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TITLE

System for Output Preview and Optimization without Querying Device Capabilities

ABSTRACT

An Output Compatibility Module, residing in the Operating System, manages all output through any of a plurality of output devices, such as printers, projectors, external monitors etc. The Output Compatibility Module uses a database of format information files in local storage to provide the functionality to open, display, and format a plurality of file types for use with output devices. Furthermore, the Output Compatibility Module also provides a graphical user interface for the user to preview and modify the formatting and display settings of an image as it would appear when viewed using the output device.

1. BACKGROUND

Problem/Opportunity

Since output devices vary widely in capability and file compatibility, it is often the case that documents designed for one device may not be displayed consistently on a different device. A document formatted to be viewed on one output device may produce less than adequate results on another output device. For example, a file displayed digitally on an LCD computer screen may not be displayed as intended when printing the same file using a printer, or when viewing the same file over a projector.

Because files can be displayed over a wide range of devices such as monitors, televisions, projectors, printers etc, there exists a need to determine an optimum format for the file to produce the intended viewing experience based on factors such as resolution, aspect ratio, color, refresh rate, etc. Some devices (such as printers) contain information regarding their output capability, which allows a personal computer to optimize file format and layout for output on that particular device. However, other devices (such as projectors) often do not have such information readily available to the host system, preventing the output from being optimized for the display medium. Because of this, a system is needed to determine and adjust file format and layout without interrogating an output device to determine that device's display capabilities.

Background Publications

Previous publications have attempted to address the problems associated with document-device compatibility. However, none of the previous publications were able to address this issue without interrogating device capabilities.

US Patent Number 7508943 describes a system for storing and playing media files over multiple platforms using a removable storage device. The removable storage device contains the media file, and a plurality of media player applications for several different operating systems, such that the file can be played back on each of these systems without the need for additional software or file conversion. However, this system requires querying the host device to determine the appropriate version of the media player to use.

US Patent Number 6023714 describes a system for dynamically adapting a file's formatting for use with a particular device. The system first queries the output device for that device's capabilities, and then selects an appropriate style sheet to better suit the characteristics of the output medium. While this system does reformat documents appropriately, it does so by querying the display characteristics of the output device.

US Patent Number 7239412 describes a system for creating a true print preview using a method and apparatus contained in a printer. The system sends the output to the printer, which returns a true-to-life representation of what the printed document will look like. However, this system requires querying the printing device for this preview. Furthermore, this system is designed for use with printing devices, and does not describe any use with other display devices.

2. SUMMARY OF THE INVENTION

Invention Summary

The operating system contains an Output Compatibility Module, which is responsible for managing file output to a plurality of device types which may be connected to a personal computer.

The Output Compatibility Module contains a database of format information files for multiple file types, such that the Output Compatibility Module can operate as a standalone file viewing system. For example, when viewing text, the Output Compatibility Module would be able to adjust characteristics such as margin size, text size, page size, line spacing etc. to better format the document to the page. Using a different format information file in the present invention may support viewing presentation files and appropriately map the presentations aspect ratio to screen dimensions. This allows the Output Compatibility Module to not only be compatible with most file types, but also easily adaptable to changes in file format or to new file formats.

The Output Compatibility Module monitors the display settings of files for output, such as size, aspect ratio, color, margins etc. When a user elects to change the viewing medium, (i.e. through printing the file or connecting a secondary monitor, such as a projector), the Output Compatibility Module opens a window in the GUI providing a preview and monitoring window for the output as it will appear when viewed through the output device. The GUI window will also provide graphical user controls over display properties such as color, aspect ratio, size, magnification, and resolution. Because the module does not query the output device, this allows the user to manually adjust the preview to conform to the known settings of the device.

Unique Concepts

The unique aspect of the present invention is the ability of the Operating System to adapt the output characteristics of a file to a plurality of different output devices without the need to query any of those devices for their unique display capabilities. Furthermore, it also provides for an integrated means of viewing and presenting files over this plurality of output devices.

3. DESCRIPTION OF THE INVENTION

Description of Elements of the Output Control Module in **Figure 1**:

The User Machine is a computing device, such as a desktop or laptop personal computer.

The OS is an operating system residing on the user machine, such as Linux, responsible for managing all hardware and software processes.

The GUI is the graphical user interface of the operating system, which provides a graphical means for the user to interact with the system.

The Output Compatibility Module is a module within the OS that formats output for display or playback on output devices.

The DB is a database containing format information files for a plurality of file type extensions for the Output Compatibility Module.

The format information files (not pictured) contain formatting and data structure information for a plurality of file types to provide the Output Compatibility Module with the functionality to open multiple different types of files.

The Output Devices (A, B, N) represent a plurality of potentially connected output devices connected to the user machine. Output Devices may be comprised of printers, monitors, projectors, etc.

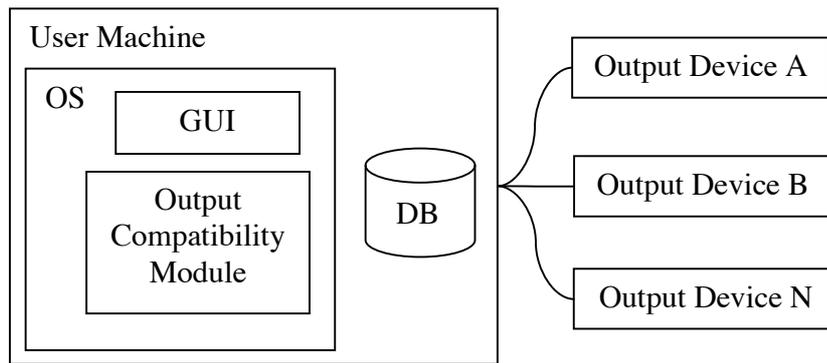


Figure 1. Diagram of the Output Compatibility Module System

Figure 2 depicts the method of using an Output Device with a User Machine implementing the Output Compatibility Module System.

In step 1, the user initiates a process involving an Output Device via the GUI. In one embodiment, this action could be telling a program to print a file. In another embodiment, this action could be connecting an external display such as a second monitor or projector to the user machine.

In step 2, the Output Compatibility Module recognizes that the user wishes to output information to an output device and opens a GUI window. This GUI window provides both a preview of the output based on current, on screen viewing parameters, and also a set of tools to adjust these parameters to tailor the output to the output device.

In optional step 3, the user adjusts the output settings to better fit the characteristics of the output device. In one embodiment, this involves the user manually adjusting settings, including output properties (such as resolution, paper size, page size, contrast, aspect ratio, color, etc.) and document layout properties (such as margins, font size, line spacing, etc). In another embodiment, the Output Compatibility Module provides an optional set of predetermined output settings and document layout settings for common device types, as well as the ability to manually adjust output settings.

In step 4, the output is displayed through the output device exactly as it appears in the GUI window.

The method ends.

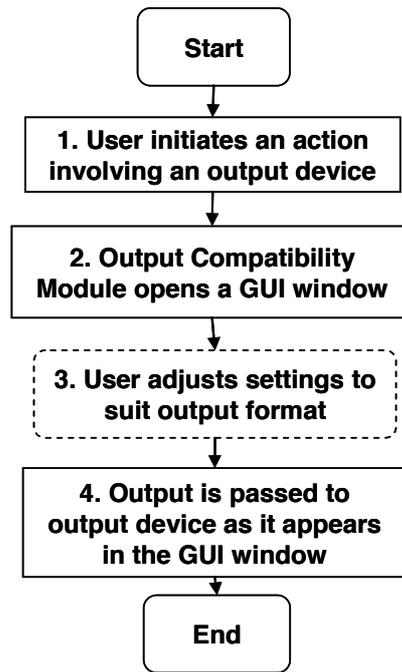


Figure 2. Method of output through the Output Compatibility Module