US 20040184080A1

(19) United States

(12) Patent Application Publication (10) Pub. No.: US 2004/0184080 A1

Gotoh et al. (43) Pub. Date: Sep. 23, 2004

(54) PRINTER CONTROLLING DEVICE, PRINTER CONTROLLING METHOD, AND COMPUTER PRODUCT

(76) Inventors: **Tetsuya Gotoh**, Kanagawa (JP); **Hajime Takahashi**, Kanagawa (JP); **Keiji Yamamoto**, Kanagawa (JP)

Correspondence Address:
**OBLON, SPIVAK, MCCLELLAND, MAIER & NEUSTADT, P.C.**
**1940 DUKE STREET**
**ALEXANDRIA, VA 22314 (US)**

(21) Appl. No.: **10/765,055**

(22) Filed: **Jan. 28, 2004**

**Related U.S. Application Data**

(63) Continuation of application No. 09/986,596, filed on Nov. 9, 2001, now Pat. No. 6,709,176.

(30) **Foreign Application Priority Data**

Nov. 10, 2000 (JP) ..... 2000-344135

**Publication Classification**

(51) **Int. Cl.**[7] ..... **G06F 15/00**; G06F 3/12

(52) **U.S. Cl.** ..... **358/1.15**; 710/19

(57) **ABSTRACT**

A schedule view is displayed in a print server. In the schedule view, print-jobs are displayed with rectangular shapes having lengths corresponding to printing time and color (or pattern) corresponding to its state, and the print-jobs are arranged and displayed in the order of prints to which the print-jobs are allocated. It is possible to intuitively grasp relative magnitude of a load of each printer by the length of a job graph, and an absolute amount of the load of each printer converted into a printing time by a displayed time scale. In addition to this, details of a job which is being processed, details of a selected job, and a state of each printer are also displayed.

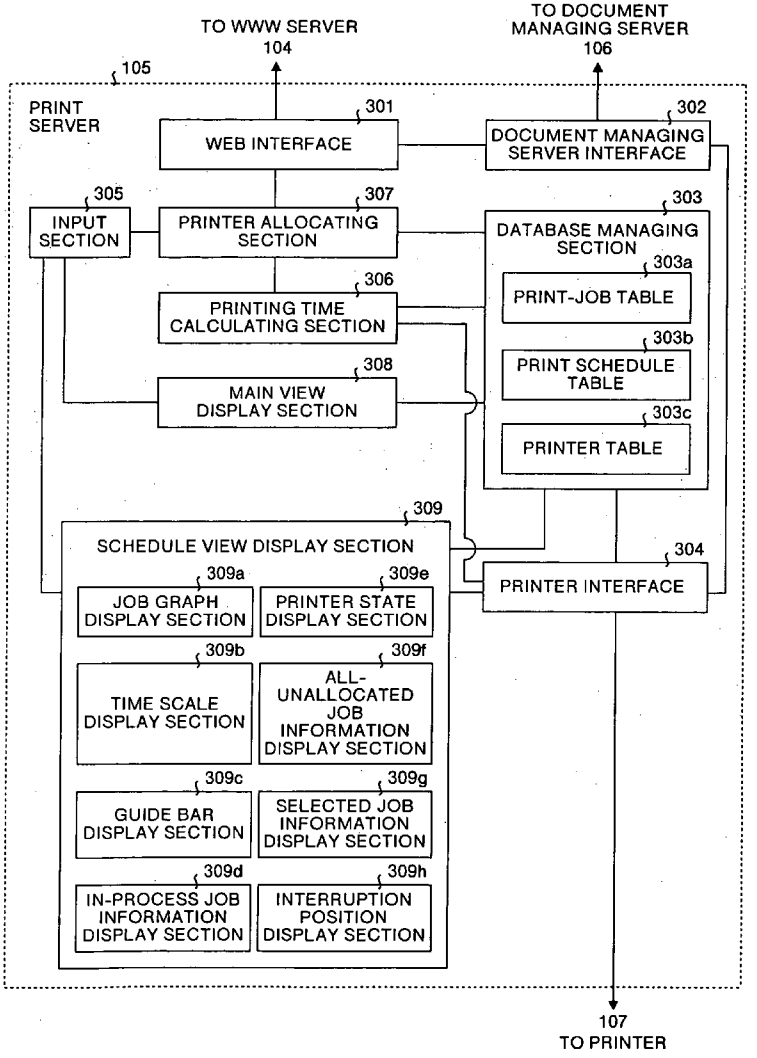


FIG.1

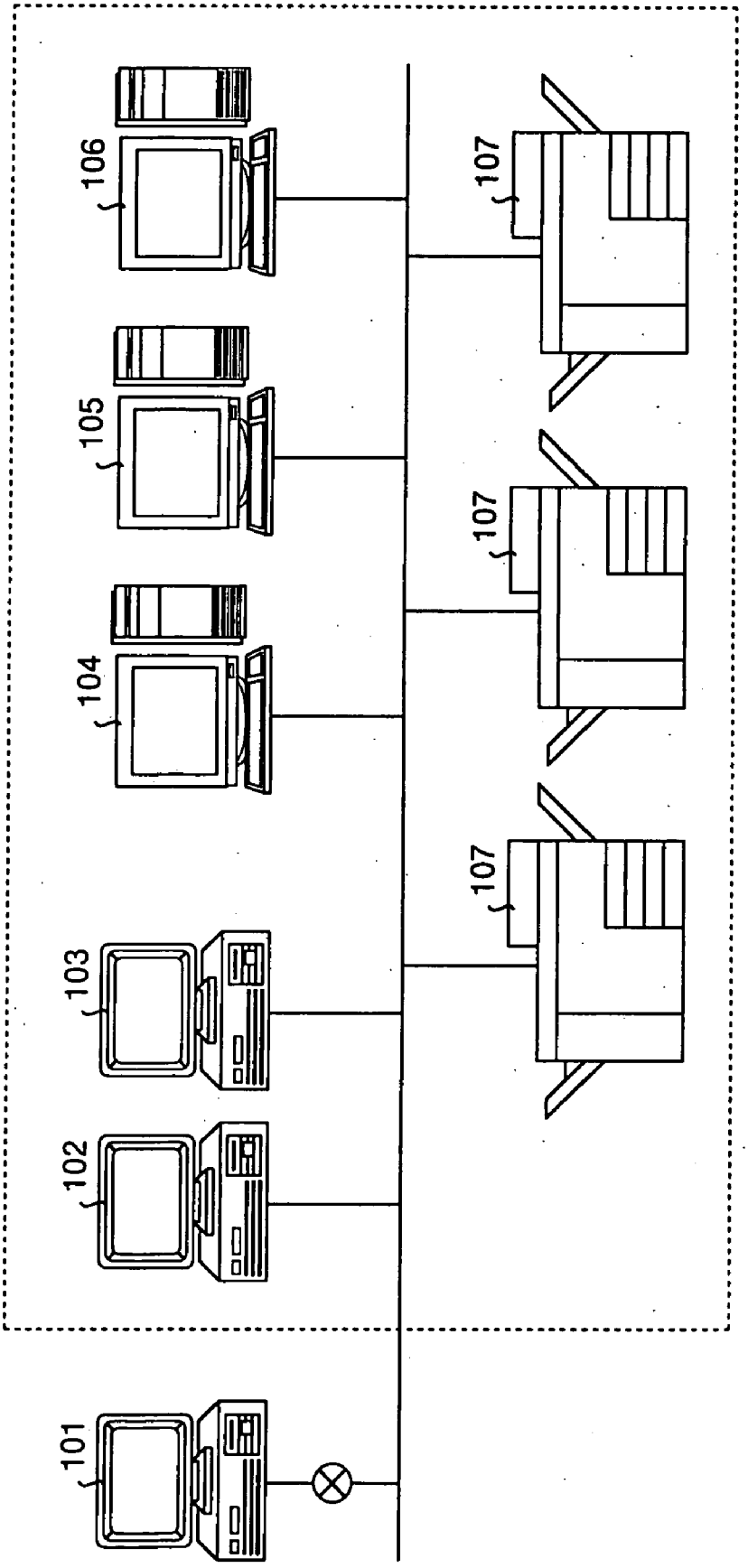


FIG.2

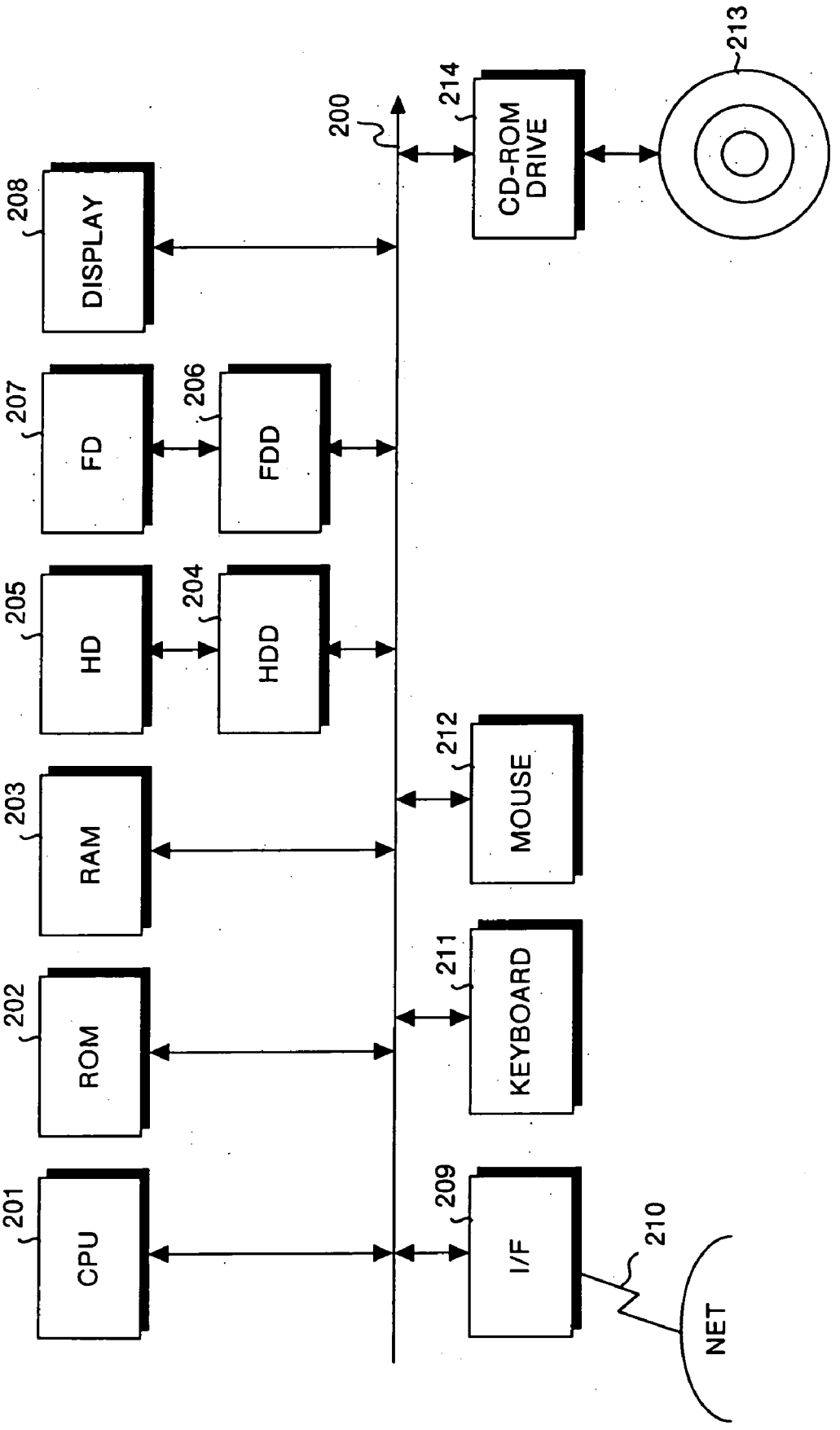

200
201
CPU
202
ROM
203
RAM
204
HDD
205
HD
206
FDD
207
FD
208
DISPLAY
209
I/F
210
NET
211
KEYBOARD
212
MOUSE
213
214
CD-ROM DRIVE

FIG.3

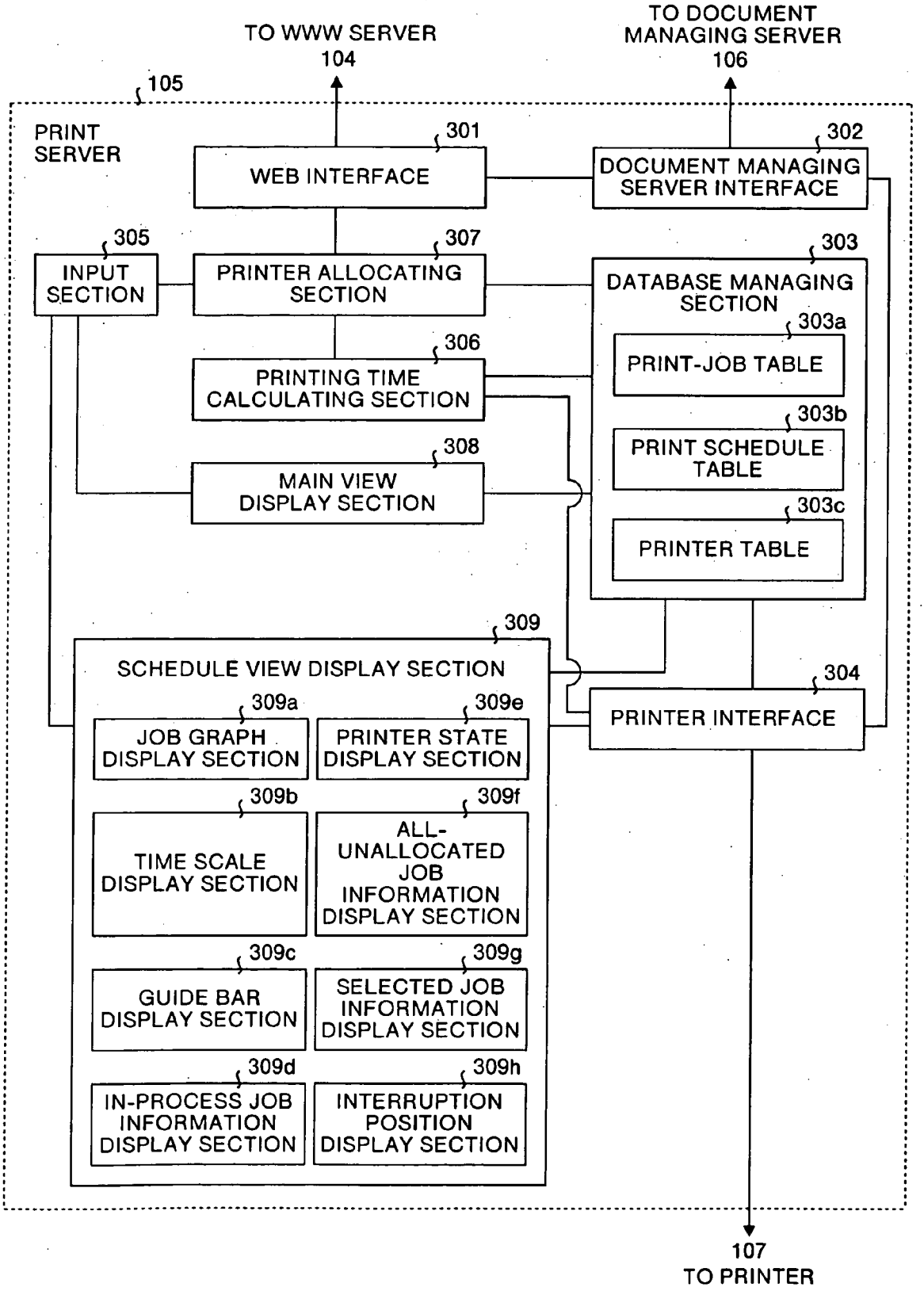

TO WWW SERVER
104
TO DOCUMENT MANAGING SERVER
106
105
PRINT SERVER
301
WEB INTERFACE
302
DOCUMENT MANAGING SERVER INTERFACE
305
INPUT SECTION
307
PRINTER ALLOCATING SECTION
303
DATABASE MANAGING SECTION
303a
PRINT-JOB TABLE
306
PRINTING TIME CALCULATING SECTION
303b
PRINT SCHEDULE TABLE
308
MAIN VIEW DISPLAY SECTION
303c
PRINTER TABLE
309
SCHEDULE VIEW DISPLAY SECTION
304
PRINTER INTERFACE
309a
JOB GRAPH DISPLAY SECTION
309e
PRINTER STATE DISPLAY SECTION
309b
TIME SCALE DISPLAY SECTION
309f
ALL-UNALLOCATED JOB INFORMATION DISPLAY SECTION
309c
GUIDE BAR DISPLAY SECTION
309g
SELECTED JOB INFORMATION DISPLAY SECTION
309d
IN-PROCESS JOB INFORMATION DISPLAY SECTION
309h
INTERRUPTION POSITION DISPLAY SECTION
107
TO PRINTER

FIG.4

| ITEM ID | DATA TYPE | SIZE (BYTE) | DESCRIPTION |
|---|---|---|---|
| JID | TEXT | 14 | JOB ID (ID IS "J + SEVEN-DIGIT NUMERICAL VALUE") |
| UID | TEXT | 8 | USER'S ID |
| NUM | INTEGER | 2 | THE NUMBER OF SHEETS (1 TO 9999) |
| SIDE | BYTE | 1 | TWO-SIDED |
| PCOL | BYTE | 1 | PRINT COLOR |
| PAGE | INTEGER | 2 | THE NUMBER OF PAGES OF DOCUMENT (1 TO 9999) |
| SIZE | TEXT | 2 | PAPER SIZE |
| SCOL | TEXT | 2 | PAPER COLOR |
| QUAL | TEXT | 2 | PAPER QUALITY |
| SPCL | TEXT | 2 | SPECIAL PAPER |
| HCOL | TEXT | 2 | FRONT PAPER COLOR |
| STPL | TEXT | 2 | STAPLE |
| PLCE | TEXT | 2 | PLACE TO BIND |
| WAY | TEXT | 2 | BINDING METHOD |
| HOLE | TEXT | 2 | PUNCHING |
| SCDL | BYTE | 1 | SCHEDULE |
| SDATE | DATE/TIME | 8 | OUTPUT DATE AND TIME (EFFECTIVE ONLY WHEN DATE IS DESIGNATED) |
| COMM | TEXT | 40 | COMMENT |
| SAVE | BYTE | 1 | DESIGNATION OF SAVE OF DOCUMENT |
| LONG | DATE/TIME | 8 | TIME PERIOD OF SAVING |
| YEAR | INTEGER | 2 | YEARS OF SAVING |
| REPE | BYTE | 1 | REPEAT CLASSIFICATION |
| OJID | TEXT | 14 | PARENT JOB ID |
| RPDL | TEXT | 35 | FILE NAME (RPDL) |
| FILE | TEXT | 35 | FILE NAME |
| MID | TEXT | 14 | ESTIMATION ID |
| STT | DATE/TIME | 8 | START OF PROCESSING |
| END | DATE/TIME | 8 | COMPLETION OF PROCESSING |
| DATE | DATE/TIME | 8 | REGISTERED DATE AND TIME |
| PERI | INTEGER | 2 | PRECEDENCE |
| UFLG | TEXT | 2 | USER JOB STATE FLAG |
| KFLG | TEXT | 2 | MANAGER JOB STATE FLAG |
| DOCID | TEXT | 45 | DOCUMENT ID OF LIFISA |
| PNAME | TEXT | 100 | PRINTER NAME |
| OPAGE | INTEGER | 2 | THE NUMBER OF OUTPUT PAGES |
| ECPY | INTEGER | 2 | THE NUMBER OF OUTPUT SHEETS |
| DIVN | INTEGER | 2 | THE NUMBER OF DIVIDED JOBS |
| AMNY | LONG INTEGER | 4 | PRINTING COST (TOTAL) |
| MEANS | BYTE | 1 | OUTPUT STYLE |
| KCOMM | TEXT | 128 | MANAGER COMMENT |

*NOTES '1' (49) PARALLEL PRINT
'2' (50) COLLECTIVE PRINT (NORMAL)
'3' (51) DEPUTY PRINT

FIG.5

| ITEM ID | DATA TYPE | SIZE (BYTE) | DESCRIPTION |
|---|---|---|---|
| JID | TEXT | 14 | JOB ID (EIGHT-DIGIT) + SMALL JOB ID (SIX-DIGIT) |
| PRNT | TEXT | 50 | PRINTER NAME |
| STT | DATETIME | 8 | PRINT-START IMPOSED DATE |
| END | DATETIME | 8 | PRINT-COMPLETION IMPOSED DATE |
| SNO | INTEGER | 2 | STARTING PAGE NUMBER |
| NUM | INTEGER | 2 | THE NUMBER OF OUTPUT SHEETS |
| KFLG | TEXT | 2 | MANAGER JOB STATE FLAG *NOTE |
| TIME | INTEGER | 2 | PRINTING TIME |

*NOTES "01" PRINT STANDBY
"02" PRINTING
"03" STOPPING
"04" NOT ALLOCATED TO PRINTER (PENDING)
"05" PRINT COMPLETION
"06" PRINT CANCEL
"07" BOUND
"08" SENT
"09" COMPLETION OF PROCESSING
"99" PRINT ERROR

FIG.6

| | GROUP NAME | PRINTER NAME | STATE | IP ADDRESS | OPERATION AT THE TIME OF RECEPTION | OPERATION AT THE TIME OF COMPLETION | DEPUTY PRINT | PARALLEL PRINT | COLOR PAGE |
|---|---|---|---|---|---|---|---|---|---|
| * | PRINTER A | PRINTER A1 | READY | 166.192.195.131 | MANUAL AT THE TIME OF INPUT | DISPLAY COMPLETION SCREEN | MANUAL | 30 SHEETS OR MORE | NOT USED |
| | | PRINTER A2 | READY | 166.192.195.132 | | | | | |
| | | PRINTER A3 | WARM UP | 166.192.195.133 | | | | | |
| | | PRINTER A4 | PAPER JAMMING | 166.192.195.134 | | | | | |
| | PRINTER B | PRINTER B1 | REPLENISH TONER | 166.192.195.141 | MANUAL AT THE TIME OF INPUT | DISPLAY COMPLETION SCREEN | AUTOMATIC | 20 SHEETS OR MORE | USED |
| | | PRINTER B2 | READY | 166.192.195.142 | | | | | |
| | | PRINTER B3 | READY | 166.192.195.143 | | | | | |
| | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |

FIG.7

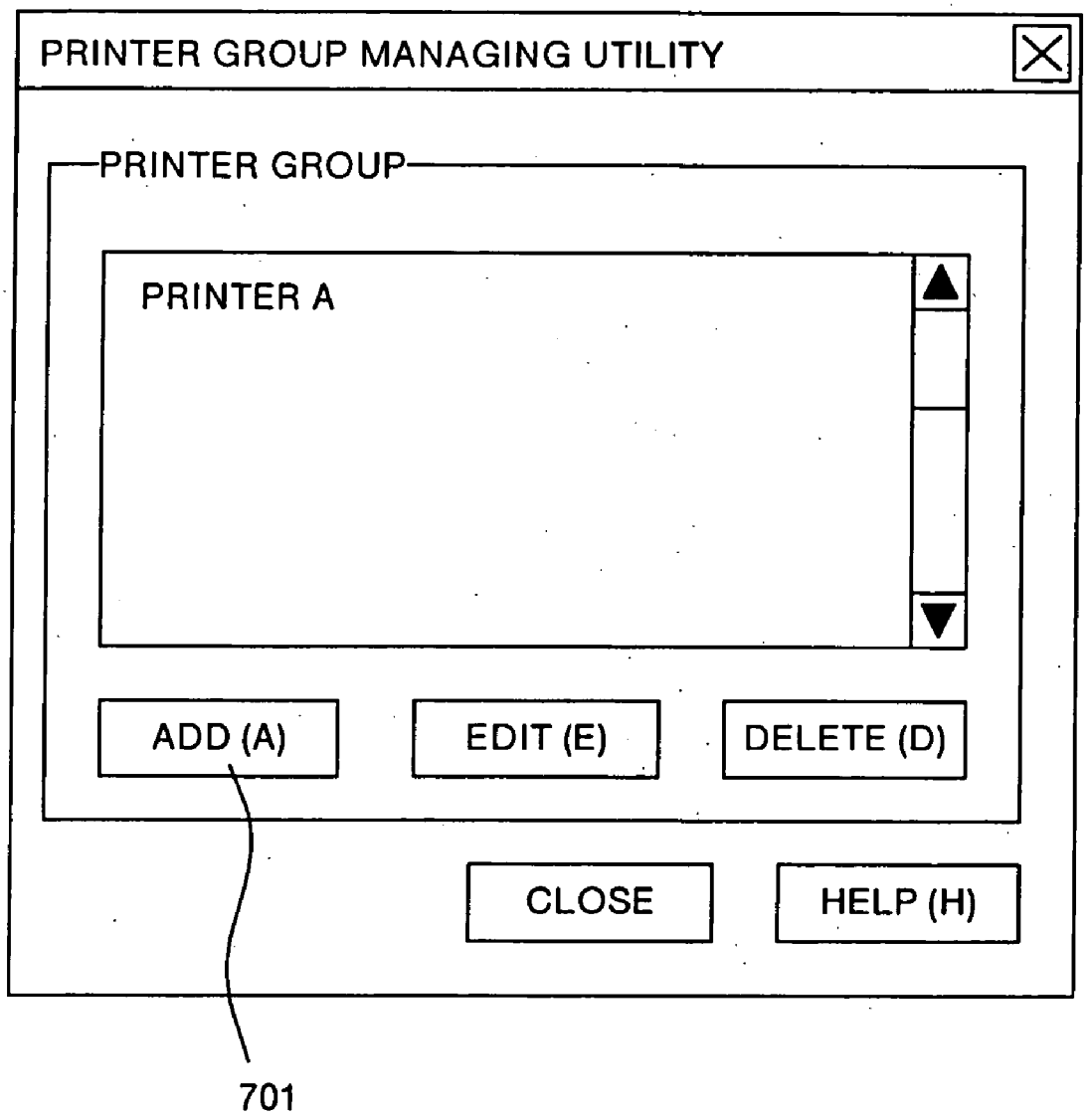

PRINTER GROUP MANAGING UTILITY
PRINTER GROUP
PRINTER A
ADD (A)
EDIT (E)
DELETE (D)
CLOSE
HELP (H)
701

FIG.8

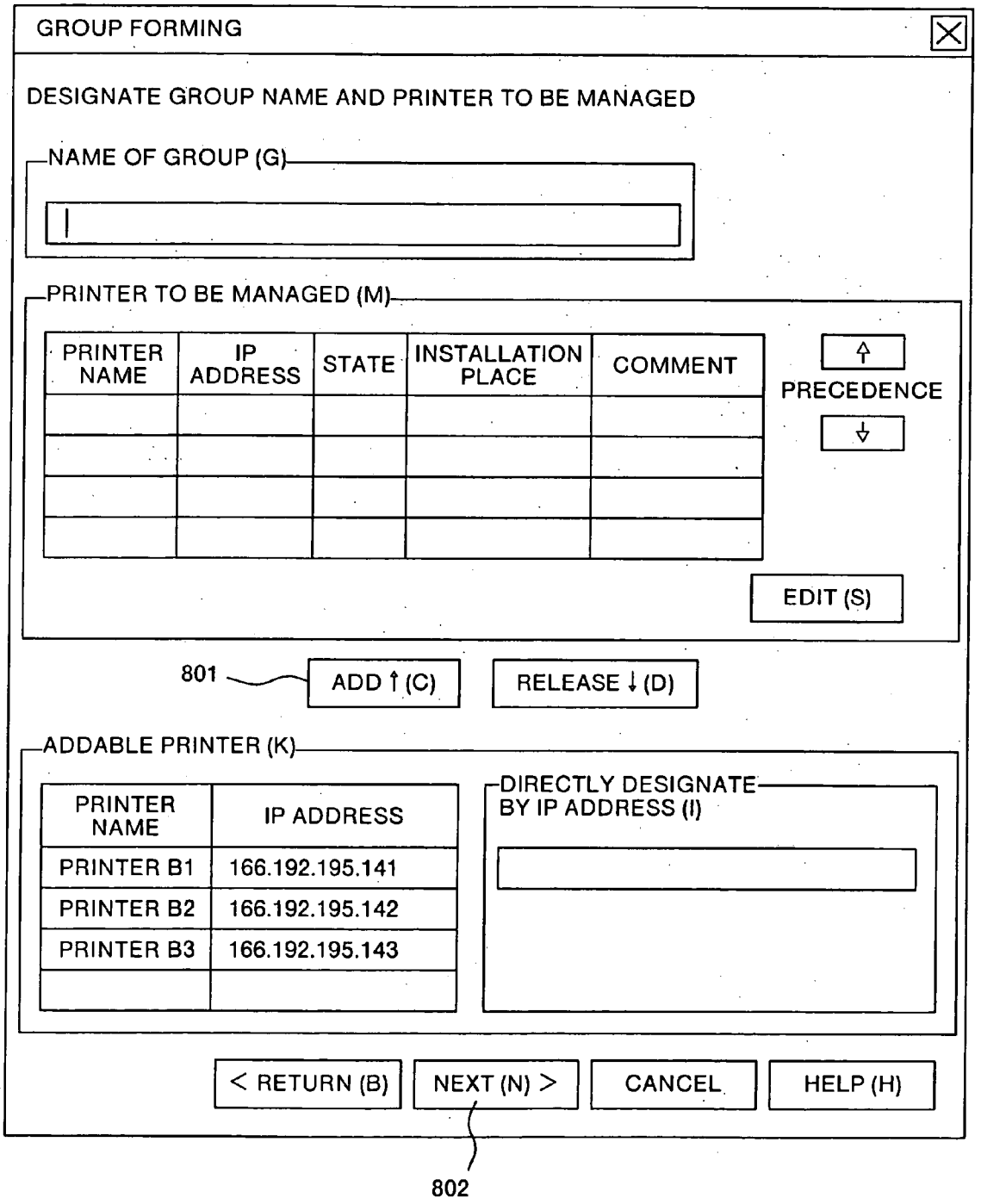

GROUP FORMING
DESIGNATE GROUP NAME AND PRINTER TO BE MANAGED
NAME OF GROUP (G)
PRINTER TO BE MANAGED (M)
PRINTER NAME
IP ADDRESS
STATE
INSTALLATION PLACE
COMMENT
PRECEDENCE
EDIT (S)
801
ADD ↑ (C)
RELEASE ↓ (D)
ADDABLE PRINTER (K)
PRINTER NAME
IP ADDRESS
PRINTER B1
166.192.195.141
PRINTER B2
166.192.195.142
PRINTER B3
166.192.195.143
DIRECTLY DESIGNATE BY IP ADDRESS (I)
< RETURN (B)
NEXT (N) >
CANCEL
HELP (H)
802

FIG.9

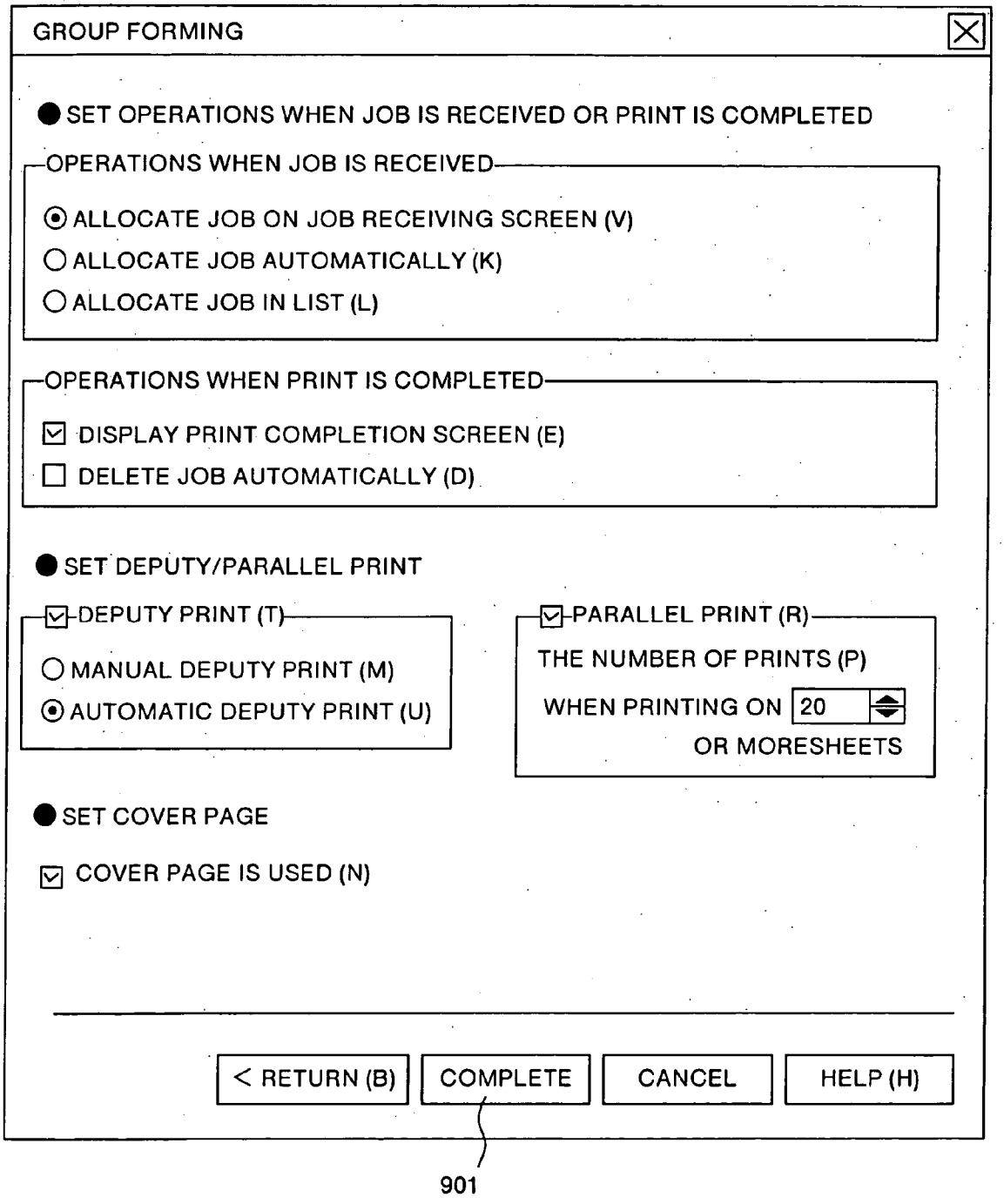

GROUP FORMING
SET OPERATIONS WHEN JOB IS RECEIVED OR PRINT IS COMPLETED
OPERATIONS WHEN JOB IS RECEIVED
ALLOCATE JOB ON JOB RECEIVING SCREEN (V)
ALLOCATE JOB AUTOMATICALLY (K)
ALLOCATE JOB IN LIST (L)
OPERATIONS WHEN PRINT IS COMPLETED
DISPLAY PRINT COMPLETION SCREEN (E)
DELETE JOB AUTOMATICALLY (D)
SET DEPUTY/PARALLEL PRINT
DEPUTY PRINT (T)
MANUAL DEPUTY PRINT (M)
AUTOMATIC DEPUTY PRINT (U)
PARALLEL PRINT (R)
THE NUMBER OF PRINTS (P)
WHEN PRINTING ON 20
OR MORESHEETS
SET COVER PAGE
COVER PAGE IS USED (N)
< RETURN (B)
COMPLETE
CANCEL
HELP (H)
901

FIG.10

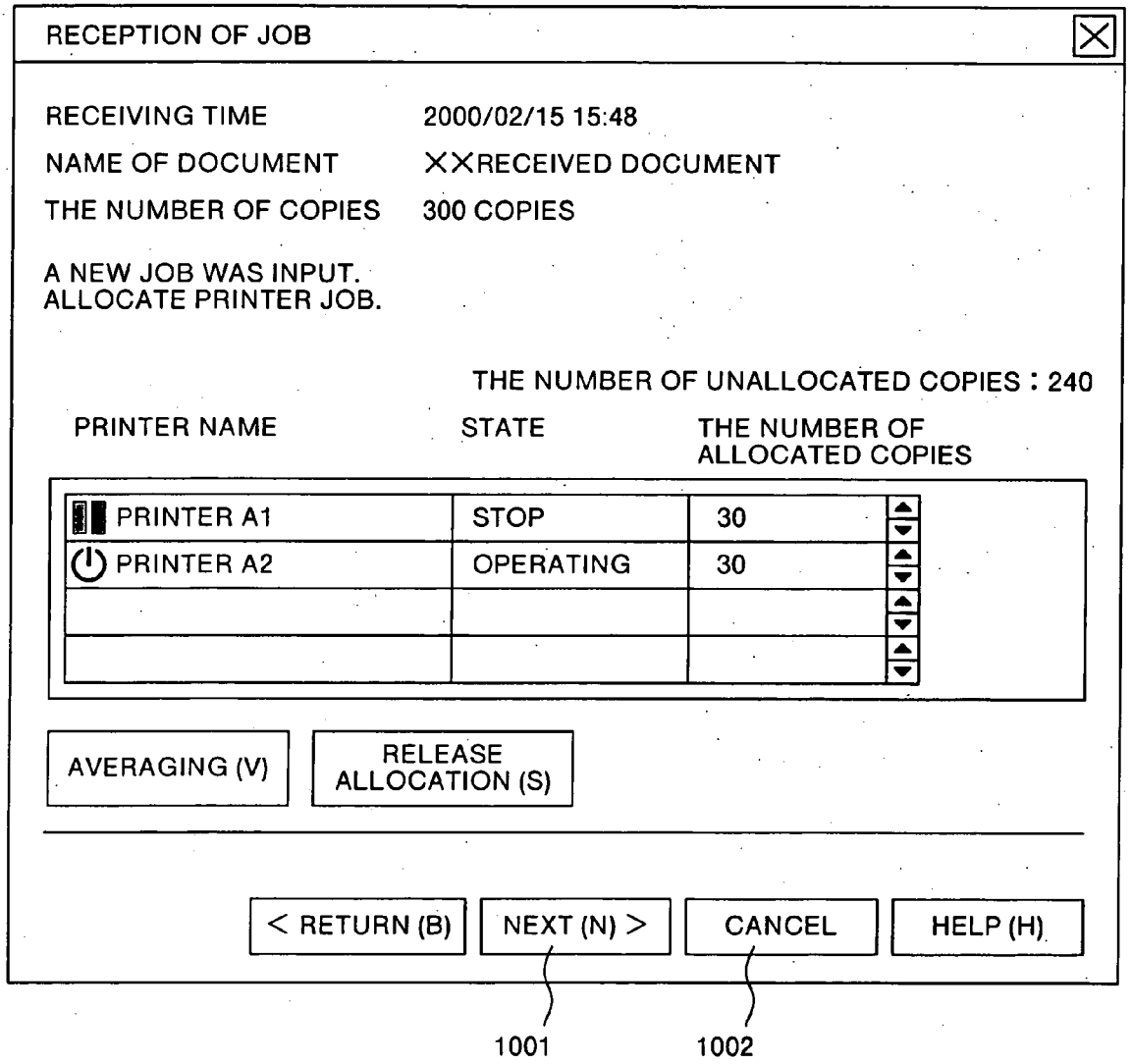

RECEPTION OF JOB
RECEIVING TIME
2000/02/15 15:48
NAME OF DOCUMENT
XXRECEIVED DOCUMENT
THE NUMBER OF COPIES
300 COPIES
A NEW JOB WAS INPUT.
ALLOCATE PRINTER JOB.
THE NUMBER OF UNALLOCATED COPIES : 240
PRINTER NAME
STATE
THE NUMBER OF ALLOCATED COPIES
PRINTER A1
STOP
30
PRINTER A2
OPERATING
30
AVERAGING (V)
RELEASE ALLOCATION (S)
< RETURN (B)
NEXT (N) >
CANCEL
HELP (H)
1001
1002

FIG.11

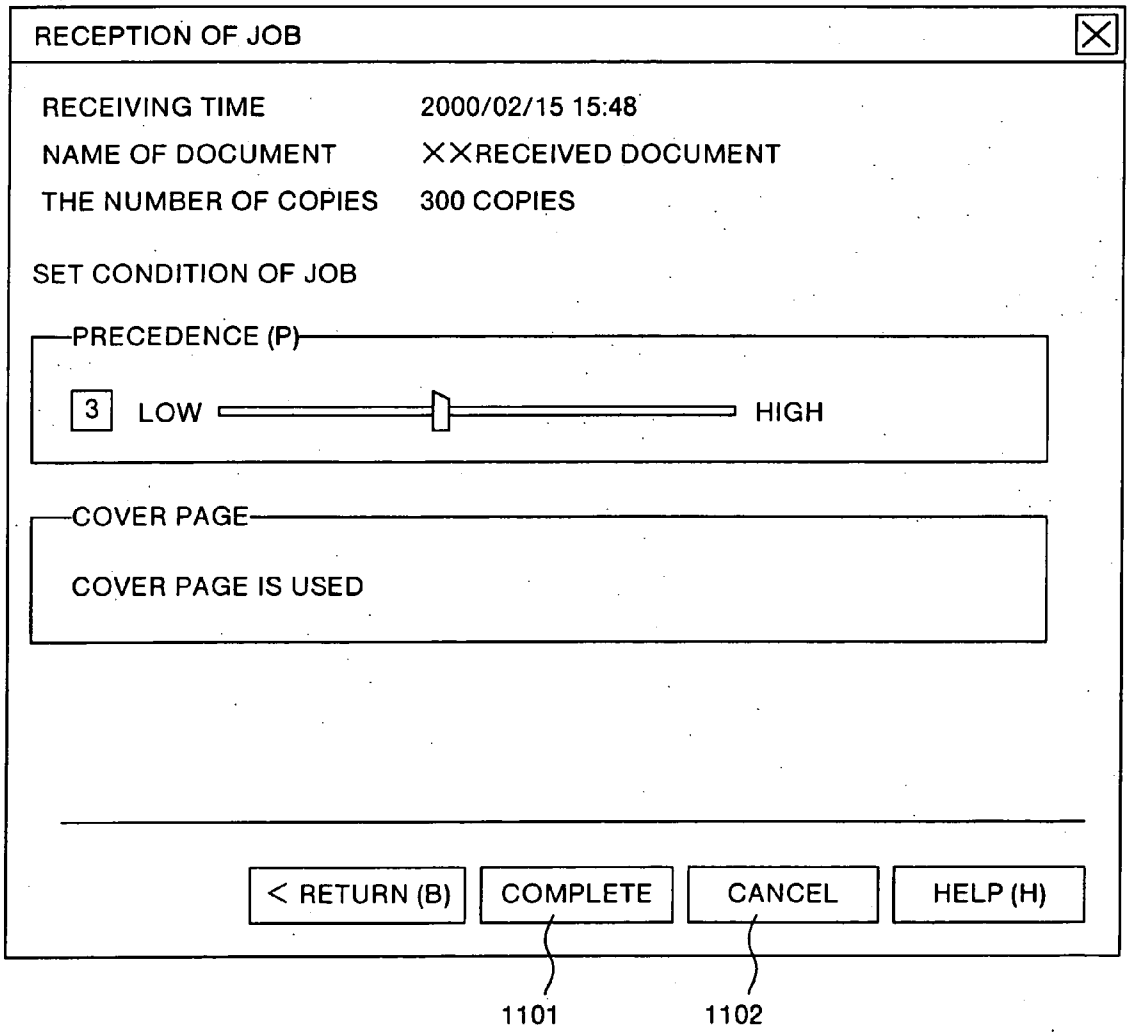

RECEPTION OF JOB
RECEIVING TIME
2000/02/15 15:48
NAME OF DOCUMENT
XXRECEIVED DOCUMENT
THE NUMBER OF COPIES
300 COPIES
SET CONDITION OF JOB
PRECEDENCE (P)
3
LOW
HIGH
COVER PAGE
COVER PAGE IS USED
< RETURN (B)
COMPLETE
CANCEL
HELP (H)
1101
1102

FIG.12

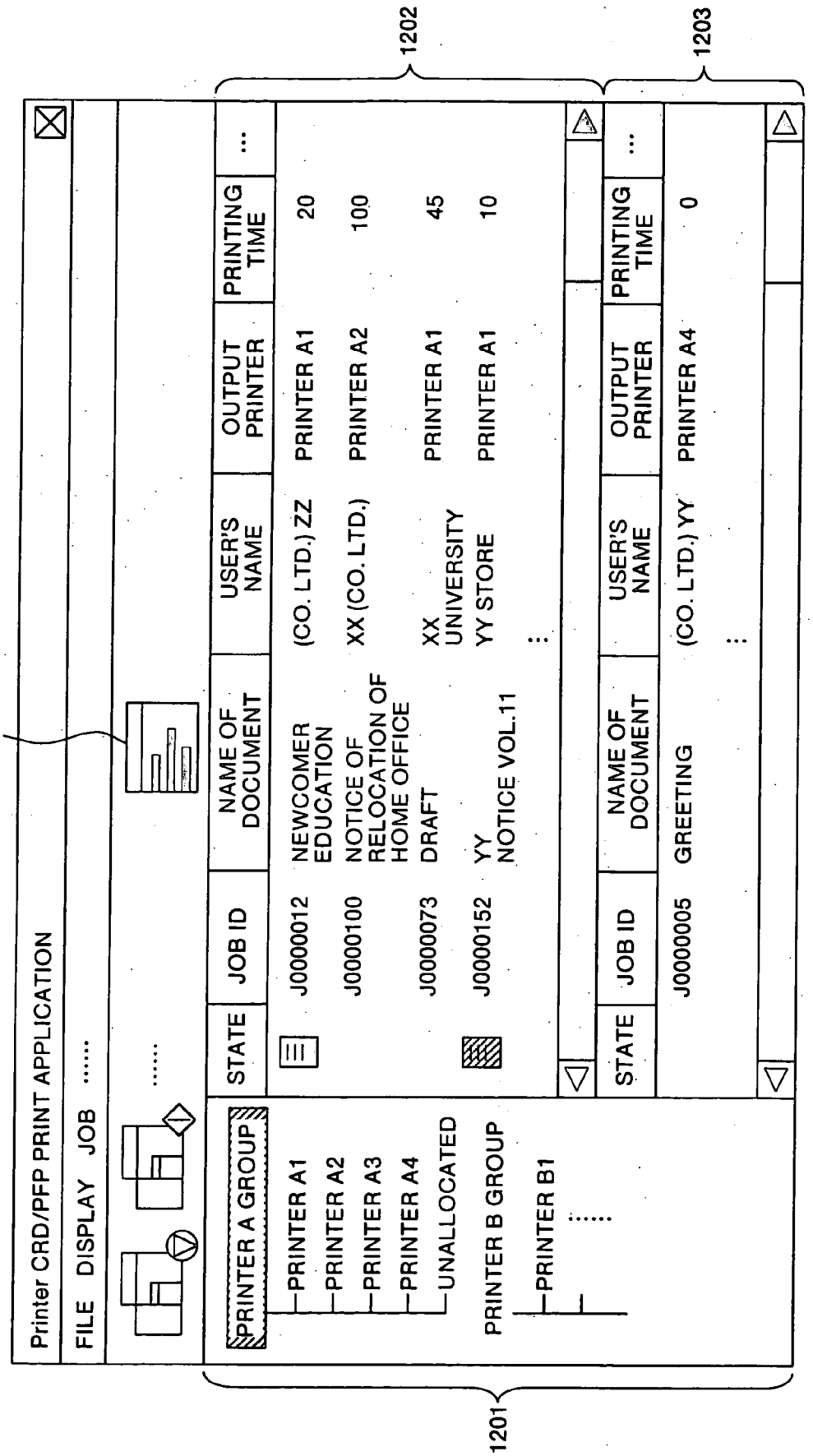
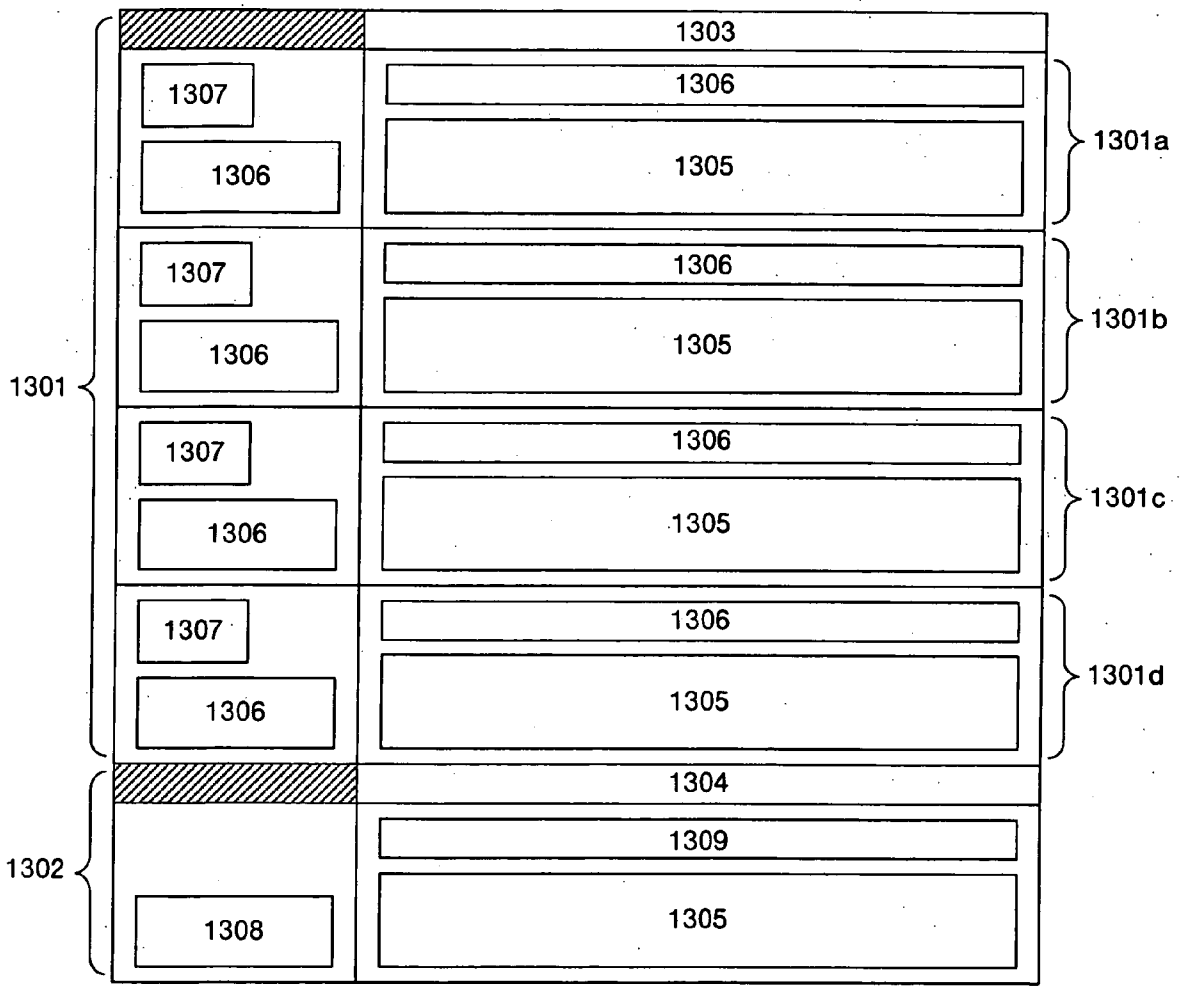

1201
1202
1203
1204
Printer CRD/PFP PRINT APPLICATION
FILE DISPLAY JOB .....
PRINTER A GROUP
PRINTER A1
PRINTER A2
PRINTER A3
PRINTER A4
UNALLOCATED
PRINTER B GROUP
PRINTER B1
STATE
JOB ID
NAME OF DOCUMENT
USER'S NAME
OUTPUT PRINTER
PRINTING TIME
J0000012 NEWCOMER EDUCATION (CO. LTD.) ZZ PRINTER A1 20
J0000100 NOTICE OF RELOCATION OF HOME OFFICE XX (CO. LTD.) PRINTER A2 100
J0000073 DRAFT XX UNIVERSITY PRINTER A1 45
J0000152 YY NOTICE VOL.11 YY STORE PRINTER A1 10
J0000005 GREETING (CO. LTD.) YY PRINTER A4 0

FIG.13


1303
1307
1306
1306
1305
1301a
1307
1306
1306
1305
1301b
1301
1307
1306
1306
1305
1301c
1307
1306
1306
1305
1301d
1304
1309
1305
1308
1302

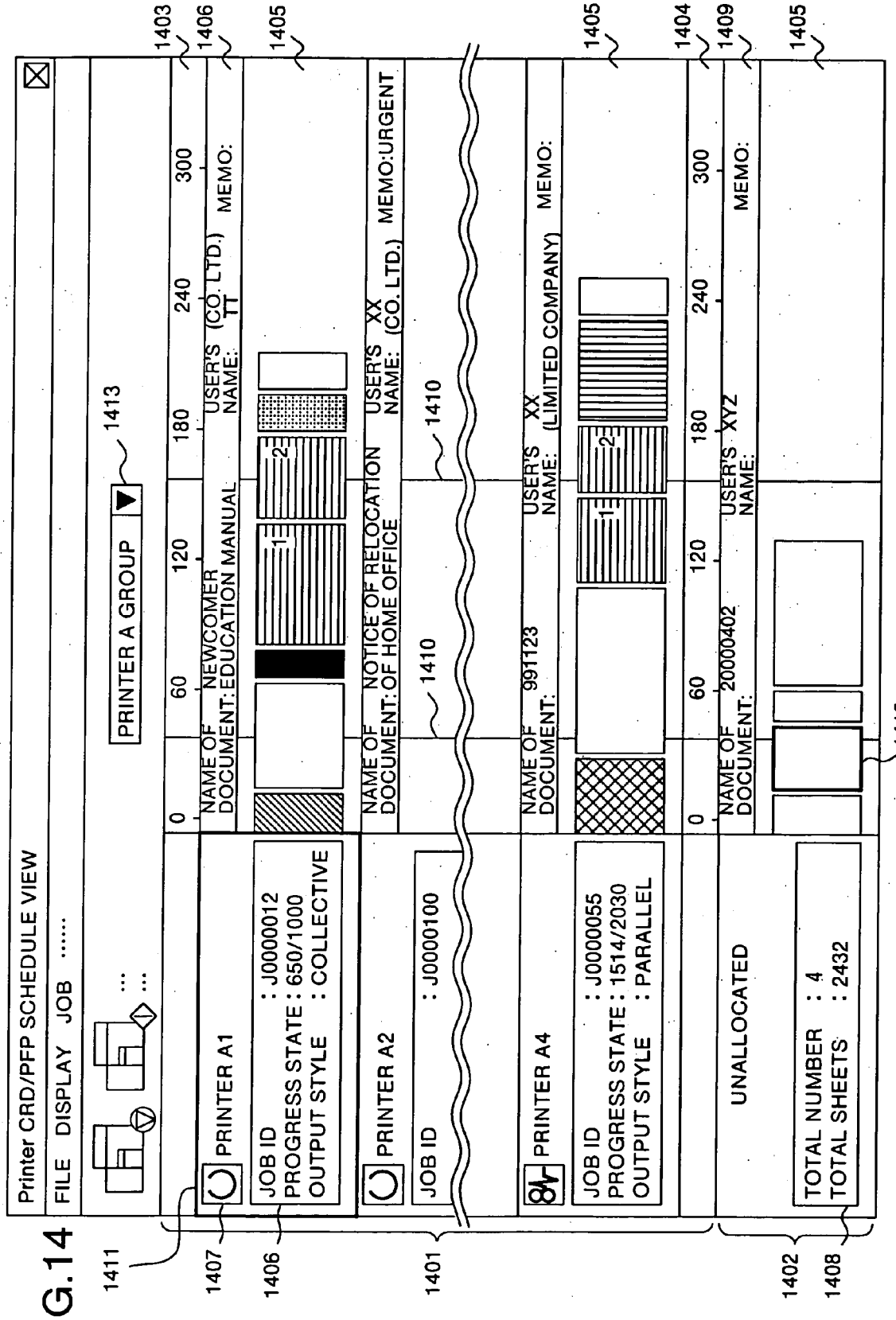

Printer CRD/PFP SCHEDULE VIEW
FILE DISPLAY JOB .....
PRINTER A GROUP
1413
1403
1406
1405
1404
1409
0
60
120
180
240
300
NAME OF DOCUMENT: NEWCOMER EDUCATION MANUAL
USER'S NAME: TT (CO. LTD.)
MEMO:
NAME OF DOCUMENT: NOTICE OF RELOCATION OF HOME OFFICE
USER'S NAME: XX (CO. LTD.)
MEMO:URGENT
NAME OF DOCUMENT: 991123
USER'S NAME: XX (LIMITED COMPANY)
MEMO:
NAME OF DOCUMENT: 20000402
USER'S NAME: XYZ
MEMO:
1410
1412
PRINTER A1
JOB ID : J0000012
PROGRESS STATE : 650/1000
OUTPUT STYLE : COLLECTIVE
PRINTER A2
JOB ID : J0000100
PRINTER A4
JOB ID : J0000055
PROGRESS STATE : 1514/2030
OUTPUT STYLE : PARALLEL
UNALLOCATED
TOTAL NUMBER : 4
TOTAL SHEETS : 2432
1411
1407
1406
1401
1402
1408

FIG.14

FIG.15

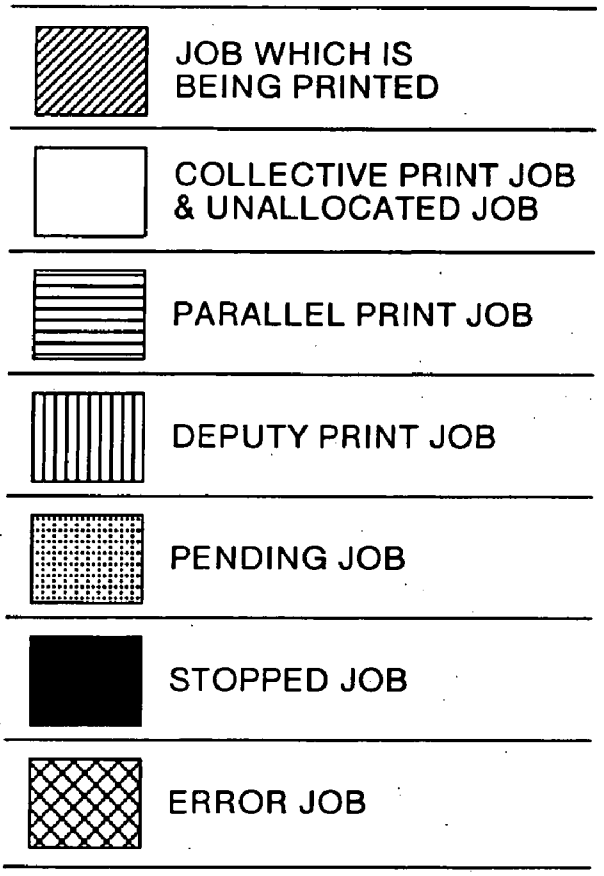

JOB WHICH IS BEING PRINTED
COLLECTIVE PRINT JOB & UNALLOCATED JOB
PARALLEL PRINT JOB
DEPUTY PRINT JOB
PENDING JOB
STOPPED JOB
ERROR JOB

FIG.16

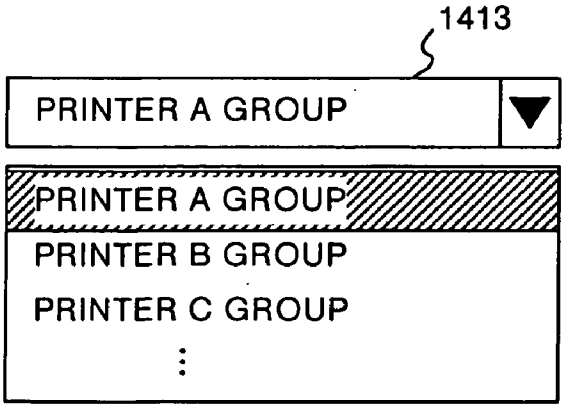

1413
PRINTER A GROUP
PRINTER A GROUP
PRINTER B GROUP
PRINTER C GROUP

FIG.17

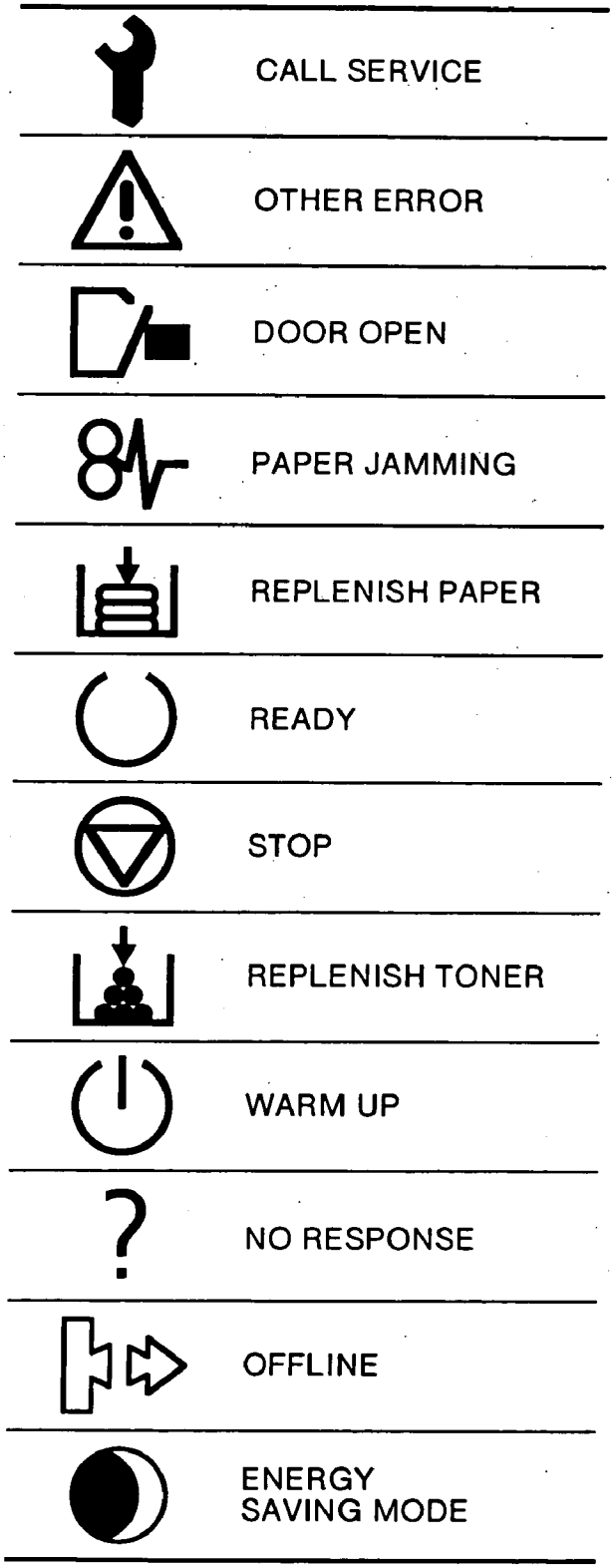

CALL SERVICE
OTHER ERROR
DOOR OPEN
PAPER JAMMING
REPLENISH PAPER
READY
STOP
REPLENISH TONER
WARM UP
NO RESPONSE
OFFLINE
ENERGY SAVING MODE

FIG.18

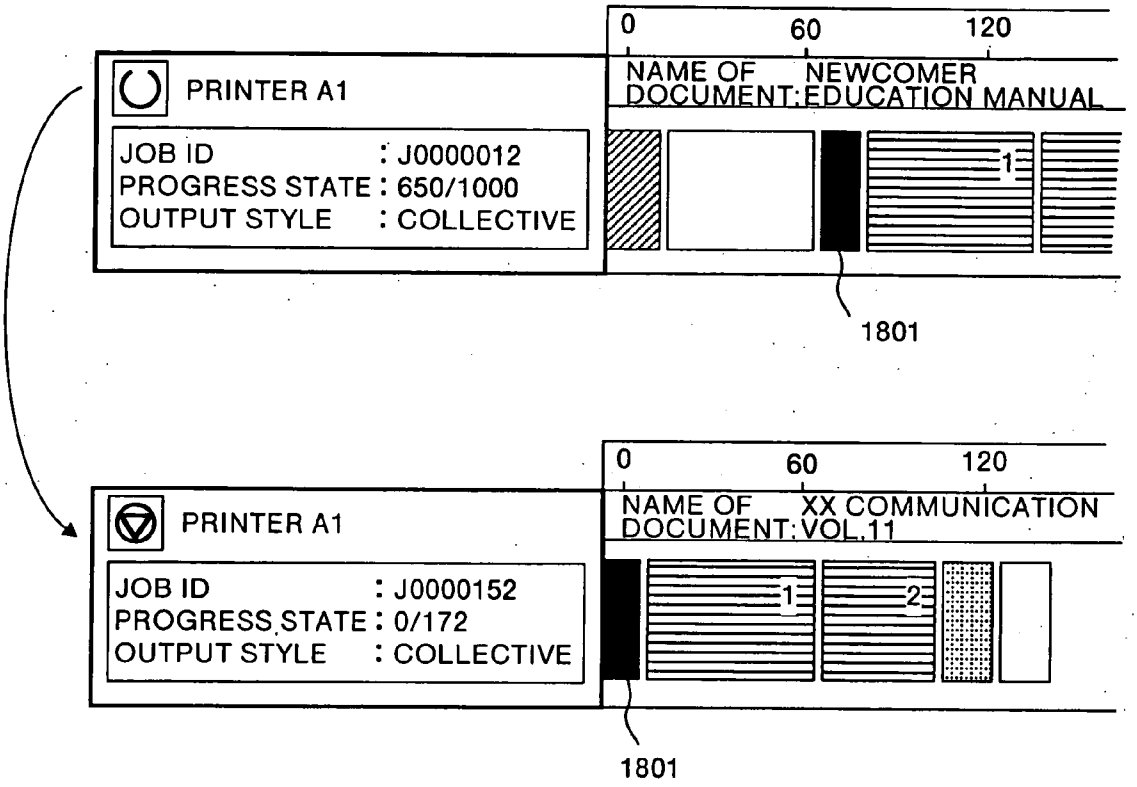

0
60
120
PRINTER A1
JOB ID : J0000012
PROGRESS STATE : 650/1000
OUTPUT STYLE : COLLECTIVE
NAME OF DOCUMENT: NEWCOMER EDUCATION MANUAL
1
1801
0
60
120
PRINTER A1
JOB ID : J0000152
PROGRESS STATE : 0/172
OUTPUT STYLE : COLLECTIVE
NAME OF DOCUMENT: XX COMMUNICATION VOL.11
1
2
1801

FIG.19

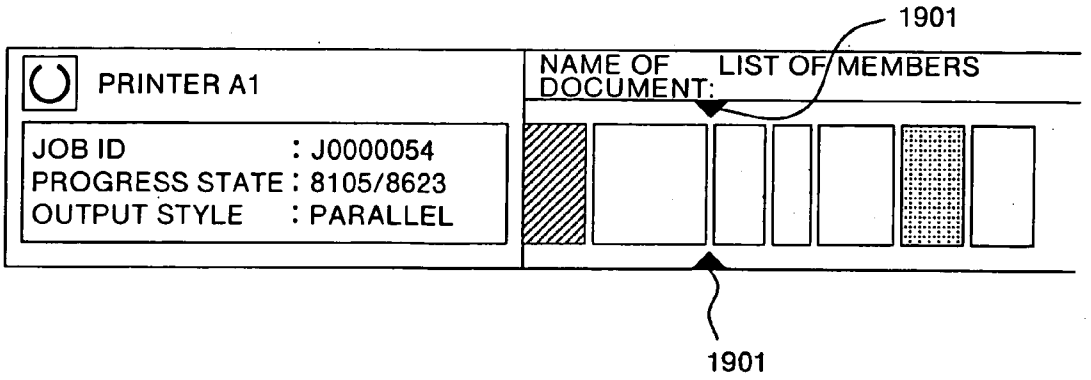

1901
PRINTER A1
JOB ID : J0000054
PROGRESS STATE : 8105/8623
OUTPUT STYLE : PARALLEL
NAME OF DOCUMENT: LIST OF MEMBERS
1901

FIG.20

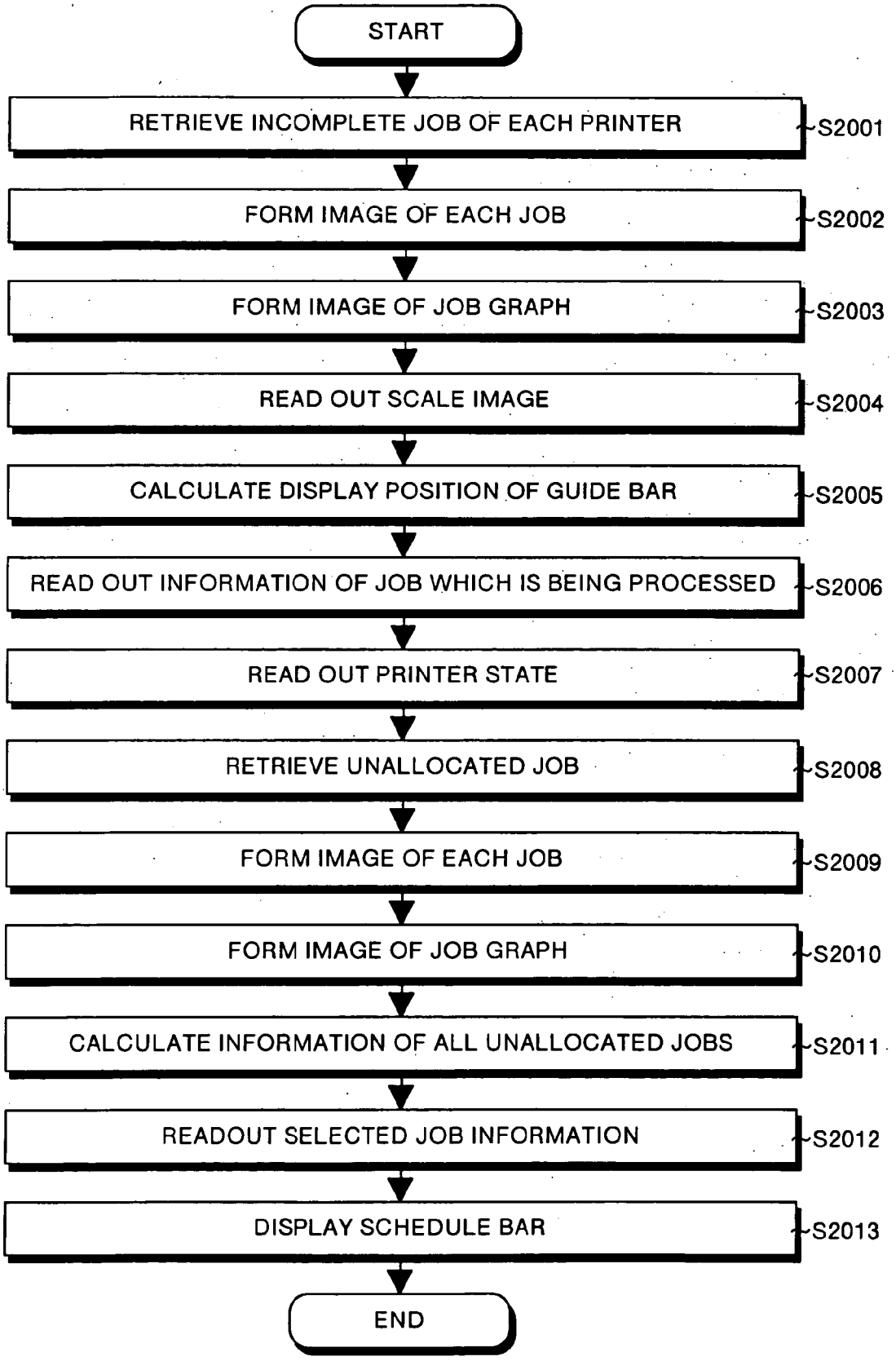
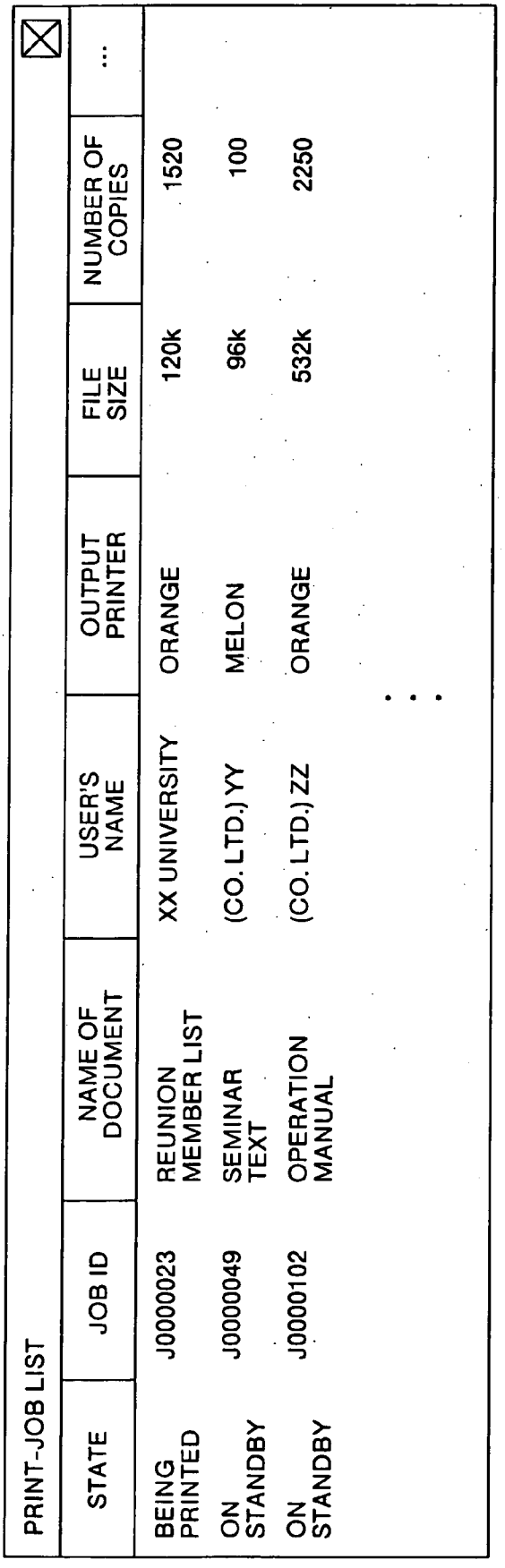

START
RETRIEVE INCOMPLETE JOB OF EACH PRINTER
S2001
FORM IMAGE OF EACH JOB
S2002
FORM IMAGE OF JOB GRAPH
S2003
READ OUT SCALE IMAGE
S2004
CALCULATE DISPLAY POSITION OF GUIDE BAR
S2005
READ OUT INFORMATION OF JOB WHICH IS BEING PROCESSED
S2006
READ OUT PRINTER STATE
S2007
RETRIEVE UNALLOCATED JOB
S2008
FORM IMAGE OF EACH JOB
S2009
FORM IMAGE OF JOB GRAPH
S2010
CALCULATE INFORMATION OF ALL UNALLOCATED JOBS
S2011
READOUT SELECTED JOB INFORMATION
S2012
DISPLAY SCHEDULE BAR
S2013
END

FIG.21


PRINT-JOB LIST
STATE
JOB ID
NAME OF DOCUMENT
USER'S NAME
OUTPUT PRINTER
FILE SIZE
NUMBER OF COPIES
...
BEING PRINTED
J0000023
REUNION MEMBER LIST
XX UNIVERSITY
ORANGE
120k
1520
ON STANDBY
J0000049
SEMINAR TEXT
(CO. LTD.) YY
MELON
96k
100
ON STANDBY
J0000102
OPERATION MANUAL
(CO. LTD.) ZZ
ORANGE
532k
2250

# PRINTER CONTROLLING DEVICE, PRINTER CONTROLLING METHOD, AND COMPUTER PRODUCT

## FIELD OF THE INVENTION

[0001] The present invention relates to a printer controlling device which displays a load state of at least one printer connected through a network, a printer controlling method, and a computer program for allowing a computer to execute the method is stored.

## BACKGROUND OF THE INVENTION

[0002] Conventionally there exists a service called "copy service", "printing service" and the like in which a designated document requested by a customer (mainly, company) is printed by a designated number of sheets, and the printed sheets are bound in a designated method and supplied.

[0003] A printing request is carried out in such a manner that a draft recorded in a paper medium or electronic medium (FD, MO, CD-ROM or the like) and a printing instruction in which the number of copies of the draft, a binding method, a delivery date and the like are written are mailed to a dealer who provides the above-described service (this is called "new order"). When a draft which was also previously requested to be printed is re-requested to be printed, the draft which is in storage on the side of the dealer may be designated and the number of copies and the like may informed on telephone (this is called "repeated order").

[0004] On the side of the dealer, processing procedure or processing time periods are determined by instinct or experience of a person in charge of this job (or task) while taking into account the number of prints, delivery date, limit of personal or physical resource and the like for each of requests received from an indefinite number of customers. According to this schedule, the designated draft is copied by a copier, or the draft is printed by a printer connected to a personal computer, and finally the copied or printed sheets are confirmed and collated and delivered to the customer.

[0005] Whereas, there is realized a system in which the printing request from a customer is received online through Internet, and scheduling or print out are automatically carried out using a print server and a plurality of printers connected to the print server.

[0006] For example, a customer accesses a Web page provided by a dealer from a personal computer of his own company, the customer inputs necessary information such as the number of copies on a print requesting form (job ticket), and the form is sent together with document data to be printed, and the printing of the document can be ordered.

[0007] The dealer received this order selects a printer that can complete already allocated jobs fastest from various printers connected to the server through LAN. Then, the dealer adds this new print-job to the last one of the print-waiting jobs.

[0008] If the new job had short delivery date and could not wait for completion of other jobs, the new job may exceptionally be processed as an interruption before the other waiting jobs. More efficient job scheduling system is also realized in which a large job is divided into some of small jobs and they are processed by a plurality of printers (concurrent printing), or a job is divided into small jobs such the loads of printers becomes equal to each other (averaging printing), or a job is distributed such that cost is minimized (optimizing printing).

[0009] However, in the above conventional art, there is a problem that it is difficult to grasp the total volume of loads of the entire system or distribution state of loads to printers, including how much jobs the entire system has, or the amount of jobs of each printer, or which printer does not have allocated jobs.

[0010] **FIG. 21** is an explanatory view showing one example of a print-job list window displayed on a conventional print server. Since time required for processing each job is found only roughly from file size or the number of copies, an item of printing time calculated by any calculation equation may be provided in addition to them (or instead of them). However, even with this item, the printing time of each job is only indicated clearly, total printing time required for processing all of jobs distributed to the printers, and the total printing time required for processing all of jobs of the entire system must be obtained by another calculation.

[0011] In order to estimate when a job is processed by a printer to which the job is allocated, printing time of previous jobs must be summed up. Therefore, it is complicate to check whether each job can be processed in time point by point. In association with unclearness of processing time period of job, it is difficult to find a total volume of jobs processed for a given time period and a total volume of jobs of each printer.

## SUMMARY OF THE INVENTION

[0012] It is an object of the present invention to provide a printer controlling device which displays a load state of at least one printer connected through a network, a printer controlling method, and a computer program for allowing a computer to execute the method is stored, capable of displaying a load state at various points in time of each printer in a system graphically, in real time and easily.

[0013] The printer controlling device according to one aspect of the present invention is which displays a load state of at least one printer connected through a network. This printer controlling device comprises an allocating unit which allocates a print-job to any of the printers, a calculating unit which calculates time required for the printer to which the job was allocated by the allocating unit which processes the print-job, and a display unit which displays the print-job by a predetermined shape having a length which is proportional to the time calculated by the calculating unit, and which arranges the predetermined shapes corresponding to all print-jobs allocated to the printer by the allocating unit an not completed at a constant distance in a horizontal direction or a vertical direction in association with individual printers.

[0014] According to the above-mentioned aspect, an accumulation state of a job to each printer is displayed in a form of the job graph comprising all jobs accumulated in the printer.

[0015] The printer controlling method according to another aspect of the present invention is a method of displaying a load state of at least one printer connected through a network. This method comprises: an allocating step of allocating a print-job to any of the printers, a

calculating step of calculating time required for a printer to which the print-job is allocated by the allocating step of processing the print-job, and a display step of displaying the print-job with a predetermined shape having a length which is proportional to time calculated by the calculating step, the display step arranging and displaying the predetermined shapes respectively corresponding to all print-jobs which are allocated to the printers by the allocating step but are not yet completed, in association with individual printers.

[0016] According to the above-mentioned aspect, an accumulation state of a job to each printer is displayed in a form of the job graph comprising all jobs accumulated in the printer.

[0017] The computer program according to still another aspect of the present invention for allowing a computer to execute the method according to the present invention. A computer can read the computer program stored in this computer-readable storage medium, and execute the method easily and automatically.

[0018] Other objects and features of this invention will become apparent from the following description with reference to the accompanying drawings.

## BRIEF DESCRIPTION OF THE DRAWINGS

[0019] **FIG. 1** is an explanatory view showing a system construction of a printing system including a printer controlling device according to an embodiment of the present invention,

[0020] **FIG. 2** is an explanatory view showing a hardware construction of a print server **105** of the embodiment of the invention,

[0021] **FIG. 3** is an explanatory view functionally showing the construction of the print server **105** of the embodiment of the invention,

[0022] **FIG. 4** is an explanatory view showing one example of items of a print-job table **303***a* of the embodiment of the invention,

[0023] **FIG. 5** is an explanatory view showing one example of items of a print schedule table **303***b* of the embodiment of the invention,

[0024] **FIG. 6** is a schematic explanatory view showing one example of items of a printer table **303***c* of the embodiment of the invention,

[0025] **FIG. 7** is an explanatory view showing one example of a printer setting dialog of the embodiment of the invention,

[0026] **FIG. 8** is an explanatory view showing one example of a printer setting dialog of the embodiment of the invention,

[0027] **FIG. 9** is an explanatory view showing one example of a printer setting dialog of the embodiment of the invention,

[0028] **FIG. 10** is an explanatory view showing one example of a printer allocating dialog of the embodiment of the invention,

[0029] **FIG. 11** is an explanatory view showing one example of a printer allocating dialog of the embodiment of the invention,

[0030] **FIG. 12** is an explanatory view showing one example of a main view of the embodiment of the invention,

[0031] **FIG. 13** is a schematic explanatory view showing a construction of a schedule view of the embodiment of the invention,

[0032] **FIG. 14** is an explanatory view showing one example of the schedule view of the embodiment of the invention,

[0033] **FIG. 15** is an explanatory view showing a corresponding relation between a job state and a color or pattern of a rectangular shape on the schedule view of the embodiment of the invention,

[0034] **FIG. 16** is an explanatory view showing one example of switching operation of a printer group of the embodiment of the invention,

[0035] **FIG. 17** is an explanatory view showing a corresponding relation between a printer state icon and a printer state of the embodiment of the invention,

[0036] **FIG. 18** is an explanatory view showing a screen state (a portion thereof) when the printer state icon is changed from "READY" to "STOP",

[0037] **FIG. 19** is an explanatory view showing one example of an interruption position pointer of the embodiment of the invention,

[0038] **FIG. 20** is a flowchart showing procedure of schedule view display processing of the print server **105** of the embodiment of the invention, and

[0039] **FIG. 21** is an explanatory view showing one example of a print-job list window displayed in the conventional art.

## DETAILED DESCRIPTION

[0040] Embodiments of a printer controlling device which displays a load state of at least one printer connected through a network, a printer controlling method, and a computer program for allowing a computer to execute the method is stored will be explained in detail with reference to the accompanying drawings.

[0041] System Construction of a Printing System:

[0042] First, the entire printing system including a printer controlling device of an embodiment of the invention will be explained. **FIG. 1** is an explanatory view showing the system construction of the printing system including a printer controlling device according to the embodiment of the present invention.

[0043] In **FIG. 1**, a reference number **101** represents a user client, and is a computer used by a customer for ordering printing operation to a dealer. A Web browser is started from this computer, and if a print-requesting Web page on a later-described WWW server **104** is accessed, a document to be printed and a job ticket in which its printing condition is written can be sent.

[0044] In **FIG. 1**, the printing system comprises later-described a reception client **102**, a managing client **103**, a WWW server **104**, a print server **105**, a document managing server **106** and a plurality of printers **107**. The computer and the printers are connected to each other through LANs.

[0045] A reference number **102** represents a reception client, and is a computer used by a person in charge of the dealer who received the order by means of telephone or mail in stead of a customer who does not have a computer or network. The person uses the reception client **102** for inputting a document to be printed and a job ticket. The reception client **102** has the same function as that of the user client **101**.

[0046] A reference number **103** represents a managing client, and is a computer used by a person in charge of the dealer for managing the printing operation ordered from a customer. If a print-managing Web page on the WWW server **104** is accessed from the Web browser, the document to be printed and the job ticket can be registered, retrieved, deleted and managed.

[0047] The reference number **104** represents the WWW server, and is a computer for supplying three kinds of Web pages, i.e., a print-requesting Web page, a print-managing Web page and a document managing server Web page, as well as Web applications for the Web pages. If the WWW server **104** received a new print order from the user client **101** or the reception client **102** through the above Web page, the WWW server **104** transfers the order to the print server **105** which will be described later.

[0048] The print server **105** controls the later-described printer **107** to allow the latter to process a print-job sent from the user client **101** or the reception client **102**. Further, as will be described later, the print server **105** displays, on a screen, accumulation state, a progress state, an operating status of each printer in real time and graphically.

[0049] A reference number **106** represents a document managing server, and is a computer for accumulating and managing a document to be printed and a job ticket. The document managing server **106** receives acquisition request from the print server **105**, and retrieves and sends a document to be held and a job ticket.

[0050] The reception client **102**, the managing client **103**, the WWW server **104**, the print server **105** and the document managing server **106** may not always individual computers, and one computer may have all of the above functions.

[0051] Each of the printers **107** forms a paper image from a document to be printed in accordance with control of the print server **105**, and prints the imaged document on a predetermined sheet of paper in accordance the designated condition.

[0052] A hardware construction of the printer controlling device (concretely, print server **105**) of the embodiment of the invention will be explained. **FIG. 2** is an explanatory view showing a hardware construction of the print server **105** of the embodiment of the invention.

[0053] In **FIG. 2**, a reference number **201** represents a CPU for controlling operation of the entire apparatus. A reference number **202** represents a ROM in which a basic input/output program is stored. A reference number **203** represents a RAM used as a work area of the CPU **201**.

[0054] A reference number **204** represents a HDD (hard disk drive) which controls read/write of data with respect to a HD (hard disk) **205**, and the reference number **205** represents the HD storing data written in accordance with control of the HDD **204**. A reference number **206** represents a FDD (floppy disk drive) which controls read/write of a FD (floppy disk) **207**. The reference number **207** represents is the FD as one example of a detachable storage medium for storing data written in accordance with control of the FDD **206**.

[0055] A display **208** displays a cursor, a window and various data such as characters and images. A network board **209** is connected to a network NET such as LAN through a network cable **210** such as a twisted pair wire, and functions as an interface between the network NET and the CPU **201**.

[0056] A keyboard **211** has a plurality of keys for inputting characters, numerical values, various instructions and the like. A mouse **212** is used for selecting and executing various instructions, selecting subject to be processed, and moving the cursor. A CD-ROM **213** is a detachable storage medium. A CD-ROM drive **214** controls read of data with respect to the CD-ROM **213**. A bus or cable **200** is used for connecting the above elements.

[0057] Next, a functional construction of the printer controlling device (print server **105**) of the embodiment of the invention will be explained. **FIG. 3** is an explanatory view functionally showing the construction of the print server **105** of the embodiment. In **FIG. 3**, only minimum functions required for explaining the present invention are illustrated, and other portions are omitted.

[0058] As shown in **FIG. 3**, a Web interface **301** controls communication with the WWW server **104**, and receives various requests such as a print-order, i.e., a register-request of a print-job transferred from the user client **101** or the like through the WWW server **104**.

[0059] As requests to be received, in addition to the register of a print-job, there are detail confirmation and state confirmation of print-job which have already been registered and a list display of print-jobs registered in the past. Therefore, the Web interface **301** first judges which request an input request is. If the input request is register of a print-job, a document to be printed and its job ticket are output to the document managing server **106** through the document managing server interface **302**, and to a later-described printer allocating section **307** (when a printer allocation at the time of input using a dialog in later-described **FIG. 9** is selected).

[0060] The document managing server interface **302** controls communication with the document managing server **106**, and sends register request of a document to be printed and a job ticket input from the Web interface **301** to the document managing server **106**, or sends acquisition request of already registered document and job ticket and receives the document and the job ticket.

[0061] A database managing section **303** receives orders from a later-described printer interface **304**, a printing time calculating section **306**, and a printer allocating section **307**, and writes the orders into a print-job table **303***a*, a print schedule table **303***b* and a printer table **303***c*.

[0062] The print-job table **303***a* is a table for holding details of contents of a print-job input from the user client **101** or the like. **FIG. 4** is an explanatory view showing one example of items of print-job table **303***a*. In the print-job table **303***a*, various printing conditions such as the number of copies ("NUM" in **FIG. 4**) and the number of printing pages ("OPAGE" in **FIG. 4**) are registered in association with job IDs.

[0063] The print schedule table **303***b* is a table for holding printer slated to process, a current state of each job registered in the print-job table **303***a*. **FIG. 5** is an explanatory view showing one example of items of print schedule table **303***b*. In the print schedule table **303***b*, a printer slanted to process ("PRNT" in **FIG. 5**), a current state ("KFLG" in **FIG. 5**), printing time ("TIME" in **FIG. 5**) and the like are registered in association with job IDs.

[0064] The printer table **303***c* is a table for all the printers **107** managed by the print server **105**. The table holds a group, a scheduling system, property and a current state of each printer in the group. **FIG. 6** is a schematic explanatory view showing one example of items of the printer table **303***c*. In **FIG. 6**, a symbol "*" represents a group selected by an inputting section **305** as will be described later, and accumulation states of jobs for printers in this group are collectively displayed in a later-described schedule view.

[0065] Among the items of the printer table **303***c* shown in **FIG. 6**, contents of "state" item are temporarily rewritten by notice from the printer interface **304** as will be described later. Contents other than that of the above item are set by dialogs shown in FIGS. **7** to **9**.

[0066] In the dialog shown in **FIG. 7**, if an adding button **701** is pushed, a dialog shown in **FIG. 8** is displayed, and an arbitrary group name such as "Printer B" is input for example. If a desired printer is selected from printers which can be added and an adding button **801** is pushed, the selected printer is added to printers managed by "Printer B" group. If a next button **802** is pushed, a dialog shown in **FIG. 9** is displayed, and a scheduling system and the like of the added group are set.

[0067] In "operation of receiving time" item of the dialog shown in **FIG. 9**, any of the following schedule systems is selected: (a) a later-described dialog in **FIG. 10** is displayed to allow an operator to manually allocate a printer for a new job simultaneously with input of the new job, (b) the printer is automatically allocated by the later-described printer allocating section **307** simultaneously with input of the new job, and (c) the printer is not allocated when the new job is input, and the operator is allowed to manually allocate the printer in the later-described main view or the schedule view. Here, it is assumed that (a) is selected for the "Printer B" group and "Printer A" group as shown.

[0068] In "parallel printing" item in dialog shown in **FIG. 9**, when the number of copies of the jobs exceeds a threshold value, it is determined in the dialog shown in **FIG. 10** to be mentioned below whether the job is divided and distributed to a plurality of printers at the default, and if it is determined to divide the job, the threshold value is set. If a complete button **901** is pushed, the set contents in dialogs in **FIGS. 8 and 9** are written in the printer table **303***c* by the database managing section **303**.

[0069] The printer interface **304** controls the communication with the printers **107**, and whenever the completion of a job is informed from any of the printers, the database managing section **303** is requested to retrieve a next job allocated to that printer from the print schedule table **303***b*, and if the next job was found, details of that job held in the print-job table **303***a* is returned.

[0070] A name of a document to be printed (or information capable of specifying that document such as ID) is extracted from the received job details, and data of that document is obtained through the document managing server interface **302**. Necessary information such as data of the document to be printed and the number of copies is sent to the printer **107** designated by the print schedule table **303***b*, and the job is processed.

[0071] The printer interface **304** receives the states sent from the printers at constant intervals. The printer interface **304** requests the database managing section **303** to rewrite the "state" item of the printer table **303***c* into a new state. States of jobs are found from the states of the printers, the database managing section **303** is requested to renew the states of the jobs held in the print schedule table **303***b*.

[0072] The inputting section **305** inputs various instructions such as selection instructions of a job or a printer displayed in the later-described schedule view, switching instructions of the printer group, allocation instructions of printers, and interruption instructions of job. The inputting section **305** corresponds to "designating unit" in claims, and a portion of process carried out by the inputting section **305** corresponds to "designating step" in claims.

[0073] The printing time calculating section **306** calculates, when requested from the later-described printer allocating section **307**, time expected to be required for processing individual input job, i.e., printing time using a printing speed of a printer to which the job is allocated, in accordance with the following equation:

[0074] printing time (min)=60 (min)×the number of copies×the number of printing pages/printing speed of printer (ppm (prints per minute)).

[0075] When printing time of a job which is not allocated to a printer is to be calculated, an average value of printing speeds of all managed printers is used as the printing speed of the printer.

[0076] The printing time informed the printer allocating section **307** from the printing time calculating section **306** is written into the "printing time" item of the print schedule table **303***b* by the database managing section **303** requested from the printer allocating section **307**. Whenever a constant time is elapsed, the printing time calculating section **306** requests the database managing section **303** to read the printing time which is being printed from the print schedule table **303***b*, and its value is re-calculated.

[0077] An equation in that case is, for example, as follows:

[0078] printing time (min)={60(min)×the number of copies×the number of printing pages/printing speed of printer (cpm)}−(60 (min)×the number of printed sheets (=the number of already printed sheets)/printing speed of printer (cpm)}.

[0079] The database managing section **303** is requested to rewrite the re-calculated printing time into the print schedule table **303***b*.

[0080] As apparent from the above description, the printing time that is calculated and recalculated by the printing time calculating section **306** and held by the print schedule table **303***b* is residue time expected to be required from the current time in the strict sense, and the printing time is reduced as the job is processed and when the job is completed, the printing time becomes zero.

[0081] The printing time calculating section **306** corresponds to "calculating unit" and "second calculating unit" in claims, and processing carried out by the printing time calculating section **306** corresponds to "calculating step" and "second calculating step".

[0082] When (a) is set in the "operation of receiving time" item of the dialog shown in **FIG. 9** as described above, the printer allocating section **307** displays a dialog as shown in **FIG. 10** simultaneously with input of a new job from the Web interface **301**. In this dialog, a printer to which the new job is to be allocated, and the number of allocation sections to the printers are set, and if a next button **1001** is pushed, a dialog shown in **FIG. 11** is displayed.

[0083] In this dialog, precedence of jobs is set, and if a completion button **1101** is pushed, a job ID (serial number) is given to the new job. At that time, if the job has been divided and distributed to a plurality of printers in the dialog in **FIG. 10**, i.e., a parallel printing has been instructed, a job ID is given to a parent job before divided, and job IDs in which a serial number particular to the small job is added to the job ID of the parent job is given to each of the small jobs after division.

[0084] The printer allocating section **307** requests the printing time calculating section **306** to calculate the printing time of each job, and outputs the printing time, the job ID, contents set in the dialogs in **FIGS. 10 and 11**, and a job ticket received from the Web interface **301** to the database managing section **303**.

[0085] In the database managing section **303**, necessary information is extracted from the input information, and the extracted information is written into each item of the print-job table **303***a* and the print schedule table **303***b*. In the print-job table **303***a*, a record is formed in unit requested from the customer in the print-job table **303***a*, i.e., in unit of parent job, and a record is formed in the print schedule table **303***b* in a unit actually processed by the printer, i.e., in a unit of the small job.

[0086] If a cancel button **1002** in the dialog in **FIG. 10** or a cancel button **1102** in the dialog in **FIG. 11** is pushed, the printer allocating section **307** outputs only the job ID, the printing time and the job ticket received from the Web interface **301** to the database managing section **303**. Thus, the "PRNT" item in the print schedule table **303***b* stays blank.

[0087] A job in which at least a job ID is written in the print-job table **303***a* and the print schedule table **303***b* but a printer is not determined is called "printer-unallocated" or "unallocated" job hereinafter.

[0088] The printer allocating section **307** corresponds to "allocating unit" in claims, and processing carried out by the printer allocating section **307** corresponds to "allocating step" in claims.

[0089] A main view display section **308** reads out necessary information from each table of the database managing section **303**, and displays a main view shown in **FIG. 12**. In a window shown in **FIG. 12**, an interior thereof is roughly divided into three. All the printers managed by the print server are displayed in a left region **1201** in a tree structure.

[0090] Jobs which are not completed but scheduled a printer selected here or all printers in a selected group are listed in a right upper region **1202**. Jobs which have already been completed in the printer are listed in a right lower region **1203**.

[0091] This window is basically similar to a conventional job list window shown in **FIG. 21**. Thus, it is difficult, in some cases, to find which printer in a group has how much load, or when a job allocated to the printer is completed. Thereupon, if a schedule view icon **1204** is pushed in the main view, a schedule view showing the above information in an easy manner is displayed instead of the above window.

[0092] A schedule view display section **309** comprises a job graph display section **309***a*, a time scale display section **309***b*, a guide bar display section **309***c*, an in-process job information display section **309***d*, a printer state display section **309***e*, all-unallocated job information display section **309***f*, a selected job information display section **309***g*, and a interruption position display section **309***h*.

[0093] **FIG. 13** is a schematic explanatory view showing a construction of a schedule view displayed by the schedule view display section **309**. The window is divided into an allocated job display area **1301** and an unallocated job display area **1302**. The areas are respectively provided with time scale display areas **1303** and **1304**.

[0094] The allocated job display area **1301** is further divided into blocks **1301***a* to *d* for each of the printers. As shown in **FIG. 13**, the window is divided for each of the printers horizontally, but the window may be divided vertically. Each block comprises a job graph display area **1305**, an in-process job information display area **1306** and a printer state display area **1307**.

[0095] The unallocated job display area **1302** comprises a single block. The block comprises a job graph display area **1305**, all-unallocated job information display area **1308** and a job information display area **1309**.

[0096] Each of the job graph display areas **1305** is drawn by the job graph display section **309***a*. The job graph display section **309***a* corresponds to "display unit" and "second display unit" in claims, and processing carried out corresponds to "display step" and. "second display step" in claims.

[0097] The time scale display areas **1303** and **1304** is drawn by the time scale display section **309***b*. The time scale display section **309***b* corresponds to "time scale display unit" in claims, and processing carried out by this unit corresponds to "time scale display step" in claims.

[0098] Although it is not illustrated in **FIG. 13**, a guide bar **1410** shown in **FIG. 14** is drawn by a guide bar display section **309***c*. The guide bar display section **309***c* corresponds to "guide bar display unit" in claims, and processing carried out by this unit corresponds to "guide bar display step" and "guide bar re-display step".

[0099] The in-process job information display area **1306** is drawn by the in-process job information display section **309***d*. The in-process job information display section **309***d* corresponds to "in-process job information display unit" in claims, and processing carried out by this unit corresponds to "in-process job information display step".

[0100] The printer state display area **1307** is drawn by the printer state display section **309***e*. This printer state display

section **309***e* corresponds to "printer state display unit" in claims, and processing carried out by this unit corresponds to "printer state display step".

[**0101**] The all-unallocated job information display area **1308** is drawn by the all-unallocated job information display section **309***f*, and this all-unallocated job information display section **309***f* corresponds to "all-unallocated job information display unit" in claims, and processing carried out by this unit corresponds to "all-unallocated job information display step" in claims.

[**0102**] The selected job information display area **1309** is drawn by the selected job information display section **309***g*. This selected job information display section **309***g* corresponds to "selected job information display unit" in claims, and processing carried out by this unit corresponds to "selected job information display step" in claims.

[**0103**] Although it is not illustrated in **FIG. 13**, a later-described interruption position pointer **1901** in **FIG. 19** is drawn by the interruption position display section **309***h*, this interruption position display section **309***h* corresponds to "interruption position display unit", and processing carried out by this unit corresponds to "interruption position display step".

[**0104**] **FIG. 14** is an explanatory view showing one example of the schedule view displayed by the schedule view display section **309**. First, in a job graph display area **1405** of each the allocated job display area **1401**, jobs allocated to that printer but not completed are displayed each with a predetermined shape having a length proportional to its printing time (e.g., rectangular, and "rectangular shape" hereinafter), and are displayed in the order without leaving space. One dot gap of the same color as the background color is provided between jobs so that its boundary can easily be seen.

[**0105**] A bar-like rectangular shape formed by arranging the rectangular shapes of jobs allocated to the same printer at distances of one dot is called "job graph" hereinafter. Since a length of each rectangular shape is proportional to a printing time of each job, the length of each job graph is proportional to a total processing time accumulated in that printer, i.e., proportional to a load of each printer. Therefore, it is possible to grasp magnitude of a load of each printer through intuition by the length.

[**0106**] When a new job was input, or when a printer slated to process an existing job was determined or changed, or when a job or printer is changed in state, or when printing time was re-calculated as the printing operation proceeded, in short, when data was written or rewritten in any of tables held in the database managing section **303**, the job graph display section **309***a* refers to each written or rewritten table, and each job graph is re-displayed (refreshed).

[**0107**] Since the printing time of a job which is being printed is re-calculated and gradually reduced as the printing operation proceeds, the length of the rectangular shape corresponding to that job is also shortened whenever the job graph is displayed. Since a job which is being printed is always displayed at a top of the job graph, i.e., on the side of a starting point of the later-described time scale, if the length of the top rectangular shape is shortened, subsequent rectangular shapes are moved into the starting point correspondingly. More intuitively, the job graph of each printer sequentially moves toward the top, here, leftward as the time is elapsed, and a point ahead of the starting point comes out from the screen. Therefore, the progress state of a job by each printer can intuitively be grasped by the movement of the job graph.

[**0108**] Color or pattern of each rectangular shape in the job graph shows a job state corresponding to that rectangular shape, and when the job graph is re-displayed, a new state of each job is renewed. **FIG. 15** is an explanatory view showing a corresponding relation between a job state and a color or pattern of a rectangular shape.

[**0109**] Characters such as "1", "2" and the like shown on a right upper corner in the rectangular shape show that a job shown with the rectangular shape is a small job divided from a parent job, in other words, that job is a subject of parallel printing. Since common characters are added to small jobs divided from the same parent job, it is easy to find when a job which is to be printed in parallel by a plurality of printers by which printer.

[**0110**] Although the characters are indicated in the rectangular shape, the invention is not limited to this, and the characters may be indicated near the rectangular shape so that it can be found that the characters indicate the rectangular shape. The same numbers are used in this embodiment, but the invention is not limited to this, and the same characters maybe used, or the same graphics or pictures such as icons may be used. Further, by indicating one of jobs divided by an icon, the other one of the divided jobs may be indicated in a different manner.

[**0111**] Accumulation states of jobs of a plurality of printers in a selected group, here, printers from "Printer A1" to "Printer A4" in the "Printer A" group are simultaneously displayed in the allocated job display area **1401**.

[**0112**] In order to see an accumulation state of a job in other group, switching instructions of displayed printer groups displayed are input from the inputting section **305**. More specifically, as shown in **FIG. 16**, a desired group is clicked by a mouse **212** from a pull-down list **1413** at an upper portion in the window. If the printer table **303***c* switches the group to another group by the database managing section **303** requested by the inputting section **305**, each portion of the schedule view display section **309** displays an accumulation state of a job and detailed information of a job which is being processed about each printer in the newly selected group instead of the group displayed heretofore.

[**0113**] In the schedule view shown in **FIG. 14**, time scales are displayed in time scale display areas **1403** and **1404** respectively. Elapsed time from the current date and time is displayed in the time scale, and its unit is minute.

[**0114**] Relative magnitude of loads of the printers can be grasped by lengths of job graph even if there is no time scale, but magnitude of absolute load such as length of printing time can not be found. If a terminal end of the job graph of a printer is located "after 120 minutes" on the scale for example, it can be found that job of remaining 120 minutes is accumulated in that printer.

[**0115**] For example, a rectangular shape whose terminal end is located "after 300 minutes" on the scale shows a job which will be completed after 300 minutes (5 hours).

Therefore, if there is a job which must be completed within that day, i.e., 17:00 that is quitting time at noon, if a user sees whether the terminal end of the rectangular shape showing that job is closer to the starting point than "after 300 minutes" on the scale, it is possible to easily judge whether the job will be completed within the deadline.

[0116] In the schedule view shown in **FIG. 14**, a guide bar **1410** is displayed. The guide bar **1410** passes through a point on the scale and astride a job graph in a direction perpendicular to the point. Each straight line is cut but this is due to design, and each the straight line is one line in principle.

[0117] If "guide bar display" is selected from "display menu", one guide bar **1410** is displayed. Whenever the "guide bar display" is executed, a new guide bar **1410** is displayed. Therefore, a desired number of guide bars **1410** can be set in the window. The guide bar **1410** can be moved to a desired position on the scale by the mouse **212**.

[0118] The guide bar **1410** can be used variously. For example, when a job graph ending at its left side and a job graph ending at its right side are mixed, this means that jobs are not equally distributed to the printers. Therefore, it is possible to equalize the levels of loads of printers by re-allocating a job of a printer having a great load to a printer having a small load.

[0119] The guide bar **1410** can also be used for checking whether processing time periods of the jobs which are printed by a plurality of printers in parallel are varied. When some of small jobs divided from the same parent job exist on the left side of the guide bar **1410** and other small jobs exist on the right side, the processing-time periods of the small jobs are varied and results of print can not be coordinated efficiently. Thus, some of jobs are re-allocated so that processing time periods of the small jobs becomes substantially the same.

[0120] The guide bar **1410** can be used for grasping whether how much time-out jobs are generated. When there exists two hours until quitting time, if the guide bar **1410** is set to "after 120 minutes", a job which lies off rightward is the time-out job. In association with this, the guide bar **1410** can be utilized for checking whether a job is completed within the deadline.

[0121] The guide bar **1410** is sequentially moved toward the starting point on the scale by the elapsed time from the setting time, and if it reached the starting point, the bar is erased. Alternatively, if the bar is set on a position of after 120 minutes on the scale, the bar may be erased after just 120 minutes. Therefore, if the guide bar **1410** is set on the terminal end of a job which a user decided to process up to here today, it is possible to grasp remaining time (a target can be achieved after 30 minutes) to achieve a target.

[0122] In the block of each printer, detailed information of a job which is being processed by each printer, more specifically, name of document, user's name, memo, job ID, progress state and an in-process job information display area **1406** for displaying output form are provided. In the drawing, an area for displaying the name of document, the user's name and the memo, and an area for displaying the job ID, the progress state and the output form are separated from each other, but this is convenient, in term of design, for keeping balance with respect to the later-described unallocated job display area **1402**, and the areas may not be divided and collectively displayed.

[0123] The progress state is indicated by "the number of printed sheets"/"total number of prints" concretely.

[0124] The number of printed sheets is the number of sheets which have already been printed, and the total number of prints is obtained from "the number of copies×the number of printing pages".

[0125] The output form shows a classification of printing states, i.e., a state in which the job is collectively processed by that printer (collective print), a state in which the job is divided into a plurality of jobs, and the jobs are processed by a plurality of printers (parallel print), a state in which a job allocated to another printer is re-allocated to this printer because of a defective condition of the other printer (deputy print).

[0126] The block of each printer is provided with a printer state display area **1407** showing a state of the printer. In the area, a current state of the printer is displayed with a predetermined icon. **FIG. 17** is an explanatory view showing a corresponding relation between a printer state icon and a printer state.

[0127] Explanation of meaning of each state is omitted, but only "STOP" will be explained. The "STOP" icon is displayed when a job which is designated to be stopped comes, and when an operator stops the operation of a printer by means of an operation panel or a print server of the printer. This is different from giving a stop attribute to the job, and directly gives stop instructions to the printer.

[0128] **FIG. 18** is an explanatory view showing a screen state (a portion thereof) when the printer state icon is changed from "READY" to "STOP". A stopped job **1801** moves toward the starting point on the scale as time elapses, and its tip end coincides with the starting point, the printer state icon is renewed to the lower "STOP" to the upper "READY". When the tip end coincided with the starting point, the processing time of the job approached.

[0129] A job which is being processed includes a job which is being printed of course, and a job causing error during the printing operation, and a job which is stopped by stopping instructions although the printing time has come. More intuitively, the job which is being processed is a job located at the top of the job graph of each printer.

[0130] In **FIG. 14**, in-process job information display area **1406** (a portion thereof) and the printer state display area **1407** of "Printer A1" are surrounded by navy blue two dot frame line **1411**, and this indicates that this printer is currently selected (the "selected printer" is different from "selected group"). It is possible to instruct the selected printer to stop or restart from upper icon and the like of the window.

[0131] Jobs which are not allocated to any of the printers are arranged in the input order and displayed in the job graph display area **1405** in the unallocated job display area **1402**. Like the allocated jobs, a length of the rectangular shape indicates printing time calculated for the job, color or pattern of the rectangular shape indicates a current state of the job (more specifically, a state in which the job is not allocated to a printer), and a length of the job graph indicates total time required for processing all the unallocated jobs.

[0132] In the unallocated job display area **1402**, there are provided an all-unallocated job information display area **1408** for displaying the total number of unallocated jobs and a total number of prints, and a selected job information display area **1409** for displaying name of document, user's name and memo (comment) of unallocated job.

[0133] In order to allocate an unallocated job to any of the printers, a selection instructions of a job and allocation instructions to the job's printer are input from the inputting section **305**. More specifically, a jot to be allocated to a printer is clicked by the mouse **212** first. The job selected in this manner is highlighted and displayed with navy blue one dot frame line **1412**.

[0134] Next, "printer allocation" is selected and executed from the upper pull-down menu of the window. When the printer allocation was executed from the menu in this manner, the printer allocating section **307** which received instructions from the inputting section **305** adds, in principle, a selected job to the last of print-waiting line of printers which has lowest load, i.e., which can start the job fastest at this point in time.

[0135] However, when it is not desired to allow a printer capable of starting the job fastest to do so, but when it is necessary to allow a particular printer to do the job before a particular job, the job can be put between desired jobs of a desired printer by clicking the job to drag and drop as it is.

[0136] A boundary between jobs is clear by the one dot gap as described above. In order to clearly show which side of the boundary the job is put at the time of drag and drop of the job, an interruption position pointers **1901** as shown in **FIG. 19** on the gap nearest the mouse cursor in principle. As the mouse cursor moves, the pointers also move.

[0137] Each job is previously provided with precedence, a job can interrupt when the job has the same or higher precedence as or than that of an interrupted job. Therefore, the interruption position pointer **1901** is not displayed in the gap when there is any job having higher precedence behind a gap nearest the mouse cursor and interruption of job having lower precedence is prohibited. In this case, a job nearest the mouse cursor is selected from jobs in the boundary which can be interrupted, and the interruption position pointer **1901** is displayed in that position.

[0138] When a job interrupted by drag and drop, the printer allocating section **307** which was informed by the inputting section **305** requests the printing time calculating section **306** to re-calculate the printing time of the selected job using the printing speed of the interrupting printer. Then, the printer allocating section **307** requests the database managing section **303** to write the printer slated to process the job as the interrupting printer, and the printing time as the printing time in the print schedule table **303***b*.

[0139] The Web interface **301**, the document managing server interface **302**, the database managing section **303**, the printer interface **304**, the inputting section **305**, the printing time calculating section **306**, the printer allocating section **307**, the main view display section **308** and the schedule view display section **309** realize functions thereof if the CPU **201** executes the instructed processing in accordance with instructions described in program stored in the storage medium such as the ROM **202**, the RAM **203**, the HD **205** or FD **207**.

[0140] Next, procedure of display processing of schedule view of the printer controlling device (print server **105**) according to the embodiment of the present invention will be explained. **FIG. 20** is a flowchart showing procedure of schedule view display processing of the print server **105** of the embodiment of the invention. When the schedule view icon **1204** was pushed on the main view shown in **FIG. 12**, the processing of this flowchart is started.

[0141] In step S**2001**, the job graph display section **309***a* of the schedule view display section **309** requests the database managing section **303** to retrieve all jobs slated to be completed after the current date and time in each printer in the selected group.

[0142] In step S**2002**, lengths of the rectangular shapes showing respective jobs are calculated from the printing time of jobs held by the print schedule table **303***b*. For example, when 1 minute on the scale is 4 dots and the printing time of the job is 120 minutes, calculation is carried out in the following manner: 4 dots×120 minutes−1 dot of gap=479 dots. If this equation is used, when the screen is enlarged, the gap of the job is also enlarged, and it is possible to avoid a problem that outer appearance is inferior.

[0143] From the state of each job held by the print schedule table **303***b*, color or pattern of the rectangular shape showing the job is determined. Referring to the job ID, if there are small jobs divided from the same parent job, these small jobs are provided with the same characters. A rectangular image showing each job is formed from the length, the color or the pattern, and the character.

[0144] In step S**2003**, images of the jobs formed in step S**2002** are connected to each other through a distance of one dot for each allocated printer, thereby forming an image of the job graph for each printer.

[0145] In step S**2004**, the time scale display section **309***b* of the schedule view display section **309** reads out an image of the previously held time scale from a storage section (not shown).

[0146] In step S**2005**, the guide bar display section **309***c* of the schedule view display section **309** judges whether the guide bar **1410** is set or not from a table (not shown) held in the guide bar display section **309***c*. If the guide bar **1410** is set, its setting date and time held in the above table and its setting position on the scale are readout. Then, a new display position on the scale is calculated based on the elapsed time from the setting date and time to the current date and time.

[0147] For example, if the "guide bar display" is selected from the "display" menu and the guide bar **1410** displayed in an arbitrary position was moved to a position after 60 minutes on the scale at 11:00, and the current time is 11:10, the elapsed time (10 minutes) from the setting date and time is subtracted the setting position (after 60 minuets), and a new display position is calculated as "after 50 minuets".

[0148] In step S**2006**, the in-process job information display section **309***d* of the schedule view display section **309** requests the database managing section **303** to read out a name of document, a user's name, a memo, a job ID, a the number of copies, the number of printing pages and the output form of a job which are being processed from the print-job table **303***a*. The read out number of copies is

multiplied by the number of printing pages to obtain the total number of prints which are being processed.

[0149] In step S2007, the printer state display section 309*e* of the schedule view display section 309 requests the database managing section 303 to read out a state of each printer in the selected group from the printer table 303*c*. Images of icons corresponding to the read out states are read out from the storage section (not shown).

[0150] In step S2008, the job graph display section 309*a* of the schedule view display section 309 requests the database managing section 303 to retrieve all the jobs which are not allocated to the printers from the print schedule table 303*b*. Then, in step S2009, length, color or pattern of the rectangular shape showing each job are determined from the printing time and the state in the print schedule table 303*b*, thereby forming the image.

[0151] Further, in step S2010, the order of the rectangular shapes formed in step S2009 is determined in accordance with the input date and time of each job held in the print-job table 303*a*, and the rectangular shapes are connected in this order at a distance of one dot, thereby forming an image of the job graph of the unallocated job.

[0152] In step S2011, the all-unallocated job information display section 309*f* of the schedule view display section 309 counts the total number of unallocated jobs retrieved in step S2008, and requests the database managing section 303 to read out the number of copies and the number of printing pages from the print-job table 303*a*. Then, the number of prints (=the number of copies×the number of printing pages) of each job is accumulated to calculate out the total number of prints of the unallocated jobs.

[0153] In step S2012, if there is a selected unallocated job among the unallocated jobs, the selected job information display section 309*g* of the schedule view display section 309 requests the database managing section 303 to read out a name of document, a user's name and a memo from the print-job table 303*a*.

[0154] In step S2013, each of the above sections inserts the images formed in the above steps, readout character information, the calculated numerical values and the like into a previously prepared image of the schedule view to show them on the screen. Thereafter, the processing of this flowchart is completed.

[0155] As explained above, according to this embodiment, since loads of the printers are displayed graphically by the job graph, it is possible to intuitively grasp whether the loads are appropriately distributed to the printers. Further, since the scale is also displayed, it is possible to grasp not only the absolute value of the load of each printer, but also the absolute amount (absolute amount converted into the printing time).

[0156] Further, since each the rectangular shape in the job graph shows the state of job by color or pattern of the rectangular shape, it is possible to intuitively grasp the size, the state of the input job, and the order of the jobs. Further, it is easy to find when a particular job is processed by the scale and thus, it is easy to manage the deadline of the jobs.

[0157] The total amount of the current jobs of each printer, the total amount of unallocated jobs, the current states of each job and each printer, jobs which are currently being processed, and the details of the selected job are displayed easily for an operator in real time. Therefore, it is possible to grasp current and future operating status of the entire system at a glance.

[0158] The printer controlling method explained in the above embodiment is realized by storing the program in a computer-readable storage medium such a ROM, a HD, a FD, a CD-ROM, an MO, a DVD, an IC card, and by reading out the program from the medium by a computer. This program can be distributed as a transfer medium through the above storage medium or through a network such as Internet.

[0159] As explained above, according to the printer controlling device and printer controlling method of the present invention, an accumulation state of a job to each printer is displayed in a form of the job graph comprising all jobs accumulated in the printer. Therefore, there is an effect that it is possible to obtain a printer controlling device capable of displaying load states of the printers in an easy-to-understand manner graphically.

[0160] Furthermore, the accumulation state of each printer belonging to the same group is displayed in the form of the job graph comprising all jobs accumulated in the printer. Therefore, there is an effect that it is possible to obtain a printer controlling device capable of displaying the load state of the printers in a group in the easy-to-understand manner graphically.

[0161] Moreover, the accumulation state of a latest job to each printer is always reflected to the job graph. Therefore, there is an effect that it is possible to obtain a printer controlling device capable of displaying the load state of the printers at various time in the easy-to-understand manner graphically and in real time.

[0162] Furthermore, the state of job in the job graph is displayed with color or pattern of corresponding predetermined shape. Therefore, there is an effect that it is possible to obtain a printer controlling device capable of displaying the states of jobs accumulated in the printers in the easy-to-understand manner graphically and in real time.

[0163] Moreover, the same characters of a corresponding predetermined shape is disposed in each job which as divided and distributed by a parallel printing function. Therefore, there is an effect that it is possible to obtain a printer controlling device capable of displaying the relation of the plurality of jobs processed by the plurality of printers in the easy-to-understand manner.

[0164] Furthermore, a job amount and the entire amount accumulated in each printer is displayed with an absolute amount converted into the printing time. Therefore, there is an effect that it is possible to obtain a printer controlling device capable of converting the load states of the printers into the printing time and displaying the same in the easy-to-understand manner.

[0165] Moreover, the guide bar capable of being used for various purposes such as averaging of load states of the printers. Therefore, there is an effect that it is possible to obtain a printer controlling device capable of easily averaging the load states of the printers.

[0166] Furthermore, the guide bar moves in an opposite direction on the scale by an amount corresponding to the

elapsed time. Therefore, there is an effect that it is possible to obtain a printer controlling device capable of easily grasping the remaining time to achieve a target.

[0167] Moreover, detailed information of the job which is being processed by a printer is displayed in addition to the accumulation state of the job to the printer. Therefore, there is an effect that it is possible to obtain a printer controlling device capable of displaying, in the easy-to-understand manner, which the currently processed job is.

[0168] Furthermore, detailed information of the job which is being processed by each printer, i.e., at least one of the name of document, the user's name, the memo, the job ID, the progress state and the output form is displayed in addition to the accumulation state of the job to the printer. Therefore, there is an effect that it is possible to obtain a printer controlling device capable of displaying the load state of the printers in the easy-to-understand manner graphically, and which the currently processed job is.

[0169] Moreover, the accumulation state of the job to the printer and detailed information of the job which is being processed by the printer are displayed side-by-side. Therefore, there is an effect that it is possible to obtain a printer controlling device capable of collectively displaying the accumulation state of the job to the printer and the detailed information of the job processed by the printer in one place.

[0170] Furthermore, it is clearly indicated by the icon that a stop of a printer is not due to trouble but due to suspending job. Therefore, there is an effect that it is possible to obtain a printer controlling device capable of displaying a cause of suspension of a printer in the easy-to-understand manner.

[0171] Moreover, the accumulation state of a job which is not yet allocated to a printer is displayed in a form of the job graph comprising all unallocated jobs. Therefore, there is an effect that it is possible to obtain a printer controlling device capable of displaying the total amount of jobs which are not allocated to the printer in the easy-to-understand manner graphically.

[0172] Furthermore, the total number of unallocated jobs and the total number of prints are clearly indicated by means of numerical values in addition to the job graph. Therefore, there is an effect that it is possible to obtain a printer controlling device capable of displaying the total amount of jobs which are not yet allocated to the printers in the easy-to-understand manner, and displaying with strict numerical value with the total number and the total number of prints.

[0173] Moreover, the accumulation state of the unallocated jobs, its total number and the total number of prints are displayed side-by-side. Therefore, there is an effect that it is possible to obtain a printer controlling device capable of collectively displaying the accumulation state of the unallocated jobs and the total number and the total number of prints in one place.

[0174] Furthermore, detailed information of a selected job among the unallocated jobs is displayed together with the job graph. Therefore, there is an effect that it is possible to obtain a printer controlling device capable of displaying the total amount of jobs which are not yet allocated to the printers in the easy-to-understand manner graphically, and displaying which the currently selected job is.

[0175] Moreover, detailed information of the selected job among the unallocated jobs, i.e., at least one of the name of document, the user's name, the memo, is displayed in addition to the job graph. Therefore, there is an effect that it is possible to obtain a printer controlling device capable of displaying the total amount of jobs which are not yet allocated to the printers in the easy-to-understand manner graphically, and displaying which the currently selected job is.

[0176] Furthermore, the accumulation state of the unallocated job and detailed information of the selected job are displayed side-by-side. Therefore, there is an effect that it is possible to obtain a printer controlling device capable of collectively displaying the accumulation state of the unallocated jobs and detailed information of the selected job in one place.

[0177] In addition, the interruption position pointer clearly indicates which selected job interrupts between which jobs. Therefore, there is an effect that it is possible to obtain a printer controlling device capable of displaying the interruption position of the selected job in the easy-to-understand manner.

[0178] The present document incorporates by reference the entire contents of Japanese priority document, 2000-344135 filed in Japan on Nov. 10, 2000.

[0179] Although the invention has been described with respect to a specific embodiment for a complete and clear disclosure, the appended claims are not to be thus limited but are to be construed as embodying all modifications and alternative constructions that may occur to one skilled in the art which fairly fall within the basic teaching herein set forth.

What is claimed:

**1**. A printing job controlling device configured to display a queue of printing jobs, comprising:

a calculating unit configured to calculate a time required to process a printing job;

a reading unit configured to read out a current status of the printing job; and

a displaying unit configured to display an image having a size proportional to the time required calculated by said calculating unit and having a pattern corresponding to the current status read out by said reading unit.

**2**. A printing job controlling device configured to display a queue of printing jobs, comprising:

a calculating unit configured to calculate a time required to process each of the printing jobs; and

a displaying unit configured to display images each having a size proportional to the time calculated by said calculating unit continuously on a predetermined displaying area,

wherein said displaying unit is configured to display an image of a current printing job at one end of the displaying area.

**3**. A printing job controlling device configured to display a queue of printing jobs, comprising:

a calculating unit configured to calculate a time required to process each of the printing jobs; and

a displaying unit configured to display rectangular images each having a size proportional to the time required calculated by said calculating unit continuously on a predetermined displaying area.

**4**. A method of displaying a queue of print jobs, comprising:

calculating a time required to process a print job;

reading out a current status of the print job; and

displaying an image having a size proportional to the time required and having a pattern corresponding to the current status.

**5**. A method of displaying a queue of print jobs, comprising:

calculating times required to process print jobs; and

continuously displaying images having sizes proportional to the times required on one end of a displaying area.

**6**. A method of displaying a queue of print jobs, comprising:

calculating times required to process print jobs; and

continuously displaying rectangular images having sizes proportional to the times required.

* * * * *