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(54) **IMAGE FORMING APPARATUS THAT RESTRICTS RECEPTION OF PRINT JOB, CONTROL METHOD THEREFOR, AND STORAGE MEDIUM**

(71) Applicant: **CANON KABUSHIKI KAISHA**, Tokyo (JP)

(72) Inventor: **Yuichiro Shibuya**, Abiko-shi (JP)

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(57) **ABSTRACT**

An image forming apparatus which is capable of efficiently executing print jobs. The image forming apparatus receives a second print job after receiving a first print job and prints a plurality of copies of print data corresponding to the first print job. Whether or not the print data is to be printed by sort printing is determined, and when the print data is to be printed by sort printing, reception of the second print job is restricted until printing of the print data is completed, and when the print data is not to be printed by sort printing, reception of the second print job is not restricted even before printing of the print data is completed.

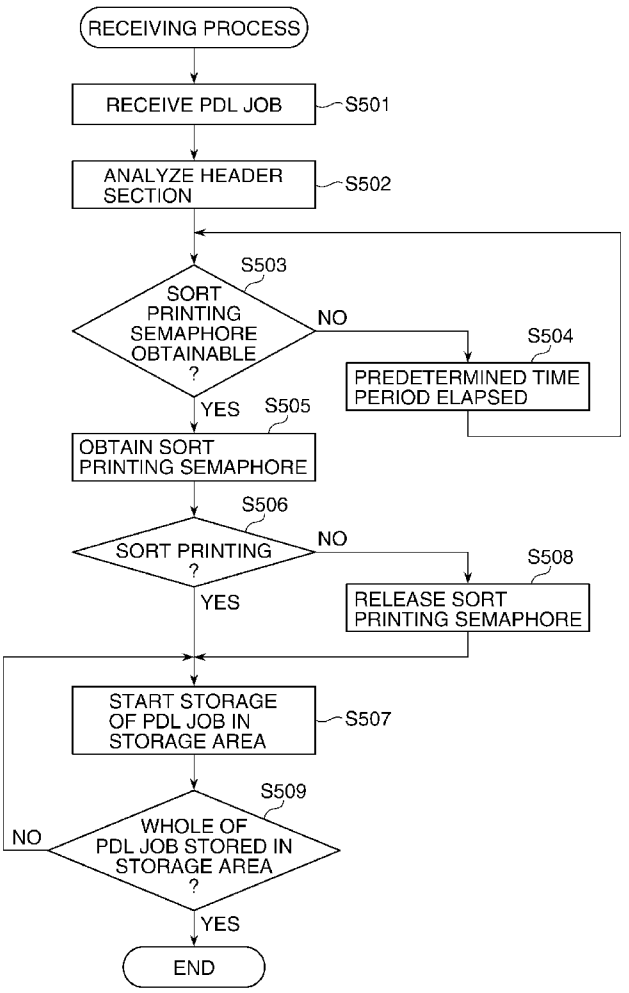

FIG. 1

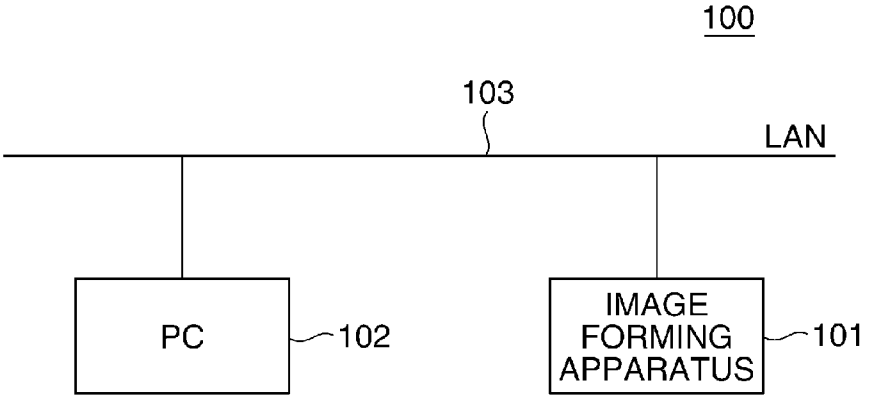
100
103
LAN
PC
102
IMAGE FORMING APPARATUS
101

FIG. 2

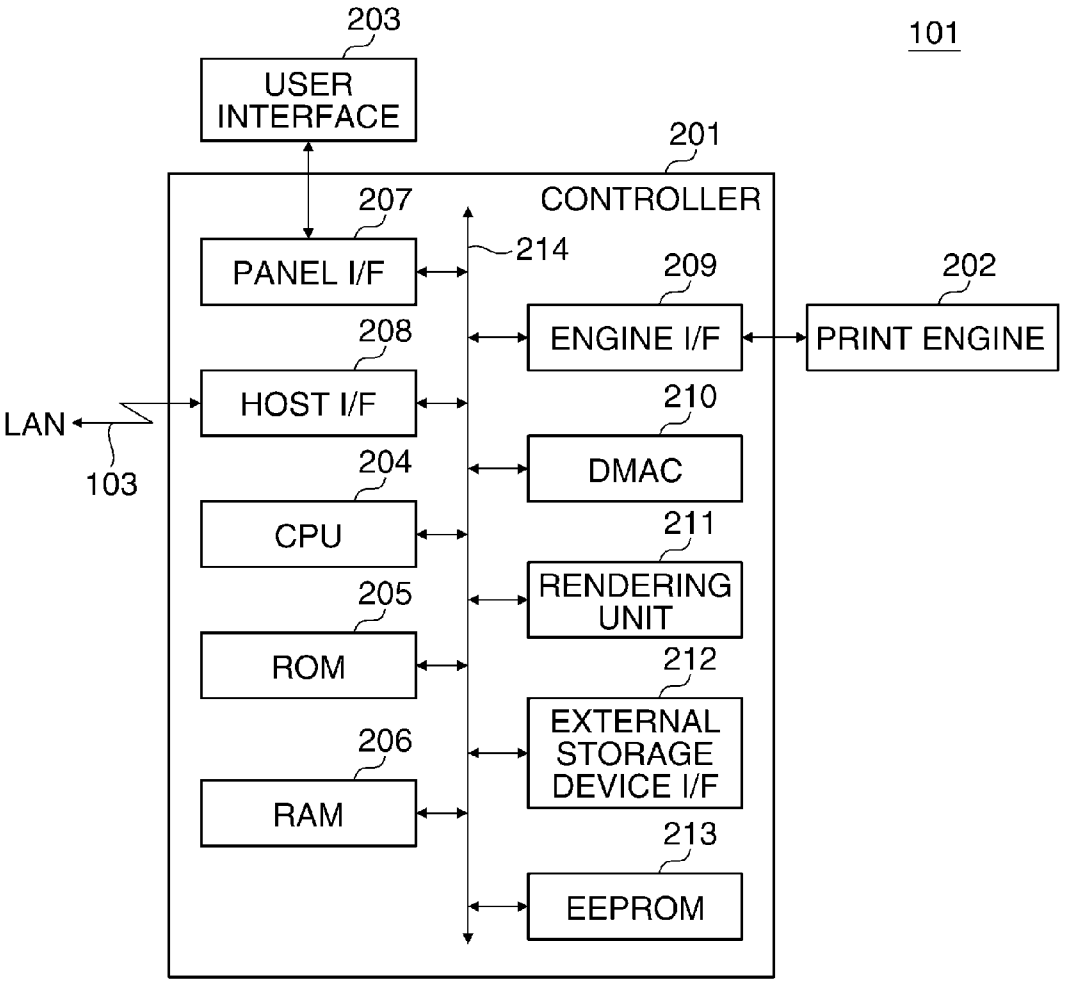
203
USER INTERFACE
101
201
CONTROLLER
207
PANEL I/F
214
209
ENGINE I/F
202
PRINT ENGINE
208
HOST I/F
LAN
103
210
DMAC
204
CPU
211
RENDERING UNIT
205
ROM
212
EXTERNAL STORAGE DEVICE I/F
206
RAM
213
EEPROM

FIG. 3

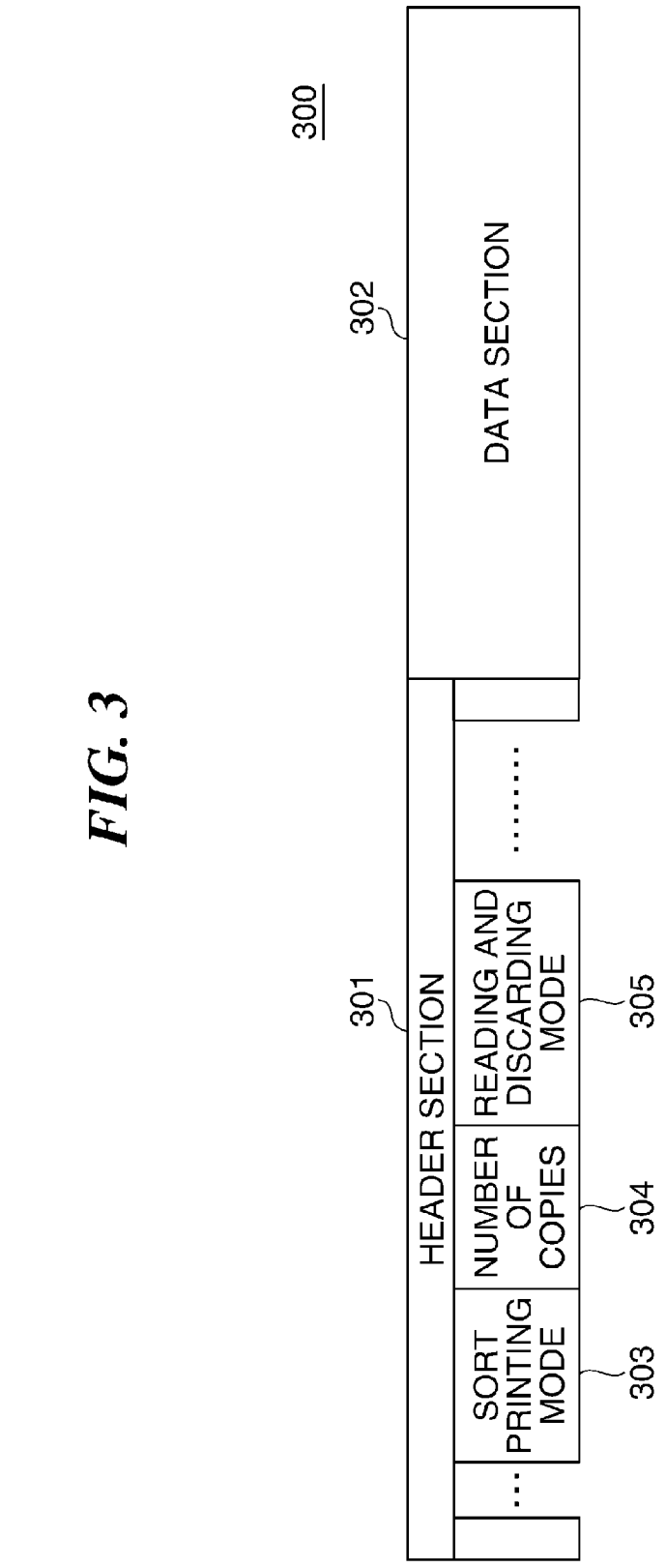
300
301
302
HEADER SECTION
DATA SECTION
...
SORT PRINTING MODE
NUMBER OF COPIES
READING AND DISCARDING MODE
.....
303
304
305

FIG. 4A

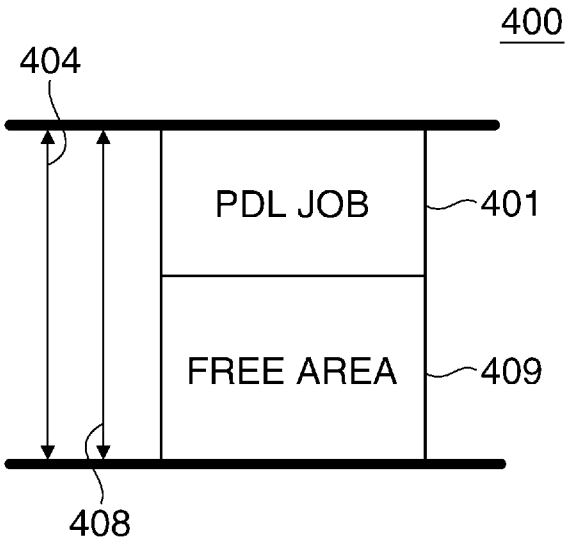
400
404
PDL JOB
401
FREE AREA
409
408

FIG. 4B

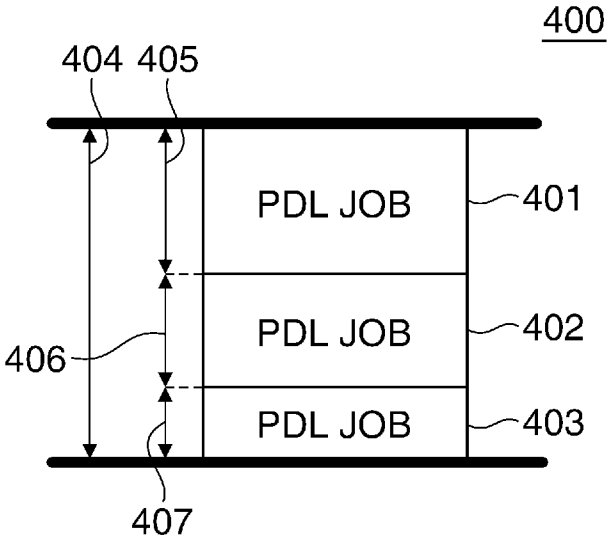
400
404
405
PDL JOB
401
PDL JOB
402
406
PDL JOB
403
407

FIG. 5

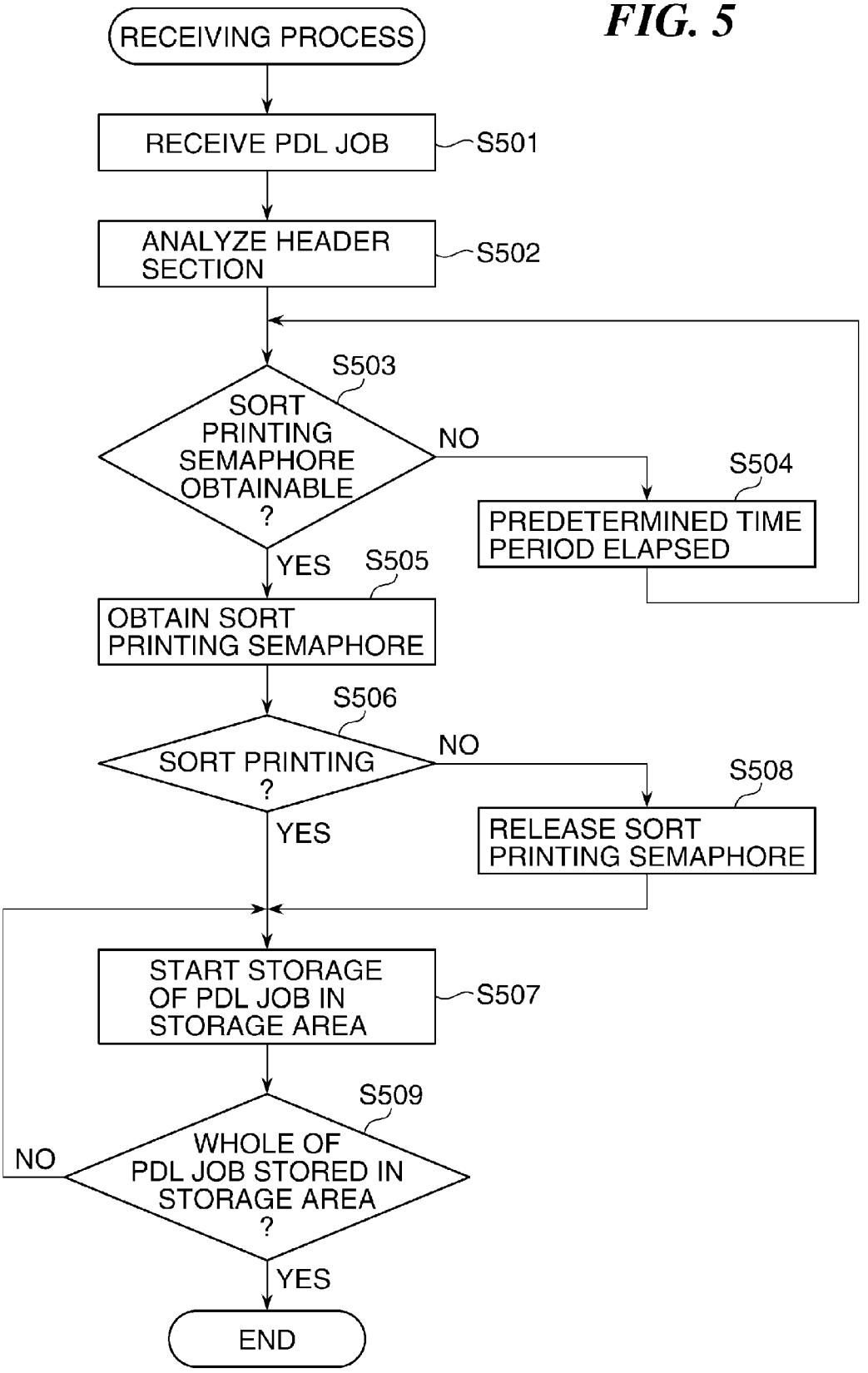
RECEIVING PROCESS
RECEIVE PDL JOB
S501
ANALYZE HEADER SECTION
S502
S503
SORT PRINTING SEMAPHORE OBTAINABLE ?
NO
S504
PREDETERMINED TIME PERIOD ELAPSED
YES
S505
OBTAIN SORT PRINTING SEMAPHORE
S506
SORT PRINTING ?
NO
S508
RELEASE SORT PRINTING SEMAPHORE
YES
START STORAGE OF PDL JOB IN STORAGE AREA
S507
S509
WHOLE OF PDL JOB STORED IN STORAGE AREA ?
NO
YES
END

FIG. 6

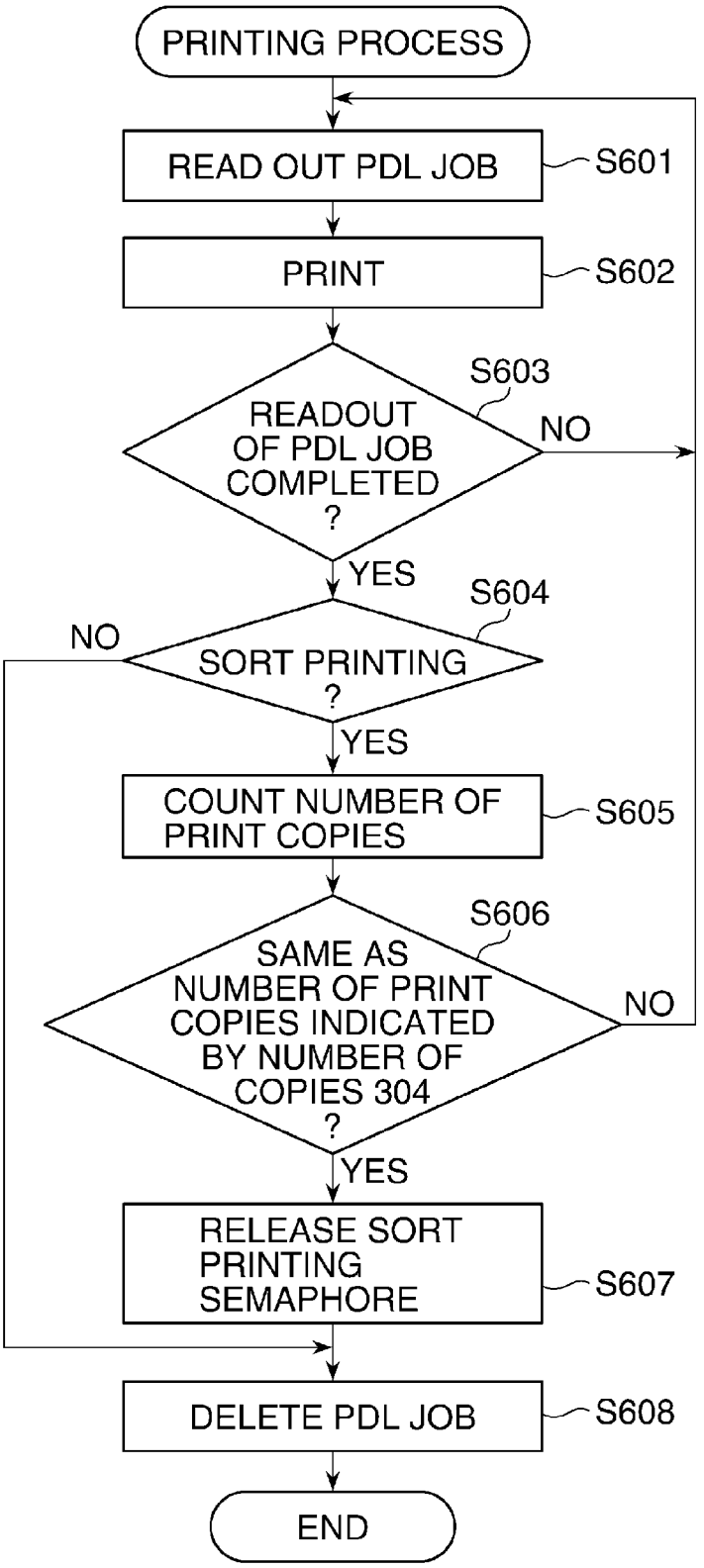
PRINTING PROCESS
READ OUT PDL JOB
S601
PRINT
S602
S603
READOUT OF PDL JOB COMPLETED ?
NO
YES
S604
NO
SORT PRINTING ?
YES
COUNT NUMBER OF PRINT COPIES
S605
S606
SAME AS NUMBER OF PRINT COPIES INDICATED BY NUMBER OF COPIES 304 ?
NO
YES
RELEASE SORT PRINTING SEMAPHORE
S607
DELETE PDL JOB
S608
END

FIG. 7

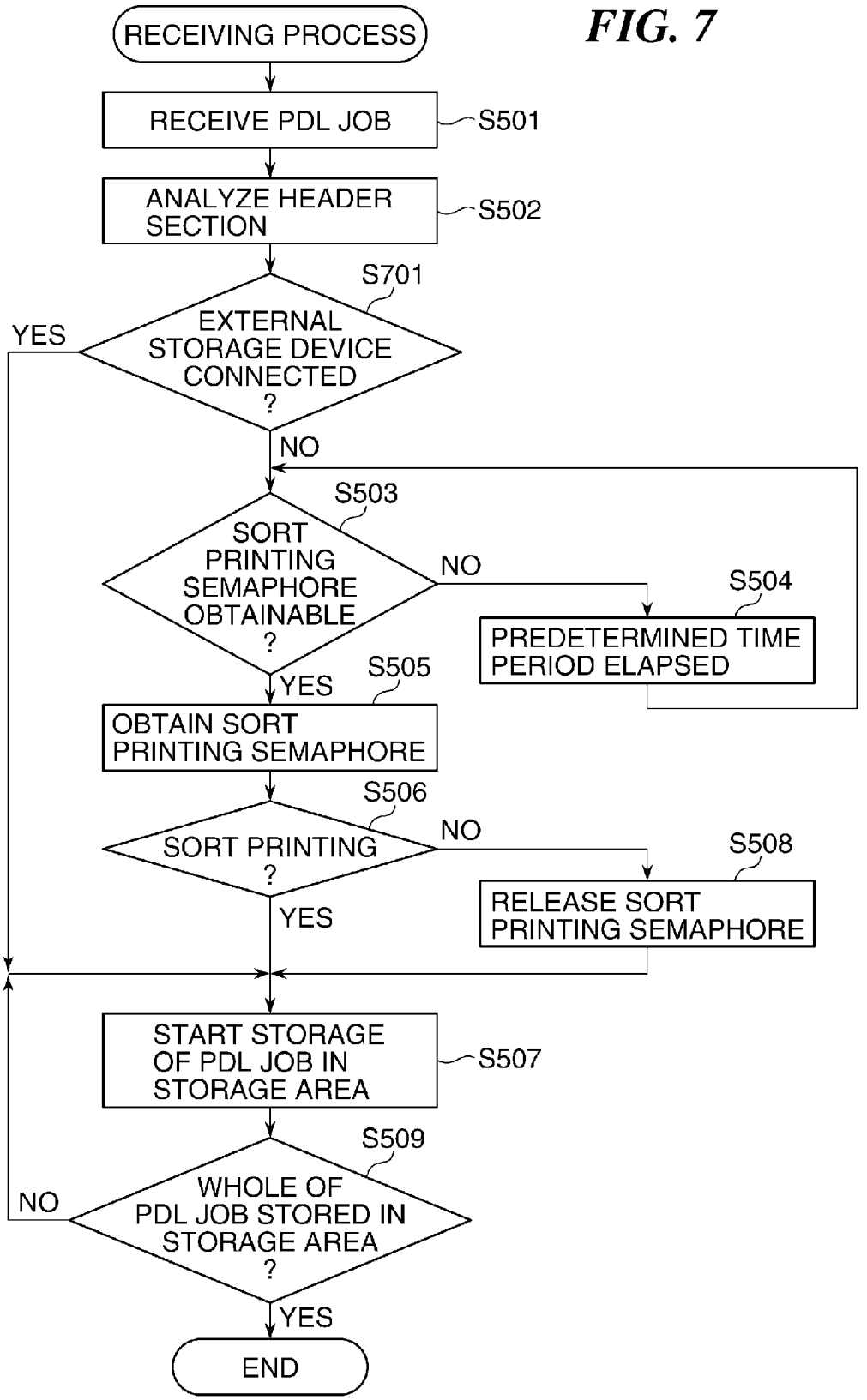
RECEIVING PROCESS
RECEIVE PDL JOB
S501
ANALYZE HEADER SECTION
S502
S701
EXTERNAL STORAGE DEVICE CONNECTED ?
YES
NO
S503
SORT PRINTING SEMAPHORE OBTAINABLE ?
NO
S504
PREDETERMINED TIME PERIOD ELAPSED
YES
S505
OBTAIN SORT PRINTING SEMAPHORE
S506
SORT PRINTING ?
NO
S508
RELEASE SORT PRINTING SEMAPHORE
YES
START STORAGE OF PDL JOB IN STORAGE AREA
S507
S509
WHOLE OF PDL JOB STORED IN STORAGE AREA ?
NO
YES
END

FIG. 8

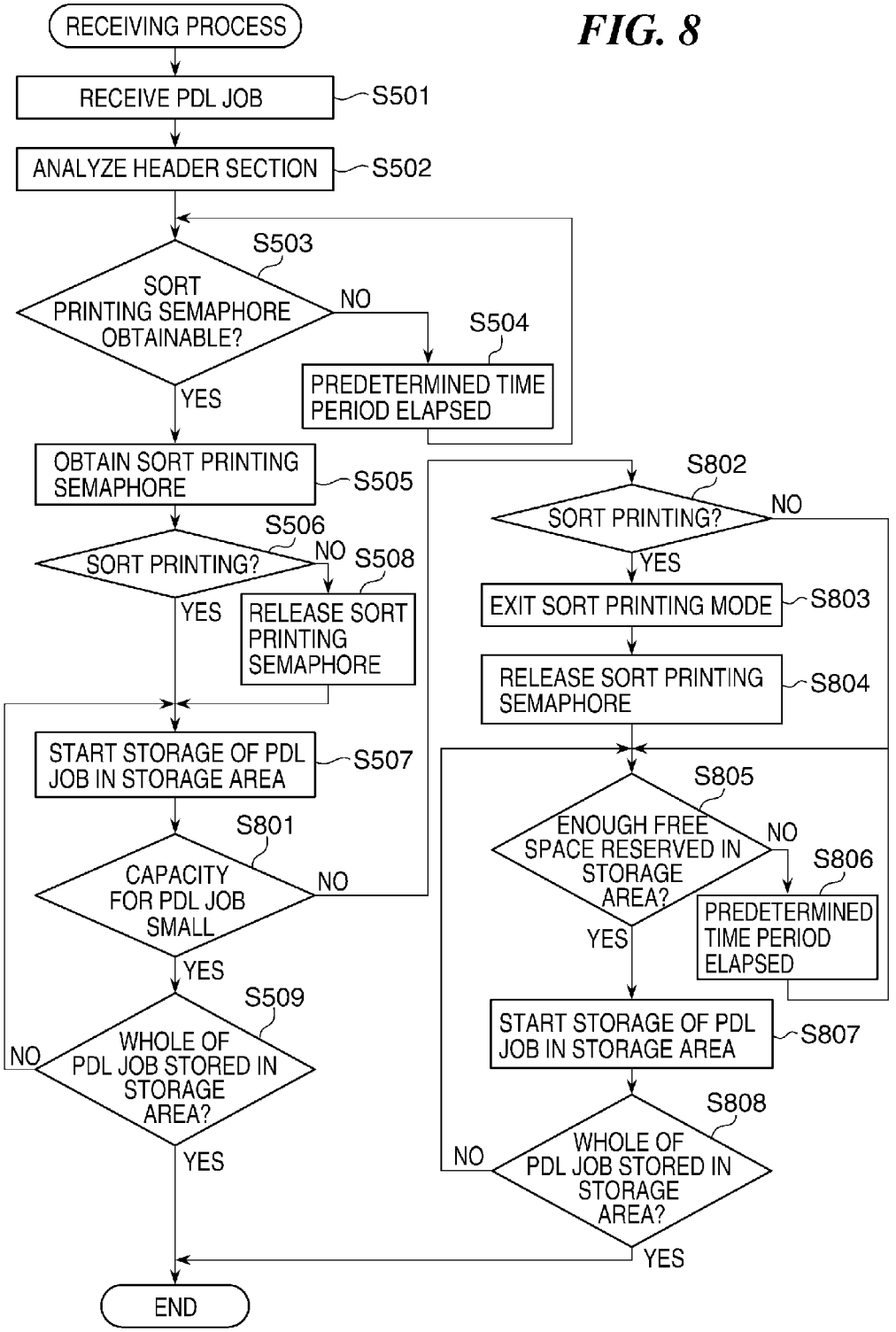
RECEIVING PROCESS
RECEIVE PDL JOB
S501
ANALYZE HEADER SECTION
S502
S503
SORT PRINTING SEMAPHORE OBTAINABLE?
NO
S504
PREDETERMINED TIME PERIOD ELAPSED
YES
OBTAIN SORT PRINTING SEMAPHORE
S505
S506
SORT PRINTING?
NO
S508
YES
RELEASE SORT PRINTING SEMAPHORE
START STORAGE OF PDL JOB IN STORAGE AREA
S507
S801
CAPACITY FOR PDL JOB SMALL
NO
YES
S509
WHOLE OF PDL JOB STORED IN STORAGE AREA?
NO
YES
END
S802
SORT PRINTING?
NO
YES
EXIT SORT PRINTING MODE
S803
RELEASE SORT PRINTING SEMAPHORE
S804
S805
ENOUGH FREE SPACE RESERVED IN STORAGE AREA?
NO
S806
PREDETERMINED TIME PERIOD ELAPSED
YES
START STORAGE OF PDL JOB IN STORAGE AREA
S807
S808
WHOLE OF PDL JOB STORED IN STORAGE AREA?
NO
YES

FIG. 9

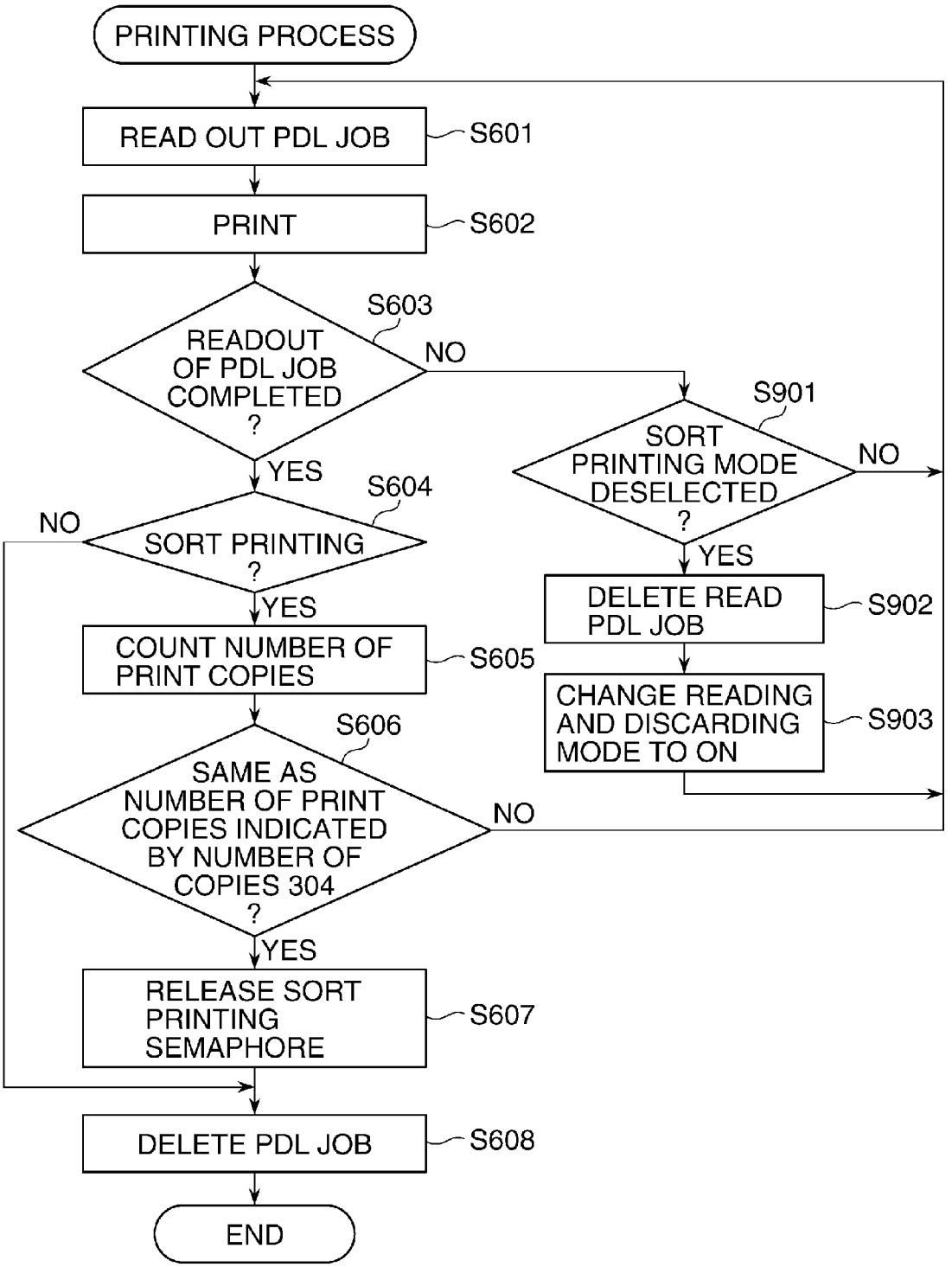
PRINTING PROCESS
READ OUT PDL JOB
S601
PRINT
S602
READOUT OF PDL JOB COMPLETED ?
S603
NO
YES
SORT PRINTING ?
S604
NO
YES
COUNT NUMBER OF PRINT COPIES
S605
SAME AS NUMBER OF PRINT COPIES INDICATED BY NUMBER OF COPIES 304 ?
S606
NO
YES
RELEASE SORT PRINTING SEMAPHORE
S607
DELETE PDL JOB
S608
END
SORT PRINTING MODE DESELECTED ?
S901
NO
YES
DELETE READ PDL JOB
S902
CHANGE READING AND DISCARDING MODE TO ON
S903

IMAGE FORMING APPARATUS THAT RESTRICTS RECEPTION OF PRINT JOB, CONTROL METHOD THEREFOR, AND STORAGE MEDIUM

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention relates to an image forming apparatus, a control method for the image forming apparatus, and a storage medium.

[0003] 2. Description of the Related Art

[0004] An image forming apparatus receives a plurality of PDL (page description language) jobs which are print jobs. When the received plurality of PDL jobs are successively stored in a memory which the image forming apparatus has, the free space of the memory may be exhausted to cause shortage of memory for executing the PDL jobs, and therefore, the PDL jobs may not be executed.

[0005] To cope with this, there are known image forming apparatuses which, upon receiving a PDL job, restrict reception of other PDL jobs so as to allocate memory for executing the received PDL job (see, for example, Japanese Laid-Open Patent Publication (Kokai) No. H10-264455).

[0006] Printing methods for use when an image forming apparatus prints a plurality of copies of print data corresponding to a PDL job include group printing in which a plurality of copies of print data are printed on a page-by-page basis, and sort printing in which a plurality of copies of print data are printed on a copy-by-copy basis. To perform printing of print data by group printing, the image forming apparatus stores print data on one page to be printed in a memory and performs printing of the print data stored in the memory. It is thus unnecessary to store print data on all pages to be printed in the memory at a time, and therefore, enough space of the memory which the image forming apparatus has is easily secured.

[0007] On the other hand, to perform printing of print data by sort printing, the image forming apparatus stores print data on all pages to be printed in the memory at a time. Therefore, when print data is printed by sort printing, a shortage of the free space of the memory which the image forming apparatus has tends to occur, and a PDL job may not be executed.

[0008] However, the image forming apparatus described in Japanese Laid-Open Patent Publication (Kokai) No. H10-264455 restricts reception of other PDL jobs irrespective of which printing method is used. Namely, the image forming apparatus described in Japanese Laid-Open Patent Publication (Kokai) No. H10-264455 excessively restricts reception of other PDL jobs and thus does not efficiently execute print jobs.

SUMMARY OF THE INVENTION

[0009] The present invention provides an image forming apparatus which is capable of efficiently executing print jobs, a control method for the image forming apparatus, and a storage medium.

[0010] Accordingly, the present invention provides an image forming apparatus that receives a second print job after receiving a first print job and prints a plurality of copies of print data corresponding to the first print job, comprising a determination unit configured to determine whether the print data is to be printed by sort printing, and a restriction unit configured to, when said determination unit determines that the print data is to be printed by sort printing, restrict reception of the second print job until printing of the print data is completed, and when said determination unit determines that the print data is not to be printed by sort printing, not restrict reception of the second print job even before printing of the print data is completed.

[0011] According to the present invention, when a print job is to be executed by sort printing, reception of other print jobs is restricted until printing of the print job is completed. On the other hand, when a print job is not to be executed by sort printing, reception of other print jobs is not restricted. As a result, print jobs are efficiently executed.

[0012] Further features of the present invention will become apparent from the following description of exemplary embodiments (with reference to the attached drawings).

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] FIG. **1** is a block diagram schematically showing an arrangement of an image forming system including an image forming apparatus according to a first embodiment of the present invention.

[0014] FIG. **2** is a block diagram schematically showing an internal arrangement of the image forming apparatus in FIG. **1**.

[0015] FIG. **3** is a diagram useful in explaining a structure of a PDL job which is received by the image forming apparatus in FIG. **1**.

[0016] FIGS. **4**A and **4**B are diagrams useful in explaining a structure of a storage area in which the PDL job in FIG. **3** is stored.

[0017] FIG. **5** is a flowchart showing the procedure of a receiving process which is carried out by a CPU of the image forming apparatus in FIG. **2**.

[0018] FIG. **6** is a flowchart showing a printing process in which bitmap data generated based on the PDL job received in the receiving process in FIG. **5** is printed.

[0019] FIG. **7** is a flowchart showing the procedure of a variation of the receiving process in FIG. **5**.

[0020] FIG. **8** is a flowchart showing the procedure of a receiving process which is carried out by the CPU of the image forming apparatus in FIG. **2**.

[0021] FIG. **9** is a flowchart showing the procedure of a printing process in which bitmap data generated based on the PDL job received in the receiving process in FIG. **8** is printed.

DESCRIPTION OF THE EMBODIMENTS

[0022] The present invention will now be described with reference to the drawings showing embodiments thereof.

[0023] First, a description will be given of a first embodiment of the present invention.

[0024] FIG. **1** is a block diagram schematically showing an arrangement of an image forming system **100** including an image forming apparatus **101** according to the first embodiment of the present invention.

[0025] The image forming system **100** in FIG. **1** has the image forming apparatus **101** and a PC **102**, and the image forming apparatus **101** and the PC **102** are connected together via a LAN **103**. A user operates the PC **102** to instruct the image forming apparatus **101** to, for example, execute a PDL job which is a print job. The image forming apparatus **101** receives a PDL job and forms an image on a recording sheet based on the PDL job.

[0026] FIG. **2** is a block diagram schematically showing an arrangement of the image forming apparatus **101** in FIG. **1**.

[0027] The image forming apparatus **101** in FIG. **2** has a controller **201**, a print engine **202**, and a user interface **203**. The controller **201** has a CPU **204**, a ROM **205**, a RAM **206**, a panel I/F **207**, a host I/F **208**, an engine I/F **209**, a DMAC **210**, a rendering unit **211**, an external storage device I/F **212**, and an EEPROM **213**. These component elements are connected to one another via a bus **214**.

[0028] The print engine **202** receives bitmap data from the controller **201** and prints bitmap data on a recording sheet. The bitmap data is printed on a recording sheet using an electrophotographic printing method, an inkjet printing method, or the like. The user interface **203** has hardware keys, an operating panel, and so on, and a user inputs instructions to the image forming apparatus **101** through the hardware keys and the operating panel. It should be noted that the operating panel may have, for example, a liquid crystal monitor, and for example, information on the image forming apparatus **101** is displayed on the liquid crystal monitor.

[0029] The CPU **204** expands programs stored in the ROM **205** into the RAM **206** and executes the programs to control the image forming apparatus **101**. The ROM **205** stores programs, which are executed by the CPU **204**, and others. The RAM **206** is a work memory for the CPU **204** and stores programs expanded from the ROM **205**. The RAM **206** also stores PDL data which PDL jobs have, intermediate data generated from the PDL data, bitmap data generated from the intermediate data, log information, and so on.

[0030] The panel I/F **207** connects the controller **201** and the user interface **203** together, the host I/F **208** connects the LAN **103** and the controller **201** together, and the engine I/F **209** connects the controller **201** and the print engine **202** together. The DMAC **210** writes data into the RAM **206** or reads out data from the RAM **206**. The rendering unit **211** converts intermediate data, which is generated from PDL data, into bitmap data. The external device I/F **212** connects the controller **201** and a removable external storage device (not shown) together. The EEPROM **213** stores, for example, setting information on the image forming apparatus **101**.

[0031] FIG. **3** is a diagram useful in explaining an arrangement of a PDL job **300** which is received by the image forming apparatus **101** in FIG. **1**.

[0032] The PDL job **300** in FIG. **3** has a header section **301** and a data section **302**. The header section **301** has attribute information on the PDL job **300** such as a sort printing mode **303**, the number of copies **304**, or a reading and discarding mode **305**. The data section **302** stores PDL data. The rendering section **211** generates bitmap data based on PDL data. The sort printing mode **303** indicates whether or not a sort printing mode in which a plurality of copies of bitmap data generated based on PDL data stored in the data section **302** are printed by sort printing is selected, and the number of copies **304** indicates the number of print copies to be made from the bitmap data.

[0033] The reading and discarding mode **305** indicates whether or not a reading and discarding mode in which the PDL job **300** is stored in a storage area **404**, to be described later, and when reading of the data section **302** is completed, the PDL job **300** is deleted from the storage area **400** even if printing of bitmap data has not been completed is selected. Usually, the reading and discarding mode is not selected when a plurality of copies of bitmap data are to be printed by sort printing, but is selected when a plurality of copies of bitmap data are to be printed by, for example, group printing, not by sort printing.

[0034] FIGS. **4**A and **4**B are diagrams useful in explaining a structure of the storage area **400** in which the PDL job **300** in FIG. **3** is stored. In the present embodiment, for example, the RAM **206** has the storage area **400**.

[0035] When the image forming apparatus **101** receives, for example, only one PDL job **401** (FIG. **4**A), the PDL job **401** is stored in a job storage area **408** having the same capacity as an overall capacity **404** of the storage area **400**. The PDL job **401**, however, does not have such an amount as to occupy the entire job storage area **408**, and hence the job storage area **408** stores the PDL job **401** and also has a free space **409**.

[0036] Also, upon receiving, for example, the PDL job **401**, a PDL job **402**, and a PDL job **403** (FIG. **4**B) in succession, the image forming apparatus **101** stores these PDL jobs **401** to **403** in the storage area **400** in the order in which the PDL jobs **401** to **403** were received. At this time, the PDL jobs **401** to **403** are stored in job storage areas **405** to **407**, respectively, which are formed by dividing the storage area **400** and have smaller capacities than the overall capacity **404** of the storage area **400**.

[0037] In the example shown in FIG. **4**B, when the PDL jobs **401** to **403** are successively received, the overall capacity **404** of the storage area **400** is filled with the job storage areas **405** to **407**. For this reason, there is not enough capacity of the storage area **400** required to execute the PDL jobs **401** to **403**, and the PDL jobs **401** to **403** are not efficiently executed. On the other hand, in the example shown in FIG. **4**A, the job storage area **408** has the free space **409**, and hence the PDL job **401** is efficiently executed. Therefore, in the case shown in FIG. **4**A, the PDL job **401** is efficiently executed even when the sort printing mode is selected for the PDL job **401**.

[0038] FIG. **5** is a flowchart showing the procedure of a receiving process which is carried out by the CPU **204** of the image forming apparatus in FIG. **2**.

[0039] Referring to FIG. **5**, first, the CPU **204** receives the PDL job **300** sent from the PC **102** (step S**501**), analyzes the header section **301**, which the received PDL job **300** has, and stores attribute information on the PDL job **300** such as the sort printing mode **303** and the number of copies **304** in the RAM **206** (step S**502**), and determines whether or not it is possible to obtain a sort printing semaphore (step S**503**).

[0040] Here, a semaphore is a function of controlling an interrupt process in which when a certain process is being carried out, it is interrupted by another process, and a sort printing semaphore is a semaphore which is used when the sort printing mode is selected. Specifically, in a case where a sort printing semaphore is obtained, and the sort printing mode is selected when one PDL job is to be executed, reception of other PDL jobs is restricted until execution of the PDL job is completed, and the obtained sort printing semaphore is released. On the other hand, in a case where no sort printing semaphore has been obtained when one PDL job is to be executed, reception of other PDL jobs is not restricted even before printing of print data is completed.

[0041] When the CPU **204** determines in the step S**503** that it is not possible to obtain a sort printing semaphore, the process returns to the step S**503** after a predetermined time period has elapsed (step S**504**). On the other hand, when it is possible to obtain a sort printing semaphore, the CPU **204** obtains a sort printing semaphore and restricts reception of other PDL jobs (step S**505**), and based on the sort printing mode **303** in the PDL job **300**, determines whether or not the

sort printing mode is selected (step S506). It should be noted that the predetermined time period in the step S504 is stored in the ROM 205 in advance.

[0042] As a result of the determination in the step S506, when the sort printing mode is selected, the CPU 204 starts storing the PDL job 300 in the storage area 400 (step S507). On the other hand, when the sort printing mode is not selected, the CPU 204 releases the sort printing semaphore to allow reception of other PDL jobs (step S508), followed by the process proceeding to the step S507. The CPU 204 then determines whether or not the whole of the PDL job 300 has been stored in the storage area 400 (step S509).

[0043] As a result of the determination in the step S509, when the whole of the PDL job 300 has not been stored in the storage area 400, the process returns to the step S507, and when the whole of the PDL job 300 has been stored in the storage area 400, the process is terminated.

[0044] According to the process in FIG. 5, when a sort printing semaphore is obtained, and the sort printing mode is selected (steps S505 and S506), reception of other PDL jobs is restricted. This prevents a shortage of the free space of the storage area 400 in the image forming apparatus 101 during sort printing and allows execution of the PDL job 300. When the sort printing mode is not selected for the PDL job 300, and a sort printing semaphore is released (steps S506 and S508), reception of other PDL jobs is allowed. As a result, other PDL jobs are smoothly received, and hence PDL jobs are efficiently executed.

[0045] FIG. 6 is a flowchart showing a printing process in which bitmap data generated based on the PDL job 300 received by the receiving process in FIG. 5 is printed. The process in FIG. 6 is carried out by the CPU 204.

[0046] Referring to FIG. 6, first, in response to storage of the PDL job 300 in the storage area 400 being started in the step S507 described above, the CPU 204 reads out the PDL job 300 from the storage area 400 (step S601). The CPU 204 then expands the read PDL job 300 to generate intermediate data from PDL data stored in the data section 302, the rendering unit 211 generates bitmap data from the intermediate data, and the print engine 202 prints the bitmap data on a recording sheet (step S602). The CPU 204 then determines whether or not readout of the PDL job 300 from the storage area 400 has been completed (step S603).

[0047] As a result of the determination in the step S603, when readout of the PDL job 300 has not been completed, the process returns to the step S601, and when readout of the PDL job 300 has been completed, the CPU 204 then determines whether or not the sort printing mode is selected based on the sort printing mode 303 (step S604). As a result of the determination in the step S604, when the sort printing mode is not selected, the CPU 204 deletes the PDL job 300 from the storage area 400 (step S608) and terminates the process. On the other hand, when the sort printing mode is selected, the CPU 204 counts the number of print copies of printed matter, that is, the number of recording sheets on which bitmap data has been printed (step S605) and determines whether or not the counted number of print copies of printed matter matches the number of print copies indicated by the number of copies 304 (step S606).

[0048] As a result of the determination in the step S606, when the counted number of print copies of printed matter matches the number of print copies indicated by the number of copies 304, the CPU 204 releases the sort printing semaphore (step S607), followed by the process proceeding to step S608, and when the counted number of print copies of printed matter does not match the number of print copies indicated by the number of copies 304, the process returns to the step S601.

[0049] According to the process in FIG. 6, in response to storage of the PDL job 300 in the storage area 400 being started in the step S507, a predetermined size of data in the PDL job 300 stored in the storage area 400 is read out (step S601). Therefore, a printing process is allowed to be started before the whole of the PDL job 300 is stored in the storage area 400, and as a result, the printing process is quickly completed.

[0050] FIG. 7 is a flowchart showing the procedure of a variation of the receiving process in FIG. 5. Processes in steps S501 to S509 in FIG. 7 are the same as those in the steps S501 to S509 in FIG. 5, and therefore, only features different from the processes in FIG. 5 will be described below.

[0051] After carrying out the process in the step S502, the CPU 204 determines whether or not an external storage device is connected to the external storage device I/F 212 (step S701). As a result of the determination in the step 701, when an external storage device is connected to the external storage device I/F 212, the process proceeds to the step S507 without obtaining a sort printing semaphore with the steps S503 to S506 and S508 skipped, and in the step S507, storage of the PDL job 300 in the storage area 400 is started. When no external storage device is connected to the external storage device I/F 212, the process proceeds to the step S503.

[0052] According to the process in FIG. 7, when an external storage device is connected to the external storage device I/F 212, storage of the PDL job 300 in the storage area 400 is started (step S507) without obtaining a sort printing semaphore (step S701), and hence reception of other print jobs is not restricted (restriction on reception is disabled). In other words, even when the sort printing mode is selected for the PDL job 300, other print jobs are received when an external storage device is connected to the external storage device I/F 212. As a result, other print jobs are smoothly received, and hence the PDL job 300 and other print jobs are more efficiently executed.

[0053] A description will now be given of a second embodiment of the present invention.

[0054] The second embodiment of the present invention is basically the same as the first embodiment described above in terms of constructions and operations, differing from the first embodiment in that whether or not to receive the PDL job 300 depends on whether or not the amount of the PDL job 300 is greater than the free space of the storage area 400. Features of constructions and operations that are the same as those in the first embodiment will not be described, only constructions and operations different from those of the first embodiment being described below.

[0055] FIG. 8 is a flowchart showing the procedure of a receiving process which is carried out by the CPU 204 of the image forming apparatus in FIG. 2. Processes in steps S501 to S509 in FIG. 8 are the same as those in the steps S501 to S509 in FIG. 5, and therefore, only features different from the processes in FIG. 5 will be described below.

[0056] After carrying out the process in the step S507, the CPU 204 determines whether or not a space required to print a plurality of copies of bitmap data generated from the PDL job 300 is smaller than a free space of the storage area 400 (step S801). As a result of the determination in the step 801, when a space required to print a plurality of copies of the bitmap data is smaller than a free space of the storage area

400, the process proceeds to the step S509, and when a space required to print a plurality of copies of the bitmap data is greater than a free space of the storage area 400, the CPU 204 determines whether or not the sort printing mode is selected based on the sort printing mode 303 (step S802).

[0057] As a result of the determination in the step S802, when the sort printing mode is selected, the CPU 204 decreases the number of print copies indicated by the number of copies 304 to one and deselects the sort printing mode (step S803) and releases the sort printing semaphore (step S804). In the present embodiment, when the sort printing mode is deselected in the step S803, the reading and discarding mode is selected in a process in step S903 in FIG. 9, to be described later. When the sort printing mode is deselected, the CPU 204 does not store the whole of the PDL job 300 in the storage area 400 at a time but successively stores pieces of the PDL job 300 in the storage area 400, and when the reading and discarding mode is selected, the CPU 204 successively deletes pieces of the PDL job 300, of which reading has been completed, from the storage area 400, causing a free space of the storage area 400 to increase.

[0058] The CPU 204 then determines whether or not a free space large enough to store the subsequent piece of the PDL job 300 has been reserved in the storage area 400 (step S805). As a result of the determination in the step S805, when enough free space has not been reserved in the storage area 400, the process returns to the step S805 after the free space of the storage area 400 has increased with the lapse of a predetermined time period (step S806). When enough free space has been reserved in the storage area 400, the CPU 204 starts storing the subsequent piece of the PDL job 300 in the storage area 400 (step S807) and determines whether or not the whole of the PDL job 300 has been stored in the storage area 400 (step S808).

[0059] As a result of the determination in the step S808, when the whole of the PDL job 300 has been stored in the storage area 400, the process is terminated. On the other hand, when the whole of the PDL job 300 has not been stored in the storage area 400, the process returns to the step S805. As a result of the determination in the step S802, when the sort printing mode is not selected, the process proceeds to the step S805 with the steps S803 and S804 skipped.

[0060] According to the process in FIG. 8, when a space required to print a plurality of copies of the bitmap data is greater than a free space of the storage area 400 (NO in the step S801), the number of print copies indicated by the number of copies 304 of the PDL job 300 is decreased to one, and the sort printing mode is deselected (step S803). This eliminates the need to continuously store the whole of the PDL job 300 in the storage area 400 until printing of the bitmap data is completed. This prevents a shortage of the free space of the storage area 400 to smoothly receive the PDL job 300, and as a result, the PDL job 300 is efficiently executed.

[0061] FIG. 9 is a flowchart showing the procedure of a printing process in which bitmap data generated based on the PDL job 300 received in the receiving process in FIG. 8 is printed. The printing process in FIG. 9 is carried out by the CPU 204. Processes in steps S601 to S608 in FIG. 9 are the same as those in the steps S601 to S608 in FIG. 6, and therefore, only features different from the processes in FIG. 6 will be described below.

[0062] As a result of the determination in the step S603, when readout of the PDL job 300 has not been completed, the CPU 204 determines whether or not sort printing was deselected in the step S803 described above (step S901). As a result of the determination in the step S901, when sort printing was not deselected, the process returns to the step S601. On the other hand, when sort printing was deselected, the CPU 204 deletes the read PDL job 300 from the storage area 400 (step S902) and selects the reading and discarding mode (step S903), followed by the process returning to the step S601.

[0063] According to the process in FIG. 9, when sort printing is deselected, the read PDL job 300 is deleted from the storage area 400 (step S902), and as a result, a free space is reserved in the storage area 400 at the right time.

Other Embodiments

[0064] 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)™), a flash memory device, a memory card, and the like.

[0065] While the present invention has been described with reference to exemplary embodiments, it is to be understood that the invention is not limited to the disclosed exemplary embodiments. The scope of the following claims is to be accorded the broadest interpretation so as to encompass all such modifications and equivalent structures and functions.

[0066] This application claims the benefit of Japanese Patent Application No. 2014-183301, filed Sep. 9, 2014, which is hereby incorporated by reference herein in its entirety.

What is claimed is:

1. An image forming apparatus that receives a second print job after receiving a first print job and prints a plurality of copies of print data corresponding to the first print job, comprising:

a determination unit configured to determine whether the print data is to be printed by sort printing; and

a restriction unit configured to, when said determination unit determines that the print data is to be printed by sort printing, restrict reception of the second print job until printing of the print data is completed, and when said

determination unit determines that the print data is not to be printed by sort printing, not restrict reception of the second print job even before printing of the print data is completed.

2. The image forming apparatus according to claim **1**, further comprising a connection unit configured to have an external storage device connected thereto, and

wherein said restriction unit is disabled when the external storage device is connected.

3. An image forming apparatus that receives a print job, prints print data corresponding to the print data by sort printing, and based on a predetermined plural number of print copies set for the print data, prints a plurality of copies of the print data, comprising:

an obtaining unit configured to obtain information on the number of print copies, information on a free space of a storage area in which the print data is to be stored, and information on an amount of the print data; and

a control unit configured to, when a space required to print the plurality of copies of the print data is greater than the free space of the storage area, decrease the predetermined number of print copies set for the print data to one.

4. The image forming apparatus according to claim **3**, further comprising a deleting unit configured to, when the print data has been printed, delete the print data stored in the storage area.

5. A control method for an image forming apparatus that receives a second print job after receiving a first print job and prints a plurality of copies of print data corresponding to the first print job, comprising:

a determination step of determining whether the print data is to be printed by sort printing; and

a restriction step of, when it is determined in said determination step that the print data is to be printed by sort printing, restricting reception of the second print job until printing of the print data is completed, and when it is determined in said determination step that the print data is not to be printed by sort printing, not restricting reception of the second print job even before printing of the print data is completed.

6. A control method for an image forming apparatus that receives a print job, prints print data corresponding to the print data by sort printing, and based on a predetermined plural number of print copies set for the print data, prints a plurality of copies of the print data, comprising:

an obtaining step of obtaining information on the number of print copies, information on a free space of a storage area in which the print data is to be stored, and information on an amount of the print data; and

a control step of, when a space required to print the plurality of copies of the print data is greater than the free space of the storage area, decreasing the predetermined number of print copies set for the print data to one.

7. A non-transitory computer-readable storage medium storing a program for causing a computer to execute a control method for an image forming apparatus that receives a second print job after receiving a first print job and prints a plurality of copies of print data corresponding to the first print job, the control method comprising:

a determination step of determining whether the print data is to be printed by sort printing; and

a restriction step of, when it is determined in the determination step that the print data is to be printed by sort printing, restricting reception of the second print job until printing of the print data is completed, and when it is determined in the determination step that the print data is not to be printed by sort printing, not restricting reception of the second print job even before printing of the print data is completed.

8. A non-transitory computer-readable storage medium storing a program for causing a computer to execute a control method for an image forming apparatus that receives a print job, prints print data corresponding to the print data by sort printing, and based on a predetermined plural number of print copies set for the print data, prints a plurality of copies of the print data, the control method comprising:

an obtaining step of obtaining information on the number of print copies, information on a free space of a storage area in which the print data is to be stored, and information on an amount of the print data; and

a control step of, when a space required to print the plurality of copies of the print data is greater than the free space of the storage area, decreasing the predetermined number of print copies set for the print data to one.

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