchart of a process for the print setting extension app to display a print setting screen according to the printer type in a first embodiment.

(17) FIGS. 15A and 15B illustrate a flowchart of a process for the print setting extension app to display a print setting screen according to a method of connection with the printer in a second embodiment.

(18) FIGS. 16A to 16C are diagrams illustrating examples of a print setting screen displayed in the case where the print setting extension app is installed and a print queue corresponding to an ink-jet printer is selected in an embodiment.

(19) FIGS. 17A and 17B illustrate a sequence chart of an example of a printer registering process not via a cloud print service in the second embodiment.

(20) FIGS. 18A and 18B are examples of a table stored in the print setting extension app in an embodiment.

(21) FIG. 19 is a flowchart of a process for the print setting extension app to display a status screen in the first embodiment.

(22) FIGS. 20A and 20B illustrate a flowchart of a process for the print setting extension app to display a status screen in the second embodiment.

DESCRIPTION OF THE EMBODIMENTS

(23) Embodiments of the present invention will be described hereinbelow with reference to the drawings. Each of the embodiments of the present invention described below can be implemented solely or as a combination of a plurality of the embodiments or features thereof where necessary or where the combination of elements or features from individual embodiments in a single embodiment is beneficial.

First Embodiment

(24) FIG. 1 is a configuration diagram of a printing system in cloud printing according to an embodiment. A client terminal **101**, a cloud print server **102**, an application management server **103**, a printer **104** (an ink-jet printer **104a** and an electrophotographic printer **104b**), and an online support server **105** are connected together via a network **107**. In this embodiment, the ink-jet printer **104a**, the electrophotographic printer **104b**, if not distinguished, are referred to as “printer **104**”.

(25) FIG. 1 illustrates one client terminal **101** and one printer **104**. Alternatively, multiple client terminals **101** and printers **104** may be provided.

(26) The server system of the cloud print server **102**, the application management server **103**, and the online support server **105** may be each constituted by a plurality of information processing apparatuses. The server system constituted by a plurality of information processing apparatuses

allows a load to be distributed to the plurality of information processing apparatuses.

(27) Alternatively, the cloud print server **102**, the application management server **103**, and the online support server **105** may virtually be physically formed in one information processing apparatus.

(28) The client terminal **101** is an information processing apparatus, such as a computer, a tablet terminal, or a smartphone. The client terminal **101** has a local printer driver **320** and a cloud printer driver **311** installed in advance. The local printer driver **320** is a general-purpose printer driver capable of generating print data to be printed by the printer **104** and generating print data that can be printed by a plurality of types of printers of a plurality of vendors. The cloud printer driver **311** is a printer driver capable of generating print data to be transmitted to the printer **104** via a cloud print service **321**. The cloud printer driver **311** is also a general-purpose printer driver capable of generating print data that can be printed by a plurality of types of a plurality of vendors. A print setting extension app **312** is a print setting application (program) for extending the print settings of the local printer driver **320** and the cloud printer driver **311**. The print setting extension app **312** is downloaded and installed in the client terminal **101** using a method described below.

(29) The network **107** is assumed to be a wide area network (WAN), such as the Internet, for connection to the cloud service but may be in a closed environment, such as a company local area network (LAN).

(30) The client terminal **101** is an information processing apparatus, such as a personal computer (PC), a tablet, or a smartphone, which is directly operated by a user. Any application software can be executed on the client terminal **101**.

(31) The printer **104** is a device that actually prints on a printing medium, such as paper, which is an image forming apparatus that converts print data received via the network **107** to image data and prints it.

(32) The printer **104** is capable of both receiving print data from the client terminal **101** via the cloud print server **102** or directly receiving print data from the client terminal **101** not via the cloud print server **102**.

(33) The printer **104** receives print data generated by the cloud printer driver **311** of the client terminal **101** via the cloud print server **102**. The printer **104** also receives print data generated by the local printer driver **320** of the client terminal **101** not via the cloud print server **102**.

(34) The cloud print server **102** receives a print instruction and print data from the outside. The cloud print server **102** transmits the received print data to the printer **104** designated by the print instruction.

(35) The application management server **103** holds and manages various applications.

(36) The application management server **103** receives an application identification information and a download request from the client terminal **101** and transmits an application specified on the basis of the received identification information to the client terminal **101**.

(37) The online support server **105** is a server apparatus that provides an online support service **351**. The online support service **351** is a server apparatus for providing an extension setup information file in which information for extending the functions of the client terminal **101** is described to the client terminal **101**.

(38) Next, referring to FIGS. 2A to 2F, the hardware configuration of the system of this embodiment will be described.

(39) FIG. 2A is a block diagram illustrating the hardware configuration of the client terminal **101**.

(40) The client terminal **101** includes a display **216**, an operating unit **217**, a storage **214**, a control unit **211**, and a network communication unit **215**.

(41) The storage **214** is a nonvolatile storage apparatus, such as a hard disk or a solid-state drive (SSD), which is capable of storing and rewriting digital data.

(42) The control unit **211** includes a central processing unit (CPU) **212** and a memory **213** and controls the overall operation of the client terminal **101**. The CPU **212** applies programs stored in

the storage **214** to the memory **213** for execution. The memory **213** is the main memory of the CPU **212** and is used as a work area and a temporary storage area for applying various programs.

(43) The network communication unit **215** is an apparatus for communicating with the external network **107** and inputs and outputs digital data to and from the external servers and client terminals via the network **107**.

(44) The display **216** is an apparatus, such as a liquid crystal display (LED), for displaying visual information to the user. The operating unit **217** is an apparatus for accepting input from the user with a keyboard or a mouse. Another example is an apparatus, such as a touch panel, having both of the functions of the display **216** and the operating unit **217**.

(45) FIG. 2B is a block diagram illustrating the hardware configuration of the cloud print server **102**. The cloud print server **102** includes a storage **224**, a control unit **221**, and a network communication unit **225**.

(46) Since the storage **224**, the control unit **221**, and the network communication unit **225** are the same as those of the client terminal **101**, descriptions thereof will be omitted.

(47) The cloud print server **102** is constituted by one information processing apparatus with the hardware configuration shown in FIG. 2B but, alternatively, may be constituted by a plurality of information processing apparatuses shown in FIG. 2B.

(48) FIG. 2C is a block diagram illustrating the hardware configuration of the application management server **103**. The application management server **103** includes a display **236**, an operating unit **237**, a storage **234**, a control unit **231**, and a network communication unit **235**.

(49) Since the display **236**, the operating unit **237**, the storage **234**, the control unit **231**, and the network communication unit **235** are the same as those of the client terminal **101**, descriptions thereof will be omitted.

(50) The application management server **103** is constituted by one information processing apparatus with the hardware configuration shown in FIG. 2C but, alternatively, may be constituted of a plurality of information processing apparatuses.

(51) FIG. 2D is a block diagram illustrating the hardware configuration of the ink-jet printer **104a**. The ink-jet printer **104a** includes a display **246**, an operating unit **247**, a control unit **241**, a network communication unit **245**, and a printing unit **248**.

(52) The display **246** is an apparatus for displaying information to the user, such as a touch panel or an LED, provided at the ink-jet printer **104a**.

(53) The operating unit **247** is an apparatus for accepting input from the user and may include a hardkey, such as a numerical keypad, in addition to a touch panel. Since the control unit **241** is the same as that of the client terminal **101**, a description thereof will be omitted.

(54) The network communication unit **245** is an apparatus for communicating with the external network **107** and has the function of mainly receiving print data and transmitting information on the ink-jet printer **104a**, such as an error, to the external server and the like.

(55) The printing unit **248** is an apparatus that performs a printing process by executing a sequence of actions, feeding, printing, and ejection of paper in a cassette or tray. Examples of the printing method include, but are not limited to, an electrophotographic method and an ink-jet method. The printing unit **248** includes a double-sided unit and finishing apparatuses for stapling and punching, for example.

(56) FIG. 2E is a block diagram illustrating the hardware configuration of the electrophotographic printer **104b**. The electrophotographic printer **104b** includes a display **256**, an operating unit **257**, a storage **254**, a control unit **251**, a network communication unit **255**, and a printing unit **258**. Since the display **256**, the operating unit **257**, the control unit **251**, the network communication unit **255**, and the printing unit **258** are the same as those of the ink-jet printer **104a**, descriptions thereof will be omitted. The storage **254** is also the same as that of the client terminal **101**, and a description thereof will be omitted.

(57) FIG. 2F is a hardware block diagram illustrating the details of the online support server **105**. In

this embodiment, the online support server **105** is constituted of one information processing apparatus but, alternatively, may be constituted by a plurality of information processing apparatuses. The online support server includes a display **266**, an operating unit **267**, a storage **264**, a control unit **261**, and a network communication unit **265**. Since the display **266** and the operating unit **267** are the same as the display **216** and the operating unit **217** of the client terminal **101**, descriptions thereof will be omitted. The storage **264** is a memory device, such as a hard disk drive (HDD) or an SSD. The storage **264** stores an extension setup information file in which information for extending the functions provided by the client terminal **101** is described.

(58) The control unit **261** includes a CPU **262** and a memory **263**. The CPU **262** controls the entire online support server **105**. The memory **263** is used for a process executed by the CPU **262**. The network communication unit **265** is an interface for the online support server **105** to communicate with the client terminal **101**. The online support server **105** receives a request to acquire a file stored in the storage **264** via the network communication unit **265** and transmits a corresponding file to the client terminal **101**.

(59) Next, referring to FIGS. **3A** and **3B**, an example of the user's procedure and the sequence between each software and the print service in this embodiment will be described.

(60) First, the printer **104** accepts a printer registering operation for registering the printer **104** with the cloud print service **321** from the user. Next, the printer **104** transmits device identification information on the printer **104** and a printer registration request to the cloud print service **321** (**S3001**). An example of the device identification information transmitted to the cloud print service **321** is a hardware ID (HWID) assigned to each printer model. The device identification information may be any information that identifies the printer model. One example is a compatible ID (COID) indicating the type of the printer.

(61) In response to receiving the registration request, the cloud print service **321** transmits the uniform resource location (URL) of the cloud print service **321** for printer registration to the printer **104**. When the user accesses the URL from the printer **104** or the information processing apparatus, the display of the terminal that has accessed the URL displays a screen containing an entry form for a user ID and a password.

(62) The user enters a user ID and a password for using the cloud print service **321** to log in the cloud print service **321**. When the login of the user has succeeded, the cloud print service **321** transmits a request to acquire information necessary for printer registration to the printer **104**. In response to the request, the printer **104** transmits printer information to the cloud print service **321**.

(63) In response to the printer registration request, the cloud print service **321** registers the information on the printer **104** and generates a print queue for the printer **104**. At that time, the cloud print service **321** acquires capability information on the printer **104** and associates the information with the generated print queue. The capability information is information indicating the functions of the printer and necessary for the user to set as print settings in printing, such as double-sided capability information, color capability information, and staple capability information. The capability information includes information indicating whether the printer **104** is an ink-jet printer or an electrophotographic printer.

(64) In this embodiment, the cloud print service **321** acquires the capability information from the ink-jet printer **104a** using an IPP as a communication protocol for transmission. FIG. **5A** is a diagram illustrating an example of the capability information acquired from the ink-jet printer **104a**. FIG. **5B** is a diagram illustrating an example of the capability information acquired from the electrophotographic printer **104b**.

(65) The cloud print service **321** acquires the item names, attributes, and default values of the setting items that the printer **104** supports using the IPP. In FIGS. **5A** and **5B**, descriptions of the default values are omitted, and the head attribute values of the individual items are taken as the default values. The item names correspond to the setting items of print settings, and the attribute values correspond the set values, options, and the ranges of the values of the individual setting

items. The item names and the attribute values stored in the printer **104** include information defined as industry-standard specifications according to the IPP and information specifically defined by the printer vendor. For example, of the item names described in FIG. 5B, “Abbreviate job name”, “Perfect binding”, and attribute values accompanying them are item names and attribute values that are specifically defined by the printer vendor. Printer-vendor-specific attribute values may be defined as attribute values corresponding to item names defined as industry-standard specifications. The capability information is independent of whether the items and attribute values are defined according to the IPP.

(66) A comparison between FIG. 5A and FIG. 5B shows that the ink-jet printer **104a** and the electrophotographic printer **104b** store different items of capability information. For example, FIGS. 5A and 5B show the item “Print quality”. This is a setting item regarding the image quality in printing. The ink-jet printer **104a** has “Fine” as a “print quality” option. However, the electrophotographic printer **104b** does not have the above option. In contrast, the electrophotographic printer **104b** has setting items regarding post-processing, such as stapling, punching, and folding. The capability information differs according to the model and the hardware configuration of the printer.

(67) Next, installation of the print setting extension app **312** performed when the user performs a setup operation for printing with the printer **104** on the client terminal **101** will be described.

(68) An operating system (OS) **313** of the client terminal **101** accepts a printer adding operation, which is a printer **104** setup operation by the user (S3002). Examples of the printer **104** setup operation are as follows. FIG. 4 is a diagram illustrating a screen related to a printer that the OS **313** of the client terminal **101** displays and that is registered with the client terminal **101**. When the user selects an object **401**, a printer add instruction is input to the OS **313**.

(69) In response to accepting the printer add instruction, the OS **313** accesses the cloud print service **321** to determine whether the OS **313** holds a token for acquiring information. If the OS **313** does not have the token, then the OS **313** displays a screen for inputting user information (login name and a password). The OS **313** transmits user information input via the screen to the cloud print service **321** to request user authentication and an access token (S3003).

(70) The cloud print service **321** performs an authentication process using the user information received from the client terminal **101** (S3004). After the authentication process is completed, the cloud print service **321** notifies the client terminal **101** of the result of the authentication process.

(71) If the user authentication has succeeded, the OS **313** of the client terminal **101** receives an access token from the cloud print service **321** (S3005).

(72) If the user authentication has failed at S3004, the cloud print service **321** notifies the OS **313** of the authentication error (S3006). The OS **313** stops the process in accordance with the authentication error information received (S3007). The OS **313**, which has failed in acquiring an access token, terminates the process shown in FIGS. 3A and 3B.

(73) If the OS **313** already has the access token or acquired the token at S3005, the OS **313** goes forward to S3008. The OS **313** searches for a printer registered with the cloud print service **321** and a printer connected to the network **107**.

(74) The OS **313** transmits a request to acquire printer information registered with the cloud print service **321** to search for a printer (S3008). At that time, the OS **313** transmits a printer information acquisition request accompanied by the access token to the cloud print service **321**.

(75) The cloud print service **321** is authorized for use by the user identified by the access token attached to the acquisition request and transmits the printer name and the HWID of a printer associated with the tenant ID for use in the client terminal **101** (S3009).

(76) The OS **313** displays a printer list in an area **402** of FIG. 4 in accordance with the printer information acquired from the cloud print service **321** and printer information detected in a search via the network **107**. The OS **313** may display only the printer information registered with the cloud print service **321**. Reference sign **403** denotes a printer detected in the search of the cloud

print service **321**. Reference sign **404** denotes a printer connected to the same network as the client terminal **101**. Displaying the printers with different object signs, like **403** and **404**, allows determination of whether each printer is a printer on the same network or a printer registered with the cloud print service **321**.

(77) When the user selects printer information from the list in the area **402**, the OS **313** inquires of the cloud print service **321** about capability information on a printer corresponding to the selected printer information (**S3010**). About which setting item the OS **313** inquires for capability information is defined by the specifications of the OS **313**. The inquiry about the capability information from the OS **313** is designated from the setting items defined as standard specifications according to the IPP of the OS **313**.

(78) The cloud print service **321** sends capability information on the printer **104** to the OS **313** (**S3011**) in response. The capability information sent from the printer **104** may be not only the capability information registered with the cloud print service **321** at **S3001** but also capability information registered with the cloud print service **321** at another timing. For example, the capability information may be sent at the timing when the capability information on the printer **104** is changed or the timing when the OS **313** detects the activation of an advanced print setting screen.

(79) At **S3011**, the cloud print service **321** gives, for a setting item designated by the client terminal **101**, an attribute value and a default value corresponding to the setting item. Here, all the attribute values registered with the cloud print service **321** are given. If the cloud print service **321** does not store a reply to the attribute about which the OS **313** inquired, the cloud print service **321** sends no response to the OS **313**.

(80) Next, the OS **313** starts to install the cloud printer driver **311** on the basis of the device identification information and the printer name of the printer selected by the user.

(81) Then, the OS **313** generates the print queue of the cloud printer driver **311** with basic device capability information included in the OS **313** (**S3012**). The device capability information refers to definition information required to generate print setting capability information of the printer driver, for example, `PrintDeviceCapabilites`, described in extensible markup language (XML). FIGS. **6A-1** and **6A-2** are diagrams illustrating an example of the device capability information in an initial state included in the OS **313**. For example, part **601** is device capability information about paper size. For “PageMediaSize” in which a setting item “Feature” indicates paper size, “Option” includes only two paper sizes, “A4” and “LETTER”, as the initial values of the device capability information. This information is stored in association with the print queue and is managed by the OS **313**. The initial-state device capability information is fixed regardless of information on the connected printer.

(82) Thereafter, the OS **313** updates the device capability information of the cloud printer driver **311** using capability information acquired from the cloud print service **321**. FIGS. **6B-1**, **6B-2**, **6B-3**, and **6B-4** are diagrams illustrating an example of device capability information updated using the capability information acquired from the cloud print service **321**. For example, part **602** is the updated device capability information about paper size. For “PageMediaSize” indicating paper size, “A5”, “HagakiPostcard”, and so on, which are “Option” other than “A4” and “LETTER”, are added as paper sizes that the printer **104** can print. Thus, the client terminal **101** first registers the device capability information included in the OS **313** with the print queue in association with the cloud printer driver **311**. At that time, the OS **313** extends the setting values by updating the device capability information using, of the capability information acquired from the cloud print service **321**, only attribute values defined by industry-standard specifications. Even if a vendor specific attribute value is acquired in acquiring the capability information, the vendor-specific attribute value is not added to the device capability information. Thus, installation of the cloud printer driver **311** is completed.

(83) Next, the OS **313** starts to install an application (program) for extending the cloud printer driver **311** in association with the printer.

(84) First, the OS **313** performs additional-identification-information adding process on the device identification information. This process is required to acquire an extension setup information file **700** for the online support server **105** and may be a character string different from normal device identification information. In this embodiment, additional identification information (“PrinterApp_”) indicating that the OS **313** is an application corresponding to the printer is added to the device identification information to distinguish the application from an application of the other device. “PrinterApp_” is illustrative only and may be another character string, numeral, or sign. As a result, if the device identification information on the printer **104** is device001, the device identification information after the additional identification information is added becomes PrinterApp_device001.

(85) The OS **313** transmits a request to search for the extension setup information file **700** containing the target device identification information with additional information to the online support service **351** (**S3013**). At that time, “PrinterApp_devoce001” with the additional identification information is reported to the online support service **351**.

(86) FIG. 7 illustrates an example of the extension setup information file **700**, which is stored in the searched online support service **351**.

(87) The extension setup information file **700** describes an application identifier for identifying a print setting extension app for use in setting print data to be sent to the printer **104**. Of the extension setup information file **700** in FIG. 7, the item “PackageFamilyName” **701** is identification information on the print setting extension application, which, in FIG. 7, corresponds to PrinterApp_aaaaaaaaaa8a!App. Meanwhile, “PrinterHardwareID” **702** describes a character string in which additional identification information is added to the identification information on the printer **104**. In FIG. 7 PrinterApp_device001 is described.

(88) The online support service **351** also stores extension setup information in which printer driver identification information is described. In the extension setup information file in which the identifier of the printer driver, the identifier of the printer driver, “PackageFamilyName” is described. “PrinterHardwareId” in the extension setup information file describes device identification information containing no additional identification information. For this reason, the OS **313** adds additional identification information to the device identification information to acquire a necessary extension setup information file from the online support service **351**.

(89) In this embodiment, the extension setup information file **700** is prepared for each HWID of the printer. The extension setup information file corresponding to the printer **104a** and the extension setup information file corresponding to the electrophotographic printer **104b** contain identification information on the same print setting extension application. This allows one print setting extension application to be associated with both the ink-jet printer **104a** and the printer **104b**. A plurality of HWIDs may be described in one extension setup information file. For example, the HWIDs of the ink-jet printer **104a** and the electrophotographic printer **104b** are described in one extension setup information file. This method also allows one print setting extension application to be associated with both the ink-jet printer **104a** and the electrophotographic printer **104b**.

(90) If the online support service **351** has the extension setup information file **700** containing target device identification information, the online support service **351** sends the extension setup information file **700** to the OS **313** (**S3014**). The contents of the sent extension setup information file are written to the registry of the OS **313**.

(91) Next, the OS **313** installs the extension setup information written in the extension setup information file acquired from the online support service **351** in association with the print queue generated at **S3012** (**S3015**).

(92) Next, the OS **313** extracts the application ID described in “PackageFamilyName” from the installed extension setup information (**S3016**).

(93) If the online support service **351** cannot detect the extension setup information file **700** containing the target device identification information, the OS **313** stops the installation of the

cloud printer driver (S3017). The OS 313 terminates the application installing process. If the OS 313 cannot receive the extension setup file or receives an error notification from the online support service 351 in a predetermined time after the search request, the OS 313 executes the process of S3017.

(94) The following is a process after the search for the extension setup information file has succeeded.

(95) The OS 313 sends a request to search for an application that matches the extracted application ID to an application management service 331 (S3018).

(96) In response to receiving the search request, the application management service 331, if having a print setting extension app that matches the application ID, sends the print setting extension app 312 to the client terminal 101 (S3019).

(97) The OS 313 installs the acquired print setting extension app 312 in association with the print queue generated by the client terminal 101 (S3020). At that time, the OS 313 stores the application ID in the registry as print queue information. The print setting extension app 312 is set to the OS 313 so that the OS 313 gives an event notification to the print setting extension application 312 at a timing set on the print setting screen.

(98) After the OS 313 is activated, the installed print setting extension app 312 is activated and operates as a background task.

(99) If the search result shows that the application management service 331 does not hold the requested print setting extension app that matches the application ID, the OS 313 stops the application installing process (S3021). At that time, the generated print queue is installed in association with the cloud printer driver 311, but the print setting extension app 312 is not associated with the print queue, and the process is terminated.

(100) The extension setup file, if distinguished from the printer driver installing file, may be searched for without adding a predetermined character string.

(101) Next, referring to FIGS. 8A and 8B, an example of the user's procedure and the sequence between each software and the print service in this embodiment will be described.

(102) A document generation app 315 displays a print setting screen (FIG. 11) for selecting a print queue as a print-setting initial screen. Examples of the document generation app 315 include to a document data creation application, a presentation-material creation application, and a picture/image data display application.

(103) In this embodiment, the print-setting initial screen is displayed by the document generation app 315. Alternatively, the OS 313 may display a similar screen. The print-setting initial screen displays an object 1101 for selecting a print queue, which is printer information, an object 1102 for print settings, and a print preview image 1103. The OS 313 selects the print queue selected by the user at the object 1101 (S801). The processes of S801 to S809 are executed at the timing when the display of the print-setting initial screen is started. The OS 313 executes the processes of S801 to S809, with a default printer selected. The processes of S801 to S809 are executed also when the user selects the object 1101 to change the print queue.

(104) Next, the OS 313 inquires of the cloud print service 321 about capability information on the printer 104 corresponding to the selected queue (S802). Since which setting item of the capability information is inquired about depends on the specifications of the OS 313, the capability information acquired at the timing is the same as that acquired at S3010 of FIG. 3A. The inquiry is sent to the printer 104 using a standard protocol defined by the IPP, such as Get-print-Attributes. If Get-print-Attributes is used, capability information determined by the OS 313 is inquired about in a list format.

(105) The cloud print service 321 sends capability information on the printer 104 from the list of capability information sent using Get-print-Attributes to the OS 313 (S803). Assume that the attribute, media size, is specified by Get-print-Attributes (IPP). If the cloud print service 321 holds the attribute of media size, the cloud print service 321 sends back a value (A4, B5, Letter, or the

like) associated with the attribute to the OS **313**.

(106) If the attribute specified by Get-print-Attributes is not present in the queue of the printer **104** in the cloud print service **321**, the cloud print service **321** sends back no associated value.

(107) The OS **313** updates the device capability information using the capability information acquired from the cloud print service **321**. The OS **313** adds the capability information acquired at **S803** of FIG. **8A** to the device capability information generated at **S3012** of FIG. **3A** (**S804**). If the device capability information has to be updated, executing the process of **S803** allows the device capability information managed by the client terminal **101** to be updated.

(108) Next, the OS **313** notifies the print setting extension app **312** of an event and an application programming interface (API) for use in editing the device capability information (**S805**). The event is reported from the OS **313** to the print setting extension app **312** at a timing set when the print setting extension app **312** is installed.

(109) In response to receiving the event, the print setting extension app **312** issues a request to acquire capability information to the cloud print service **321**. The capability information acquired here is capability information for writing setting items and attribute values that are specifically defined by the printer vendor to the device capability information.

(110) In response to receiving the device capability information editing event from the OS **313**, the print setting extension app **312** inquires of the cloud print service **321** about capability information on the printer **104** (**S806**). At that time, the print setting extension app **312** inquires of the cloud print service **321** about capability information including setting items specific to the printer vendor, such as “Perfect binding” and “Saddle binding”, and setting items containing attribute values. Furthermore, the print setting extension app **312** acquires information indicating whether the printer corresponding to the selected printer information is an ink-jet printer or an electrophotographic printer from the cloud print service **321**. The inquiry is made using Get-print-Attributes as at **S802** of FIG. **8A**, in which the item name of the setting item to be inquired is specified to acquire the capability information. The capability information acquired at **S806** may be not only the setting items and attribute values specifically defined by the printer vendor but also the setting items in the capability information acquired by OS **313**.

(111) In response to receiving an inquiry about specific capability information from the print setting extension app **312**, the printer **104** responds to the print setting extension app **312** via the cloud print service **321** (**S807**). In this embodiment, the capability information sent back at **S807** is the capability information on the printer **104** stored in the cloud print service **321**. Alternatively, the capability information acquired again from the printer **104** by the cloud print service **321** may be sent back at the timing when the request is given at **S806**.

(112) In response to acquiring the capability information from the printer **104**, the print setting extension app **312** edits the device capability information via a configuration information object which is a data unit required to edit the device capability information. The print setting extension app **312** edits the device capability information by converting the capability information, such as “Perfect binding” and “Saddle binding”, acquired at **S807** of FIG. **8A** to device capability information and adding it to a configuration information object (**S808**). As a result of the edition, in addition to the capability information on the standard setting items acquired in the inquiry from the OS **313**, printer-vendor-specific setting items and attribute values are stored in the device capability information. As a result of the edition, information indicating whether the printer corresponding to the selected print queue is an ink-jet printer or an electrophotographic printer is stored in the device capability information.

(113) Next, the print setting extension app **312** passes the edited device capability information to the OS **313** (**S809**). The OS **313** stores the device capability information acquired from the print setting extension app **312** in association with the print queue.

(114) When the OS **313** updates the device capability information, an object serving as a trigger for displaying the user interface (UI) of the print setting extension app **312**, like an object **1104** in FIG.

11, is enabled (**S810**). The object **1104** is in grayout until the process of **S810** is completed.

(115) When the user selects the object **1104**, the print setting extension app **312** is activated from the OS **313** to display a print setting screen as shown in FIGS. **10A** to **10D** (**S811**). The print setting screen does not depend on the kind of the document generation app **315** used.

(116) In the case where the print queue and the print setting extension app **312** are not associated with each other, a standard print setting screen installed in advance in the OS **313** is displayed, as in FIG. **9A**. When an Advanced Setting button **901** is pressed, the standard print setting screen displays an advanced print setting screen, shown in FIG. **9B**, in which setting items that cannot be displayed in FIG. **9A** are displayed. The advanced print setting screen shown in FIG. **9B** corresponds to the scroll bar, which allows the screen to scroll as in FIGS. **9C** and **9D**, allowing setting of a plurality of setting items supported by the OS **313**. An OK button **902** is used to store the set print settings to return the screen to the screen in FIG. **9A**. An Apply button **903** is used to store the print settings. A Cancel button **904** is used to return to the screen in FIG. **11** without storing the print settings. Similarly, an OK button **905** is used to store the print settings and to return to the screen in FIG. **11**.

(117) Referring back to the print setting extension app **312**, the print setting extension app **312** receives the print setting information generated from the print setting capability information that the OS **313** generates from the device capability information and displays the extended-printing setting screen in FIG. **10A**. This will be described on the assumption that the selected printer is the electrophotographic printer **104b**. FIGS. **10A** to **10D** are examples of the extended-printing setting screen displayed in the case where the printer corresponding to the selected print queue is the electrophotographic printer **104b**. FIGS. **10A** to **10D** are displayed by scrolling the screen.

(118) For example, the output paper size of a setting item **1001** in FIG. **10A** is print setting information generated from psk: PageMediaSize in FIG. **6B-2**. An option A4 of output paper size is generated by the print setting extension app **312** from the information print setting information psk: IOSA4 and displayed. Thus, the print setting extension app **312** displays the device capability information as setting values on the extended-printing setting screen. If the printer corresponding to the selected print queue is the electrophotographic printer **104b**, objects for setting Stapling **1004**, Punching **1005**, and Folding **1006** are displayed, as shown in FIG. **10B**. As shown in FIG. **10D**, objects for setting items that are not set for an ink-jet printer, for example, Store job to printer **1007** and Abbreviate job name **1009**, are also displayed.

(119) If the printer corresponding to the print queue selected at the object **1101** is the ink-jet printer **104a**, the extended-printing setting screens shown in FIGS. **16A** to **16C**.

(120) FIGS. **16A** to **16C** can be switched by a scrolling operation. Some setting items, such as paper size, paper type, copies, orientation, and print quality, are common to FIGS. **10A** to **10D**.

(121) In contrast, the extended-printing setting screen in the case where the ink-jet printer **104a** is selected does not display setting items specific to electrophotographic printers, such as stapling, punching, and folding. Thus, this embodiment allows switching of the displayed setting items and objects according to the printing method of a printer corresponding to the selected print queue.

(122) FIGS. **10A** to **10D** and FIGS. **16A** to **16C** have the following difference, in addition to the difference in setting item.

(123) FIGS. **13A** and **13B** are diagrams illustrating examples of a screen displayed when an object **1301** is selected to expand a pulldown for setting a paper type. FIG. **13A** is an example of a screen displayed when the selected printer is the electrophotographic printer **104b**. FIG. **13B** is an example of a screen displayed when the selected printer is the ink-jet printer **104a**.

(124) An area **1302** in FIG. **13A** displays attribute values of the paper type shown in FIG. **5B**. An area **1303** in FIG. **13B** displays attribute values of the paper type shown in FIG. **5A**. Since FIG. **13B** cannot display all paper types at a time, a slider bar **1304** is displayed so that the user can display paper types not displayed by operating the slider bar. Thus, the print setting extension app **312** allows for displaying different attribute values in accordance with capability information

acquired from the printer.

(125) The print setting extension app **312** provides a function for the user to freely change print settings and, if the print settings are changed, stores the setting values thereof. When the user selects the object **1002** displayed on the extended-printing setting screens in FIGS. **10A** to **10D** and FIGS. **16A** to **16C**, the print settings are determined. Assuming that the user has changed the media size from A4 to Letter on the UI, the print setting information that the print setting extension app **312** holds changes from A4 to Letter. When the object **1002** is selected by the user, the print setting extension app **312** acquires print setting information that is processed on the print setting screen from the extended-printing setting screen. The print setting extension app **312** passes the print setting information to the OS **313** and closes the extended-printing setting screens shown in FIGS. **10A** to **10D** and FIGS. **16A** to **16C** (**S812**). When the process at **S812** is completed, the print setting screen shown in FIG. **11** is displayed in which the setting values set with the print setting extension app **312** are reflected.

(126) When the user selects an object **1105** on the screen shown in FIG. **11**, a print instruction is input to the OS **313**. The OS **313** executes a printing process in response to the input instruction (**S813**).

(127) In response to the instruction to execute printing, the OS **313** generates intermediate data and passes the generated intermediate data and the print setting information edited on the print setting screen to the print setting extension app **312** (**S814**). The intermediate data is data generated before conversion to print data, such as page-description language (PDL) data. One example is extensible markup language (XML) paper specification (XPS) data. The print setting information is also contained in the intermediate data.

(128) In response to receiving the intermediate data and print setting information from the OS **313**, the print setting extension app **312** generates print data based on the intermediate data and generates print capability information based on the print setting information (**S815**). Examples of the print data include a portable document format (PDF) file and a PDL file, such as PWG-Raster. Specifically, the print capability information is an attribute value that is print setting information defined by an IPP.

(129) After generating the print data, the print setting extension app **312** passes the generated print data and the print capability information to the print queue of the OS **313** (**S816**).

(130) In contrast to **S814** to **S816**, in the case where the print setting extension app **312** is not installed in the client terminal **101**, the client terminal **101** executes the process described below at **S816**. The OS **313** generates XPS data, edits the page layout, and converts the XPS data to a predetermined format to generate print data and print capability information (**S817**). In this embodiment, the predetermined format is, for example, PDF or PWG-Raster.

(131) The OS **313** transmits the print data and print capability information passed from the print setting extension app **312** or the print data and print capability information generated by the OS **313** to the cloud print service **321** via the print queue (**S818**).

(132) The cloud print service **321** transmits the print data and print capability information passed from the client terminal **101** to the printer **104** (**S819**). The printer **104** may regularly send inquiry to the cloud print service **321** to acquire unprinted print data held on the cloud print service **321** and print capability information corresponding to the print data. Although capability information is acquired at the timing when a print queue is selected by the document generation app **315** in the process of **S801** in FIG. **8A**, and the succeeding processes until the display of the print setting screen are performed, the above process may be started at another timing. For example, the above process may be started at the timing when an Other Settings button **1104** displayed on the document generation app **315** is pressed.

(133) This is a processing procedure for, when a print queue and the print setting extension app **312** are associated with each other, displaying the extended-printing setting screen (FIGS. **10A** to **10D**) of the print setting extension app **312** at the timing when a print queue is selected and executing

printing.

(134) Next, a process executed by the print setting extension app **312** to display different extended-printing setting screens according to the printing method will be described with reference to the flowchart in FIG. **14**. The process shown in FIG. **14** is achieved by the CPU **212** of the client terminal **101** executing a program of the print setting extension app **312**. The process shown in FIG. **14** is started when the client terminal **101** is activated.

(135) First, the print setting extension app **312** determines whether the print setting extension app **312** has received an event from the OS **313** (**S1401**). The OS **313** notifies the print setting extension app **312** of the event at a timing set by the print setting extension app **312** in advance. In this embodiment, in the case where the print setting extension app **312** corresponding to the printer selected in the area **1101** in FIG. **11** is stored, the OS **313** notifies the print setting extension app **312** of the event. The OS **313** may report the event at another timing. For example, the OS **313** may notify the print setting extension app **312** of the event at the timing when “Other settings” **1104** in FIG. **11** is selected. The print setting extension app **312** repeats the process of **S1401** until the event is given. In response to receiving the event, the print setting extension app **312** advances the process to **S1402**.

(136) The print setting extension app **312** acquires information indicating a printing method for the printer corresponding to the selected print queue from the cloud print service **321** (**S1402**). The process of **S1402** is executed when the print setting extension app **312** provides an instruction to the OS **313**. The OS **313** acquires the information indicating the printing method for the printer corresponding to the print queue selected by the cloud print service **321** using a command defined by the IPP. For example, the OS **313** acquires setting items and attribute values that allow the type of the printer **104** to be identified, such as Marker-types and Printer-supply, from the cloud print service **321**. The information acquired at **S1402** may be any other information for determining whether the printer corresponding to the selected print queue is an ink-jet printer or an electrophotographic printer.

(137) The print setting extension app **312** determines whether the OS **313** has completed the acquisition of information indicating the printer printing method from the cloud print service **321** (**S1403**). The print setting extension app **312** executes the process of **S1403** until the acquisition of capability information from the cloud print service **321** is completed.

(138) If the acquisition is completed, the print setting extension app **312** updates the device capability information (**S1404**). The print setting extension app **312** instructs the OS **313** to update the device capability information with the capability information acquired from the cloud print service **321**. Thus, the information on the printer printing method is stored in the device capability information corresponding to the print queue. If information on the printing method is stored in the device capability information, the processes of **S1402** to **S1404** may be omitted.

(139) After completion of update, the print setting extension app **312** acquires device capability information (**S1405**). The process **S1405** is a process for acquiring a printing method for a printer corresponding to the print queue.

(140) The print setting extension app **312** determines whether the printer corresponding to the selected print queue is an ink-jet printer in accordance with the device capability information received from the OS **313** (**S1406**). For the determination, a setting item and an attribute value that allow the type of the printer **104** to be identified, such as Marker-types and Printer-supply, are used. For example, if the capability information does not contain the item of Printer-supply, and Ink-Cartridge is acquired from the item of Marker-types, the print setting extension app **312** determines that the printer is an ink-jet printer. In contrast, if the capability information does not contain the item of Ink-Cartridge, and the value of Toner is acquired from the item of Printer-supply, the print setting extension app **312** determines that the printer is an electrophotographic printer. This embodiment determines whether the printer corresponding to the selected print queue is an ink-jet printer. Alternatively, it may be determined whether the printer corresponding to the selected print

queue is an electrophotographic printer.

(141) If the printer corresponding to the selected print queue is determined to be an ink-jet printer, the print setting extension app **312** acquires capability information for setting up a print setting screen for an ink-jet printer from the cloud print service **321** (**S1407**).

(142) FIG. **18A** is a table stored in the print setting extension app **312**. The table in FIG. **18A** is a list of capability information that the print setting extension app **312** acquires when an event notification is given from the OS **313**. The individual columns correspond to printers of the individual printing methods, and the individual rows correspond to attribute information which are setting items. The white circles in the table indicate that the print setting extension app **312** acquires capability information on the setting items. The hyphens (-) in the table indicate that the print setting extension app **312** does not acquire capability information on the setting items. For example, if the printer corresponding to the selected print queue is an ink-jet printer, the print setting extension app **312** acquires capability information, such as paper size and paper type, but does not acquire capability information, such as stapling and folding. If the printer corresponding to the selected print queue is an electrophotographic printer, the print setting extension app **312** acquires capability information, such as stapling and folding, but does not acquire capability information on marginless printing. This embodiment specifies setting items for acquiring capability information using a table as shown in FIG. **18A**. However, any other method may be employed that allows capability information to be inquired about for items that differ between a case where the printer corresponding to the selected print queue is an ink-jet printer or an electrophotographic printer. At **S1407**, the print setting extension app **312** inquires about capability information for the items with the white circle with reference to the column of the ink-jet printer of the table.

(143) The capability information includes setting items and attribute values defined by industry-standard specifications and printer-vendor-specific setting items and attribute values for ink-jet printers. The capability information may include duplicate items of the items contained in the capability information acquired by the OS **313**.

(144) In contrast, if it is determined that the printer corresponding to the selected print queue is not an ink-jet printer, the print setting extension app **312** acquires capability information using attribute information for electrophotographic printers (**S1408**). At **S1408**, the print setting extension app **312** acquires capability information on the setting items with the white circle with reference to the column of the electrophotographic printer in FIG. **18A**.

(145) The print setting extension app **312** determines whether the acquisition of capability information from the cloud print service **321** has been completed (**S1409**). If the acquisition of capability information has not been completed, the print setting extension app **312** performs the process of **S1409**. In contrast, the acquisition of capability information has been completed, the print setting extension app **312** advances the process to **S1410**.

(146) The print setting extension app **312** updates the device capability information on the basis of the acquired capability information (**S1410**). With this operation, in addition to standard setting items, printer-vendor-specific setting items and attribute values regarding ink-jet printers are stored in the device capability information.

(147) The print setting extension app **312** generates an extended-printing setting screen on the basis of print-setting capability information generated from the updated device capability information (**S1411**).

(148) The print setting extension app **312** displays a print setting screen on the display **216** of the client terminal **101** (**S1412**). At that time, if the capability information acquired at **S1407** is used, the extended-printing setting screens for ink-jet printers as shown in FIGS. **16A** to **16C** are displayed. In contrast, the capability information acquired at **S1408** is used, the extended-printing setting screens for electrophotographic printers as shown in FIGS. **10A** to **10D** are displayed.

(149) Thus, the print setting extension app **312** can singly display an extended-printing setting

screen corresponding to the printer type, as known printer drivers.

(150) Another timing when the print setting extension app **312** acquires information from the cloud print service **321** is as follows:

(151) When the amount of remaining recording agent of the printer, such as ink or toner, becomes low, when a paper jam has occurred in printing, or when paper empty has occurred, the printer notifies the cloud print service **321** of the change in printer status. The change includes that the printer status is an error and changed-status information. In this embodiment, the status information indicates the kind of the error occurring in the printer **104**, and so on.

(152) If the status of the print queue indicated by the print data received from the client terminal **101** is an error, the cloud print service **321** notifies the client terminal **101** that the status of the printer is an error. The OS **313** of the client terminal **101** displays an object **1206** on a screen **1205** in FIG. **12A** in response to the notification from the cloud print service **321**. When the user clicks the object **1206**, the OS **313** notifies the print setting extension app **312** that the object **1206** is clicked. In response to receiving the notification, the print setting extension app **312** accesses the cloud print service **321** to acquire the printer status information. The print setting extension app **312** displays a status screen illustrated in FIG. **12B** or **12C**.

(153) FIG. **12B** illustrates an example of a status screen displayed when the printer that has output a status change notification is the ink-jet printer **104a**. The status screen displays, in addition to the status information **1201**, remaining ink information, a Purchase Supplies button **1210**, and so on. The status information **1201** is an area in which a message regarding the status of the printer is displayed. For example, when paper empty has occurred in the printer, a message "Paper has run out. Set paper." is displayed. The message displayed changes according to the current status.

(154) An Update button **1202** is an object for acquiring status information again from the cloud print service **321**.

(155) An area **1203** indicates the remaining amounts of inks registered with the cloud print service **321**. The print setting extension app **312** acquires the remaining amounts of inks registered with the cloud print service **321** and displays the amounts.

(156) The Purchase Supplies button **1210** is a button for accessing a website for purchasing ink cartridges and paper. Ink-jet printers are supposed to be privately owned, so that users who use the printers and users who purchase consumables, such as ink and paper, are the same in many cases. For this reason, the Purchase Supplies button **1210** is displayed so that the user who has determined that the ink level has become low on the status screen **1203** can purchase consumables, such as ink cartridges, on the spot. When the user selects the Purchase Supplies button **1210**, the user can access a Web page that sells consumables. This allows the user to save time and effort to purchase consumables. In this embodiment, the ink-jet printer **104a** registers the URL of the consumable purchase site with the cloud print service **321**, and the print setting extension app **312** acquires the URL of the consumable purchase site from the cloud print service **321**. Alternatively, the print setting extension app **312** may store the URL of the consumable purchase site in advance so that the Purchase Supplies button **1210** can be displayed without the need for acquiring the information from the cloud print service **321**.

(157) The cancel button **1207** is an object for terminating the display of the status screen.

(158) FIG. **12C** illustrates an example of a status screen in the case where the printer that has given a status change notification is the electrophotographic printer **104b**.

(159) The status information **1208** is the same object as the status information **1201** and displays a message regarding the status of the electrophotographic printer **104b**.

(160) An update button **1204** is the same object as the Update button **1202**. A Cancel button **1209** is the same object as the Cancel button **1207**.

(161) The status screen for electrophotographic printers shown in FIG. **12C** does not display the area **1203** that displays remaining consumables information and the Purchase Supplies button **1210**. This is because electrophotographic printers are used in corporate offices in many cases, so that

users who use the printer for printing and users who purchase consumables differ.

(162) Next, referring to FIG. 19, a process that the print setting extension app 312 executes in displaying the status screen will be described. The process shown in FIG. 19 is achieved by the CPU 212 executing a program of the print setting extension app 312. The process in FIG. 19 is started when the power of the client terminal 101 is turned on.

(163) The print setting extension app 312 determines whether a notification that a pop-up display has been selected has been given from the OS 313 (S1901). The notification given from the OS 313 contains information indicating whether an error has occurred in a printer corresponding to the print queue. If the notification has not been given, the print setting extension app 312 repeats the determination at S1901. If the notification has been given, the print setting extension app 312 executes the process of S1902.

(164) The print setting extension app 312 transmits, to the cloud print service 321, a request to acquire information indicating a printing method for a printer corresponding to the print queue specified on the basis of the notification from the OS 313 (S1902). The process of S1902 is the same as the process of S1402 in FIG. 14.

(165) The print setting extension app 312 determines whether the acquisition of information, from the cloud print service 321, the information indicating the printing method for the printer corresponding to the print queue specified on the basis of the notification from the OS 313 has been completed (S1903). The process of S1903 is the same as the process of S1403 in FIG. 14.

(166) The print setting extension app 312 updates the stored device capability information on the basis of the information received from the cloud print service 321 (S1904). This process is also the same as the process of S1404 in FIG. 14. In the case where information indicating the printing method for the printer is already stored in the device capability information, the print setting extension app 312 may execute the process of S1905 without performing the processes of S1902 to S1904.

(167) The print setting extension app 312 acquires the updated device capability information (S1905).

(168) The process of S1905 is also the same as the process of S1405 in FIG. 14.

(169) The print setting extension app 312 determines whether the device capability information stores the information indicating that the printer corresponding to the print queue is an ink-jet printer (S1906). The process of S1906 is the same as the process of S1406 in FIG. 14. When the printing method specified from the device capability information is an ink-jet method, the print setting extension app 312 executes the process of S1907.

(170) The print setting extension app 312 acquires status information on the printer with reference to the table shown in FIG. 18B (S1907). FIG. 18B is a table showing information that the print setting extension app 312 acquires from the cloud print service 321 in displaying a status screen. The columns show printing methods, and the rows show acquisition information. The white circle indicates that the information is to be acquired, and the hyphen indicates that the information is not to be acquired. The print setting extension app 312 acquires the status, the remaining recording agent, and the URL of the consumable purchase site of the printer from the cloud print service 321.

(171) In contrast, if the printing method specified from the device capability information at S1906 is not an ink-jet method, the print setting extension app 312 executes the process of S1908.

(172) The print setting extension app 312 acquires printer status information with reference to the table in FIG. 18B (S1908). The print setting extension app 312 acquires the printer status information from the cloud print service 321 with reference to the column of the electrophotographic printer in FIG. 18B. In this case, the print setting extension app 312 does not acquire information on the remaining recording agent and the URL of the consumable purchase site.

(173) The print setting extension app 312 determines whether the acquisition of printer information has been completed (S1909). If the acquisition of printer information has not been completed, the

print setting extension app **312** executes the process of **S1909**. If the acquisition of printer information has been completed, the print setting extension app **312** executes the process of **S1910**.

(174) The print setting extension app **312** generates a status screen based on the acquired information and displays the status screen (**S1910**). Executing the process of **S1910** causes the status screen shown in FIG. **12B** or FIG. **12C** to be displayed.

(175) The print setting extension app **312** determines whether an update button has been selected (**S1911**). The print setting extension app **312** determines whether the update button **1202** in FIG. **12B** or the update button **1204** in FIG. **12C** has been selected (**S1911**). If the update button has been selected, the print setting extension app **312** returns the process to **S1906**. If the update button has not been selected, the print setting extension app **312** executes the process of **S1912**.

(176) The print setting extension app **312** determines whether a cancel button has been selected (**S1912**). If the cancel button **1207** in FIG. **12C** or the cancel button **1209** in FIG. **12B** has been selected, the print setting extension app **312** advances the process to **S1913**. If the cancel button has not been selected, the print setting extension app **312** returns the process to **S1911**. If a button other than the above button has been selected in the process from **S1910** to **S1911** or in the process from **S1911** to **S1912**, the print setting extension app **312** executes a process corresponding to the selected button. For example, when the Purchase Supplies button **1210** is selected, the print setting extension app **312** activates a Web browser installed in the client terminal **101** to execute a process for accessing a URL associated with the button.

(177) The print setting extension app **312** terminates the display of the status screen (**S1913**). The process of this flowchart is terminated by executing **S1913**. After the process of FIG. **19** ends, the print setting extension app **312** returns the process to the start point of this processing procedure.

(178) Executing the process of FIG. **19** allows the items of printer information that the print setting extension app **312** acquires from the cloud print service **321** to be changed, enabling a status screen corresponding to the printing method to be displayed.

(179) The above embodiment shows a case in which the print setting extension app **312** acquires capability information and transmits print data to the printer **104** via the cloud print service **321**. Alternatively, the print setting extension app **312** may communicate capability information and print data directly to the printer **104**.

Second Embodiment

(180) The first embodiment shows an example in which an ink-jet printer and an electrophotographic printer registered with the cloud print service **321** are supported by one print setting extension app **312**.

(181) A second embodiment shows a case in which one printer is connected to the client terminal **101** not via a cloud print service.

(182) In the second embodiment, the ink-jet printer **104a** in FIG. **1** is connected to the client terminal **101** not via a cloud print service. In contrast, the electrophotographic printer **104b** communicates with the client terminal **101** via the cloud print service, as in the first embodiment.

(183) In the second embodiment as well, in the case where the ink-jet printer **104a** and the electrophotographic printer **104b** are not distinguished, the term “printer **104**” is used. In the second embodiment, the print setting extension app **312** supports both the ink-jet printer **104a** and the electrophotographic printer **104b**.

(184) Since FIG. **1** to FIG. **13B** are the same as in the first embodiment, descriptions thereof will be omitted.

(185) First, a method for registering a printer not via the cloud print service **321** will be described.

(186) Directly connecting the client terminal **101** and the ink-jet printer **104a** requires that the client terminal **101** and the ink-jet printer **104a** are in the same network or directly connected together with a universal serial bus (USB) cable, a LAN cable, or the like.

(187) The screen shown in FIG. **4** is displayed on the client terminal **101**, with the client terminal **101** and the ink-jet printer **104a** connected to the same network. When the object **401** is selected,

the client terminal **101** searches for a connectable printer. The ink-jet printer **104a** responds to it. When the user selects the ink-jet printer **104a** that is displayed as a search result, information on the ink-jet printer **104a** and information on the local printer driver **320** are associated with each other.

(188) The OS **313** acquires the printer information on the selected ink-jet printer **104a**.

(189) The printer information acquired here is the HWID or COID of the printer **104a**. In addition, the OS **313** transmits a request to acquire capability information to the ink-jet printer **104a**. The capability information acquired in response to the request is only about setting items set in the OS **313** in advance, and capability information on vendor-specific setting items is not acquired.

(190) The OS **313** generates a print queue based on the acquired printer information and capability information. The OS **313** installs a print setting extension app specified on the basis of the HWID and COID of the ink-jet printer **104a** and associates the print setting extension app with the print queue. If the print setting extension app **312** has already been installed, the OS **313** does not additionally install an additional print setting extension app but only performs association with the print queue.

(191) Thus, the print queue of the ink-jet printer **104a** is generated, and printer information and the print setting extension app **312** are associated with the print queue.

(192) Next, a processing procedure for transmitting print data from the client terminal **101** to the printer **104** will be described. The method for transmitting print data from the client terminal **101** to the electrophotographic printer **104b** via the cloud print service **321** is the same as the method of the first embodiment, and a description whereof will be omitted.

(193) Referring to FIGS. **17A** and **17B**, a process for transmitting print data from the client terminal **101** to the ink-jet printer **104a** not via a cloud print service will be described.

(194) Examples of the document generation app **315** include a document-data generation application, a presentation-material generation application, and a picture/image-data display application.

(195) The document generation app **315** displays a print setting screen (FIG. **11**) for selecting a print queue as a print-setting initial screen. In this embodiment, the print-setting initial screen is displayed by the document generation app **315**. Alternatively, the OS **313** may display a similar screen. The print-setting initial screen displays an object **1101** for selecting a print queue, an object **1102** for performing various print settings, and a print preview screen **1103**.

(196) The OS **313** selects a print queue associated with a printer that is set as a default printer (**S1701**). In this embodiment, a printer **104** that is not connected to the cloud is selected as a default printer. The processes from **S1701** onward are executed also when the user operates the object **1101** to change the print queue.

(197) Next, the OS **313** inquires of the ink-jet printer **104a** about capability information (**S1702**). Which setting item of the capability information is inquired about is determined in advance by the specifications of the OS **313**. The inquiry is made to the printer **104** using a command based on a standard protocol defined by an IPP, such as Get-print-Attributes. If Get-print-Attributes is used, capability information determined by the OS **313** is inquired about in a list format.

(198) The ink-jet printer **104a** responds to the capability information list sent with Get-print-Attributes to the OS **313** (**S1703**). For example, suppose the attribute of media size is designated by Get-print-Attributes (IPP). If the cloud print service **321** holds the attribute of media size, the cloud print service **321** sends back values (A4, B5, Letter, and so on) associated with the attribute. If the attribute designated with Get-print-Attributes is not present in the queue of the printer **104**, the printer **104** does not send back an associated value. The capability information acquired at **S1503** is capability information inquired regardless of the type and capabilities of the printer to which the OS **313** is connected.

(199) The OS **313** updates the device capability information using the capability information acquired from the ink-jet printer **104a**. The OS **313** adds the capability information acquired at **S1503** of FIG. **15A** to the device capability information generated at **S3012** of FIG. **3A** (**S1704**). If

the device capability information is to be updated, the device capability information managed by the client terminal **101** can be updated by performing **S1503**. In the update of device capability information at **S1704**, only the attribute value defined by industry-standard specifications is updated.

(200) Next, the OS **313** notifies the print setting extension app **312** of an event and an API for use in editing the device capability information (**S1705**). The event notification timing is registered when the print setting extension app **312** is installed in the OS **313** of the client terminal **101**.

(201) In response to receiving the event, the print setting extension app **312** transmits a request to acquire capability information to the ink-jet printer **104a**. The capability information acquired here is capability information for writing setting items and attribute values that are specifically defined by the printer vendor to the device capability information.

(202) In response to receiving the event from the OS **313**, the print setting extension app **312** inquires about capability information on the ink-jet printer **104a** (**S1706**). At that time, the print setting extension app **312** inquires of the ink-jet printer **104a** about capability information on setting items specific to the printer vendor and setting items containing attribute values specific to the printer vendor. The inquiry is made using Get-print-Attributes as at **S1502** of FIG. **15A**, in which the item name of a setting item is specified so that capability information is acquired. In this embodiment, the capability information is acquired at **S1506** for setting items that are specifically defined by the printer vendor and setting items including attribute values that are specifically defined by the printer vendor. The capability information acquired may contain the setting items acquired by the OS **313**.

(203) In response to receiving an inquiry about specific capability information from the ink-jet printer **104a**, the print setting extension app **312** responds to the print setting extension app **312** (**S1707**). The method of response is the same as at **S1503** of FIG. **15A** described above. In this embodiment, the ink-jet printer **104a** sends back capability information held by the ink-jet printer **104a** at **S1507**.

(204) The processes of **S1508** to **S1517** are the same as the corresponding blocks from **S808** to **S817** in FIGS. **8A** and **8B**, and descriptions thereof will be omitted.

(205) The OS **313** transmits the print data and print capability information passed from the print setting extension app **312** or the print data and print capability information generated by the OS **313** to the ink-jet printer **104a** via a print queue (**S1718**).

(206) This is the processing procedure for transmitting print data to the ink-jet printer **104a** not via the cloud print service **321**.

(207) In the second embodiment, as in the first embodiment, the extended-printing setting screen that the print setting extension app **312** displays differs between a case where a print queue associated with the ink-jet printer **104a** is selected and a case where a print queue associated with the electrophotographic printer **104b** is selected. If a print queue associated with the ink-jet printer **104a** is selected, the print setting extension app **312** displays the extended-printing setting screen shown in FIGS. **16A** to **16C**. In contrast, if a print queue associated with the electrophotographic printer **104b** is selected, the print setting extension app **312** displays the extended-printing setting screen shown in FIGS. **10A** to **10D**.

(208) FIGS. **15A** and **15B** show a flowchart for a process whereby the print setting extension app **312** displays an extended-printing setting screen in the second embodiment. The process shown in FIGS. **15A** and **15B** is implemented by the CPU **212** of the client terminal **101** executing a program of the print setting extension app **312**. The flowchart shown in FIGS. **15A** and **15B** is started when the power of the client terminal **101** is turned on.

(209) The print setting extension app **312** determines whether an event has been given from the OS **313** (**S1501**). The OS **313** notifies the print setting extension app **312** of the event at a timing set by the print setting extension app **312** in advance. In this embodiment, the OS **313** notifies the print setting extension app **312** of the event in the case where the print setting extension app **312**

corresponding to the printer selected in the area **1101** in FIG. **11** is stored. The OS **313** may report the event at another timing. For example, the OS **313** may notify the print setting extension app **312** of the event at the timing when “Other settings” **1104** in FIG. **11** is selected. The print setting extension app **312** repeats the process of **S1501** until the event is given. In response to receiving the event, the print setting extension app **312** advances the process to **S1502**.

(210) The print setting extension app **312** determines whether the printer driver associated with the selected print queue is the cloud printer driver **311** (**S1502**). For the determination, the print setting extension app **312** acquires information indicating whether the registered driver is the cloud printer driver **311** or the local printer driver **320** using driver information stored in the storage **214** in FIG. **2A**. This embodiment determines whether the printer driver corresponding to the print queue is the cloud printer driver **311**. Alternatively, it may be determined whether the printer driver corresponding to the print queue is the local printer driver **320**.

(211) In response to determining that the cloud printer driver **311** is associated with the print queue, the print setting extension app **312** executes the process of **S1503**.

(212) The print setting extension app **312** acquires information indicating a printing method for a printer corresponding to the selected print queue from the cloud print service **321** (**S1503**). The print setting extension app **312** instructs the OS **313** to transmit a request to acquire the printing method for the printer to the cloud print service **321**.

(213) In contrast, if it is determined that the local printer driver **320** is associated, the print setting extension app **312** executes the process of **S1504**. The print setting extension app **312** acquires information indicating the printing method for the printer corresponding to the selected print queue from the printer associated with the local printer driver **320** (**S1504**). The print setting extension app **312** transmits a request to acquire the printing method for the ink-jet printer **104a** to the OS **313**. The OS **313** acquires the information on the printing method for the ink-jet printer **104a** from the ink-jet printer **104a** using the IP address of the ink-jet printer **104a** registered with the print queue.

(214) The method for acquiring the information on the printing method is the same as the method of the first embodiment. For acquiring the printing method directly from the printer, the same attributes as in acquiring the printing method from the cloud print service are used.

(215) The print setting extension app **312** determines whether the acquisition of information indicating the printing method for the printer corresponding to the selected print queue has been completed (**S1505**). If the acquisition of the information indicating the printing method has not been completed, the print setting extension app **312** executes the process of **S1505** again. In contrast, if the acquisition of the information indicating the printing method has been completed, the print setting extension app **312** advances the process to **S1506**.

(216) The print setting extension app **312** updates the device capability information based on the information acquired at **S1503** or **S1504** (**S1506**). The print setting extension app **312** instructs the OS **313** to update the device capability information. Thus, the printing method for the printer associated with the print queue is stored in the device capability information. If the printing method is already stored in the capability information on the printer corresponding to the selected print queue, the processes of **S1502** to **S1506** may be omitted, and the print setting extension app **312** may execute **S1507** after **S1501**.

(217) The print setting extension app **312** acquires the device capability information (**S1507**).

(218) The print setting extension app **312** determines whether the printer corresponding to the selected print queue is an ink-jet printer on the basis of the device capability information received from the OS **313** (**S1508**). The second embodiment determines whether the printer corresponding to the selected print queue is an ink-jet printer. Alternatively, it may be determined whether the printer corresponding to the selected print queue is an electrophotographic printer. The determination method is the same as the method of the first embodiment, and a description thereof will be omitted.

(219) If the printer corresponding to the selected print queue is an ink-jet printer, the process goes to **S1509**.

(220) The print setting extension app **312** determines whether the printer driver corresponding to the selected print queue is the cloud printer driver **311** (**S1509**). The process of **S1509** is the same as the process of **S1502**.

(221) If the printer driver corresponding to the selected print queue is the cloud printer driver **311**, the print setting extension app **312** executes the process of **S1510**.

(222) The print setting extension app **312** inquires of the cloud print service **321** about the printer capability information (**S1510**). The process of **S1510** is executed by the print setting extension app **312** instructing the OS **313** to acquire capability information. In this case, the OS **313** acquires capability information about printer-vendor specific attributes, in addition to standard capability information. At **S1510**, the print setting extension app **312** acquires capability information on the setting items with a white circle in the column of the ink-jet printer with reference to the table shown in FIG. **18A**.

(223) If the printer driver corresponding to the selected print queue is the local printer driver **320**, the print setting extension app **312** executes the process of **S1511**.

(224) The print setting extension app **312** directly inquires of the printer associated with the local printer driver **320** about capability information (**S1511**). The process of **S1511** is implemented by the print setting extension app **312** instructing the OS **313** to acquire capability information. In this case, the OS **313** acquires capability information on printer-vendor specific attributes in addition to standard capability information. For example, OS **313** acquires capability information about the setting items with the white circle in the column of the ink-jet printer in FIG. **18A**.

(225) At **S1510** and **S1511**, the capability information inquired about is the same, although the destinations of the inquiries differ.

(226) If at **S1508** the acquired device capability information does not contain information indicative of an ink-jet printer, the print setting extension app **312** performs the process of **S1512**. Since the process of **S1512** is the same as the processes of **S1502** and **S1509**, a description thereof will be omitted.

(227) If the printer driver corresponding to the selected print queue is the cloud printer driver **311**, the print setting extension app **312** inquires of the cloud print service **321** about printer capability information (**S1513**). The process of **S1513** is implemented by the print setting extension app **312** instructing the OS **313** to acquire capability information. At **S1513**, the print setting extension app **312** acquires capability information about the setting items with a white circle in the column of the electrophotographic printer in FIG. **18A**.

(228) In contrast, if the printer driver corresponding to the selected print queue is a local print driver, the print setting extension app **312** directly transmits a request to acquire capability information to the electrophotographic printer (**S1514**). The process of **S1514** is implemented by the print setting extension app **312** instructing the OS **313** to acquire capability information. At **S1514**, the print setting extension app **312** acquires capability information about the setting items with a white circle in the column of the electrophotographic printer in FIG. **18A**.

(229) The processes of **S1516** to **S1518** are the same as the processes of **S1410** to **S1412** in FIG. **14**, and descriptions thereof will be omitted.

(230) Thus, the capability information can be acquired regardless of the connection status of the printer **104**, so that a print setting extended screen according to the printer type can be displayed.

(231) In this embodiment, the print setting extension app **312** determines at **S1502** and **S1509** whether the printer driver corresponding to the selected print queue is a cloud printer driver or a local printer driver. Then, the destination of the capability-information acquisition request is changed according to the determination. Alternatively, the print setting extension app **312** may specify a print queue and requires the OS **313** to acquire capability information, and the OS **313** may change the destination of the capability information-acquisition request according to the type

of the printer driver corresponding to the specified print queue.

(232) Next, display of the status screen will be described.

(233) If the status of the printer **104** is an error when the client terminal **101** transmits print data to the printer **104**, the printer transmits an error notification to the client terminal **101**. The printer **104** notifies the cloud print service **321** of the error and status information indicating the details of the error. If the status of the printer **104** corresponding to a print queue specified by print data transmitted from the client terminal **101** to the cloud print service **321** is an error, the cloud print service **321** notifies the client terminal **101** of the error.

(234) When a status change notification is sent from the printer **104** or the cloud print service **321**, the client terminal **101** displays a pop-up screen. The pop-up screen displayed here is a screen as in FIG. **12A**, as in the first embodiment. A status screen displayed when the printer that has transmitted the notification is the electrophotographic printer **104b** is also a screen as in FIG. **12C**, as in the first embodiment. If the printer that has transmitted the notification is the ink-jet printer **104a** that bypasses the cloud print service **321**, a status screen as in FIG. **12D** is displayed. The difference from the first embodiment is that a Remote UI button **1211** is displayed. The Remote UI button **1211** is an object for accessing a Web server function of the ink-jet printer **104a** through the Web browser of the client terminal **101**. If the Remote UI button **1211** is selected, the print setting extension app **312** activates the Web browser of the client terminal **101** to access a URL reported from the ink-jet printer **104a**. The Remote UI allows determination of the status information on the ink-jet printer **104a**, the network setting of the main body, job settings, the job history, and so on.

(235) Referring to FIGS. **20A** and **20B**, a process for displaying a status screen in the second embodiment will be described. The process shown in FIGS. **20A** and **20B** is implemented by the CPU **212** executing a program of the print setting extension app **312**. The flowchart shown in FIGS. **20A** and **20B** is started when the power of the client terminal **101** is turned on. The same processes as in the first embodiment are given the same reference signs as in FIG. **19**, and descriptions thereof will be omitted.

(236) The print setting extension app **312** determines whether the printer driver corresponding to the printer whose status notification has been updated is a cloud printer driver (**S2001**). If the print driver is a cloud printer driver, the print setting extension app **312** executes the process of **S1902**. If not, the print setting extension app **312** transmits a request to acquire information indicating the printing method to the printer (**S2002**). The process is the same as the process of **S1504** in FIG. **15A**. If the printing method is already stored in the device capability information on the printer, the processes of **S2001** to **S1904** may be omitted.

(237) Next, the print setting extension app **312** executes the processes of **S1903** to **S1906**.

(238) At **S2003**, the print setting extension app **312** determines whether a printer driver corresponding to the printer that has given the status notification is a cloud printer driver.

(239) If the corresponding driver is a cloud printer driver, the print setting extension app **312** executes the process of **S1907**. If the corresponding driver is a local printer driver, the print setting extension app **312** transmits an inquiry about printer information to the printer connected to the client terminal **101** (**S2004**). The process **S2004** is implemented by the print setting extension app **312** instructing the OS **313** to acquire printer information. The printer information acquired at **S2004** is the items with the white circle in the column of the ink-jet printer in FIG. **18B** plus a URL for displaying the Remote UI.

(240) At **S2005**, the print setting extension app **312** determines whether the printer driver corresponding to the printer that has given the status notification is a cloud printer driver.

(241) If the printer driver is a cloud printer driver, the print setting extension app **312** executes the process of **S1908**. If the printer driver is a local printer driver, the print setting extension app **312** transmits an inquiry about printer information to a printer connected to the client terminal (**S2006**). The process **S2006** is implemented by the print setting extension app **312** instructing the OS **313** to acquire printer information. The printer information acquired at **S2006** is the items with the white

circle in the column of the electrophotographic printer in FIG. 18B.

(242) Next, the print setting extension app **312** executes the processes of **S1909** to **S1913** and terminates the process in the flowchart. If the Remote UI button **1211** is operated during the processes of **S1910** to **S1912**, the print setting extension app **312** activates the Web browser of the client terminal **101** to access the URL acquired at **S2004**.

(243) In FIGS. **20A** and **20B**, at the processes of **S2001**, **S1902**, and **S2002**, the print setting extension app **312** determines the type of the printer driver corresponding to the printer that has reported update of status information and switches the destinations of the information acquisition request. Those processes may be executed by the OS **313**. In this case, the print setting extension app **312** notifies the OS **313** of the print queue corresponding to the printer that has reported the status update and information to be acquired. The OS **313** determines whether the printer driver associated with the print queue reported from the print setting extension app **312** is a cloud printer driver or a local printer driver and switches the destinations of the information acquisition request.

(244) For **S2003** to **S2006**, **S1907**, and **S1908** as well, the print setting extension app **312** may notify the OS **313** of the print queue whose status update is reported and the kind of information to be acquired. The OS **313** may determine whether the printer driver corresponding to the print queue reported from the print setting extension app **312** is a cloud printer driver or a local printer driver and switch the destinations of the information acquisition request.

(245) Executing the process shown in FIGS. **20A** and **20B** allows the kind of information acquired from the printer **104** and the cloud print service **321** to be changed according to the printing method and the connecting method.

(246) In the second embodiment, the ink-jet printer **104a** connects to the client terminal **101** not via the cloud print service **321**, and the electrophotographic printer **104b** connects to the client terminal **101** via the cloud print service **321**.

(247) Alternatively, the ink-jet printer **104a** and the client terminal **101** may be connected via the cloud print service, and the electrophotographic printer **104b** and the client terminal **101** may be connected not via the cloud print service.

(248) Both the ink-jet printer **104a** and the electrophotographic printer **104b** may be connected directly to the client terminal **101** without using the cloud print service **321**.

(249) In any case, the present invention can be applied to a case in which the ink-jet printer **104a** and the electrophotographic printer **104b** display an extended-printing setting screen using one print setting extension app **312**.

(250) The application according to an embodiment of the present invention allows inquiry about printer information suitable for the type of a printer associated with a general-purpose printer driver.

Other Embodiments

(251) Embodiment(s) of the present invention can also be realized by a computer of a system or apparatus that reads out and executes computer executable instructions (e.g., one or more programs) recorded on a storage medium (which may also be referred to more fully as a 'non-transitory computer-readable storage medium') to perform the functions of one or more of the above-described embodiment(s) and/or that includes one or more circuits (e.g., application specific integrated circuit (ASIC)) for performing the functions of one or more of the above-described embodiment(s), and by a method performed by the computer of the system or apparatus by, for example, reading out and executing the computer executable instructions from the storage medium to perform the functions of one or more of the above-described embodiment(s) and/or controlling the one or more circuits to perform the functions of one or more of the above-described embodiment(s). The computer may comprise one or more processors (e.g., central processing unit (CPU), micro processing unit (MPU)) and may include a network of separate computers or separate processors to read out and execute the computer executable instructions. The computer executable instructions may be provided to the computer, for example, from a network or the storage medium.

The storage medium may include, for example, one or more of a hard disk, a random-access memory (RAM), a read only memory (ROM), a storage of distributed computing systems, an optical disk (such as a compact disc (CD), digital versatile disc (DVD), or Blu-ray Disc (BD)TM), a flash memory device, a memory card, and the like.

(252) While the present invention has been described with reference to embodiments, it is to be understood that the invention is not limited to the disclosed 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.

Claims

1. A non-transitory computer-readable storage medium storing a first application program supporting a general purpose driver, the general purpose driver configured to generate print data from data output by a second application program configured to display a first setting screen including a first object for setting a first setting item, the first application program including instructions causing an information processing apparatus to: inquire of a cloud print service about first capability information for an inkjet printer; receive the first capability information; display, on a display, a second setting screen on which the first setting item is able to be set and including a second object for setting a second setting item based on the received first capability information, the second setting item not able to be set on the first setting screen, the second setting screen being displayed by the first application program; inquire of the cloud print service about second capability information for an electrophotographic printer, the second capability information including information being not included in the first capability information; receive the second capability information; and display, on the display, a third setting screen on which the first setting item is able to be set and including a third object for setting a third setting item based on the received second capability information, the third setting item not able to be set on the first setting screen and not able to be set on the second setting screen, the third setting screen being displayed by the first application program.
2. The non-transitory computer-readable storage medium according to claim 1, wherein the first application program further includes instructions causing the information processing apparatus to: determine whether a printer corresponding to a print queue selected by a user is the inkjet printer or the electrophotographic printer.
3. The non-transitory computer-readable storage medium according to claim 1, wherein the general purpose driver is a driver generating print data that can be printed by a plurality of types of printers of a plurality of vendors.
4. The non-transitory computer-readable storage medium according to claim 1, wherein the information being included in the second capability information and being not included in the first capability information is information regarding stapling.
5. The non-transitory computer-readable storage medium according to claim 1, wherein the information being included in the second capability information and being not included in the first capability information is information regarding folding.
6. The non-transitory computer-readable storage medium according to claim 1, wherein the information being included in the second capability information and being not included in the first capability information is information regarding page collate.
7. The non-transitory computer-readable storage medium according to claim 1, wherein the information being included in the second capability information and being not included in the first capability information is information regarding storing a print job in the electrophotographic printer.
8. The non-transitory computer-readable storage medium according to claim 1, wherein the first capability information includes information regarding marginless printing, the information

regarding marginless printing being not included in the second capability information.

9. The non-transitory computer-readable storage medium according to claim 1, wherein the first capability information and second capability information include information regarding two sided printing.

10. A control method of an information processing apparatus, the control method being executed by executing a first application program supporting a general purpose driver, the general purpose driver configured to generate print data from data output by a second application program configured to display a first setting screen including a first object for setting a first setting item, the control method comprising: inquiring of a cloud print service about first capability information for an inkjet printer; receiving the first capability information; displaying, on a display, a second setting screen on which the first setting item is able to be set and including a second object for setting a second setting item based on the received first capability information, the second setting item not able to be set on the first setting screen, the second setting screen being displayed by the first application program; inquiring of the cloud print service about second capability information for an electrophotographic printer, the second capability information including information being not included in the first capability information; receiving the second capability information; and displaying, on the display, a third setting screen on which the first setting item is able to be set and including a third object for setting a third setting item based on the received second capability information, the third setting item not able to be set on the first setting screen and not able to be set on the second setting screen, the third setting screen being displayed by the first application program.

11. An information processing apparatus having a first application program supporting a general purpose driver, the general purpose driver configured to generate print data from data output by a second application program configured to display a first setting screen including a first object for setting a first setting item, the information processing apparatus comprising: a display; and a processor that causes, by executing the first application program, the information processing apparatus to: inquire of a cloud print service about first capability information for an inkjet printer; receive the first capability information; display, on the display, a second setting screen on which the first setting item is able to be set and including a second object for setting a second setting item based on the received first capability information, the second setting item not able to be set on the first setting screen, the second setting screen being displayed by the first application program; inquire of the cloud print service about second capability information for an electrophotographic printer, the second capability information including information being not included in the first capability information; receive the second capability information; and display, on the display, a third setting screen on which the first setting item is able to be set and including a third object for setting a third setting item based on the received second capability information, the third setting item not able to be set on the first setting screen and not able to be set on the second setting screen, the third setting screen being displayed by the first application program.
