

[0028] FIG. 2 is an illustration of an image portion and its relationship to tiles in one of the resolution layers of a multi-resolution image, used in connection with a preferred embodiment of the present invention;

[0029] FIG. 3 is a simplified illustration of an Internet publishing system for publishing images over the Internet or any other suitable computer Network, in accordance with a preferred embodiment of the present invention;

[0030] IS FIGS. 4A, 4B and 4C are simplified illustrations of a page with text and images from a scalable document as seen at various display resolutions, in accordance with a preferred embodiment of the present invention;

[0031] FIG. 5 is a simplified flowchart of the operation of operation of a document viewer in accordance with a preferred embodiment of the present invention;

[0032] FIG. 6 is a simplified illustration of a fragmenting tool for converting standard documents to image-less documents, and a composing tool for converting image-less documents to standard documents; and

[0033] FIG. 7 is a simplified schematic diagram of a pre-press application employing a preferred embodiment of the present invention.

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT

[0034] The present invention concerns Internet publishing of documents, and provides the capability of storing electronic documents on a web server computer and enabling clients to interactively view, download and print the documents using web browsers. The present invention is useful in the graphic arts industry for providing efficient on-line proofing capability to customers for pre-press jobs that include high quality images, and overcomes transmission delays prevalent in prior art systems. It is also useful for console management of raster image processing (RIP) print jobs.

[0035] An example of RIP systems to which the present invention applies is a controller for a color copier. Such a controller typically performs pre-press services, raster image processing and media management. An operator of such a controller uses a console to request a print job sitting in a controller queue, typically for purposes of proofing or modification. The controller typically generates a Portable Document Format (PDF) file and transmits the entire file, which may be very large, to the console. After arriving at the console, document viewer software such as Adobe Acrobat or Adobe Exchange is typically used to render the PDF document and display it. Initially the pages of the PDF document are typically displayed as one or more thumbnail images. The operator subsequently interactively zooms in and out of pages to check quality, align pages for folding, and perform other actions. Modifications are typically written to an Adobe PDF "job ticket," which is sent back to the controller. The PDF file is also send back to the controller if it was modified at the console. The controller applies the modifications and performs raster image processing.

[0036] Communication of PDF documents back and forth between the controller and the console is normally slow, primarily because of the large sizes of the document files,

due in turn to the high-resolution images contained therein. Image-rich documents can be as large as several hundred megabytes.

[0037] The present invention can be used to overcome the problem of communication delays between the controller and the console, by breaking up a PDF document into a much smaller image-loss PDF document and a collection of images that can be dynamically inserted into the image-less document at a designated resolution. For image-rich documents that contain high resolution images, such as those commonly used in graphics arts today, the present invention offers marked performance advantages.

[0038] An example of a color copier controller to which the present invention can be applied is the Fiery controller of Electronic for Imaging (EFI), Inc.

[0039] In a preferred embodiment, the present invention uses resolution-independent paradigms for images, multi-resolution tiled image formats and an Internet imaging protocol for requesting portions of images at desired pixel resolutions, all of which are described hereinbelow.

[0040] Internet Publishing

[0041] A web browser is software running on a client computer that retrieves data from server computers using the HTTP protocol. A web server is software running on a server computer that delivers requested data to web browsers using the HTTP protocol.

[0042] Documents archived on a server computer can be accessed by client computers by means of web browsers. If a document is not in hyper-text markup language (HTML) format, additional server-side or client-side processing may be necessary. Such server-side processing involves auxiliary software on the server for converting each document page requested into HTML format for viewing by the client. Client-side processing involves auxiliary software used with the browser, in the form of a plug-in, an Active-X control or a Java applet, for interpreting the non-HTML format.

[0043] A widely used non-HTML format for documents is the Portable Document Format (PDF) of Adobe Systems Inc. Advantages of PDF documents are their consistent rendering when printed on different output devices, and their non-editable state. A publisher creating a PDF document can be assured that the document will be rendered exactly as he intends, and that the document will not be edited other than by himself. Information about Adobe's PDF document format and its advantages is available on the Internet at <http://Hwww.adobe.com/prodindex/postscript/pdf.html>.

[0044] The present invention, as described hereinbelow, enables applications to interactively view electronic documents, such as PDF documents, located on a document server, by scaling and moving within pages.

[0045] Reference is now made to FIG. 1 which is a simplified illustration of a network configuration for Internet publishing in which a preferred embodiment of the present Invention operates. A server computer 110 stores documents for access by multiple client computers 120. Server computer 10 contains a web server 130 for serving files 140 and documents 150 to client computers 120 in response to requests 160. Client computers 120 typically contain web browsers 170 for displaying pages of documents 150, and typically use links 180 in documents 150 to request data from server computer 110.