Distribution of Digital Content in Mobile Computing Environments

Field of the Invention

The present invention relates generally to the distribution of digital content, in which a mobile computing environment is provided within which it is possible to operate the digital content.

Definitions throughout this specification

The term "document" is to be taken as referring to any digital content, including but not limited to text, pictures, audio and video.

Reference to related applications

The present invention is related to earlier Singapore patent applications numbers 20001262-5 and 20001263-3, and PCT/SG99/00037 the contents of which are hereby incorporated by reference (the "earlier applications").

Background to the invention

Aberdeen's research (Securing the Gap Between E-Mail and E-Commerce, Aberdeen Group, July 9 1999) shows that businesses spend $300 billion annually on document delivery services such as certified mail, courier, overnight express, and facsimile transmission. Since 90% of business documents originate in electronic form, online distribution would be speedier and cheaper than sending documents manually. For example, UPS charges $2.50 for an electronic document up to1.4 Mbytes in size, but $10 to deliver 20 pages overnight. As factors that contribute to success of physical delivery – track-ability, security, reliability – are quickly emerging as standards in electronic delivery, Aberdeen projects that 35% of the overnight delivery market, or 21 million documents per business day, will transition to the Internet by 2001.

A document can be delivered electronically in one of two formats – a published format, or the original format in which the document is created. If a published format (e.g. PDF) is used, the recipient would not be able to edit the document, and the sender would have no control over usage of the document. If the document is sent out in its original format, the sender still has no way of controlling usage.

Another problem with the present model of electronic document delivery is that the sender has to assume that the recipient has the necessary software to work on the document. This delivery model has proved to be problematic, as recipients often do not have the correct software, release version, or installation settings. The technique of including some software in documents, such as embedding Java scripts in HTML

pages and adding macros to Microsoft Office documents, provide only a partial solution.

The present invention will address the shortcomings of the existing model by distributing a document within a computing environment that is configured to control and operate the document. The recipient of the document need not have the correct software or fonts on their machine, as they are bundled in the accompanying computing environment. Moreover, the sender's right can be safeguarded through the computing environment, which can enforce usage controls and implement flexible charging models.

Currently, the standard mechanism to protect a digital document is to encrypt it, so that only authorized users with the correct key can decrypt the document. Examples are PostX, DocSpace, and Marimba's DocService. This mechanism can be complemented with usage control features, as done by Tumbleweed and CertifiedMail.com. These solutions do not solve the problem of the recipient not having correct software or configuration settings to operate the document.

Another popular technique for protecting digital documents is through watermarking. A document can be watermarked with the owner's information. The document can further be watermarked with users' information to establish a usage trail. However, watermarking allows only enforcement after the fact; it does not control the usage of the document, nor does watermarking address the necessity for the recipient to have the proper environment.

The present invention addresses both problems by distributing the document in a computing environment, which is configured to operate the document. The invention complements, rather than replaces, the existing techniques described above.

Consideration of the prior art

Interleaf, Inc. WO00/02148 discloses a system and method for the "rendering and displaying of a document at a client system without requiring that any application specific software be installed on the client system." A "compound document" is defined as a "self-contained document structure which has the capacity to include, in combination, text, graphics, and images". The documentation is described as including text, graphics and possibly images. Page10, line 1 et seq, describes document downloading from server to client as including any applets (Java) associated with the documents including downloading applets to decompress received documents, scale documents, control GUI features and present features such as toolbars, history bars etc., (P.17 line 22 et seq.). Interleaf does not go into detail regarding usage control except to say that some security is provided by not "storing" the document permanently on the client. Like the present invention, Interleaf provides a mechanism for bundling accompanying software for manipulating a document, e.g. decompression, GUI appearance. However, the present invention goes a step further by providing an environment within which the software and document are to be operated. Some resulting advantages include the ability to mask off any conflicting configurations and software on the native

machine, and to determine what resources are available, for instance for usage controls.

Budge et al. 6,014,689 discloses a system in which video messages containing audio and video components and an attached player in an executable file are sent over conventional communications networks as an email, as described throughout the specification. When the recipient views the email, the file is executed and the audio/video message either uses the embedded player or a player resident on the viewer's machine. Budge does not disclose any details regarding usage controls. This patent provides a mechanism for bundling a player with video message in an executable file. Same distinction as with WO00/02148.

Venkatraman et al. 6,014,688 assigned to the PostX Corporation, describes an email enhancement system in which software is embedded in an email in order for the recipient to view contents and perform the functional attributes that make up the email message. This patent provides a mechanism for bundling software with an email. Same distinction as with WO00/02148.

Narasimhalu et al. 5,499,298 discloses controlling access and usage of digital information by incorporating usage history and allowable access into the digital content as described in col. 4, line 45 et seq. as including "use once" and "use-n-times" feature. This patent provides a mechanism for embedding usage control information within digital content. The difference is that the present invention provides an operating environment as described above, as well as accompanying software.

Stefik 5,715,403 disclose a system for controlling the distribution and use of digital work having usage rights in which "right specification components" include time, control, copy count, access, and fee/incentives; with usage rights attached directly to digital works (col. 9, line 18 et seq.) This patent provides a mechanism for embedding usage control information within digital content. The difference is that the present invention provides an operating environment as described above, as well as accompanying software.

Archibald et al. 5,825,883 is directed towards a system that accounts for usage of digital applications e.g. software application, video file, text file, image file, by embedding a "meter module" as shown in Figure 6, and described in Col. 10, line 57 et seq, as a means to control and monitor access and usage and bill accordingly. This patent provides a system to account for usage of digital applications by embedding a meter module. Same distinction as with 5,499,298.

Wyman 5,745,879 discloses a system for managing execution of licensed programs in which the product use authorization may allow a variety of license alternatives such as "duration", "context" (location and environment), consumption, etc. (Col. 10, line 42 et seq.). This patent provides a system for managing execution of licensed software. Same distinction as with 5,499,298.

Summary of invention

The present invention therefore provides a system to distribute digital content with an accompanying operating environment, from a sender to at least one recipient, the sender and the at least one recipient each having a machine, the system including the steps of: -

(a) the sender creating then saving as image data a mobile computing environment containing the digital content;
(b) the sender transmitting the image data to the recipient to enable the recipient to open the digital content and for the mobile computing environment to be recreated on and take over the recipient's machine, including the loading of the digital content within the mobile computing environment.

Preferably the digital content is placed within the mobile computing environment on the machine of the sender through the steps of: -

(c) the sender specifying a category for the digital content;
(d) the recreation on the sender's machine of one amongst one or more mobile computing environments that are pre-configured for that category of digital content; and
(e) the sender creating or importing the digital content within the recreated mobile computing environment.

Alternatively or additionally, the digital content is placed within the mobile computing environment on the machine of the sender through the steps of:

(f) the sender specifying the digital content which has already been created;
(g) the recreation on the sender's machine of one amongst one or more mobile computing environments that are pre-configured for that category of digital content; and
(h) the loading of the digital content into the recreated mobile computing environment.

Further alternatively or additionally, the digital content is placed within the mobile computing environment on the machine of the sender through the steps of:

(i) the sender selecting the mobile computing environment, which is recreated on the sender's machine; and
(j) the sender creating or importing the digital content within the recreated mobile computing environment.

The sender may configure the mobile computing environment after it is created on the sender's machine.

The image data may be transferred from the sender to the recipient on a physical storage medium, or over a communication medium.

It is preferred that the recreated mobile computing environment masks off one or more components in a native computing environment on the recipient's machine, according to the sender's specification.

The recreated mobile computing environment on the recipient's machine may contain a counter, set by the sender, for limiting the usage of the content. Furthermore, the recreated mobile computing environment on the recipient's machine may obtain authorization from an approval authority before opening the digital content, and/or the recreated mobile computing environment on the recipient's machine may notify a tracking agent each time the digital content is used.

The sender may configure the mobile computing environment after it is created on the sender's machine, the configuring including at least one item selected from the list consisting of:

(a) modifying the digital content;
(b) customizing the computing environment; and
(c) specifying usage requirements.

The mobile computing environment may include at least one feature selected from the list comprising:

(i) a wallpaper;
(ii) a plurality of desktop icons;
(iii) a plurality of programs and documents; together with any shortcuts relevant hereto;
(iv) a set of fonts;
(v) a clipboard or cache;
(vi) a registry; and
(vii) a plurality of directory mappings.

Description of drawings

In order that the invention may be fully understood and readily put into practical effect, a preferred embodiment will now be described with reference to the accompanying drawings in which:

Figure 1 is an illustration of the system architecture; and
Figure 2 is a preferred flow chart.

Description of preferred embodiment

In the earlier applications there is detailed a mechanism for loading a mobile computing environment onto a machine for configuration, such as setting environment variables, loading data and installing software, then unloading the computing environment with all the configuration for subsequent recreation, either

on the same or another machine. The present invention makes use of this mechanism.

In a preferred embodiment of the present invention, pre-configured computing environments are registered on the sender's machine for operating various types of files. Each computing environment contains the software, fonts, environment settings and so forth that are needed to open the associated file category. A computing environment may also include other useful resources, like reference materials, backup utilities and (network) printers at a professional printing shop.

When the sender creates a new document, the operating system on his machine automatically loads the computing environment that is associated with the category of the new document. This is followed by the creation and opening of the new document using the appropriate software.

Besides creating the document using the software and tools in the computing environment, the sender can also customize the computing environment itself. This could include but are not limited to installing additional software, and masking off certain local resources, such as the floppy drive and local printers, so that they will not be available when the computing environment is recreated on the recipient's machine. Moreover, the sender can specify usage control requirements. These requirements could include, but are not limited to, a embedded usage counter, a notification being sent to a tracking agent each time the document is opened, or an authorization from an approval authority before the document can be opened.

Finally, the sender invokes a mechanism to unload the computing environment with all its contents and save it as image data. The image data can now be sent to the recipient, either on a physical medium such as CD-ROM, or via online transmission.

The sender can distribute a document, with accompanying software and usage control, in a disposable operating environment. Also, the operating environment can be clean and free of defects and/or viruses.

At the recipient's end, a standard loader is needed on his machine to reconstruct the computing environment from its image data. When the computing environment is recreated, it takes over the recipient's machine, so that resources within the computing environment are available to the recipient. The computing environment also carries out the usage control and resource masking measures specified by the sender. Finally, the target document is opened with the appropriate software. The recipient can operate the digital content using the accompanying software, and use all the resources in the provided accompanying environment.

In another preferred embodiment, the sender selects a pre-existing document, which causes the associated computing environment to be loaded, followed by the opening of the selected document using the appropriate software.

In a third preferred embodiment, the sender starts by selecting a computing environment directly. Once the selected computing environment is loaded, he then proceeds to invoke the appropriate software to create or import the document.

To now refer to the drawings, Figure 1 shows the system architecture. A sender client machine 10 can send a digital document with its computing environment to a recipient client machine 40, via sender server machine 20 and recipient server machine 30.

It is shown in Figure 2, the sender specifies the new document type, and the computing environment which is registered to handle documents of the type requested is then downloaded from the sender's server 20 to the sender's machine 10.

After the sender 10 creates the document, the sender 10 can then do one or more of:

(i) modify the document;
(ii) customize the computing environment such as, for example, by installing additional software, mask off local resources, and so forth; and
(iii) specify usage requirements such as, for example, usage counter, usage tracking, runtime authorizations, and so forth,

following which the sender 10 saves the computing environment (including document) on the server 20. The computing environment is then sent from sender server 20 to recipient server 30. The recipient 40 can then load the computing environment from the server 30.

At this time the computing environment:

(i) verifies that the internal usage counter is not exceeded; and/or
(ii) reports usage to server 20; and/or
(iii) obtains authorization from server 20; and/or
(iv) masks applications in recipient machine 40 so that only the computing environment is used by recipient 40.

The recipient 40 can then use the document in the computing environment.

Whilst there has been described in the foregoing description a preferred embodiment of the present invention, it will be understood by those skilled in the technology that many variations or modifications may be made without departing from the present invention.

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Claims

1. A system to distribute digital content with an accompanying operating environment, from a sender to at least one recipient, each having a machine, the system including the steps of:-
   (a) the sender creating then saving as image data a mobile computing environment containing the digital content;
   (b) the mobile computing environment being created on the sender's machine from one or more mobile computing environments that are pre-configured for a category of digital content;
   (c) the created mobile computing environment including a plurality of programs, and usage controls specified by the sender; and
   (d) the sender transmitting the image data to the recipient to enable the recipient to open the digital content
   and for the mobile computing environment to be recreated on
   and take over the recipient's machine,
   including the loading of the digital content within the mobile computing environment.

2. The system as in claim 1, wherein the digital content is placed within the recreated computing environment on the machine of the sender through the steps of:
   (e) the sender specifying the category of the digital content;
   (f) the sender creating or importing the digital content within the created mobile computing environment.

3. The system as in claim 1, wherein the digital content is placed within the created mobile computing environment on the machine of the sender through the steps of:
   (g) the sender specifying the digital content which has already been created; and
   (h) the loading of the digital content into the created mobile computing environment.

4. The system as claimed in claim 1, wherein the sender configures the mobile computing environment after it is created on the sender's machine.

5. The system as claimed in claim 1, wherein the created mobile computing environment includes at least one feature selected from the list comprising:
   (i) a wallpaper;
   (ii) a plurality of desktop icons;
   (iii) a set of fonts;
   (iv) a clipboard or cache;
   (v) a registry; and
   (vi) a plurality of directory mappings.

6. The system as claimed in claim 1, wherein the image data is transferred from the sender to the recipient on a physical storage medium.

7. The system as claimed in claim 1, wherein the image data is transferred from the sender to the recipient over a communication medium.

8. The system as in claimed in claim 1, wherein the created mobile computing environment masks off one or more components in a native computing environment on the recipient's machine, according to the sender's specification.

9. The system as claimed in claim 1, wherein created mobile computing environment on the recipient's machine contains a counter, set by the sender, for limiting the usage of the digital content.

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10. The system as claimed in claim 1, wherein the created mobile computing environment on the recipient's machine obtains authorization from an approval authority before opening the digital content.

11. The system as claimed in claim 1, wherein the created mobile computing environment on the recipient's machine notifies a tracking agent each time the digital content is used.

12. The system as claimed in claim 2, wherein the sender configures the mobile computing environment after it is created on the sender's machine, the configuring including at least one item selected from the group consisting of:
(a) modifying the digital content; and
(b) customizing the computing environment.

13. A system as claimed in claim 12, wherein the mobile computing environment includes at least one feature selected from the group consisting of:
(i) a wallpaper
(ii) a plurality of desktop icons;
(iii) a set of fonts;
(iv) a clipboard or cache;
(v) a registry; and
(vi) a plurality of directory mappings.

14. The system as claimed in claim 3, wherein the sender configures the created mobile computing environment after it is created on the sender's machine, the configuring including at least one item selected from the group consisting of:
(a) modifying the digital content; and
(b) customizing the computing environment.

15. The system as claimed in claim 14, wherein the created mobile computing environment includes at least one feature selected from the group consisting of:
(i) a wallpaper;
(ii) a plurality of desktop icons;
(iii) a set of fonts;
(iv) a clipboard or cache;
(v) a registry ; and
(vi) a plurality of directory mappings.

16. The system as claimed in claim 4, wherein the configuring includes at least one item selected from the group consisting of:
(a) modifying the digital content; and
(b) customizing the computing environment.

17. The system as claimed in claim 16, wherein the created mobile computing environment includes at least one feature selected from the list comprising:
(i) a wallpaper;
(ii) a plurality of desktop icons;
(iii) a set of fonts;
(iv) a clipboard or cache;
(v) a registry ; and
(vi) a plurality of directory mappings.

18. The system as claimed in claim 12, wherein the created mobile computing environment masks off one or more components in a native computing environment on the recipient's machine, according to the sender's specification.

19. The system as claimed in claim 14, wherein the created mobile computing environment masks off one or more components in a native computing environment on the recipient's machine, according to the sender's specification.

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20. The system as claimed in claim 16, wherein the created mobile computing environment masks off one or more components in a native computing environment on the recipient's machine, according to the sender's specification.