

[0029] FIG. 3 is a flow chart illustrating schematically another embodiment of a method of printing a document using an updated printer driver, according to the invention; and

[0030] FIG. 4 is a flow chart illustrating schematically one embodiment of updating a printer driver, according to the invention.

DETAILED DESCRIPTION

[0031] The present invention is directed to methods, systems, and devices that can be used for providing backward compatibility to a printer or printer system for a new version of a page description language. The present invention is also directed to methods, systems, and devices that include an updated printer driver to provide the backward compatibility.

[0032] The methods, systems, and devices described herein may be embodied in many different forms and should not be construed as limited to the embodiments set forth herein. Accordingly, the methods, systems, and devices described herein may take the form of an entirely hardware embodiment, an entirely software embodiment or an embodiment combining software and hardware aspects. The following detailed description is, therefore, not to be taken in a limiting sense. The methods described herein can be performed using any type of computing device that includes a processor or any combination of computing devices where each device performs at least part of the process.

[0033] Suitable computing devices typically include mass memory and typically include communication between devices. The mass memory illustrates a type of computer-readable media, namely computer storage media. Computer storage media may include volatile, nonvolatile, removable, and non-removable media implemented in any method or technology for storage of information, such as computer readable instructions, data structures, program modules, or other data. Examples of computer storage media include RAM, ROM, EEPROM, flash memory or other memory technology, CD-ROM, digital versatile disks (DVD) or other optical storage, magnetic cassettes, magnetic tape, magnetic disk storage or other magnetic storage devices, or any other medium which can be used to store the desired information and which can be accessed by a computing device.

[0034] Methods of communication can include both wired and wireless (e.g., RF, optical, or infrared) communications methods and such methods provide another type of computer readable media; namely communication media. Communication media typically embodies computer-readable instructions, data structures, program modules, or other data in a modulated data signal such as a carrier wave, data signal, or other transport mechanism and includes any information delivery media. The terms "modulated data signal," and "carrier-wave signal" includes a signal that has one or more of its characteristics set or changed in such a manner as to encode information, instructions, data, and the like, in the signal. By way of example, communication media includes wired media such as twisted pair, coaxial cable, fiber optics, wave guides, and other wired media and wireless media such as acoustic, RF, infrared, and other wireless media.

[0035] FIG. 1 illustrates one embodiment of a system for printing documents. A computer 102 generates or stores a file, such as a spool file format, to be used in printing the document. The computer 102 includes a printer driver. The file is provided, using the printer driver, to a file processor 104 (such as a Raster Image Processor (RIP)) to convert the file into a format useable by the printer 106 to print the document. As described above, the file processor 104 can be, at least in part, included with the printer 106. It is this file processor 104 that

can be updated when a new version of a page description language is released. In those instances where at least a portion of the file processor 104 is resident on the printer, the present invention can be used to provide an updated printer driver with a new component to process the file instead of completely or partially updating the file processor 104.

[0036] The printer 106 can be a printing press or any other printing device. In one embodiment, printing is done directly from the RIP to a color printer (for example, an ink-jet printer, a laser printer, or a printer using other printing technology). If printing on a conventional printing press the RIP can be used to image onto, for example, film or plates; if onto film, then that can be used to image plates, and the plates can then be mounted on the printing press to actually perform the printing process.

[0037] The present invention is particularly directed to those instances where the spool file format is passed through directly to a RIP on a controller board embedded within a printing device. The printer driver in this situation is normally very simple; in many cases it may perform no processing at all on the spool file format as it is passed through.

[0038] One example of such a process is illustrated schematically in FIG. 2. A file is received for printing (step 202). The printer driver passes the file from the computer to the printer without processing (step 204). The file processor (e.g., a RIP) on the printer processes the file (step 206) and the document is printed (step 208).

[0039] The present invention is directed, at least in part, to modifying this processing by providing an updated printer driver for converting files in the new version of the PDL to make the files compatible with the older version of the PDL supported by the printer. This updated printer driver uses information about the capabilities and requirements of the printer. FIG. 3 illustrates schematically one embodiment of a method of printing a document. A file in a new version of a PDL is received for printing (step 302). The updated printer driver processes the file to convert the file from the new version of the PDL to an older version of the PDL supported by the printer (step 304). The file processor (e.g., a RIP) on the printer further processes the converted file (step 306) and the document is printed (step 308).

[0040] The RIP on the controller board supports a certain version of the spool file PDL. When used with a version of the operating system and print subsystem that creates the same version of the PDL, the print subsystem and controller work together and prints are produced as expected.

[0041] If the same simple printer driver and embedded controller are now used with a version of the operating system and print subsystem that support a new version of the PDL, then a number of outcomes may arise:

[0042] 1) If the new version of the PDL includes new features that change the PDL sufficiently that a RIP for an older version could not interpret the new version, then pages from the new operating system & print subsystem likely would not print and an error message would probably be produced.

[0043] 2) If the new version of the PDL is designed to be backwards compatible with the old version, but without fall-back structures, then the printer may appear to print correctly, but certain aspects of the output may be missing because the printer does not understand the new features. An example of this case would be the addition of support for transparency in PDF version 1.4; a PDF 1.3 RIP would not realize that it could not process the file correctly, but all elements that were intended to be transparent would be rendered as fully opaque.

[0044] 3) If the new version of the PDL includes new features, but is designed to include fall-back structures that can be processed by a RIP for the older version, then the job