

1 INFORMATION PROCESSING APPARATUS AND OUTPUT APPARATUS

BACKGROUND OF THE INVENTION

Field of the Invention

5 The present invention relates to an information processing apparatus for sending data to an output apparatus such as a printer connected through a bilateral interface, and an output apparatus for receiving data from an information processing apparatus such as a
10 host computer and outputs data in accordance with the input data.

Related Background Art

In a recent recording apparatus of this type, output information inputted from a host computer is
15 analyzed to develop bit map data as an output data of a printer engine such as a laser beam printer, and a laser beam modulated in accordance with the developed data is scanned and exposed to a photo-conductor drum to record an image.

20 A recording apparatus which can output data WYSIWYG-processed (What You See Is What You Get) by a host computer in accordance with page edit data has also been put into practice.

In this case, the recording apparatus may be
25 of a type which develops the bit map data WYSIWYG-processed by the host computer to a bit map memory to output it, or a type which receives data to be

1 rasterized from the host computer, generates output
bit map data by a rasterization function of the
recording apparatus and develops it in the bit map
memory for outputting it.

5 In the prior art recording apparatus of the
type which develops the bit map data WYSIWYG-processed
by the host computer to the bit map for outputting
it, a time from the start of the bit map development
of the output information by the host computer to the
10 start of printing by the printer engine is determined
by a rasterization time of the host computer.

Further, in the type which receives the data
to be rasterized from the host computer, generates
the output bit map data by the rasterization function
15 of the recording apparatus and develops it to the bit
map memory for outputting it, the time required for
the host computer to transfer the output information
to the printer is short but the rasterization time
of the recording apparatus itself is long so that
20 information received out of image writing synchroniza-
tion with the printer engine cannot be correctly
recorded.

In the recording apparatus in the field of
DTP for page editing by fully utilizing graphics,
25 images and outline font, a demand to shorten the
outputting time has been increasing and improvements
of a printer control method and a printer control

1 system to meet such a demand has been desired.

SUMMARY OF THE INVENTION

It is an object of the present invention to
5 provide an information processing apparatus for grasping
a capability of a printer connected thereto through
a bilateral interface and determining a ratio of share
to output data, and an output apparatus for processing
data in accordance with the ratio information of the
10 share to the data processing received from the informa-
tion processing apparatus connected thereto through
the bilateral interface.

In order to achieve the above object, the
present invention provides an information processing
15 apparatus comprising acquiring means for acquiring
resource information of a printer connected
through a bilateral interface, and determination
means for determining a ratio of share to
rasterization of information in the data outputted
20 to the printer, to be shared by a rasterizer in the
printer.

Further, in order to achieve the above object,
the present invention provides an output apparatus
comprising receiving means for receiving ratio informa-
25 tion of share to rasterize rasterization information
in data outputted from an information processing
apparatus connected through a bilateral interface,

1 and control means for causing a rasterizer to rasterize
the information in accordance with the ratio of share
of the rasterization.

Accordingly, the information processing
5 apparatus and the output apparatus can render uniform
the resources and the share of the processing capabilities
so that a higher processing performance and an
efficient operation of the resources are attained.

10 BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 shows a sectional view of a construction
of a first recording apparatus to which the present
invention is applied;

Fig. 2 shows an external view of a construction
15 of a second recording apparatus to which the present
invention is applied;

Fig. 3 shows a block diagram of a control unit
of the second recording apparatus shown in Fig. 2;

Fig. 4 shows a block diagram of a printer
20 control system in one embodiment of the present
invention;

Fig. 5 shows a diagram of a data processing
path between a printer and a host computer shown in
Fig. 1;

25 Fig. 6 shows a flow chart of font rasterization
parallel processing of the printer and the host
computer in one embodiment of the present invention;

1 Fig. 7 shows a flow chart of detailed procedure
of a font rasterization analysis and classification
routine shown in Fig. 3; and

 Fig. 8 shows a ratio of share of rasterization
5 of the printer and the host computer shown in Fig.
1.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

 Before describing a construction of an
10 embodiment, constructions of a laser beam printer and
an ink jet printer to which the embodiment is to be
applied are explained with reference to Figs. 1 to
3. A printer in the embodiment is not to be limited
to the laser beam printer or the ink jet printer but
15 it may be other type of printer.

 Fig. 1 shows a sectional view of a construction
of a first recording apparatus to which the present
invention is applied. It may be a laser beam printer
(LBP).

20 In Fig. 1, numeral 1500 denotes an LBP main
unit which receives print information supplied from
an externally connected host computer, stores it,
generates a bit map image in accordance with the stored
information, and forms an image on a record sheet which
25 is a recording medium. Numeral 1501 denotes a console panel
having console switches and LED displays arranged thereon,
and numeral 1000 denotes a printer control unit for

1 controlling the overall LBP main unit 1500 and analyzing
the print information supplied from the host computer. The
printer control unit 1000 converts the print informa-
tion to a video signal of the corresponding bit pattern
5 and supplies it to a laser driver 1502, which drives
a semiconductor laser 1503, and it turns on and off
a laser beam 1504 emitted from a semiconductor laser
1503 in accordance with the input video signal. The
laser beam 1504 is laterally swung by a rotating polygon
10 mirror 1505 to scan and expose to an electrostatic
drum 1506. Thus, an electrostatic latent image of
a character pattern is formed on the electrostatic
drum 1506. The latent image is developed by a develop-
ing unit 1507 arranged around the electrostatic drum
15 1506 and then transferred to a record sheet. The
record sheet may be a cut sheet, and cut sheet recording
sheets are contained in a sheet cassette 1508 mounted
in the LBP 1500, and the sheet is taken into the
apparatus by a sheet feed roller 1509 and a transport
20 roller 1511, and it is supplied to the electrostatic
drum 1506.

Fig. 2 shows an external view of a second
recording apparatus to which the present invention
is applied. It may be an ink jet recording apparatus
25 (IJRA).

In Fig. 2, a carriage HC which engages with
a helical groove 5004 of a lead screw 5005 rotated

1 by the forward or backward rotation of a drive motor
5013 through drive force transmission gears 5011 and
5009 has a pin (not shown) and it is reciprocally
driven in the directions of arrows a and b. An ink
5 jet cartridge IJC is mounted on the carriage HC.
Numeral 5002 denotes a sheet retainer plate which
presses a sheet to a platen 5000 over the range of
movement of the carriage. Numerals 5007 and 5008
denotes photo-couplers which serves as home position
10 detection means for detecting the presence of a lever
5006 of the carriage in the range to switch the
direction of rotation of a motor 5013. Numeral 5016
denote a member for supporting a capping member 5022
which caps the entire surface of a recording head,
15 and numeral 5015 denotes suction means for sucking
the interior of the cap and it suction-recovers the
recording head through an aperture 5023 in the cap.
Numeral 5017 denotes a cleaning blade which is movable
back and forth by a member 5019. Numeral 5018 denotes
20 a main unit support plate which supports 5017 and 5019.
Numeral 5012 denotes a lever for starting the suction
of the suction recovery, and it is moved with the
movement of a cam 5020 which is engaged with the
carriage so that a drive force from the drive motor
25 is controlled by known transmission means such as a
clutch.

The capping, cleaning and suction recovery

1 are conducted at the corresponding positions by the
action of the lead screw 5005 when the carriage is
brought to the home position. It may conduct desired
operations at a desired timing.

5 Fig. 3 shows a block diagram of a control unit
of the second recording apparatus shown in Fig. 2.

In Fig. 2, numeral 1700 denotes an interface
to which a record signal is applied, numeral 1701
denotes an MPU, numeral 1702 denotes a program ROM
10 for storing a control program to be executed by the
MPU 1701, and numeral 1703 denotes a DRAM which stores
various data (including the record signal record data
to be supplied to a head). Numeral 1704 denotes a
gate array for controlling the supply of the record
15 data to a recording head 1708, and it also controls
the transfer of data among the interface 1700, the
MPU 1701 and the DRAM 1703. Numeral 1710 denotes a
carrier motor for carrying the recording head 1708,
numeral 1709 denotes a transport motor for transporting
20 a record sheet, numeral 1705 denotes a head driver
for driving the recording head, numeral 1706 denotes
a motor driver for driving the transport motor 1709,
and numeral 1707 denotes a motor driver for driving
the carrier motor 1710.

25 In the recording apparatus of the present
embodiment, when a record signal is applied from the
host computer through the interface 1700, the record

1 signal is converted to print record data by the gate
array 1704 and the MPU 1701. The motor drivers 1706
and 1707 are driven and the recording head is driven
in accordance with the record data sent to the head
5 driver 1705 to print it out.

Fig. 4 shows a block diagram of a configuration
of a printer control system in one embodiment of the
present invention. A laser beam printer (see Fig.
1) is used in the present embodiment.

10 The present invention may be applied to any
system in which process is made through a network such
as a LAN, whether it is a single unit system or a
multi-unit system.

In Fig. 4, numeral 100 denotes a host computer
15 which has a CPU 1 for processing a document having
mixture of graphics, images, characters and tables
(including spread sheets) in accordance with a document
processing program stored in a ROM 2, and the CPU 1
centrally controls devices connected to a system bus
20 4. A control program for the CPU 1 shown in flow
charts of Figs. 6 and 7 is stored in the ROM 2.

Numeral 3 denotes a RAM which functions as
a main memory and a work area of the CPU 1. Numeral
5 denotes a keyboard controller (KBC) which controls
25 the key entry from a keyboard 9. Numeral 6 denotes
a CRT controller (CRTC) which controls the display
of a CRT display (CRT) 10. Numeral 7 denotes a disk

1 controller (DKC) which controls the access of a hard
disk (HD) 11 which stores a boot program, various
application programs, font data, a user file and an
edit file, and a floppy disk (FD) 12. Numeral 8
5 denotes a printer controller (PRTC) which is connected
to the printer 1500 through an interface (bilateral
interface) 13 to control the communication with the
printer 1500. The CPU 1 may develop (rasterize) an
outline font to a display information RAM set on the
10 RAM 3 to permit the WYSIWYG processing on the CRT 10.
Further, the CPU 1 may open various registered windows
in accordance with a command indicated by a mouse cursor,
not shown, to process various data.

The document processing program may be stored
15 in the hard disk 11 or the floppy disk 12 and loaded
to the RAM 3 through the DKC 7 for execution.

In the printer 1500, numeral 14 denotes a CPU
which centrally controls the access to various devices
connected to a system bus 17 in accordance with a
20 control program stored in a ROM 15 and outputs an image
signal as print data to a print unit (printer engine)
20 connected through a printer interface 19.

Numeral 19 denoted a RAM which is used as a
work area of the CPU 14 and a storage for record
25 information. The RAM 16 may be constructed to be
expanded in the memory capacity by an optional RAM
connected to an expansion port, not shown.

1 The printer interface 19 converts the print
data to a format compatible to the mechanism of the
print unit 20 and outputs it. It may convert parallel
data to serial data. A plurality of dot fonts of
5 different sizes and outline font data may be stored
in the ROM 15 as printer fonts. A rasterization program
for developing outline font or vector graphics data
commanded by the host computer 100 to share to a bit
map on a rasterization area of the RAM 16, in parallel
10 with the rasterization on the host computer 100 is
stored in the ROM 15.

As a result, a ratio of share of the rasteriza-
tion is dynamically switched in accordance with the
analysis of the rasterization information in the output
15 information which is outputted to the printer 1500
by the host computer 100. Depending on the analysis
of the rasterization information, one of the printer
1500 and the host computer 100 may conduct the
rasterization.

20 At least one card slot, not shown, may be
provided to permit the connection of a build-in font
as well as an optional card and a card containing a
program for interpreting a different printer control
language (an emulation card). An NVRAM which stores
25 printer mode setting information from a console unit,
not shown, may be provided.

In the printer control system of the present

1 embodiment, the host computer 100 acquires the
resource data from the printer 1500, and when a print
job occurs, the CPU 1 analyzes the print job in
accordance with the resource data of the printer 1500
5 to dynamically determine the ratio of share of the
parallel processing between the first rasterizer (the
function of the CPU 1) and the second rasterizer (the
function of the CPU 14), and the second rasterizer
or the first rasterizer parallelly processes the
10 rasterization information in the print job in accordance
with the determined ratio of share of the parallel
processing so that the print job is efficiently proces-
sed while the shares to the data processing of the
printer and the host computer are rendered uniform.

15 The CPU 1 analyzes the font size in the print
job based on the resource data of the printer to
dynamically determine the ratio of share of the parallel
processing by the first rasterizer and the second
rasterizer so that the host computer and the printer
20 functionally share the rasterization for the specific
types of fonts.

 The CPU 1 further analyzes the quantity of
outline interpolation information in the print job
based on the resource data of the printer to dynamically
25 determine the ratio of share of the parallel processing
of the first rasterizer and the second rasterizer so
that the rasterization corresponding to the number

1 of interpolations in the outline information is
functionally shared by the host computer and the printer.

In the present embodiment, the resource data
include resource/processing capability information
5 such as an inquiry to the printer 1500, the presence
or absence of a draw function to each draw unit of
a line or a circle of the printer by the reference
to a definition file on the host computer 100, a draw
process time, the presence or absence of the rasteriza-
10 tion function of the outline font and a rasterization
time, and they are stored in a memory such as the RAM
16. The CPU 1 analyzes all or a portion of those
information to dynamically determine the ratio of share
of the parallel processing of the first rasterizer
15 and the second rasterizer. The CPU 1 dynamically
switches the ratio of share of the parallel processing
for each page of the output edit information (charac-
ters, graphics, tables and images).

As an example of the analysis of the resource
20 data by the host computer 100, time data required for
the printer 1500 to rasterize a predetermined size
of outline font is stored in the memory such as the
RAM 16 as table data, and when the size of the outline
font of the record data is equal to the stored size,
25 the table data is used, and when they are not equal,
the table data of the outline font of the record data
is corrected to accumulate the rasterization times

1 of the respective characters to determine the ratio
of share of the rasterization of the host computer
100 and the printer 1500. In the calculation of the
rasterization time, the number of interpolation points
5 (for example, the interpolation by a bezier curve) may
be taken into consideration to attain more accurate
calculation of the processing time. Further, in the
calculation of the rasterization time, where a plurality
of languages which can be interpreted by the printer
10 1500 are provided or the printer has a plurality of
resolution powers to record, a plurality of tables
for rasterization may be provided in the memory such
as the RAM 16 so that the rasterization time is more
accurately calculated by taking the differences in
15 the languages and the resolution power into account.

Thus, where there is a font rasterizer (the
function of the CPU 14 in the present embodiment) in
the printer 1500, the rasterization of the font may
be distributed to the host computer 100 and the printer
20 1500 in accordance with the performances thereof. One
font may be transferred to the printer 1500 in the
form of bit map to conduct the rasterization by the
host computer 100 and the remaining fonts may be
transferred to the printer 1500 in the form of outline
25 for the rasterization by the CPU 14.

On the other hand, where the printer 1500 has
the data in the form of outline in, for example, the

1 ROM 15, the host computer 100 transfers only the
character codes and the attributes thereof to the
printer 1500 and quickly terminates the data transfer
from the host computer to shorten the time to release
5 the host computer.

In the banding by the printer 1500 in which
an overrun may take place if all data are banded by
the printer 1500 when the banding of the print data
is to be executed in a predetermined memory capacity,
10 a portion or all of the band may be assigned to the
host computer 100 to prevent a print error of the
printer 2500 due to the variation of the share of the
record information processing.

A flow of a print job process of the printer
15 control system of the present invention is now explained
with reference to Figs. 5 and 6.

Fig. 5 shows a diagram of a data process path
between the printer 1500 and the host computer 100
shown in Fig. 4.

20 In Fig. 5, numeral 101 denotes an application
being executed, which may be a DTP processing program.
Numeral 103 denotes a data analyzer which analyzes
a print job for each page, classifies it to an outline
font or the like (see Fig. 7 to be explained later),
25 determines the share of the rasterization, and directs
data to be processed to the font 103, a font rasterizer
(which functions as a first rasterizer) 104, a graphics

1 rasterizer (which functions as the first rasterizer)
105 and a page data generator 106, which combines
output data from the data analyzer 102, the graphics
rasterizer 105, the font 103 and the font rasterizer
5 104.

Numerals 107 and 201 denote input/output
handlers which control the input/output of the printer
1500 and the host computer 100. Numeral 202 denotes
a rasterizer which develops the rasterized data to
10 a bit map. Numeral 203 denotes a rasterizer which
rasterizes a font by referring a memory 204 which
stores the outline data by referring the received
outline font or based on the received character codes.
Numeral 205 denotes a print control unit which controls
15 the transfer of the bit map data outputted from the
rasterizer 202 to the print unit 20 (see Fig. 4).
A-N denote data process paths.

As shown in Fig. 5, where it is determined
by the print job by the data analyzer 102 that there
20 are rasterizer 202 and font rasterizer 203 in the
printer 1500, the rasterization of the font may be
distributed in accordance with the performances of
the host computer 100 and the printer 1500, and one
font may be processed by the rasterization by the host
25 computer 100 and transferred to the printer 1500 (paths
C-H-J-K) in the form of bit map and the remaining fonts
may be transferred (paths D-G-J-K) to the printer 1500

1 in the form of outline for the rasterization by the
font rasterizer 203.

Fig. 6 shows a flow chart of a rasterization
parallel process of the printer 1500 and the host
5 computer 100 shown in Fig. 4. Numerals (1) to (6)
denote steps of the host computer 100, and numerals
(11) to (14) denote steps of the printer 1500. When
the rasterization is assigned to the printer 1500 by
the step (3), the shift to the step (3) and the steps
10 (11) et sq. are parallelly processed to parallelly
process the font rasterization.

Analysis and classification routine of the
font data in the print job is executed (1) in accordance
with the flow chart shown in Fig. 7 to determine the
15 share of processing in accordance with the processing
capability (2). Where the rasterization to the printer
1500 has been decided, the outline data of the font
or the character code of the outline font is sent to
the printer 1500 (3). As a result, the process of
20 the step (11) is parallelly started. The process by
the host computer 100 is described below.

The rasterization (scaling) on the font data
assigned to the host computer 100 is executed (4),
and the developed bit map font is sent to the printer
25 1500 (5). As a result, the process of the step (12)
is simultaneously started.

The page data is then sent to the printer 1500

1 (6), and the process is terminated.

On the other hand, when the font data assigned from the host computer 100 is received in the step (3), the received font is scaled (rasterized) and it
5 is registered in the RAM 16 (11).

On the other hand, when the bit map data is received from the host computer 100 in the step (5), the received bit map data is registered in the RAM 16 (12).

10 On the other hand, when the page data is received from the host computer 100 in the step (6), the received page data is stored in the RAM 16 (13), and the rasterizer 202 page-rasterizes it by referring the data in the RAM 16 and transfers the page-rasterized
15 printer data to the print control unit 205 (14), and the process is terminated.

In this manner, the host computer acquires the resource data of the printer, analyzes the print job in accordance with the resource data, and determines
- 20 - ~~the ratio of share of the rasterization of the printer~~ and the host computer to the rasterization information of the print job, and the host computer and/or the printer parallelly rasterizes the information extracted from the print job in accordance with the determined
25 ratio of share of the rasterization so that the shares of the rasterization of the information by the printer and the host computer are rendered uniform. The

1 resource data processing program which the host computer
100 analyzes need not be stored in the ROM 2 if it
is stored in the hard disk 11 of the host computer
100 by the floppy disk 12 and can be executed by the
5 print driver.

Fig. 7 shows a flow chart of a detail of the
font rasterization/analysis/classification routine
shown in Fig. 6. Numerals (1) to (11) denote steps.

When a print job is generated by an application
10 program, the data analyzer 102 searches the font data
of the print job (1) to determine whether the data
still exists or not (2), and if the decision is NO,
the process is terminated, and if the decision is YES,
whether the searched data matches to the bit map font
15 of the printer 1500 or not is determined (3). If the
decision is YES, the font is classified to the bit
map code of the printer 1500 (8), and the process
returns to the step (1).

On the other hand, if the decision in the step
— — — — — 20 (3) is NO, whether the searched data matches to the
outline font in the printer 1500 or not is determined,
(4), and if the decision is YES, the font is classified
to the outline code of the printer 1500 (9), and the
process returns to the step (1).

25 On the other hand, if the decision in the step
(5) is NO, whether the searched data is the outline
font or not is determined (6), and if the decision

1 is YES, the data is separated to the host computer
scaling for the rasterization by the host computer
100 (11), and the process returns to the step (1).
If the decision is NO, the searched data is classified
5 to the bit map data (7) and the process returns to
the step (1).

The font data in the print job is classified
into one of the following five types by a flow chart
of Fig. 7.

10 The font data classified to the bit map code
in the step (8) has the bit map font data in the printer
1500. This, the character codes and the attributes
are sent from the data analyzer 102 to the printer
1500 and they are processed by the rasterizer 202
15 (paths B-J-K).

The font data classified to the outline code
in the step (9) has the outline font data in the printer
1500. Thus, the character codes and the attributes
are sent from the data analyzer 102 to the printer
20 ~~1500 and they are~~ converted to the bit map font data
by the font rasterizer on the printer 1500 and processed
by the rasterizer 202 (paths B-J-K-M-N), or they are
converted to the bit map font data by the font rasterizer
104 on the host computer 100 and the converted bit
25 map font data is sent to the printer 1500 and processed
by the rasterizer 202 (paths C-H-J-K).

The font data classified to the outline data

1 in the step (10) has the font rasterizer 203 on the
printer 1500 but does not have the outline font data.
Thus, the character codes and the attributes are
delivered from the data analyzer 102 to the font 103
5 and the corresponding outline font data is sent to
the printer 1500, and they are converted to the bit
map font data by the font rasterizer 203 on the printer
1500 and processed by the rasterizer 202 (paths D-
G-K-M), or they are converted to the bit map font data
10 by the font rasterizer 104 on the host computer 100
and the converted bit map font data is sent to the
printer 1500 and processed by the rasterizer 202 (paths
C-H-J-K).

The font data classified to the host scaling
15 in the step (11) does not have the font rasterizer in
the printer 1500. Accordingly, the font data is converted
to the bit map data by the font rasterizer 104 on the
host computer 100 and the converted bit map data is
sent to the printer 1500 and processed by the rasterizer
20 (paths C-H-J-K).

The font data classified to the bit map data
in the step (7) does not have the bit map font data
in the printer 1500. Accordingly, the bit map font
data on the host computer 100 is sent to the printer
25 1500 and processed by the rasterizer 202.

When the font rasterization of the outline
font is to be shared, the font data classified to the

1 host scaling (step (11)) of the five types of the
classified font data is font-rasterized by the host
computer 100, and the font data classified to the
outline code (step (9)) and the outline data (step
5 (10)) are font-rasterized by the host computer 100
or the printer 1500 in accordance with the font
rasterization resource (capability) of the host
computer 100 and the printer 1500.

Fig. 8 shows a diagram of a ratio of share
10 of the rasterization of the printer 1500 and the host
computer 100 shown in Fig. 4. It shows a share status
of the rasterization when the printer 1500 has the
rasterizer 202 which can process the rasterized data
and the font rasterizer 203 which can execute the font
15 rasterization in accordance with the outline font data.

In Fig. 8, numeral 30 denotes a font rasteriza-
tion process in the print job, which comprises host
computer scaling 31 which the host computer 100 scales,
outline data 32 (including graphics and font) which
20 the printer 1500 can rasterize, and outline code 33.

In the status shown in Fig. 8, the outline
data 32 is divided to outline data 32-H which is
processed by the host computer 100 and outline data
32-P which is processed by the printer 1500, and the
25 outline code 33 is directly processed by the font
rasterizer 203 of the printer 1500.

In the font rasterization 30 in the print job,

1 the host scaling 31 is first processed and the remaining
outline data 32 and the outline code 33 are divided
into the host scaling process and the printer scaling
process including the host scaling 31 in accordance
5 with the host processing capability and the printer
processing capability.

In Fig. 8, the outline data is divided. When
the outline data 32 is small in amount and the outline
code 33 is large, the outline code may be divided.

10 Where the font rasterizer 203 which can process
the outline font data on the host computer 100 is not
provided in the printer 1500, the font information
is classified to the host scaling 31 and the outline
code 33, and when there is no outline font data in
15 the printer 1500 and the font rasterizer 203 which
can process the outline font data on the host computer
100 is provided, the font data is classified to the
host scaling 31 and the outline data 32. In any case,
it is divided to the host scaling process and the
20 ~~printer-scaling~~ process including the host scaling
31 in accordance with the host processing capability
and the printer processing capability.

In this manner, the host computer 100 acquires
the resource data of the printer 1500 and dynamically
25 determines the ratio of share of the rasterization
for each printer job so that the share of the data
processing of the host computer 100 and the printer

1 1500 is rendered uniform and the time from the input
of the print command to the start of the sheet feed
from the printer 1500 is shortened.

In the present embodiment, the font rasteriza-
5 tion of the outline font is shared by the host computer
and the printer although the rasterization of other
than font such as the rasterization of the vector
graphics or the expansion and the compaction of the
bit image may also be shared.

10 In the present embodiment, the timing to acquire
the resource data (for example, the table data) is
not referred although the host computer 100 may store
the resource data in the hard disk 11 as a temporary
file at a timing communicatable with the printer 1500,
15 or the resource data may be read from the printer 1500
at the time of the print command and stored as a
temporary file, or it may be previously stored in the
HD 11 of the host computer 100.

In the present embodiment, the host computer
20 acquires the resource data of the printer, analyzes
the print job based on the resource data, and determines
the ratio of share of the rasterization of the printer
and the host computer to the rasterization information
of the print job, and the host computer and/or the
25 printer parallelly rasterize the information extracted
from the print job in accordance with the determined
ratio of share of the rasterization so that the share

1 of the rasterization of the printer and the host
computer is rendered uniform.

Further, the rasterization information including
the font data and the vector graphics data is parallelly
5 rasterized by the host computer and/or the printer
so that the share of the rasterization of the host
computer and the printer is rendered uniform.

The host computer acquires the resource data
of the printer, and when the print job is generated,
10 it analyzes the print job based on the resource data
of the printer to dynamically determine the ratio of
share of the parallel processing of the first rasterizer
and the second rasterizer, and the second rasterizer
or the first rasterizer parallelly share the rasteriza-
15 tion of the information in accordance with the determined
ratio of share of the parallel processing so that the
print job is efficiently processed while the share
of the data processing of the printer and the host
computer is rendered uniform.

20 Since the rasterization information including
the font data and the vector graphics data is parallelly
processed in a shared manner, the print job is
efficiently processed while the share of the data
processing of the printer and the host computer is
25 rendered uniform.

Since the font size in the print job is analyzed
based on the resource data of the printer to dynamically

1 determine the ratio of share of the parallel processing
of the first rasterizer and the second rasterizer,
the rasterization of the specific types of font can
be functionally shared by the host computer and the
5 printer.

Further, since the amount of outline interpola-
tion information in the print job is analyzed based
on the resource data of the printer to dynamically
determine the ratio of share of the parallel processing
10 of the first rasterizer and the second rasterizer,
the rasterization process corresponding to the number
of interpolations in the outline information can be
functionally shared by the host computer and the printer.

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1 WHAT IS CLAIMED IS:

1. An information processing apparatus
comprising:

acquiring means for acquiring resource
5 information of a printer connected through a bilateral
interface; and

determination means for determining a ratio
of share of rasterization of information in the data
outputted to said printer, to be shared by a rasterizer
10 in said printer.

2. An information processing apparatus according
to Claim 1, wherein said resource information includes
processing capability information such as the presence
15 or absence of the rasterization information of said
printer and a rasterization time.

3. An information processing apparatus according
to Claim 1, wherein said rasterization information
20 includes font data and vector graphics data.

4. An information processing apparatus according
to Claim 1, wherein said rasterizer generates bit map
data in accordance with the rasterization information.
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5. An information processing apparatus according
to Claim 1, further comprising a rasterizer for

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1 processing the rasterization information, wherein the
rasterizer in said printer and/or the second rasterizer
parallellly share the processing.

5 6. An information processing apparatus according
to Claim 1, wherein said determination means analyzes
a font size in the data to be outputted base on the
resource information of said printer to dynamically
determine the ratio of share of the rasterization.

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7. An information processing apparatus according
to Claim 1, wherein said determination means analyzes
the amount of outline interpolation information in
the data to be outputted based on the resource informa-
15 tion of said printer to dynamically determine the ratio
of share of the rasterization.

8. An information processing apparatus according
to Claim 1, wherein said information processing apparatus
20 is a host computer.

9. An output apparatus comprising;
receiving means for receiving ratio information
of share of rasterization of rasterization information
25 in data outputted from an information processing
apparatus connected through a bilateral interface;
and





1 control means for causing a rasterizer to
rasterize the rasterization information in accordance
with the ratio of share of the rasterization.

5 10. An output apparatus according to Claim 9,
wherein the rasterization information includes font
data and vector graphics data.

11. An output apparatus according to Claim 9,
10 wherein said information processing apparatus is a
host computer.

12. An output apparatus according to Claim 9,
wherein said output apparatus is a laser beam printer.
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