ENHANCED VIDEO PROGRAMMING SYSTEM AND METHOD UTILIZING A WEB PAGE STAGING AREA

The present invention relates to a method and apparatus of constructing and presenting web pages.

Computers have the capability to provide massive amounts of educational and entertainment information by way of the Internet. Currently, on-line systems offer a variety of different services to users, including news feeds, electronic databases (either searchable by user directly on the on-line system, or downloadable to the user's own computer), private message services, electronic newsletters, real time games for play by several users at the same time, and job placement services, to name a few. However, currently most on-line communications occur merely through text. This is in contrast to the audio/visual presentation of the alternative electronic medium, television. However, it is expected that as multi-media's incessant growth continues, audio/visual programs will proliferate and text will become less and less dominant in the on-line environment.

Even though these programs will be introduced, the Internet will remain essentially user unfriendly due to its very massiveness, organization, and randomness. Simply stated, there is no order or direction in the Internet. Specific pieces of information can be hard to find, and it is even harder to put that piece of information into a meaningful context.

Television, on the other hand, has been criticized for being a passive medium. Whilst interactive television systems have increased the level of user interaction, and thus, provided greater learning and entertainment opportunities, vast information resources such as databases are inaccessible from such a medium.

The present invention seeks to close the gap between video programming and the vast information resources of the Internet.

According to a first aspect of the present invention there is provided a method of constructing and presenting web pages, comprising the steps of:

receiving a request for a web page including an address for use in retrieving information to construct the web page;

retrieving the information using the address;

constructing the web page hidden from view on a display device in order to produce a constructed web page; and

commanding the constructed web page to be displayed on the display device based upon particular criteria.

Preferably, the receiving step comprises receiving timer event information providing an indication as to when to command the web page for presentation on the display device; and the commanding step comprises commanding the constructed web page to be displayed based upon the timer event information

For example, the receiving step may comprise receiving a particular amount of time to generate a time-out using the timer event information.

The constructed web page may then be transmitted for display upon detecting the time-out.

In an embodiment, the commanding step comprises commanding the constructed web page to be displayed upon receipt of a particular command.

The receiving step preferably comprises receiving a uniform resource identifier.

Preferably, the constructing step comprises constructing the web page in a portion of a memory associated with a machine at which the web page is to be presented.

In an embodiment a web browser may be used to retrieve the information.

The commanding step may comprise transmitting a program to the machine concurrent with commanding the constructed web page for display.

Preferably, the commanding step comprises transmitting a video program, audio program, or multimedia program.

The program and the constructed web page may be transmitted for simultaneous display on the display device.

Alternatively, the program and the constructed web page may be transmitted for simultaneous display on a television.

In a further alternative, the program may be transmitted for display on a television, and the constructed web page may be transmitted for display on the display device.

The web page may be displayed overlayed on content displayed for the program.

The present invention also extends to apparatus for constructing and presenting web pages, comprising:

receiving means for receiving a request for a web page including an address for use in retrieving information to construct the web page;

retrieving means for retrieving the information using the address;

means for constructing the web page hidden from view on a display device in order to produce a constructed web page; and

means for commanding the constructed web page to be displayed on the display device based upon particular criteria.

Apparatus of the invention may comprise a personal computer, a television, a cable box, a satellite box, or a personal digital assistant for containing the receiving means, the retrieving means, the constructing means and the commanding means.

Embodiments of the present invention will hereinafter be described, by way of example, with reference to the accompanying drawings, in which;

Figure 1 is a diagram showing the receipt and decoding of video signals at a subscriber location using a method of the invention;

Figure 2 is a diagram showing an alternative embodiment to achieve the integration of Internet information with video content;

Figure 3 is a flow diagram of the basic software of the invention;

Figure 4 is a diagram showing an embodiment in which URLs are directly transmitted to a user;

Figure 5 shows an embodiment of a system comprising a digital cable box;

Figure 6 shows an embodiment of a system including a digital T.V.;

Figure 7 shows an example of a user interface;

Figure 8 shows an example of a display providing a user interface;

Figure 9 is a diagram showing an embodiment of a system having distributed communication servers;

Figure 10 is a diagram of a system using a web page staging area; and

Figure 11 is a flow chart illustrating a method for using a web page staging area.

Figure 1 illustrates an embodiment of a computer based system for receiving a video program along with embedded uniform resource locators (URLs) which direct a user's computer 16 to address locations, or web sites, on the Internet 20 to retrieve related web pages. The web pages correspond to the video presentation. The particular video programming can be delivered in analog, digital or digitally compressed formats (e.g. MPEG2) via any transmission means, including satellite, cable, wire, television broadcast or sent via the web.

The video programming is preferably created at a centralized location, for example, as content creation 4 indicated in Figure 1, for distribution to subscribers. Program creation may be accomplished by any appropriate means. After a video program is created, uniform resource locators (URLs) are embedded. In one embodiment, the URLs are embedded into the vertical blanking interval of the video programming by a URL encoder 8, as shown in Figure 1. In this embodiment, the URLs are encoded onto eight fields of line 21 of the VBI. Line 21 is the line associated with close captioning, among other things. However, the URLs may additionally and/or alternatively be embedded in other fields of the VBI, in the horizontal portion of the video, as part of the audio channel, in any subcarrier to the video, or if the video is digital, in one of the data fields.

Although Figure 1 shows the video with the URLs broadcast over the same transmission line, the URLs may be sent down independently of the video program on a data channel. In this embodiment, the URLs may be forwarded to the remote sites either prior to initiation or during the program. Preferably, the URLs have associated time stamps which indicate to the subscriber stations when, during the video program, to display the particular web pages addressed by the URLs. Alternatively, the user can select when to call the particular web pages for display with the video program.

The particular information in line 21 is not part of the visual part of the program, and thus, is not perceptible to the human eye, thereby making it ideal to send data information to the users. Whilst the bandwidth capacity of line 21 is limited, as a system as described transmits only the URLs, and not full web pages, there is more than enough capacity. Furthermore, no additional hardware is necessary at the computer 16 to receive the video and retrieve the web pages.

Once the video program is created, it may be transmitted to user sites over any transmission means, including broadcast, cable, satellite, or Internet, and may reside on video servers. Furthermore, the video program, with or without embedded URLs, may be encoded onto storage means such as a video tape, for example of VHS or Beta format, or an optical disc such as CD or DVD, or any other medium.

Preferably, each receiver station comprises any Intel x86 machine (preferably a 486 processor, pentium processor, etc), an Apple Computer, UNIX or any other type of standard computer workstation. The local computer 16 is preferably connected to either a cable and/or broadcast television or to a local VCR or other video source. At each subscriber site, the local personal computer 16 preferably receives the cable transmission by cable connection on the back of the personal computer 16. The video/audio program may be processed for display on the computer screen using a PC card capable of displaying video signals on a computer monitor in an appropriate TV format such as PAL or NTSC. One example of a PC card is a WinTV card. In addition to the cable connection, there is the Internet 20 connection created concurrently with the cable connection.

The Internet 20 connection may be via high-speed line, RF, conventional modem or by way of two-way cable carrying the video programming. The local PC 16 has Internet access via, for example, an ASCII software mechanism. In an embodiment, at each subscriber site, an associated local URL decoder 12 extracts the URLs, preferably embedded in the vertical blanking interval, with the use of a suitable VBI decoder device. The URL decoder 12 may be either a stand-alone unit or a card which is implemented into the personal computer 16.

In the embodiment shown in Figure 2, the uniform resource locators (URLs) are encoded into the video as described above. Again, the URLs are preferably encoded onto eight fields of line 21 of the VBI, but may also be sent independently of the video. In this embodiment, a URL decoder 24 is located at the server site rather than at the subscriber location. When the decoder 24 receives the video program signal, it strips out the URL codes on line 21 of the VBI and delivers these codes independently to an Internet server 28. The URL code is then subsequently delivered over the Internet 20 to the user PC 16. Simultaneously, the video is broadcast over conventional broadcast or cable transmission means 36 to the user's personal computer 16.

The alternative shown in Figure 4, does not use the VBI. In this embodiment, the system runs an online service over the Internet 20. This service is in the form of an Internet web site 62 which provides a user-interface to a database 78 and to one or more associated data servers 90. The service provides member accounts to TV broadcasters 66 who sign up to use the illustrated system in conjunction with their broadcasts. Each member broadcaster will enter the service at their computer 70 through web browser software 74 using their member account by entering various identification and password information. Once within their account, the member will be provided with a graphical user interface for pre-scheduling URLs for transmission to users 118 over a direct Internet connection 94 at particular times of day. The same user interface, or a variation of it, can be used by broadcasters for live transmission 82 of URLs to users at the same time as a broadcast 86.

One example of this interface might be a scheduling calendar (daily, weekly, monthly, yearly) in which the broadcaster 66 may allocate time periods

which coincide with their broadcasts 86, and during which they will send out URLs to their users to link to web pages. For each time period (for example, a particular hour long period during the day) determined by the broadcaster 66 to be a broadcast period (a period during which they want to transmit URLs that correspond to a television show being broadcast from their TV broadcast facility 110 to the external TV 114 of the user 118 at that time), the broadcaster 66 may then enter a series of URLs into an associated file ("Link File") for transmission over the Internet 20 at that time. This Link File may have a user interface such as a spreadsheet, table, or list, or it may be simply a tab-delimited or paragraph-delimited text-file. As an example, each of the records in the Link File consists of a data structure which may contain information such as:

(<timecode>,<URL>,<label or title>, <additional information>,<additional information>,...)

The above data structure is just one example. The records in the Link File preferably specify the time, Internet address (i.e. URL), label (such as an associated name), and some optional additional information, for each web page the broadcaster 66 desires to launch during a show.

When a broadcaster 66 modifies their calendar and/or the Link File associated with any given time period(s) in their calendar, this information is saved into the database 78 which is attached to the site 62. Each broadcaster 66 may maintain multiple calendars in the database 78 if they broadcast in different time zones, for example.

The database 78 provides the Link File records for upcoming time periods to a server 90, which may be one server or a distributed network of server programs on multiple computers across the network, to be utilized for scaling to large national or global audiences. The server 90 provides the Link File records, including the URLs, to the user's personal computer 16, which is connected via a network. Examples of possible networks include the public Internet 94, a direct private network, or even a wireless network.

One feature of the embodiment illustrated in Figure 4 is that one or more broadcasters 66 may utilize the same schedule in the database 78 for their own

broadcasts 86 or during the same broadcast. For example, a network broadcaster may develop a master schedule and various affiliate broadcasters may subscribe to that schedule or copy it (in the database) and add or delete specific URLs in the schedule for their local audiences or unique programming. This scheme enables affiliates to insert URLs for local advertisers or local subjects into a sequence of more general URLs provided by their network broadcaster 66. In other words, the affiliate can add links that ride on the network feed and then redistribute it to their local audiences.

The system of Figure 4 also enables personalization in the form of unique series of URLs specific to each user's unique profile, which are directly sent over the Internet 20 to each user's specific client software 106. This can be achieved from the broadcaster 66 to each individual user 118, or to particular collections of users. To accomplish personalization, the service may send a different stream of URLs to each user's client software program 106. The stream of URLs sent depends upon a user profile stored in the database 78 or the client software program 106, a user profile which is built on demand or over time for each user 118 based on criteria such as the location of the user, choices the user makes while using a client software program 106, choices the broadcaster 66 makes during a broadcast 86, or automatic choices made by an algorithm (such as a filter) residing on the service 62. Personalization enables each user to receive URLs which are uniquely relevant to their interests, demographics, history, or behaviour in the system.

Once the URLs have reached the personal computer 16, the operation of all of the systems shown in Figures 1, 2 and 4 is similar.

In one embodiment, a JAVA enabled browser 98 as well as specialized software 106 are installed on the computer 16. The JAVA enabled browser 98 allows the computer 16 to retrieve the web pages 102 and is presently the preferred software, as it is platform independent, and thus, enables efficient and flexible transfer of programs, images, etc., over the Internet 20. The specialized interface software 106 (hereinafter, "client software") acts as an interface between the video programming and the Internet functions. The client software 106 retrieves URLs from the video program (embodiment of Figure 1) or directly from the Internet connection (embodiments of Figures 2 and 4), interprets these

URLs and directs the JAVA enabled browser 98 to retrieve the particular relevant web pages 102. The client software 106 also synchronizes web pages to the video content for display on the user's computer 16, as shown in Figures 3 and 4 and explained in more detail below.

As explained above, the URLs may be encoded and embedded into the video signal by inserting them into the vertical blanking interval (VBI).

Alternatively, the URLs may be entered by member TV broadcasters 66 along with specified times for transmitting the URLs to the user. At the appropriate times, the URLs are sent directly over the Internet to the user's PC 16 via the client software 106 over a direct point-to-point or multicasting connection.

The system may have the capability to detect identical URLs sent directly after one another and to cause the browser not to fetch URLs in these particular cases. As shown in Figure 3, once the URL code is received at the computer, the client software 106 first interprets the URL and determines in step 42 whether the particular URL has been received previously. If it has already been received, the next received URL is interpreted for determination of prior receipt. If the particular URL has not been detected before, the software checks for misspelling in step 46 and any other errors, and if errors exist, corrects these particular errors. Once again, it is determined whether the URL has been previously detected. If it has, the next URL is accessed in step 38. If the URL has not been detected, the specific URL is added to the URL list in step 54. The specific URL is then sent to the web browser, preferably a JAVA enabled browser 98. Upon receipt of the URL, the browser 98, in step 58, will access the web site address 122 (Figure 4) indicated by the URL and retrieve the cited web page(s) 102 via the Internet.

Viewers can view the integrated presentation in the following manner. As mentioned above, the video signal is processed and displayed on a video window on the PC screen using a WinTV card, for example. The corresponding audio is forwarded to the audio card and sent to the PC speakers.

The retrieved web pages 102, referenced by the URL, are optionally time stamped to be displayed on the computer screen when predetermined related video content is displayed in the video window, thus enhancing the video presentation by providing in-depth information related to the video content thereto. Another section on the screen is also preferably used to represent an operational control panel. This control panel provides a list of the URLs which have been broadcast and correspondingly received by the computer 16. This control panel is updated to add a URL code each time a new URL code is received by the PC 16. This list gives the subscriber the flexibility to go back and retrieve particularly informative or interesting web pages that have already been displayed earlier in the program, or alternatively, to print them out for future reference. Furthermore, the list may include URLs referring to web pages not displayed with the broadcast program, but which provide further information on a certain topic of interest to the viewer.

In an example, a viewer may begin watching a musical video featuring a band. As the video is received by the PC 16, URLs are either being received with the video signal or are being received directly via the Internet 20 or another data channel, and are interpreted by the client software 106. Upon direction and command, the JAVA enabled browser 98 retrieves particular web pages 102 from Internet 20 web sites identified in the URLs. These web pages 102 are then displayed on the video screen at particular times. So, for example, whilst the viewer is watching the music video, biographical information on the band may also be displayed adjacent to the video window. Web pages 102 may also include an upcoming concert schedule, and/or audio clips of the band's music may be downloaded from the Internet 20.

As another example, a user may be watching a program relating to financial news. Whilst the narrator is shown discussing high tech stocks, web pages corresponding to detailed financial performance information on high tech stocks, environment and characteristics may be displayed with the video on the computer screen. If the personalization features are included, web pages associated with a particular user's stock may be fetched and displayed on the computer screen with the video program. When the program narrator switches to a discussion on the weekly performance of the Dow Jones, web pages

presenting related financial performance information may be simultaneously displayed.

A user may view the interactive program using a television set 114 or other display monitor in conjunction with the display screen of the personal computer 16. In this case, the relevant web pages are shown on the personal computer 16 whilst the video program is displayed on the television monitor 114. In this alternative, a cable set top box receives the television program from the multi-channel cable. The personal computer 16 also receives the video program from the multi-channel cable and extracts the URLs, embedded in the vertical blanking interval of the video signal or directly transmitted 94 over the Internet 20. The client software 106 extracts the URLs and retrieves the particular web pages as described above. The web pages are then synchronized with the particular video frames and presented to the user. It is understood that a hyperlink may exist on the web site that will allow the user to automatically load the client software and call up the specific television channel referenced in the web site. For example, someone browsing the Internet 20 may come upon a major television network's web site. It is possible then to scroll to an interesting story and then to click on an hyperlink to turn on the software which tunes the TV window to the network.

Instead of receiving the video program from a transmission means, the video program may be addressed directly from the user site if the video program, with or without embedded URLs, has been stored on appropriate means. The storage means may be a videotape in any format, such as VHS or Beta, or an optical disc in any format, such as DVD or CD-ROM. In this case, the user PC 16 and/or television 114 are connected to a video tape player, a disc drive, or other appropriate device.

Figures 5 and 6 show two alternative examples of systems which may be employed. As shown in Figure 5, a user may view an interactive program using a television set 18 or other display monitor in conjunction with a digital cable box 140. In this case, the digital cable box 140 performs the functions of the personal computer 16 shown in Figures 1, 2 and 4, and the client software is stored in memory in the digital cable box 140. In one embodiment, the digital cable box 140 includes two tuners, thus allowing both the web page and the

video program to be simultaneously viewed on the same screen. If video and web stream, however, are carried on one channel, then only one tuner is necessary.

The client software retrieves URLs from the received video program, directly from the Internet connection 20 or via a separate data channel, interprets these URLs and directs the web enabled browser to retrieve the particular relevant web pages, and synchronizes the retrieved web pages to the video content for display on the television 18. The relevant web pages are preferably shown in one frame of the television 18 while the video program is displayed in another frame. Alternatively, the web page can replace the video program on the display.

In this embodiment, the digital cable set top box 140 receives the television program from the multi-channel cable. The URLs can be encoded into the digital program channel using MPEG1, MPEG2, MPEG4, MPEG7 or any other compression video scheme. Alternatively, the URLs can be transmitted to the digital cable boxes 140 from an Internet server 148. The digital cable box 140 decodes the URLs from the digital video signal or directly transmitted over the Internet 20. The client software decodes the URLs and retrieves the particular web pages as described above. Preferably, the web pages are synchronized with the particular video frames and presented to the user.

As with all the embodiments described above, instead of receiving the video program from a transmission means, the video program may be addressed directly from a local video source 144 if the video program, with or without embedded URLs, is stored on a storage means such as a video tape or optical disc. In this embodiment, the digital cable box 140 is connected to a VCR, disc drive or other appropriate device.

Figure 6 illustrates an embodiment where a digital TV 152 is the remote reception unit and performs the functions of the personal computer, shown in Figures 1, 2 and 4, and the digital cable box 140 shown in Figure 5. A processor means and memory are incorporated in the digital TV 152, and the client software and web browser software are implemented in memory in the digital TV 152. All of the functions described above with reference to the other

embodiments are performed in a similar manner by the digital TV 152 embodiment.

Although the digital cable box/TV 140, 18 and digital TV 152, shown in Figures 5 and 6, are incorporated into the embodiment of Figure 1, in substitution for the PC 16, they may also be substituted for the PC 16 shown in Figures 2 and 4.

A user may view the video and web content on one screen (in two windows), or with the video on one display screen and the web content on a separate display monitor. Alternatively, a user may access the video or web content separately. Thus, a user may branch from video to web content and vice versa.

The systems described herein are well-suited to the education environment. Thus, students and teachers may access one or more web servers. Software components including instructor and student user software, authoring software and database assessment software are provided. An instructor may, for example, use content creation software on a personal computer to easily integrate into the curriculum current information published on the web through an interface 156 shown in Figure 7. The instructor creates a playlist (i.e. linkfile) 160, the playlist 160 comprising a list of web pages, text notes and questions. The web sites and questions are set out in a predetermined order and can be assigned times. Preferably, the URLs identifying the web site and time stamps are sent automatically to the desktop of each student in the virtual community, either during a playback of a pre-recorded program or during a live event.

At each of the student workstations, the program is directed by the playlist 160. In other words, the playlist 160 provides the structure for the program. At predetermined times as indicated by the playlist 160, the browser will fetch and display a web page in a frame on the computer screen. Because program events can be set up in this manner at predetermined times, the entire program and playlist can be prerecorded and stored in a web database for later access by students.

It will be appreciated that the students and the instructor may be located anywhere, as long as they are all connected to the web. Because a server controls the program, the instructor output comes from the server and the student workstations are automatically updated by the web server.

This educational embodiment integrates web content and other media with collaborative groupware functionality to create an interactive environment for students and teachers. The student may receive a traditional video lesson through a frame in his or her web browser, or from a television. Separate frames may be simultaneously provided as shown in Figure 8, which shows the browser displaying: web pages 176 automatically delivered to each student's desktop with information or exercises that complement the video presentation; a chat dialogue frame 168 for conversing with the instructor and/or other students online; and an interactive playlist 164 of web pages and questions comprising the lesson.

In the student interface of Figure 8, each student may perform a virtual experiment, for example, during a physics lesson to learn about gravity. In addition, the students may converse with one another and with the instructor using the chat dialogue frame 168. They may also send web pages to one another and provide answers to questions from the teacher via the chat dialogue frame 168 of the student interface 176. With the chat feature, students may break into subgroups for collaborative learning. Whenever a student in the group sends a message, the message is sent to the Internet server 20 and every other student in the subgroup receives and views the message in their chat dialogue frame 168.

The instructor, however, may retain control over the chat feature. For example, the instructor may terminate the chat feature or web push to terminate unruly on-line conversations or the sending of web pages by students.

The systems described herein are more powerful than conventional distance learning systems as they allow the instructor to freely and conveniently exercise almost any type of testing strategy. The instructor may test students using a combination of the chat dialogue feature and web pages. For example, multiple choice questions and short answer questions can appear in the chat

window 168. Essay questions, requiring longer answers, become web pages. As mentioned above, students can perform virtual experiments on-line. Once the instructor's personal computer receives student answers, student scoring may be presented to the instructor in any format including tables, charts, diagrams, bar graphs, etc. The instructor, thus, may analyze the results and has the capability of providing real-time feedback to the students.

Students may also receive individualized feedback via branched interactive audio, video and/or graphics responses. For example, the workstation may branch to a particular audio response, preferably prerecorded in the instructor's own voice, based on the student response to a multiple-choice question. A plurality of potential audio responses may be made available at the student's workstation, for example, by a method as described in US patent No. 5,537,141. Additionally and/or alternatively, personalized video, audio and graphics segments may be delivered and displayed to the student based on a student answer or personal profile, for example, in a manner as described in US patent No. 5,724,091.

Responses to student answers may be more substantive using a memory feature comprising an algorithm which selects an interactive response to the user based not only on the student's current answer selection, but also on the student's previous responses. The algorithm, preferably stored in memory at each student's workstation and under processor control, selects an output interactive response based on student responses. In an example, a student who gets three or more answers in sequence right receives a more difficult question. However, a student who fails to correctly answer one or more of the three questions receives an easier question.

The system illustrated in Figure 9 is capable of servicing large numbers of users, for example, several schools. As shown, communications servers 180 distribute and route message across a LAN, WAN and the Internet. At the heart of the system is a group database server 184, and this is surrounded by several communication servers 180 which each serve an area 192. Each communication server 180 is surrounded by squares representing user stations 188. The communication servers 180 are organized in node relationships with one another.

Each node is responsible for serving an area 192. An area 192 is defined as a virtual location serviced by a single communication server 180 (or "com server"). An area 192 may be a single school, an office, or may consist of several actual physical locations. The defining characteristic of an area 192 is that messages sent from one member of an area 192 to another need not be routed outside of the servicing com server 180.

An area member is analogous to the frequently used term "user". For example, a "user" may be a student in an educational environment.

The distributed communication system shown in Figure 9 permits the dynamic addition of communication servers 180 within a group with little or no administrative tasks as well as the addition of groups within an overall communications network. A communication server group consists of several defined virtual areas 192 (preferably, consisting of no more than 250 members each), each area 192 serviced by a single com server 180. This system allows members of one area 192, or group, to easily communicate with members of another area 192 or group without any configuration changes.

In the past, service of very large numbers of users has required large expensive servers and networks. Furthermore, as the user base increased, performance suffered and the hardware had to be upgraded to service the demand.

The distributed communication system allows the same, relatively inexpensive, machines to serve an ever-increasing user base. This is accomplished by routing messages from one server to another when necessary following substantially the same core pattern as IP routing and DNS lookups. If a message is for a member not belonging to the current area 192 or group, the message is routed through the distributed communication system until its destination, or someone who knows the destination and can deliver the message, is found. The destination may be cached so subsequent messages for that member or group may be more efficiently delivered.

Referring to Figure 9, if a message is posted by member "A" and is intended only for the members of group 1, the message never leaves the area 1 com server. However, if the message is intended for members of area 1 and for members of area 2, the area 1 com server forwards the message to the group database server 184. The message is broadcast to the members of area 1 and tagged in the group database server 184 as belonging to area 2. The message is then routed to area 2 and broadcast to area 2 members. With this technique, any member may potentially send a message to any other member. If the area com server 180 does not recognize the destination, the message is forwarded up the line. Each com server 180 does not need to know about any other server 180. Messages are routed until they delivered. If undeliverable, the original sender is notified.

New areas 192 can be added on the fly. When a new com server 180 is added to the network, it registers itself with the database application. Henceforth, any message destined for the new area 192 may be routed properly without altering the other area servers 180.

This method and system works for global messages or for user to user messages. Furthermore, new groups may also be dynamically added. Once added, each new group database server 184 registers itself with the existing database servers 184. This distribution of load permits nearly unlimited expansion with existing software and hardware. Each server manages a finite number of members, cumulatively serving a growing community.

Users need not be informed as to the particular com server 180 they should connect to. Members are directed to a single URL. The selection of the server for user connection is determined by load balancing software. In this manner, the network may appear to be a global network of servers or simply a local classroom.

The architecture described, which uses database servers as routing gateways, enables the system to serve with minimum administration and configuration and with lower end, cost-effective hardware.

A web page staging area feature permits the construction of web pages hidden from view by the user. Once the web page is constructed, it is displayed to the user based upon timer event information or receipt of a particular command that it be displayed. Thus, the user is provided with a more television-like experience in viewing content from the Internet or other source in that the user need not view a web page being constructed on a display device. Use of timer event information for displaying the constructed web page also permits synchronization of the web page with associated programming. For example, the timer event information may be used to trigger display of a web page for an advertisement at the same time as corresponding information is provided by the video programming. The programming, or an associated program, may include, for example, a video program, audio program, multimedia program, combinations of those programs, or other information. The content for the web page may include a wide variety of information such as, for example, advertisements, sports, graphics, music, or any type of multimedia information.

Figure 10 shows a system 200 using a web page staging area. System 200 includes a server 202 providing commands such as a pre-fetch push command, explained below, and related information to a client machine 204. Client machine 204 includes a web browser 210 and an associated browser plug-in 208. Web browser 210 uses a portion of memory 214 reserved for constructing web pages hidden from view. It also uses a timer event 212, such as a JavaScript timer, for use in determining when to display constructed web pages when timer event information is used. Web browser 210 includes a connection through the Internet 220 or other network to a remote web server 222 for use in retrieving content to construct web pages. Web browser 210 displays content on an associated display device 209.

Client machine 204 may display both the web page along with programming as described above, such as video, audio, or multimedia content. In particular, client machine 204 may be implemented by a personal computer for displaying both the programming and the web page, by a television for displaying both the programming and the web page, or by both a personal computer for displaying the web page and an associated television for displaying the programming. Personal computers may include hardware and software for displaying video and audio programming such as television signals. Also,

televisions may include associated hardware with web browsers, such as a set-top converter (digital or analog), for use in retrieving and displaying web pages and other content from the Internet. Therefore, client machine 204 may be implemented by any type of digital display device or device for controlling a digital display device, or combinations of such devices, and examples include a personal computer, a television, a cable box, a satellite box, and a personal digital assistant.

In operation, server 202 transmits a pre-fetch push command with an address and optional timer event information 206 to browser plug-in 208. A pre-fetch push command is used to obtain and assemble content, for example a web page, prior to presentation on an associated machine. The address is used to obtain particular content or other information from web sites or networks such as a local area network, wide-area network, intranet, or the Internet. An example of such an address is a Uniform Resource Identifier (URI). A URI is a compact string of characters for identifying an abstract or physical resource. More specifically, URIs provide a simple and extensible means for identifying a resource, and a URI can be further classified as a locator, a name, or both. The specification of URI syntax and semantics is derived from concepts introduced by the World Wide Web global information initiative.

URIs include, for example, URLs and Uniform Resource Names (URNs). A URL is a subset of a URI that identifies resources via a representation of their primary access mechanism, such as their network "location", rather than identifying the resource by name or other attribute of that resource. The term URN refers to a subset of URI that is required to remain globally unique and persistent even when the resource ceases to exist or becomes unavailable.

Browser plug-in 208 passes the URI and timer event information, if present, to web browser 210, which initializes timer event 212, as shown with connection 224, if timer information is invoked. Browser plug-in 208 also uses the URI to retrieve content for a web page from web server 222. As web browser 210 retrieves the content, it constructs a web page 218 hidden from view in hidden staging frame 214. Upon detecting a time-out by timer event 212, browser plug-in 208 commands web browser 210 to display the constructed web page. Alternatively, if a timer was not invoked, browser plug-in waits for a

show command 207 from server 202. In response to time-out by timer event 212 or receipt of show command 207, web browser 210 retrieves the constructed web page from hidden staging frame 214 and displays web page 216 on associated display device 209. Only one hidden staging frame 214 is shown for illustrative purposes; the machine 204 may include many hidden staging frames by, for example, using different reserved portions of memory in order to concurrently construct many web pages hidden from view.

Figure 11 is a flow chart of a method 230 and illustrates use of a web page staging area to construct web pages hidden from view. Method 230 may be implemented in software by browser plug-in 208 and web browser 210 controlling operation of the client machine 204. In method 230, the server 202 sends to the client machine 204 a pre-fetch push command along with a URI and optional timer event information (step 232). The pre-fetch push command may include any type of information instructing client machine 204 to construct a web page hidden from view. The URI specifies the network address for obtaining the content for the web page. The time event information, when used, provides an indication of when to display the constructed web page and it may use a JavaScript timer, or other software or hardware timers. Also, it may provide a relative indication of when to display the web page, such as a particular number of seconds after receiving the command, or it may provide an indication of an actual time at which to display it.

Browser plug-in 208 receives the pre-fetch push command, URI, and optional timer event information (step 234). It sets up hidden staging frame 214 in memory and initializes timer event 212 using the timer event information, if present (step 236). Hidden staging frame 214 may be implemented using a portion of memory in or associated with the client machine 204. Browser plug-in 208 may set up the hidden staging frame by reserving a particular portion of memory based upon an expected size of the web page to be constructed, and the size information may be sent by server 202 with the pre-fetch push command. Alternatively, a portion of memory may be reserved in advance for constructing web pages.

Browser plug-in 208 interacts with web browser 210 to construct the web page (step 238). In particular, web browser 210 uses the URI or other address

information to retrieve content for the web page from web server 222 through the Internet 220 or other network. As web browser 210 retrieves the content, it constructs the web page 218 in hidden staging frame 214 so that the user does not view the web page being constructed. The construction involves retrieving and locally compiling content for the page for presentation of the page when completed. For presentation of the page in a web browser on a computer display device, the construction involves assembling the content for display in the browser. If the web browser operates in a different environment, such as with a video program, the construction may also involve reframing the content for display with the program. Although only web server 222 is shown for providing the content, web browser 210 may obtain the content for the web page from server 202 or from multiple sources.

Browser plug-in 208 determines if a timer was invoked through transmission of timer information with the pre-fetch push command (step 239). If a timer was invoked, browser plug-in 208 through web browser 210 monitors timer event 212 to determine when to display the constructed web page (step 240). In particular, it determines if timer event 212 has expired (step 242). If a timer was not invoked, browser plug-in 208 waits for show command 207 (step 241). Upon detecting a time-out (step 242) or receiving show command 207 (step 241), browser plug-in 208 commands web browser 210 to display the constructed web page (step 244). Instead of using a time-out feature as timer information, browser plug-in 208 may use other types of time indications for determining when to display the web page such as displaying it at a particular time.

Based upon the command from browser plug-in 208, web browser 210 retrieves the constructed web page 216 from hidden staging frame 214 and displays it on associated display device 209 (step 246). Accordingly, the user is presented with a constructed web page at a particular time or in response to a particular command, and potentially corresponding to programming also presented to the user. Although browser plug-in 208 and web browser 210 are described as constructing one web page in method 230, they may concurrently execute method 230 for construction and display of multiple web pages at the same time or at least partially overlapping times.

Display device 209 may concurrently display both a program and web browser 210 for presenting the constructed web page. In particular web browser 210 may be displayed in a window or frame overlayed on the program, referred to as a picture-in-picture presentation. In this case, the content for web browser 210 is combined with the program to generate one signal containing the overlayed browser window and content in the program. Client machine 204 may receive the program from server 202 or from other sources, such as television, broadcast television, cable, satellite, or local storage such as video or a digital versatile disc (DVD). The local content may, for example, be stored on the hard disk drive of the client machine 204.

Many uses of a web page staging area are possible, and the following provides an example of how it may be used in conjunction with a sporting event. For instance, before the start of a professional football game, a producer decides that he wants to send the users a game in the form of a JAVA applet which will require a certain amount of time to download. He also wants to send a web page incorporating a graphic of moments from past games between the two teams participating in the game. The producer pushes the JAVA applet from server 202 to the user's web page staging area in the machine 204, and to any other participating users, along with a JavaScript timer embedded in the page in order to have it launch precisely at the start of the football game.

In addition, the producer sends the prepared graphic to the user's web browser 210 in another hidden frame and to the other users' web browsers. However, the producer does not know exactly when he wants to show that page to the viewer on line, and he does not include a JavaScript timer in that page. When the game starts, the JAVA game applet automatically appears at the kickoff on the users' display devices such as display device 209. At a later time the producer decides it is appropriate to display the prepared graphic. At that time, the producer sends a command to all the web staging areas on the client machines to display the graphic in the users' web browsers such as web browser 210 in machine 204.

It will be appreciated that modifications in, and variations of the illustrated embodiment may be made within the scope of this application as defined by the appended claims.

CLAIMS

1. A method of constructing and presenting web pages, comprising the steps of:

receiving a request for a web page including an address for use in retrieving information to construct the web page;

retrieving the information using the address;

constructing the web page hidden from view on a display device in order to produce a constructed web page; and

commanding the constructed web page to be displayed on the display device based upon particular criteria.

2. A method as claimed in Claim 1, wherein:

the receiving step comprises receiving timer event information providing an indication as to when to command the web page for presentation on the display device; and

wherein the commanding step comprises commanding the constructed web page to be displayed based upon the timer event information.

3. A method as claimed in Claim 2, wherein the receiving step comprises receiving a particular amount of time to generate a time-out using the timer event information.

4. A method as claimed in Claim 3, wherein the commanding step comprises transmitting the constructed web page for display upon detecting the time-out.

5. A method as claimed in any preceding claim, wherein the commanding step comprises commanding the constructed web page to be displayed upon receipt of a particular command.

6. A method as claimed in any preceding claim, wherein the receiving step comprises receiving a uniform resource identifier.

* C L M S *

7. A method as claimed in any preceding claim, wherein the constructing step comprises constructing the web page in a portion of a memory associated with a machine at which the web page is to be presented.

8. A method as claimed in any preceding claim, wherein the retrieving step comprises using a web browser to retrieve the information.

9. A method as claimed in any preceding claim, wherein the commanding step comprises transmitting a program to the machine concurrent with commanding the constructed web page for display.

10. A method as claimed in Claim 9, wherein the commanding step comprises transmitting a video program, audio program, or multimedia program.

11. A method as claimed in Claim 9 or Claim 10, wherein the commanding step comprises transmitting the program and the constructed web page for simultaneous display on the display device.

12. A method as claimed in Claim 9 or Claim 10, wherein the commanding step comprises transmitting the program and the constructed web page for simultaneous display on a television.

13. A method as claimed in Claim 9 or Claim 10, wherein the commanding step comprises transmitting the program for display on a television and transmitting the constructed web page for display on the display device.

14. A method as claimed in Claim 11 or Claim 12, wherein the commanding step comprises transmitting the web page for display overlayed on content displayed for the program.

15. A method as claimed in any preceding claim, further comprising performing the receiving, retrieving, constructing, and commanding steps using a personal computer, a television, a cable box, a satellite box, or a personal digital assistant.

* C L M S *

16. A method as claimed in any preceding claim, wherein the retrieving step comprises retrieving advertising, sports, or music content.

17. Apparatus for constructing and presenting web pages, comprising:

receiving means for receiving a request for a web page including an address for use in retrieving information to construct the web page;

retrieving means for retrieving the information using the address;

means for constructing the web page hidden from view on a display device in order to produce a constructed web page; and

means for commanding the constructed web page to be displayed on the display device based upon particular criteria.

18. Apparatus as claimed in Claim 17, wherein:

the receiving means is arranged to receive timer event information providing an indication of when to command the web page for presentation on the display device; and

the commanding means is responsive to the timer event information for commanding the constructed web page be displayed.

19. Apparatus as claimed in Claim 18, wherein said receiving means is arranged to receive a particular amount of time and to generate a time-out using the timer event information.

20. Apparatus as claimed in Claim 19, wherein said commanding means is arranged to transmit the constructed web page for display upon detecting the time-out.

21. Apparatus as claimed in any of Claims 17 to 20, wherein the commanding means is arranged to command the constructed web page to be displayed upon receipt of a particular command.

22. Apparatus as claimed in any of Claims 17 to 21, wherein said receiving means is arranged to receive a uniform resource identifier.



23. Apparatus as claimed in any of Claims 17 to 22, wherein said commanding means is arranged to construct the web page in a portion of a memory associated with a machine at which the web page is to be presented.

24. Apparatus as claimed in any of Claims 17 to 23, wherein said retrieving means is arranged to use a web browser to retrieve the information.

25. Apparatus as claimed in any of Claims 17 to 24, wherein said commanding means is arranged to transmit a program to a machine concurrent with commanding the constructed web page to be displayed.

26. Apparatus as claimed in Claim 25, wherein the program transmitted is a video program, an audio program, or a multimedia program.

27. Apparatus as claimed in Claim 25 or Claim 26, wherein said commanding means is arranged to transmit the program and the constructed web page for simultaneous display on the display device.

28 Apparatus as claimed in Claim 25 or Claim 26, wherein said commanding means is arranged to transmit the program and the constructed web page for simultaneous display on a television.

29. Apparatus as claimed in Claim 25 or Claim 26, wherein the commanding means is arranged to transmit the program for display on a television and to transmit the constructed web page for display on the display device.

30. Apparatus as claimed in any of Claims 25 to 28, wherein the commanding means is arranged to transmit the web page for display overlayed on content displayed for the program.

31. Apparatus as claimed in any of Claims 17 to 30, comprising a personal computer, a television, a cable box, a satellite box, or a personal digital assistant for containing the receiving means, the retrieving means, the constructing means and the commanding means.



32. Apparatus as claimed in any of Claims 17 to 31, wherein the retrieving means is arranged to retrieve advertising, sports, or music content.

