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(54) **ELECTRONIC FILE CONVERSION APPARATUS, ELECTRONIC FILE CONVERTING METHOD AND COMPUTER READABLE MEDIUM**

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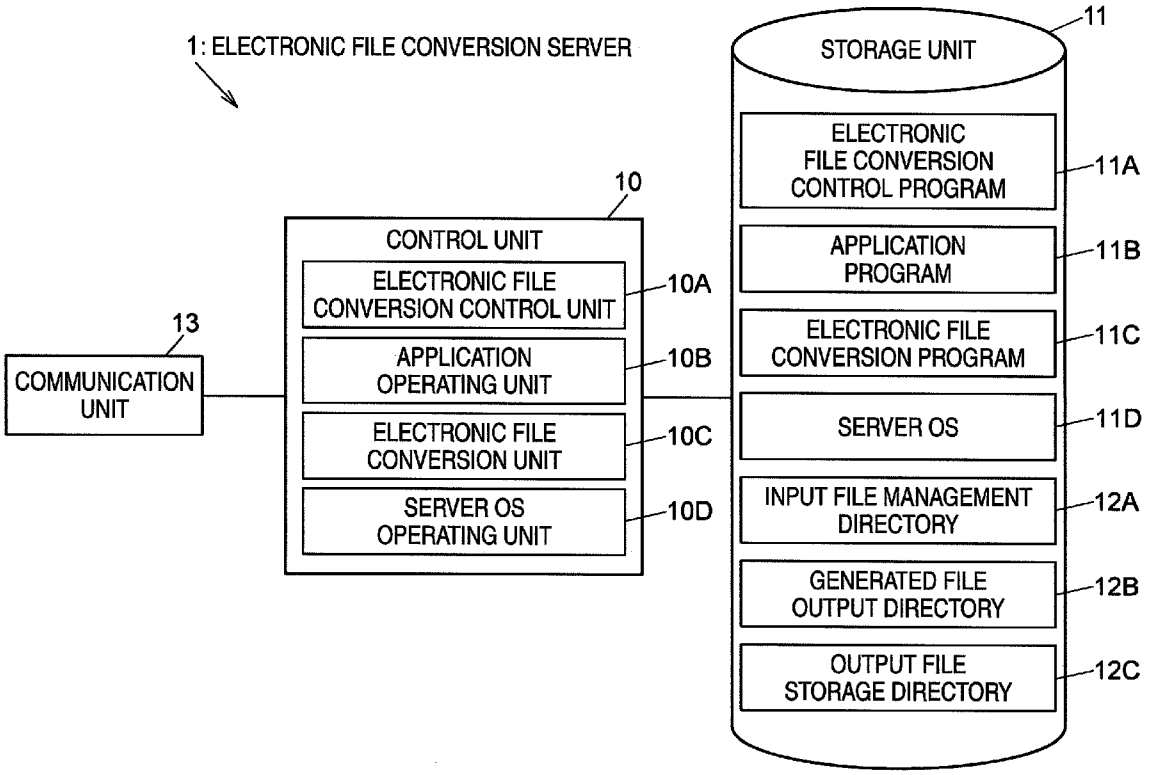
(57) **ABSTRACT**

An electronic file conversion apparatus includes a first management unit, a first changing unit, a conversion unit, a transfer unit and a second management unit. The first management unit receives a first electronic file, and associates the first electronic file with an identifier. The first changing unit changes a file name of the first electronic file by adding the identifier. The conversion unit converts the first electronic file into a second electronic file based on drawing information of the first electronic file generated by an operating system. The transfer unit transfers the changed file name of the first electronic file to a file name of the second electronic file. The second management unit associates the first electronic file with the second electronic file based on the identifier included in the changed file name of the first electronic file and the file name of the second electronic file.



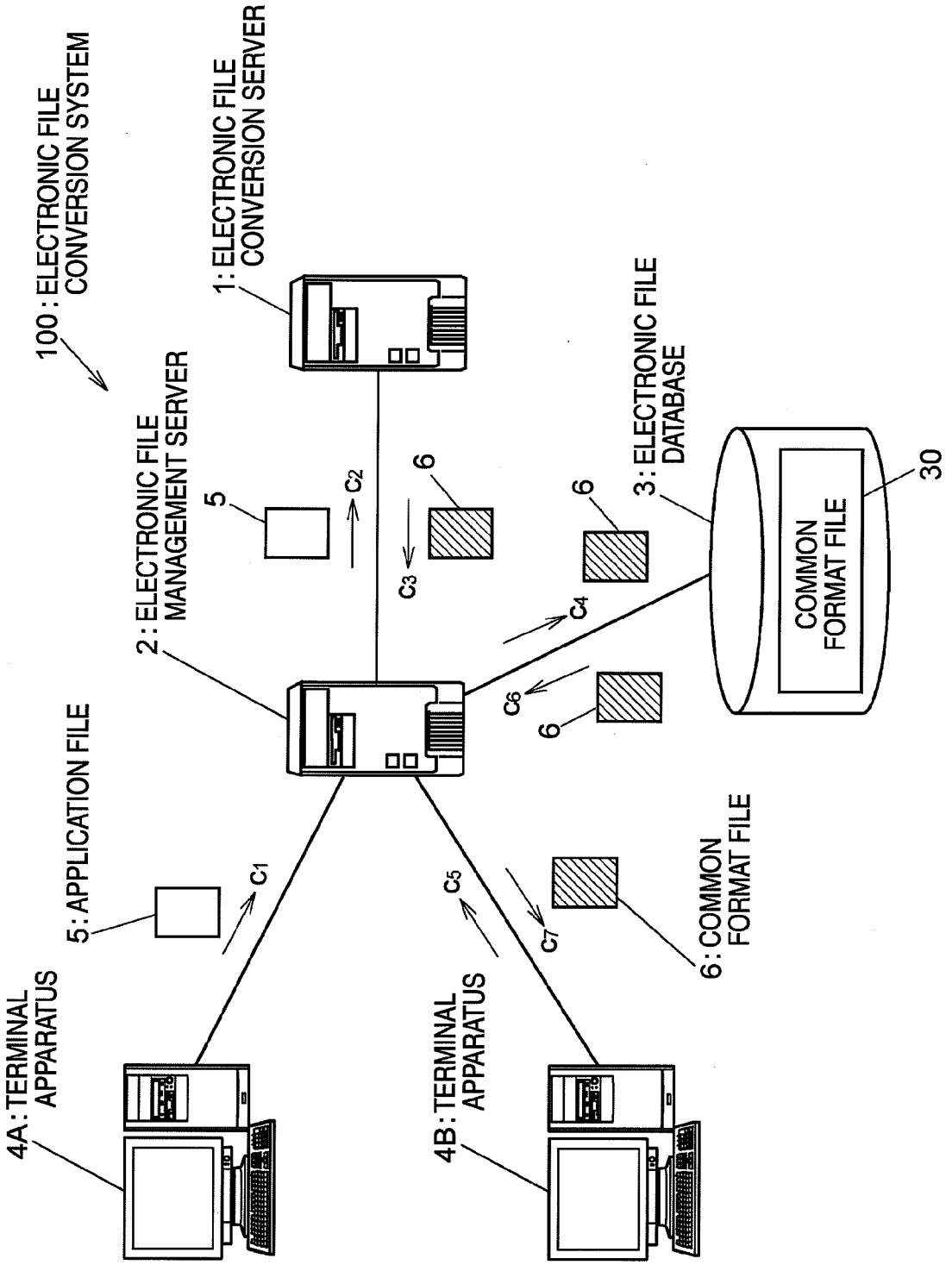

100 : ELECTRONIC FILE CONVERSION SYSTEM
1 : ELECTRONIC FILE CONVERSION SERVER
2 : ELECTRONIC FILE MANAGEMENT SERVER
3 : ELECTRONIC FILE DATABASE
4A : TERMINAL APPARATUS
4B : TERMINAL APPARATUS
5 : APPLICATION FILE
6 : COMMON FORMAT FILE
COMMON FORMAT FILE
30
C1
C2
C3
C4
C5
C6
C7

FIG. 1

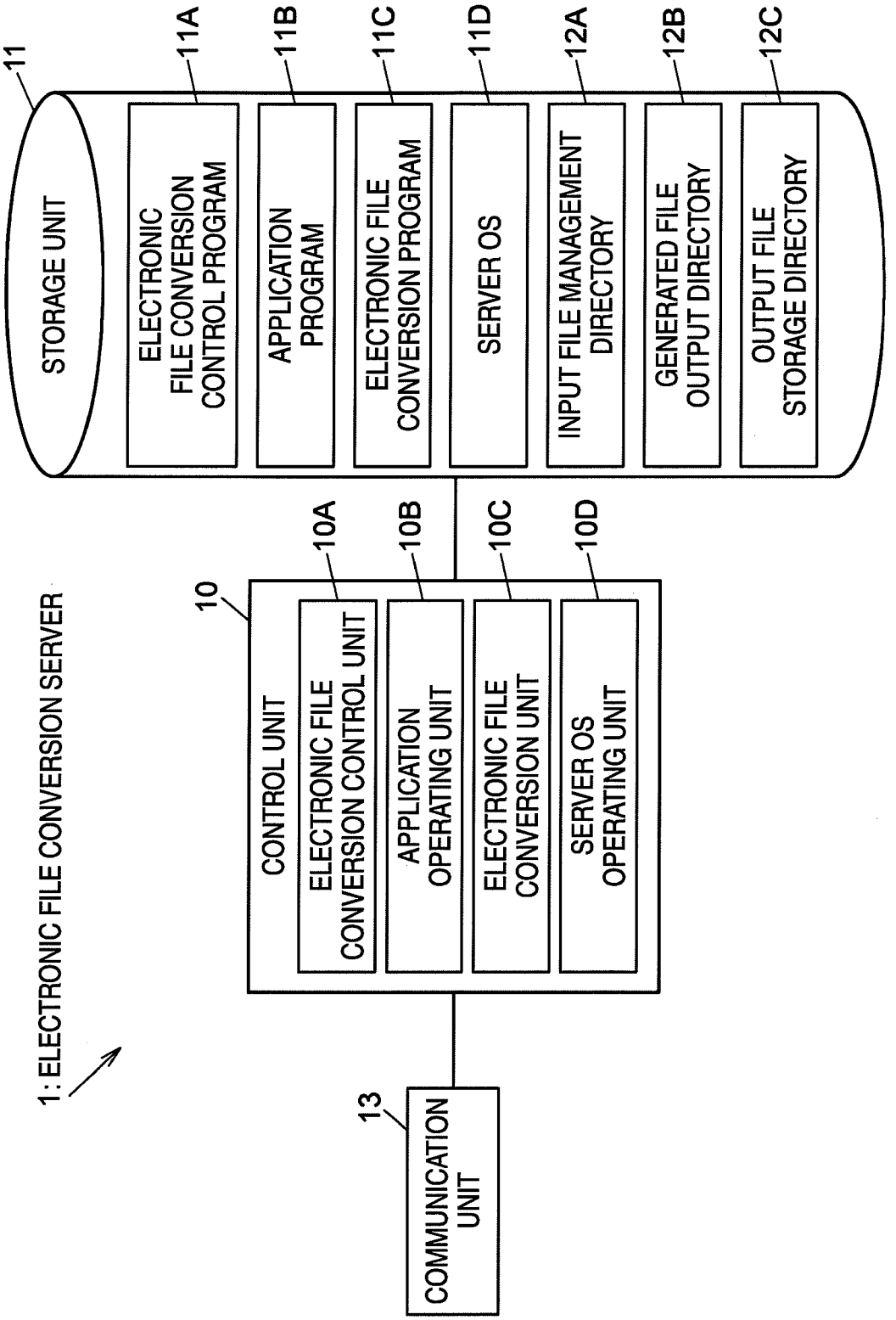

1: ELECTRONIC FILE CONVERSION SERVER
10
CONTROL UNIT
10A
ELECTRONIC FILE CONVERSION CONTROL UNIT
10B
APPLICATION OPERATING UNIT
10C
ELECTRONIC FILE CONVERSION UNIT
10D
SERVER OS OPERATING UNIT
13
COMMUNICATION UNIT
11
STORAGE UNIT
11A
ELECTRONIC FILE CONVERSION CONTROL PROGRAM
11B
APPLICATION PROGRAM
11C
ELECTRONIC FILE CONVERSION PROGRAM
11D
SERVER OS
12A
INPUT FILE MANAGEMENT DIRECTORY
12B
GENERATED FILE OUTPUT DIRECTORY
12C
OUTPUT FILE STORAGE DIRECTORY

FIG. 2

FIG. 3

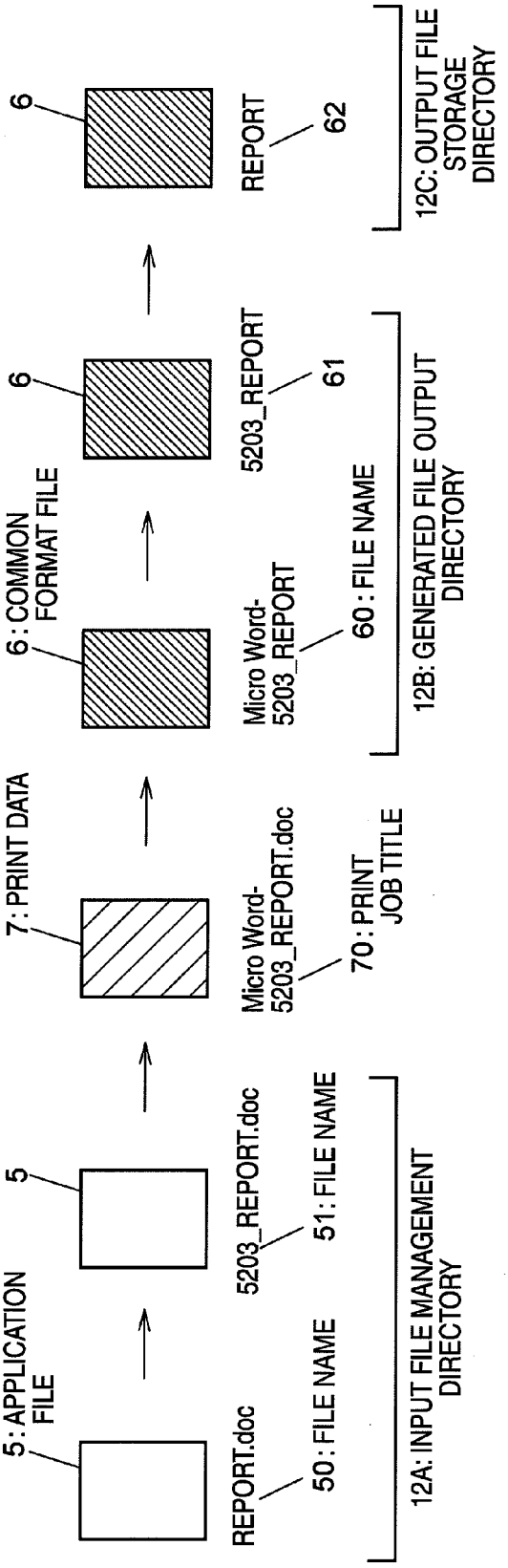

5: APPLICATION FILE
5
6: COMMON FORMAT FILE
6
6
7: PRINT DATA
REPORT.doc
50: FILE NAME
5203_REPORT.doc
51: FILE NAME
Micro Word-5203_REPORT.doc
70: PRINT JOB TITLE
Micro Word-5203_REPORT
60: FILE NAME
5203_REPORT
61
REPORT
62
12A: INPUT FILE MANAGEMENT DIRECTORY
12B: GENERATED FILE OUTPUT DIRECTORY
12C: OUTPUT FILE STORAGE DIRECTORY

FIG. 4

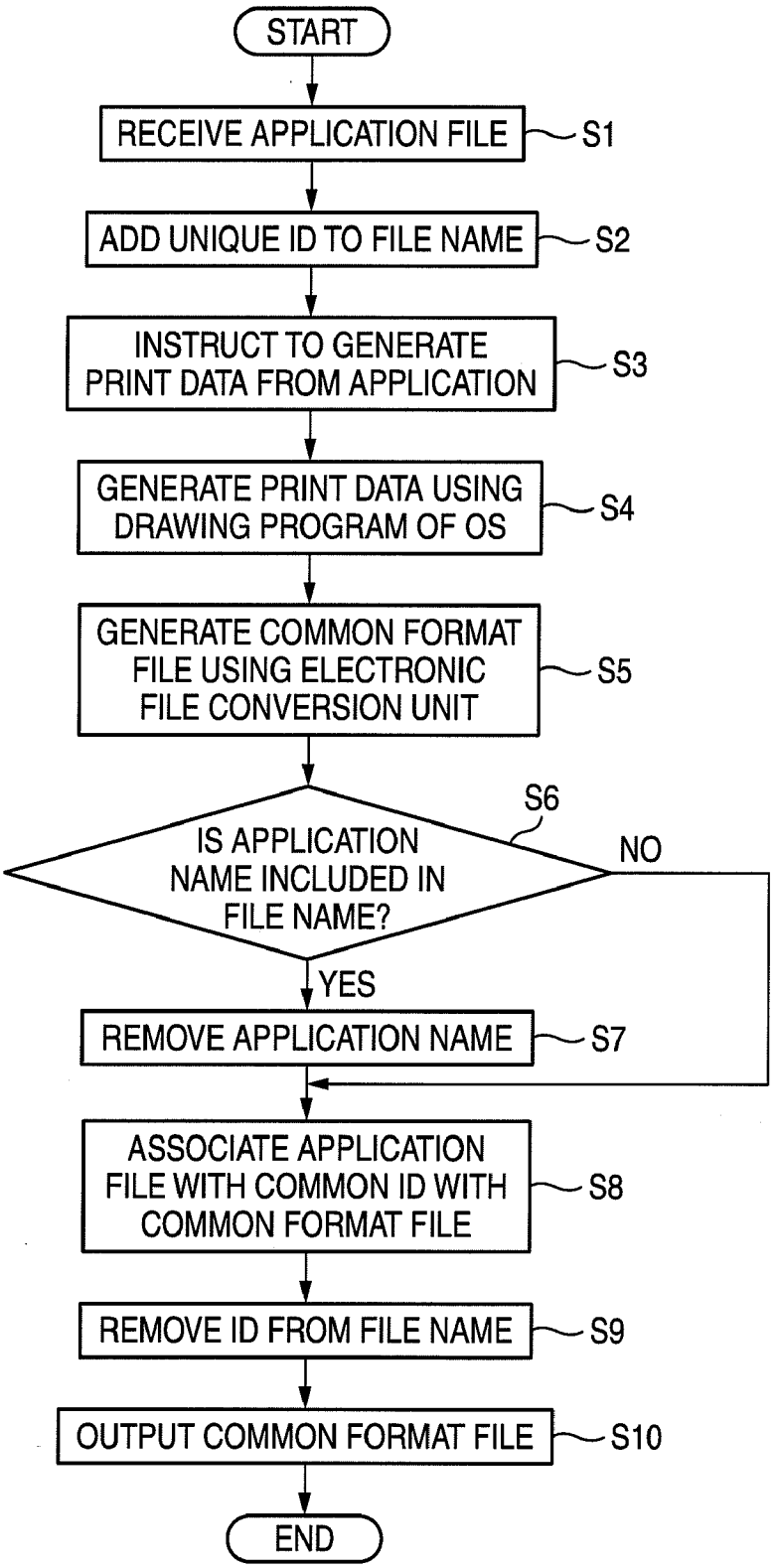
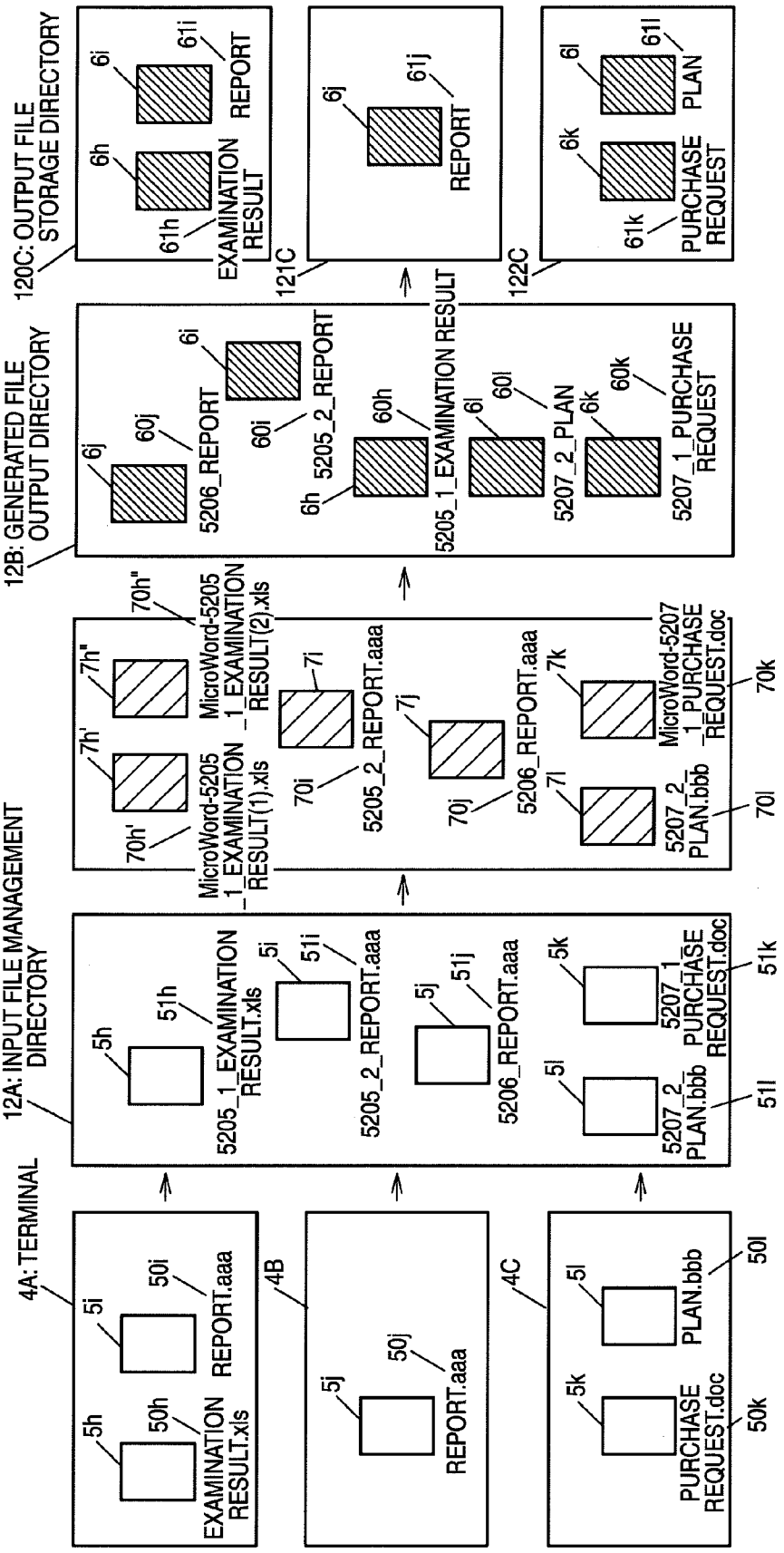

START
RECEIVE APPLICATION FILE
S1
ADD UNIQUE ID TO FILE NAME
S2
INSTRUCT TO GENERATE PRINT DATA FROM APPLICATION
S3
GENERATE PRINT DATA USING DRAWING PROGRAM OF OS
S4
GENERATE COMMON FORMAT FILE USING ELECTRONIC FILE CONVERSION UNIT
S5
S6
IS APPLICATION NAME INCLUDED IN FILE NAME?
NO
YES
REMOVE APPLICATION NAME
S7
ASSOCIATE APPLICATION FILE WITH COMMON ID WITH COMMON FORMAT FILE
S8
REMOVE ID FROM FILE NAME
S9
OUTPUT COMMON FORMAT FILE
S10
END

FIG. 5


4A: TERMINAL
4B
4C
12A: INPUT FILE MANAGEMENT DIRECTORY
12B: GENERATED FILE OUTPUT DIRECTORY
120C: OUTPUT FILE STORAGE DIRECTORY
121C
122C
EXAMINATION RESULT.xls
REPORT.aaa
PURCHASE REQUEST.doc
PLAN.bbb
5205_1_EXAMINATION RESULT.xls
5205_2_REPORT.aaa
5206_REPORT.aaa
5207_1_PURCHASE REQUEST.doc
5207_2_PLAN.bbb
MicroWord-5205_1_EXAMINATION RESULT(1).xls
MicroWord-5205_1_EXAMINATION RESULT(2).xls
MicroWord-5207_1_PURCHASE REQUEST.doc
5206_REPORT
5205_2_REPORT
5205_1_EXAMINATION RESULT
5207_2_PLAN
5207_1_PURCHASE REQUEST
EXAMINATION RESULT
REPORT
PURCHASE REQUEST
PLAN

ELECTRONIC FILE CONVERSION APPARATUS, ELECTRONIC FILE CONVERTING METHOD AND COMPUTER READABLE MEDIUM

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application is based on and claims priority under 35 USC119 from Japanese Patent Application No. 2009-163722 filed on Jul. 10, 2009.

BACKGROUND

1. Technical Field

[0002] The present invention relates to an electronic file conversion apparatus, an electronic file converting method and a computer readable medium.

SUMMARY

[0003] According to an aspect of the invention, an electronic file conversion apparatus that converts an electronic file using an operating system, includes a first management unit, a first changing unit, a conversion unit, a transfer unit and a second management unit. The first management unit receives a first electronic file, and associates the first electronic file with an identifier. The first changing unit changes a file name of the first electronic file by adding the identifier. The conversion unit converts the first electronic file with the changed file name into a second electronic file based on drawing information of the first electronic file generated by the operating system. The transfer unit transfers the changed file name of the first electronic file to a file name of the second electronic file. The second management unit associates the first electronic file with the second electronic file based on the identifier included in the changed file name of the first electronic file and the file name of the second electronic file.

BRIEF DESCRIPTION OF THE DRAWINGS

[0004] Exemplary embodiments of the invention will be described in detail based on the following figures, wherein:

[0005] FIG. **1** is a diagram schematically illustrating an example of the structure of an electronic file conversion system according to a first embodiment of the invention;

[0006] FIG. **2** is a diagram schematically illustrating an example of the structure of an electronic file conversion server according to the first embodiment of the invention;

[0007] FIG. **3** is a diagram schematically illustrating an example of the conversion of an electronic file according to the first embodiment of the invention;

[0008] FIG. **4** is a flowchart illustrating an example of the operation of the electronic file conversion system according to the first embodiment of the invention; and

[0009] FIG. **5** is a diagram schematically illustrating an example of the conversion of an electronic file according to a second embodiment of the invention.

DETAILED DESCRIPTION

[0010] FIG. **1** is a diagram schematically illustrating an example of the structure of an electronic file conversion system according to a first embodiment of the invention.

[0011] An electronic file conversion system **100** includes: an electronic file conversion server **1** that receives an application file **5** generated by an application, such as a word processor, a table calculating application, or a drawing application, as an electronic file and converts the electronic file, such as a PDF (Portable Document Format) file or a DocuWorks (registered trademark) file into a common format file **6**; an electronic file management server **2** that manages the communication of the electronic file among the electronic file conversion server **1**, an electronic file database, and terminal apparatuses **4**A and **4**B; and the terminal apparatuses **4**A and **4**B that generate the application file **5** and refer to a common format file **30** of the electronic file database **3**.

[0012] The electronic file management server **2** receives the application file **5** generated by the terminal apparatus **4**A or **4**B (C**1**). Then, the application file **5** is transmitted from the electronic file management server **2** to the electronic file conversion server **1** (C**2**), and the common format file **6** converted by the electronic file conversion server **1** is stored in the electronic file database **3** (C**4**) through the electronic file management server **2** (C**3**). The electronic file conversion server **1** and the electronic file management server **2** may be integrated into one apparatus.

[0013] When the terminal apparatus **4**A or **4**B requests the electronic file management server **2** to refer to the electronic file (C**5**), the electronic file management server **2** acquires the common format file **6** from the electronic file database **3** (C**6**) and transmits the acquired common format file **6** to the terminal apparatus **4**A or **4**B (C**7**).

[0014] FIG. **2** is a diagram schematically illustrating an example of the structure of the electronic file conversion server according to the first embodiment of the invention.

[0015] The electronic file conversion server **1** includes: a control unit **10** that includes, for example, a CPU (Central Processing Unit) and a memory, controls each unit, and executes various kinds of programs; a storage unit **11** that includes a storage device, such as an HDD (Hard Disk Drive) or a flash memory, and stores information; and a communication unit **13** that communicates with the electronic file management server **2** through a network, such as a LAN (Local Area Network).

[0016] The control unit **10** executes an electronic file conversion program **11**A, which will be described below, to operate an electronic file conversion control unit **10**A. In addition, the control unit **10** executes an operating system **11**D (server OS) of the server and an application program **11**B, which will be described below, to operate an application operating unit **10**B, and executes an electronic file conversion program **11**C, which will be described below, to operate an electronic file conversion unit **10**C.

[0017] The electronic file conversion control unit **10**A receives the application file **5** from the electronic file management server **2**, associates the received file with the common format file **6** generated by the electronic file conversion unit **10**C, which will be described below, and outputs the file. In addition, the electronic file conversion control unit **10**A changes the file names of the application file **5** and the common format file **6**, if necessary. The electronic file conversion control unit **10**A allocates an ID that is uniquely determined to the received application file **5**.

[0018] The application operating unit **10**B opens the application file **5** and executes a drawing program of a server OS operating unit **10**D to generate drawing data from the application file **5**. The drawing data is also called print data that is used for printing. When the operating system is Windows (registered trademark), data is generated as an EMF (En-

hanced Metafile). When the operating system is the Macintosh (registered trademark) OS, data is generated as QuickDraw.

[0019] The electronic file conversion unit **10**C uses the print data to generate data, such as a PDF file or a DocuWorks file, as the common format file. In general, the application, such as a word processor, a table calculating application, or a drawing application, includes a command to print the generated application file. When a print command is issued, print data is generated according to the drawing program of the operating system. The application or the operating system controls the generation of the print data. The print data can be associated with the application file in process order. When a plurality of applications generates the print data in parallel, the times when the print data is generated are different from each other and the completion of the generation of the print data and the process order are also considered. Therefore, the association between the print data is not necessarily correct. In this embodiment, the common format file is generated on the basis of the print command of the application and print data generated by the print command, and the conversion of the electronic file using the file name is controlled while the common format file is generated.

[0020] The storage unit **11** stores the electronic file conversion control program **11**A that allows the control unit **10** to function as the above-mentioned units, an application program **11**B that allows the control unit **10** to function as the application operating unit **10**B, an electronic file conversion control program **11**C that allows the control unit **10** to function as the electronic file conversion unit **10**C, and a server operating system (OS) **11**D that allows the control unit to function as the server OS operating unit **10**D that controls the overall operation of the electronic file conversion server **1**.

[0021] In addition, the storage unit **11** stores an input file management directory **12**A into which the application file **5** received from the electronic file management server **2** is stored, a generated file output directory **12**B into which the common format file generated by the electronic file conversion unit **10**C is stored, and an output file storage directory **12**C into which the common format file **6** that has been completely associated with the application file **5** and is to be output to the electronic file management server **2** is stored.

[0022] FIG. **3** is a diagram schematically illustrating an example of the conversion of the electronic file according to the first embodiment of the invention.

[0023] When the application file **5** with a file name **50** is transmitted to the electronic file conversion server **1**, the application file **5** is stored in the input file management directory **12**A. Then, the electronic file conversion control unit **10**A allocates, for example, an ID '5203' to the application file **5**, and the file name of the application file **5** is changed to a file name **51** corresponding to the ID '5203'.

[0024] Print data **7** is generated from the application file **5** by the operation of the application operating unit **10**B according to the drawing program of the server OS operating unit **10**D. The print data **7** has a print job title **70** being changed by adding an application name 'MicroWord' to the file name **51**. The application is given depending on the specifications of the application program **11**B.

[0025] The common format file **6** is generated from the print data **7** by the electronic file conversion unit **10**C, has a file name **60** transferred from the name of the print job title **70**, and is stored in the generated file output directory **12**B. Then, when there is an application file name in the file name **60**, the application file name is removed from the file name **60** of the common format file **6** and the common format file **6** has a file name **61** including an ID and the original file name **50**.

[0026] Then, the common format file **6** is associated with the original application file **5** based on the ID, has a file name **62** being changed by removing the ID from the file name **61**, and is stored in the output file storage directory **12**C. When the electronic file is converted into the common format file, the electronic file conversion control unit **10**A uses the allocated ID for the association of the electronic file before and after format conversion through the file name of the electronic file.

[0027] Next, the operation of an electronic file conversion system according to an embodiment of the invention will be described with reference to the drawings.

[0028] First, for example, the user uses an arbitrary application of the terminal apparatus **4**A to generate the application file **5** and requests the electronic file management server **2** to register the generated application file **5**. The electronic file management server **2** transmits the application file **5** to the electronic file conversion server **1** in response to the registration request. The electronic file conversion server **1** converts the application file **5** into the common format file **6** such that the terminal apparatus in which the application generating the application file **5** is not installed but an application capable of analyzing the common format file is installed can display, read, and print the common format file.

[0029] Next, the content of the operation of the electronic file conversion server **1** receiving the application file **5** and converting the application file **5** into the common format file **6** will be described.

[0030] FIG. **4** is a flowchart illustrating an example of the operation of the electronic file conversion system according to the first embodiment of the invention.

[0031] First, the electronic file conversion control unit **10**A receives the application file **5** from the electronic file management server **2** and stores the application file **5** in the input file management directory **12**A (S**1**). Then, the electronic file conversion control unit **10**A allocates a unique ID to the received application file and changes the file name **50** of the application file **5** into the file name **51** having the ID added thereto, as shown in FIG. **3** (S**2**).

[0032] Then, the application operating unit **10**B opens the application file **5**, executes a print command (S**3**), and generates the print data **7** with the print job title **70** using the drawing program of the server OS operating unit **10**D (S**4**). The electronic file conversion unit **10**C generates the common format file **6** from the print data **7** and stores the common format file **6** in the generated file output directory **12**B (S**5**).

[0033] Then, the electronic file conversion control unit **10**A checks the file name **60** of the generated common format file **6**. When the application name is included in the file name (S**6**; Yes), the electronic file name changing unit **10**B removes the application name (S**7**). When the application name is not included in the file name (S**6**; No), Step S**7** is omitted.

[0034] Then, the electronic file conversion control unit **10**A compares the file name **50** with the file name **61** and associates the application file **5** with the common format file **6** (S**8**). The electronic file conversion control unit **10**A removes the ID from the file name **61** of the common format file **6** to generate a file name **62** (S**9**), and stores the common foi mat file **6** in the output file storage directory **12**C.

[0035] Then, the electronic file conversion control unit **10**A outputs the common format file **6** stored in the output file storage directory **12**C to the electronic file management server **2** (S**10**).

[0036] In a second embodiment, a plurality of terminals that receives application files at the same time is provided, and the application file is associated with the common format file in the terminals.

[0037] FIG. **5** is a diagram schematically illustrating an example of the conversion of an electronic file according to the second embodiment of the invention.

[0038] Application files **5***h* to **5***l* having file names **50***h* to **50***l* are transmitted from terminals **4**A to **4**C to the electronic file conversion server through the electronic file management server **2** and are stored in the input file management directory **12**A by the electronic file conversion control unit **10**A. The electronic file conversion control unit **10**A gives IDs, which are set to each terminal and each application file, to the application files **5***h* to **5***l*. For example, four digits '5205' to '5207' are given to the terminals and one digit '1' and '2' is given to each file. Therefore, the electronic file conversion control unit **10**A gives combinations of the digits to the file names **50***h* to **50***l* to change the file names **50***h* to **50***l* into file names **51***h* to **51***l*. The electronic file conversion control unit **10**A manages the order in which the application files **5***h* to **5***l* are stored in the input file management directory **12**A. The order may be different from the order in which the application files **5***h* to **5***l* are received from the terminals **4**A to **4**C. Different IDs may be applied to the application files, and the allocated IDs may be associated with the IP addresses of the terminals. In this way, the receivers of the application files may be managed.

[0039] Print data **7***h*' to **7***l* is generated from the application files **5***h* to **5***l* by the application operating unit **10**B and the drawing program of the server OS operating unit **10**D. An application name, for example, 'MicroExcel' or 'MicroWord' may be given to the file name, as in print job titles **70***h*', **70**", and **70***k*. The print data **7***h*' and **7***h*" is generated from the application file **5***h* and is divided into two pieces of print data in terms of the structure of data. The print data **7***h*' to **7***l* is generated in parallel by each application.

[0040] Common format files **6***h* to **6***l* are generated from the print data **7***h*' to **7***l* by the electronic file conversion unit **10**C, have file names **60***h* to **60***l* transferred from the file names of the print job titles **70***h*' to **70***l*, respectively, and are stored in the generated file output directory **12**B. The electronic file conversion unit **10**C processes all of the print data **7***h*' to **7***l* in parallel to generate the common format files **6***h* to **6***l*. The order in which the common format files **6***h* to **6***l* are generated and output is not necessarily identical to the order in which the electronic file conversion unit **10**C receives the common format files **6***h* to **6***l*. The file names **60***h* to **60***l* include the original file names **50***h* to **50***l* and IDs from which the application names are removed, respectively.

[0041] Then, the electronic file conversion control unit **10**A associates the common format files **6***h* to **6***l* with the original application files **5***h* to **5***l* on the basis of the IDs. The common format files **6***h* to **6***l* have file names **61***h* to **61***l* from which the IDs are removed and are stored in output file storage directories **120**C to **121**C that are generated in the terminals **4**A to **4**C, respectively.

[0042] The invention is not limited to the above-described embodiments, but various modifications and changes of the invention can be made without departing from the scope and spirit of the invention. For example, the functions of the application operating unit **10**B and the electronic file conversion unit **10**C may be implemented by the electronic file conversion control program **11**A.

[0043] The electronic file conversion control unit **10**A, the application operating unit **10**B, and the electronic file conversion unit **10**C according to the above-described embodiments may be read from a storage medium, such as a CD-ROM, to the storage unit of the apparatus, or they may be downloaded from a server that is connected to the network, such as the Internet, to the storage unit of the apparatus. In addition, some or all of the units according to the above-described embodiments may be implemented by hardware, such as ASIC.

[0044] The foregoing description of the exemplary embodiments of the present invention has been provided for the purposes of illustration and description. It is not intended to be exhaustive or to limit the invention to the precise forms disclosed. Obviously, many modifications and variations will be apparent to practitioners skilled in the art. The embodiments were chosen and described in order to best explain the principles of the invention and its practical applications, thereby enabling others skilled in the art to understand the invention for various embodiments and with the various modifications as are suited to the particular use contemplated. It is intended that the scope of the invention be defined by the following claims and their equivalents.

What is claimed is:

1. An electronic file conversion apparatus that converts an electronic file using an operating system, comprising:

a first management unit that receives a first electronic file, and that associates the first electronic file with an identifier;

a first changing unit that changes a file name of the first electronic file by adding the identifier;

a conversion unit that converts the first electronic file with the changed file name into a second electronic file based on drawing information of the first electronic file generated by the operating system;

a transfer unit that transfers the changed file name of the first electronic file to a file name of the second electronic file; and

a second management unit that associates the first electronic file with the second electronic file based on the identifier included in the changed file name of the first electronic file and the file name of the second electronic file.

2. The electronic file conversion apparatus according to claim **1**, further comprising:

a second changing unit that changes the file name of the second electronic file by removing the identifier from the file name of the second electronic file after the second management unit associates the first electronic file with the second electronic file.

3. An electronic file converting method that converts an electronic file using an operating system, comprising:

receiving a first electronic file;

associating the first electronic file with an identifier;

changing a file name of the first electronic file by adding the identifier;

converting the first electronic file with the changed file name into a second electronic file based on drawing information of the first electronic file generated by the operating system;

transferring the changed file name of the first electronic file to a file name of the second electronic file; and

associating the first electronic file with the second electronic file based on the identifier included in the changed file name of the first electronic file and the file name of the second electronic file.

4. The electronic file converting method according to claim **3**, further comprising:

changing the file name of the second electronic file by removing the identifier from the file name of the second electronic file after associating the first electronic file with the second electronic file.

5. A computer readable medium storing a program causing a computer to execute a process for converting an electronic file using an operating system, the process comprising:

receiving a first electronic file;

associating the first electronic file with an identifier;

changing a file name of the first electronic file by adding the identifier;

converting the first electronic file with the changed file name into a second electronic file based on drawing information of the first electronic file generated by the operating system;

transferring the changed file name of the first electronic file to a file name of the second electronic file; and

associating the first electronic file with the second electronic file based on the identifier included in the changed file name of the first electronic file and the file name of the second electronic file.

6. The computer readable medium according to claim **5**, the process further comprising:

changing the file name of the second electronic file by removing the identifier from the file name of the second electronic file after associating the first electronic file with the second electronic file.

* * * * *