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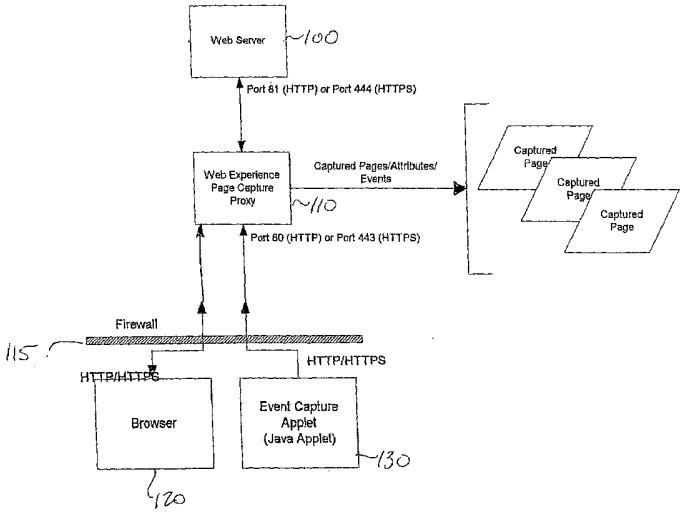
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(54) Title: METHOD, APPARATUS, AND SYSTEM FOR CAPTURING, PROCESSING, AND/OR PLAYING SELECTED DATA EXCHANGED BETWEEN A SERVER AND A USER



(57) Abstract: Data exchanged between at least one server (100) and at least one user (120) is captured, selectively recorded, and replayed. The exchanged data is intercepted in a capturing module that operates independently from the server (100) and the user(120). A copy of the intercepted data is stored in a database(110). The intercepting and storing are performed transparently to the user. The captured data is retrieved and a determination is made whether the retrieved data satisfies predefined rules. Data that satisfies the predefined rules is selected, and the selected data is recorded. The captured data is collected during a given time period, and a session of interactions between the server (100) and the user (120) is assembled in the order in which they occurred. Then, the session is replayed.

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METHOD, APPARATUS, AND SYSTEM FOR CAPTURING, PROCESSING, AND/OR PLAYING SELECTED DATA EXCHANGED BETWEEN A SERVER AND A USER

CROSS REFERENCE TO RELATED APPLICATIONS

This application claims priority from U.S. Patent Applications No. 10/061,469, No. 10/061,489, and No. 10/061,491 filed January 31, 2002. These applications are hereby incorporated by reference.

BACKGROUND

The present invention is directed to a method, apparatus, and system for capturing, processing, and/or playing selected data. More particularly, the present invention is directed to a method, apparatus, and system for capturing, processing and/or playing selected data exchanged between a server and a user.

For systems employing interactions between a user and server, it is often desirable to be able to view the interactions, ideally in a manner that is transparent to the user. This is particularly desirable in a context such as sales, customer service, or e-commerce, where interactions between customers and a service provider are important indicators of customer satisfaction.

Attempts have been made to recreate interactions between a user and a server. For example, click stream analysis procedures have been used to recreate interactions between a web user and a web service provider. This type of procedure is analogous to reviewing and analyzing the script to a movie. While this procedure reveals some information about the interaction between the server and the user, it does not provide a clear tangible picture of special effects, the environment, chemistry between the user and the server, etc.

Other attempts have been made to replay recorded interactions between a server and a user. However, these attempts are typically implemented at the server and are thus suitable only for a particular type of server. In addition, these approaches typically do not distinguish between interactions that are considered important and interactions

that are not important. Thus, a lot of time and resources are wasted on replaying unimportant recorded interactions.

There is thus a need for a way of capturing data exchanged between a server and a user in a manner that is independent of the server and transparent to the user and that provides a full picture of the interaction between the server and the user. There is also a need for a technique for selectively processing data captured during an exchange between a server and a user. Still further, there is a need for a technique replaying data selected from among data captured during exchanges between and a web server and a user.

SUMMARY

The present invention is directed to a method, apparatus and system for capturing, processing, and/or replaying selected data exchanged between at least one server and at least one user.

According to exemplary embodiments, data from the user destined for the server or data from the server destined for the user is intercepted in a capturing module that operates independently from the server and the user. A copy of the intercepted data is stored in a database. The intercepted data destined for the server is forwarded to the server, or the intercepted data destined for the user is forwarded to the user. The intercepting and storing are performed transparently to the user. Interception may be performed continuously. Storing of data may be performed during a predetermined time window or at predetermined time intervals.

According to exemplary embodiments, data captured during the exchange between the server and the user is retrieved. A determination is made whether the retrieved data satisfies predefined rules. Data that satisfies the predefined rules is selected, and the selected data is recorded.

According to exemplary embodiments, the data captured during the interaction between the server and the user during a given time period is collected. A session of interactions between the server and the user, including the at least one interaction, is assembled in the order in which they occurred. Then, the session is replayed.

According to one embodiment, data that satisfies predetermined search criteria is searched for among the captured data, and a result set of data satisfying the search criteria is created. The session is assembled from the result set. The data may be searched based upon predefined rules. The search criteria may be specified by the user and may include a date and time range or a specific user. The captured data may be searched sequentially.

According to exemplary embodiments, the intercepted data may include events, attributes, images, user identifications, requests, and/or responses. Only a predetermined portion of the data and/or data that satisfies predefined rules may be stored.

According to an exemplary embodiment, the user is a web server or a web browser, and the server is a web server. The data may be exchanged in the form of an Internet protocol and assembled into a web page view for the user.

Data may be exchanged between a plurality of servers and the user, the server and a plurality of users, or a plurality of servers and a plurality of users. The intercepting and storing may be performed concurrently for capturing data exchanged simultaneously between the plurality of servers and the user, the server and the plurality of users, or the plurality of servers and the plurality of users.

Further objects, advantages and features of the present invention will become more apparent when reference is made to the following description taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1A illustrates an exemplary system for capturing data exchanged between a server and a user;

FIG. 1B illustrates an exemplary system for capturing, recording, and playing back data according to an exemplary embodiment;

FIG. 1C illustrates in detail an exemplary system for processing captured data according to an exemplary embodiment;

FIGS. 2A and 2B illustrate an exemplary method for capturing and recording data exchanged between a server and a user;

FIGS. 3A-3C illustrate how data is stored according to exemplary embodiments;

FIGS. 4A and 4B illustrate exemplary page tables before and after post-processing, respectively;

FIG. 5 illustrates an exemplary method for processing captured data according to an exemplary embodiment;

FIGS. 6A-6C illustrate exemplary search pages;

FIGS. 7A-7G illustrate an exemplary playback page; and

FIG. 8 illustrates an exemplary method for playing data according to an exemplary embodiment.

DETAILED DESCRIPTION

According to exemplary embodiments, data exchanged between a server and a user is captured in a manner that is independent of the server and transparent to the user. The captured data may be selectively processed and played back.

In the following description, the server is referred to as a web server, and the user is referred to as a web browser. It will be appreciated, however, that the invention may be applicable to other types of servers and users.

FIG. 1A illustrates an exemplary system for capturing data exchanged between a server and a user according to an exemplary embodiment. The system includes a server, such as a web server 100, a data capturing module, such as a page capture module 110, and a user, such as a web browser 120. Although only one web server 100, page capture module 110, and web browser 120 are depicted in FIG. 1A, it will be appreciated that the invention is applicable to any number of servers, data capturing modules, and users.

The web browser 120 may be implemented in a personal computer, a telephone, etc. The web server 100 may be implemented as a server supporting any operating system, e.g., Unix, Linux, NT or Windows 2000.

The page capture module 110 is arranged between the web server 100 and the web browser 120. For security purposes, a firewall 115 may separate the web browser 120 and the page capture module 110.

The page capture module 110 operates independently from the web server 100 and the web browser 120. Thus, the page capture module 110 does not need to be customized for each type of web server but may be used with any web server, supporting any operating system.

Although the page capture module 110 operates independently from the web server 100 and the web browser, it may be implemented in the same device as the web server 100 or the web browser 120.

According to an exemplary embodiment, the page capture module 110 intercepts data exchanged over the Internet using the HyperText Transfer Protocol (HTTP). Both HTTP (unsecure) and HTTPS (secure) protocols may be supported by the page capture module 110. For secure protocols, a security certificate is shared between the web server 100 and the page capturing module 110. In addition, other types of data stream protocols may be supported, e.g., eXtensible Markup Language (XML) and socket based data transfers.

According to exemplary embodiments, the page capture module 110 acts as a redirection or proxy server from the user's perspective. The page capture module 110 listens on a specified port, such as port 80 for HTTP or port 443 for HTPPS, and then redirects all browser requests to the web server 100, which is configured to listen on a port other than ports 80 or 443. Of course, if the page capture module 110 is implemented in the same device as the web server 100, the web server may listen on the same port. Web server responses are intercepted by the page capture module 110 and redirected back down to the web browser 120.

The page capture module 110 captures pages and other data exchanged between the web server 100 and the browser 120. Pages and other data may be captured continually or at designated intervals or time windows. The page capture module 110 may also record these pages and other data, or recording may be performed in a separate recorder server connected to the page capture module.

Each web browser 120 is assigned a unique machine identity (ID) by the web server 100. A persistent machine ID cookie may be created by the web server 110 and stored at the web browser 120 for this purpose. All pages served to a particular web browser 120 are identified and grouped by the machine ID.

Although the module 110 is described as a page capture module, according to exemplary embodiments, other types of data may also be captured. For example, events and attributes may be captured. Attributes may be captured in a manner similar to that in which pages are captured, as described above.

For event capturing, according to an exemplary embodiment an event capture module captures user side events and delivers these to the page capture module 110. The event capture module may be implemented as an applet 130 that is downloaded to the web browser 120. Although shown as a separate component, the event capture applet 130 is stored at the browser, with parameters such as the web browser machine ID, the host Internet Protocol (IP) address, and the current page name. The event capture applet 130 may be notified, for example, by JavaScript embedded in the current page, whenever an event needs to be recorded. The event capture applet 130 records events such as: page load, page unload, page scroll, page resize, and browser exit. The event capture applet 130 sends captured events to the page capturing module 110 via, for example, a Transmission Control Protocol/Internet Protocol (TCP/IP) socket connection on port 80 (or port 443 for secure exchanges).

For event capturing, an HTTP request header containing a unique signature or identifier may be used to send a captured event to the page capture module 110. The unique signature may take the form of an application defined request header. Captured event data may include a browser machine ID, a page name, an event type ID, and event data.

According to an exemplary embodiment, the page capture module 110 intercepts HTTP requests that are identified as event captured HTTP requests and does not send the event captured HTTP request to the web server 110.

FIG. 1B illustrates an exemplary system for capturing, recording and playing back data according to an exemplary embodiment. Pages and other data captured

during exchanges between the web server 100 and the web browser 120 at the page capture module 110 are sent from the page capturing module 110 to a page preprocessor 125 via, e.g., a TCP/IP socket.

According to an exemplary embodiment, each captured page is assigned a unique page ID and is associated with a specific browser user machine ID. Each page may also contain the date and time that the page was captured and the page status (recording, processing, playback, etc.) After pages are captured, this information is extracted from the captured page, and a new record is inserted into a database 145.

The page preprocessor 125 acts as a recorder server and stores the captured data in a device such as a database 145. The pages 135 are passed on to the page post-processor 140. Alternatively, the page capture module 110 may perform this recording. To reduce the amount of storage necessary, only predetermined portions of data may be stored, e.g., the request portion or the response portion. Also, only data satisfying predetermined rules, e.g., rules indicating timing, may be stored. When the captured pages are recorded, identifying information may also be recorded, e.g., a session record ID, a date/time of recording, a machine ID, etc.

The post-processing module 140 determines which captured data satisfies predefined rules, e.g., business rules, and records this data in a file180, such as a Java Archive (JAR) file. The database 145 is updated to indicate what captured data has been selected and recorded for playback. This is described in more detail below with reference to FIG. 1C.

A playback tool 190 selects recorded data from the database 180, using the information in the database 145. The playback module 190 controls playback of the data. The data may be displayed, for example, in a search frame for the web server or the browser. This is described in further detail below.

Although not shown in the interest of simplifying the illustrations, it will be appreciated that the system in FIG. 1B may also include other components, e.g., configuration files used for processing and log files use for storing information for debugging, etc.

Referring now to FIG. 1C, this figure illustrates in detail an exemplary system for processing captured data according to an exemplary embodiment. Captured and recorded pages, attributes, and events are fed to a page post-processing program running on a page post-processor 140. A business rules engine 150 delivers business rules to the post-processor 140 that evaluates the captured/recorded pages to determine whether they satisfy the business rules. Data from a page table database 160 and a page rule table database 170 is used during this evaluation. Pages that satisfy the business rules are recorded for future playback. The page table and page rule database are updated after post-processing.

When a set of captured pages is identified as a session, then a session record is created of the identified session during post-processing. The session identification information may be stored in a session table, such as that shown in FIG. 3C.

According to exemplary embodiments, business rules are applied to the recorded data to determine whether a page should be saved for playback. Business rules are business elements that are compared with captured data in real time. An example of a comparison of business rule with captured data may be determining whether the captured data is an interaction resulting in a sale greater than a predetermined number of dollars, determining whether an interaction was longer than a predetermined number of minutes, etc. As another example, a business rule may state that the current page is to be recorded and all previous pages for that machine ID in that session.

According to an exemplary embodiment pages that do not satisfy the business rules are deleted.

According to an exemplary embodiment, the post-processing program appends the recorded JAR file to the playback JAR file in the playback directory for the current machine ID. If a playback file does not exist for the specified machine ID, the post-processing program may create one.

Images are retrieved for saved pages.

According to an exemplary embodiment, events may be recorded as a text file using XML. The file has the same name as the page that generated the event.

A time period may be set for retaining recorded data, e.g., 30 minutes. This time period may be used in determining whether a page is part of a session, and pages that are part of the same session may be grouped for future playback.

FIG. 2A illustrates an exemplary process for capturing data exchanged between a server and a user. The process begins at step 200 at which the page capture module 110 receives a request/response from the web browser 120 or receives a response/request from the web server 100. The page capture module 110 passes the request/response to the web server 100 or the web browser 120, respectively. At step 205, the page capture module 110 determines whether the request/response is eligible for recording based on, e.g., on timing, content type (for example, text or HyperText Markup Language (HTML)), positioning on a page, etc. If not, the process proceeds to step 210, at which no action is required. If the request/response is eligible for recording, a determination is made at step 215 whether a browser machine ID cookie exists. If not, an attempt to create the cookie is made at step 220. A determination is made at step 225 whether the cookie is created successfully. If not, a cookie create failure is created, and the request/response is redirected to the web browser 120 (or the web server 100) at step 230. Instead of a cookie, it will be appreciated that any other form of persistent ID may be used. For example, a persistent ID may be created using Uniform Resource Locator (URL) rewriting.

If the cookie (or other persistent ID) is created successfully or the browser machine ID cookie exists, a determination is made whether event capturing is enabled, e.g., whether the event capture applet 130 has been notified that an events needs to be recorded, at step 235. If not, the page is sent to the page preprocessor at step 240. Otherwise, the event is captured at step 245.

An exemplary process for recording captured requests and responses is shown in FIG. 2B. The process begins at step 250 at which a page preprocess thread is created. At step 255, a determination is made whether there is an event type request header. If not, the last page ID for the current browser machine ID is obtained at step 260, and the captured event is recorded at step 265. If there is an event type request header, a page table entry for the captured page is inserted at step 270 and stored, e.g.,

in the database 145. At step 275, the next available page ID is retrieved. At step 280, the captured data, e.g., page and attributes, are recorded.

The tables of data shown in FIGS.3A-3C demonstrate an example of how data is selected and stored for future playback according to an exemplary embodiment. Captured data is stored in a page table such as that shown in FIG. 3A. In FIG. 3A, each table entry includes a machine ID, a page ID, a page status, a page path, and a page create date. Data regarding rules is stored in a page rule table, as shown in FIG. 3B. Each entry the page rule table includes a page rule ID, a page ID and a rule ID. The page rule tables indicate which rule(s) were used to capture a specific page. The page rule table is updated as the result of evaluating pages in a session. Data concerning a session is stored in a sessions table, as shown in FIG. 3C. Each entry in the session table includes a session ID, a page ID and a number of pages.

To demonstrate how data storing works, assume for example that the page table before post-processing appears as shown in FIG. 4A. Assume that a customer defined a maximum age limit of 30 minutes, and the current time at the time of page post-processing is 9:30:00 A.M. To identify an eligible session for page post-processing, a list of page table entries in which the machine ID equals xxx and page status equals 1 is selected and stored by page creation date. The list of matching pages is processed, and for each page, the current page creation date is compared to the previous page creation date. If the difference is greater than 30 minutes, then a session has been identified. To create a new session ID, the page ID for the first page in that session may be used. In this example, a session ID, yyy, has been generated. The session ID is stored in the session table, such as that shown in FIG. 3C.

Next, a determination is made whether the newly identified session is eligible for processing, using the page creation date for the last page in the session. If the page creation date for the last page in the session is greater than 30 minutes compared to the current time, then the session is eligible for post-processing. Otherwise, the session is not eligible at the current time, and the page status ID is reset back to 1.

For the last page entry in a list of page entries, a determination is made whether the last set of pages form a complete session and are therefore eligible for page post-processing.

After post-processing, the page table appears as shown in FIG. 4B.

FIG. 5 illustrates an exemplary process for processing captured data according to an exemplary embodiment. The process begins at step 500 at which a list of eligible machine id's is retrieved from the database of stored captured data. At step 505, a determination is made whether the machine ID is eligible to proceed. In not, the process enters a sleep mode at step 510 and returns to step 500. If, at step 505, it is determined that there is an eligible machine ID to process, the list of captured pages from the specified machine ID is retrieved from the database at step 515. At step 520, a determination is made whether there is a captured page to process. If not, the process returns to step 505. If there is a captured page to process, business rules are evaluated for the specified page at step 525. These rules may be generated by the client. For example, the client may only want pages of a certain media recorded. At step 530, a determination is made whether the page satisfies the business rules. If not, the page files are deleted at step 535, the page entry ID selected from the database at step 540, and the process returns to step 520. If, at step 530, the page is determined to satisfy the business rules, the image files for the page are retrieved at step 545, the absolute and relative paths are updated at step 550, and the page is written to a playback file at step 555. From step 525, the process returns to step 530.

According to an exemplary embodiment, a user is allowed to search for, select and playback a recorded browser session using the playback module 190 shown, e.g., in FIG. 1B. The playback module 190 assembles a session of recordings selected by the user and plays back the session. The playback module may be implemented using, e.g., Netscape 4.5x and above browser or an Internet Explorer 4.x and above browser.

According to an exemplary embodiment, an exemplary search page layout 600 as shown in FIGS. 6A-6C may be used for searching. FIGS. 6A and 6B illustrate a search page 600, and FIG. 6C illustrates a rule search page 610.

The search page 600 is split into two screens, one of which is shown in FIG. 6A, and the other of which is shown in FIG. 6B. The search page screen shown in FIG. 6A allows the user to specify session search criteria. Session search criteria may include date/time criteria and rule criteria. Also, all captured pages may be searched for a specific machine ID. The screen shown in FIG. 6B illustrates the search parameters that are selected and the resulting sessions found based on the search parameters.

Date search criteria allow a user to find matching page captured sessions based on the begin/end date/time criteria. Date/time may be searched by entering, e.g., either a begin time or a begin and an end time. Rule criteria allows the user to find matching captured sessions based on business rules used to capture individual pages in a session. For instance, a user may wish to see all sessions that contain pages that were captured that satisfy business rule ID 0001 or business rule ID 0012. More than one business rule may be specified when performing searches by business rules.

The user may specify either the date/time criteria or the rule criteria or any combination of both. The date/time and rule criteria may be specified in the screen shown in FIG. 6A. Alternately, the rule criteria may be specified using the page 610 shown in FIG. 6C.

The results may be displayed in the screen shown in FIG. 6B. The results may be displayed as a tree view that may be expanded. Each top level tree node may be a hyperlink representing one row returned by the query. When a top level tree node is expanded, all matching pages for that node may be displayed.

The matching page information may be retrieved from the corresponding JAR file. The recorded pages for each top level tree node may be programmatically extracted from the corresponding JAR file. Each second level tree node may be a hyperlink to a recorded page. The selected recorded page may be displayed in a page display area, e.g., as described below. For pages that are recorded as frames, the parent frame may be displayed first.

To play back a session, a session is selected from a list of sessions based on the dates and rules provided. The selected session ID is retrieved, and the session ID is matched to a current machine ID.

According to an exemplary embodiment, playback of a session may be handled using the playback page as shown in FIG. 7A. The playback page includes a playback control window 710 and a page display window 720. The playback page corresponds to a particular session. For example, the playback page shown in FIG. 7A corresponds to session "107405".

As shown in FIG. 7A, the playback control window 710 includes a session playback control area, a session information area, and a detailed page information area.

The playback control area provides control using video cassette recorder (VCR) type button controls. The VCR type button control enables the user to move to the first captured page in a session, play the session, pause session and remain at current page, stop session playback and return to first page in session, and move to last captured page in session. Although not illustrated, a slider control may also be used, permitting the user to move from page to page, backward or forward by sliding the control to the left or to the right. Settings may be also be set to configure playback to run in a real-time mode or to use a specified page interval between pages during playback using, e.g., the playback preferences frame shown in FIG. 7B.

The session information area of the window 710 contains hyperlinks: playback preferences, sessions annotations, all page annotations, page flow, and help. Selecting one of these links causes the corresponding frame to be displayed. For example, selecting the hyperlink "Playback Preferences" causes the frame shown in FIG. 7B to be displayed which permits selection of real-time playback or page interval playback. Selecting the hyperlink "Session Annotations" causes the frame shown in FIG. 7C to be displayed, which allows session notes to be added and displays saved session notes for a particular session. Selecting "All page Annotations" causes the frame shown in FIG. 7D to be displayed, which permits page annotations to be added and displays saved annotations for a particular page. Selecting the hyperlink "Page Flow" causes the frame shown in FIG. 7E to be displayed, which illustrates thumbnails of captured

pages. Selecting the hyperlink "Help" causes a help frame (not shown) to be displayed. Other hyperlinks may be used for playback control, as needed.

In the detailed page information area of window 710, a list of the captured pages in a session is displayed. Selecting one of the hyperlinks in the list causes the corresponding captured page to be displayed, e.g., in the window 720. For example, in FIG. 7A, the currently selected page ("Apache Status") is shown in the window 720. Icons next to the hyperlinks may be used to display related information. For example, selecting the icon including a paper with a "!" causes the page attributes frame shown in FIG. 7F to be displayed, and selecting the icon including a paper and a pencil causes the pages notes frame shown in FIG. 7G to be displayed.

According to one embodiment, captured pages may be viewed sequentially, with the session of pages assembled in the order in which the pages occurred. Alternatively, the pages may be viewed in any order desired.

FIG. 8 illustrates a process for playing data according to an exemplary embodiment. The process begins at step 800 at which data captured during interaction between the user and the server during a given time period is collected. At step 810, a session of interactions is assembled din the order in which they occurred. This step may include searching a certain of a result set from which the session is assembled. At step 820, the session is replayed.

According to exemplary embodiments, a user interaction with a server is captured. For a web user and a web server, this information may be used to recreate the web experience of the user. For example, in a customer service context, the flow of customer inputs and the text and images that are displayed on the pages that are viewed by the customer may be captured and recorded. In such a context, this recreation will provide contact center personnel the ability to observe the customer's experience for the purpose of analyzing how well service was delivered and whether or not the needs of the customer were met. The invention may also be useful in other contexts, such as sales or e-commerce.

While the examples above primarily discuss capturing, recording, and playing back exchanged pages, the invention is not limited to page capturing, recording and

play back. According to exemplary embodiments, any type of data, including for example events and attributes, may be captured during an interaction between a user and a server, selectively recorded, and played back.

According to exemplary embodiments, all the user actions within a browser session may be captured, without degrading the performance of the browser session or web host environment. Also, all captured data may be transmitted efficiently with low network bandwidth utilization. Thousands of concurrent users may be supported simultaneously, with the recording of a large number of sessions that are simultaneously occurring on different web sites provided by various web servers.

It should be understood that the foregoing description and accompanying drawings are by example only. A variety of modifications are envisioned that do not depart from the scope and spirit of the invention. The above description is intended by way of example only and is not intended to limit the present invention in any way.

WHAT IS CLAIMED IS:

1. A method for capturing data exchanged between at least one server and at least one user, the method comprising the steps of:

intercepting data exchanged between the server and the user in a proxy server that operates independently from the server and the user;

storing the intercepted data; and

forwarding the data from the server or the user to the user or the server, respectively.

2. The method of claim 1, wherein the intercepting and storing are performed transparently to the user.

3. The method of claim 1, wherein the data includes at least one of events, attributes, images, user identifications, requests, and responses.

4. The method of claim 1, wherein the data is exchanged in the form of an Internet protocol and is assembled into a web page view for the user.

5. The method of claim 3, wherein only a predetermined portion of the data is stored.

6. The method of claim 5, wherein only requests or responses are stored.

7. The method of claim 1, wherein the user is a web server or a web browser, and the server is a web server.

8. The method of claim 1, wherein the step of intercepting is performed continuously, and the step of storing is performed during a predetermined time window or at predetermined time intervals.

9. The method of claim 1, further comprising selecting data that satisfies predefined rules among the intercepted data, wherein the step of storing stores the selected data.

10. The method of claim 1, further comprising replaying data exchanged between the server and the user, using the stored data.

11. The method of claim 1, wherein data is exchanged between a plurality of servers and the user, the server and a plurality of users, or a plurality of servers and a plurality of users.

12. The method of claim 11, wherein the steps are performed concurrently for capturing data exchanged simultaneously between the plurality of servers and the user, the server and the plurality of users, or the plurality of servers and the plurality of users.

13. An apparatus for capturing data exchanged between at least one server and at least one user, the apparatus including:

intercepting means operating independently from the server and the user for intercepting data exchanged between the server and the user;

storage means for storing the intercepted data; and

forwarding means for forwarding the intercepted data from the server or the user to the user or the server, respectively.

14. The apparatus of claim 13, wherein the intercepting and storing are performed transparently to the user.

15. The apparatus of claim 13, wherein the data includes at least one of events, attributes, images, user identifications, requests, and responses.

16. The apparatus of claim 13, wherein the data is exchanged in the form of an Internet protocol and is assembled into a web page for display to the user.

17. The apparatus of claim 15, wherein only a predetermined portion of the data is stored.

18. The apparatus of claim 17, wherein only requests or responses are stored.

19. The apparatus of claim 13, wherein the user is a web server or a web browser, and the server is a web server.

20. The apparatus of claim 13, wherein the data is intercepted continuously and is stored during a predetermined time window or at predetermined time intervals.

21. The apparatus of claim 13, further comprising means for selecting data that satisfies predefined rules among the intercepted data, wherein the selected data is stored in the database.

22. The apparatus of claim 13, further comprising means for replaying data exchanged between the server and the user using the stored data.

23. The apparatus of claim 13, wherein data exchanged between a plurality of servers and the user, the server and a plurality of users, or a plurality of servers and a plurality of users is captured.

24. The apparatus of claim 23, wherein data exchanged simultaneously between the plurality of servers and the user, the server and the plurality of users, or a plurality of servers and a plurality of users is captured concurrently.

24. A system for capturing data, comprising:

at least one server;

at least one user, wherein the server and the user exchange data; and

at least one proxy server connected between the server and the user and operating independently from the server and the user, wherein the proxy server intercepts data exchanged between the server and the user, stores the intercepted data, and forwards the data from the server or the user to the user or the server, respectively.

25. The system of claim 24, wherein the processor performs intercepting and storing transparently to the user.

26. The system of claim 24, wherein the data includes at least one of events, attributes, images, user identifications, requests, and responses.

27. The system of claim 24, wherein the data is exchanged in the form of an Internet protocol and is assembled into a web page for display to the user.

28. The system of claim 26, wherein only a predetermined portion of the data used to display the web page is stored.

29. The system of claim 28, wherein only requests or responses are stored.

30. The system of claim 24, wherein the user is a web server or a web browser, and the server is a web server.

31. The system of claim 24, wherein the data is intercepted continuously and is stored during a predetermined time window or at predetermined time intervals.

32. The system of claim 24, wherein data that satisfies predefined rules is selected from among the intercepted data, and the selected data is stored.

33. The system of claim 24, wherein the stored data is used for replaying data exchanged between the server and the user.

34. The system of claim 24, wherein data exchanged between a plurality of servers and the user, the server and a plurality of users, or a plurality of servers and a plurality of users is captured.

35. The system of claim 34, wherein data simultaneously exchanged between the plurality of servers and the user, the server and the plurality of users, or the plurality of servers and the plurality of users is captured concurrently.

36. A method for selectively processing data captured during at least one exchange between at least one server and at least one user, the method comprising the steps of:

retrieving data captured during the exchange between the server and the user;

determining whether the retrieved data satisfies predefined rules;

selecting the data that satisfies the predefined rules; and

recording the selected data.

37. The method of claim 36, wherein the selected data is recorded for a finite duration.

38. The method of claim 36, wherein the user is a web browser or a web server, and the server is a web server.

39. The method of claim 36, wherein the captured data includes at least one of pages, events, or attributes.

40. The method of claim 36, wherein the captured data is in the form of an Internet protocol and is displayed to the user as a web page.

41. The method of claim 40, wherein only a predetermined portion of the data is captured.

42. The method of claim 41, wherein only a response or a request portion of the data is captured.

43. The method of claim 42, further comprising retrieving image data associated with the captured data for displaying the web page to the user.

44. The method of claim 42, further comprising retrieving code module data associated with the captured data.

43. The method of claim 36, wherein the steps are performed for data captured during simultaneous exchanges between a plurality of servers and the user, the server and a plurality of users, or a plurality of servers and a plurality of users.

44. An apparatus for selectively processing data captured during at least one exchange between at least one server and at least one user, the apparatus comprising:

means for retrieving data captured during the exchange between the server and the user;

means for determining whether the retrieved data satisfies predefined rules;

means for selecting the data that satisfies the predefined rules; and

means for recording the selected data.

45. The apparatus of claim 44, wherein the selected data is recorded for a finite duration.

46. The apparatus of claim 44, wherein the user is a web browser or a web server, and the server is a web server.

47. The apparatus of claim 44, wherein the captured data includes at least one of pages, events, or attributes.

48. The apparatus of claim 44, wherein the captured data is in the form of an Internet protocol and is displayed to the user as a web page.

49. The apparatus of claim 44, wherein only a portion of the data is captured.

50. The apparatus of claim 49, wherein only a request or a response portion of the data is captured.

51. The apparatus of claim 50, further comprising means for retrieving image data associated with the captured data for displaying the web page.

52. The apparatus of claim 50, further comprising means for retrieving code module data associated with the captured data.

53. The apparatus of claim 44, wherein data captured during exchanges between a plurality of servers and the user, the server and a plurality of users, or a plurality of users and a plurality of servers is selectively processed.

54. A system for selectively processing captured data, comprising:

at least one server;

at least one user; and

at least one processor for selectively processing data captured during an exchange between the server and the user, wherein the processor retrieves the captured data, determines whether the retrieved data satisfies predefined rules, selects the data that satisfies the predefined rules, and records the selected data.

55. The system of claim 54, wherein the selected data is recorded for a finite duration.

56. The system of claim 54, wherein the user is a web browser or a web server, and the server is a web server.

57. The system of claim 54, wherein the captured data includes at least one of pages, attributes, and events.

58. The system of claim 54, wherein the data is in the form of an Internet protocol and is used for displaying a web page to the user.

59. The system of claim 54, wherein only a predetermined portion of the data is captured.

60. The system of claim 59, wherein only a request or a response portion of the data is captured.

61. The system of claim 60, wherein the processor retrieves image data associated the captured data for displaying the web page to the user.

62. The system of claim 60, wherein the processor obtains code modules associated with the captured data.

63. The system of claim 54, wherein data captured during exchanges between a plurality of servers and the user, the server and a plurality of users, or a plurality of servers and a plurality of users is selectively processed.

65. A method for replaying data captured during at least one interaction between at least one server and at least one user, the method comprising the steps of:

collecting data captured during the interaction between the server and the user during a given time period;

assembling a session of interactions between the server and the user, including the at least one interaction, in the order in which they occurred; and

replaying the session.

66. The method of claim 65, further comprising:

searching for data that satisfies predetermined search criteria, among the captured data; and

creating a result set of data satisfying the search criteria, wherein the session is assembled from the result set.

67. The method of claim 66, wherein the step of searching searches among data selected from the captured data based upon predefined rules.

68. The method of claim 65, wherein the captured data includes at least one of pages, events, or attributes.

69. The method of claim 65, wherein the captured data is in the form of an Internet protocol, and the session is displayed as at least one web page to the user.

70. The method of claim 65, wherein the user is a web server or a web browser, and the server is a web server.

71. The method of claim 66, further comprising specifying the search criteria by the user.

72. The method of claim 66, wherein the search criteria includes a date and time range.

73. The method of claim 66, wherein the captured data is searched sequentially.

74. The method of claim 66, wherein the search criteria includes a specific user identification.

75. The method of claim 65, wherein the steps are performed for replaying data captured during interactions between a plurality of servers and the user, the server and a plurality of users, or a plurality of servers and a plurality of users.

76. An apparatus for replaying data captured during at least one interaction between at least one server and at least one user, the apparatus comprising:

means for collecting data captured during the interaction between the server and the user during a given time period;

means for assembling a session of interactions between the server and the user, including the at least one interaction, in the order in which they occurred; and

means for replaying the session.

77. The apparatus of claim 76, further comprising:

means for searching for data that satisfies predetermined search criteria among the captured data captured; and

means for creating a result set of data satisfying the predetermined search criteria, wherein the session is assembled from the result set.

78. The apparatus of claim 77, wherein the searching means searches among data selected from the captured data based upon predefined rules.

79. The apparatus of claim 76, wherein the captured data includes at least one of pages, events, or attributes.

80. The apparatus of claim 76, wherein the data is in the form of an Internet protocol, and the session is displayed as at least one web page to the user.

81. The apparatus of claim 76, wherein the user is a web browser or a web server, and the server is a web server.

82. The apparatus of claim 77, wherein the search criteria is specified by the user.

83. The apparatus of claim 77, wherein the search criteria includes a date and time range.

84. The apparatus of claim 77, wherein the captured data is searched sequentially.

85. The apparatus of claim 77, wherein the search criteria includes a specific user identification.

86. The apparatus of claim 76, wherein the apparatus replays data captured during interactions between a plurality of servers and the user, the server and a plurality of users, or a plurality of servers and a plurality of users.

87. A system for replaying captured data, comprising:

at least one server,

at least one user,

a player for collecting data captured during at least one interaction between the server and the user during a given time period, assembling a session of interactions between the server and the user, including the at least one interaction, in the order in which they occurred, and replaying the session.

88. The system of claim 87, wherein the player searches for data that satisfies predetermined search criteria among the captured data, creates a result set of saved data satisfying the predetermined criteria, and assembles the session from the result set.

89. The system of claim 87, wherein the player searches among data selected from the captured data based upon predefined rules.

90. The system of claim 87, wherein the captured data includes at least one of pages, events, or attributes.

91. The system of claim 88, wherein the data is in the form of an Internet protocol, and the session is displayed as at least one web page to the user.

92. The system of claim 87, wherein the user is a web browser or a web server, and the server is a web server.

93. The system of claim 88, wherein the user specifies the search criteria.

94. The system of claim 88, wherein the search criteria includes a date and time range.

95. The system of claim 88, wherein the player searches the captured data sequentially.

96. The system of claim 88, wherein the search criteria includes a specific user identification.

97. The system of claim 87, wherein data captured during interactions between a plurality of servers and the user, the server and a plurality of users, or a plurality of servers and a plurality of users is replayed.

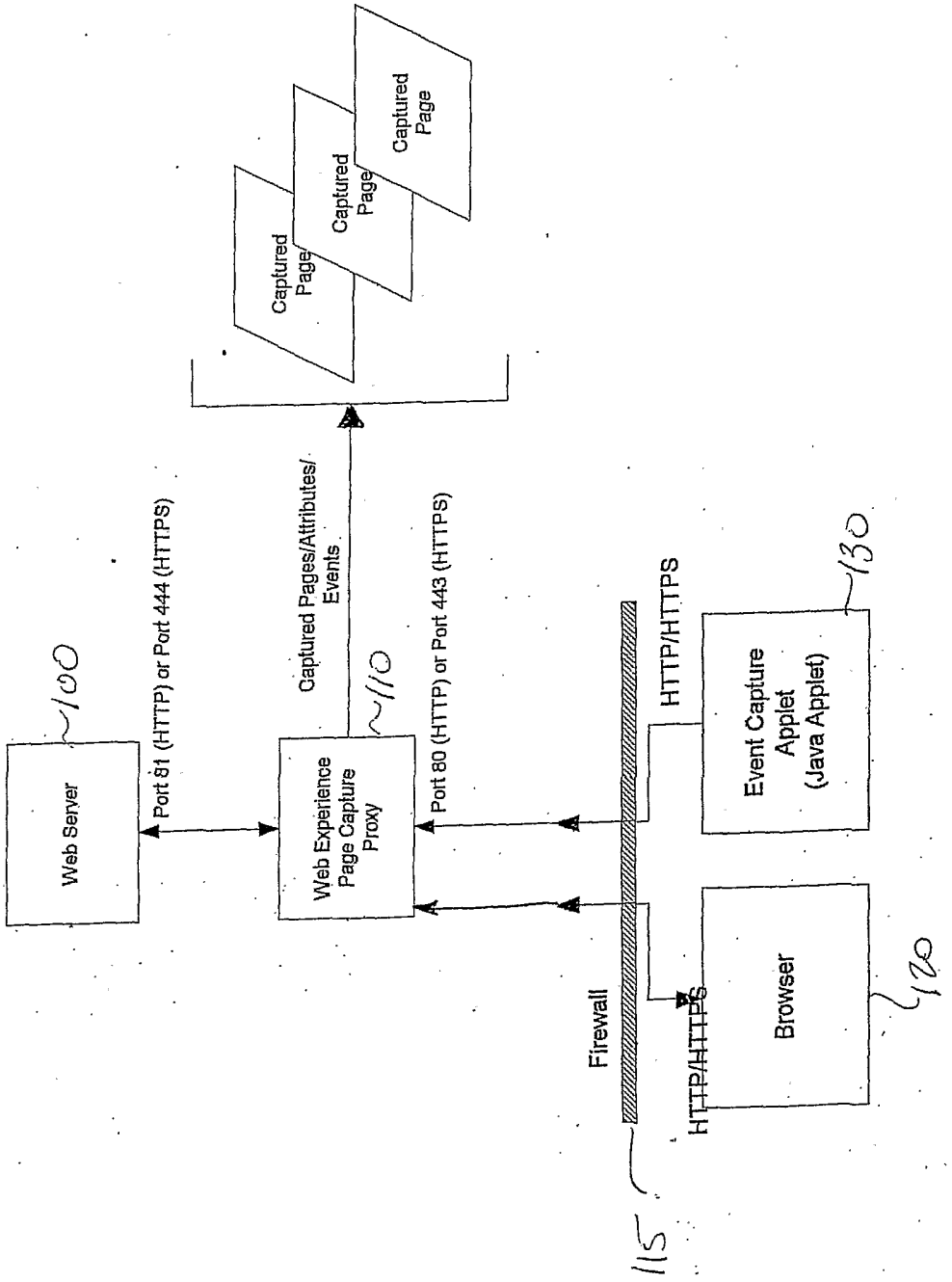

Captured Page
Captured Page
Captured Page
Captured Pages/Attributes/ Events
Port 81 (HTTP) or Port 444 (HTTPS)
Port 80 (HTTP) or Port 443 (HTTPS)
Web Server
Web Experience Page Capture Proxy
Firewall
HTTP/HTTPS
HTTP/HTTPS
Event Capture Applet (Java Applet)
Browser
100
110
115
120
130

FIG. 1A

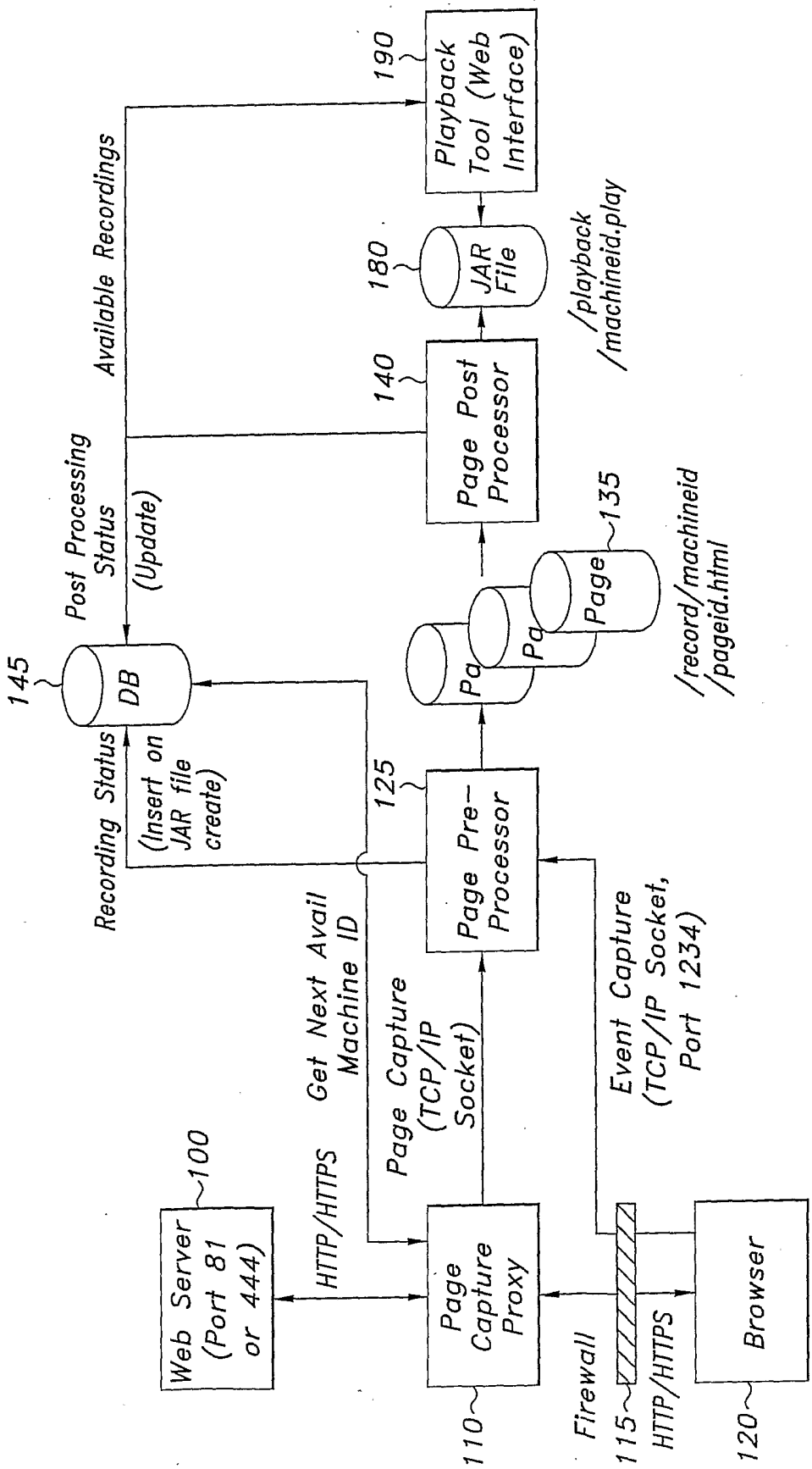

Web Server (Port 81 or 444)
100
HTTP/HTTPS
Page Capture Proxy
110
Firewall
115
HTTP/HTTPS
Browser
120
Page Capture (TCP/IP Socket)
Get Next Avail Machine ID
Page Pre-Processor
125
Event Capture (TCP/IP Socket, Port 1234)
/record/machineid /pageid.html
Page
135
Page Post Processor
140
/playback /machineid.play
JAR File
180
Playback Tool (Web Interface)
190
Available Recordings
Post Processing Status (Update)
DB
145
Recording Status (Insert on JAR file create)

FIG 13

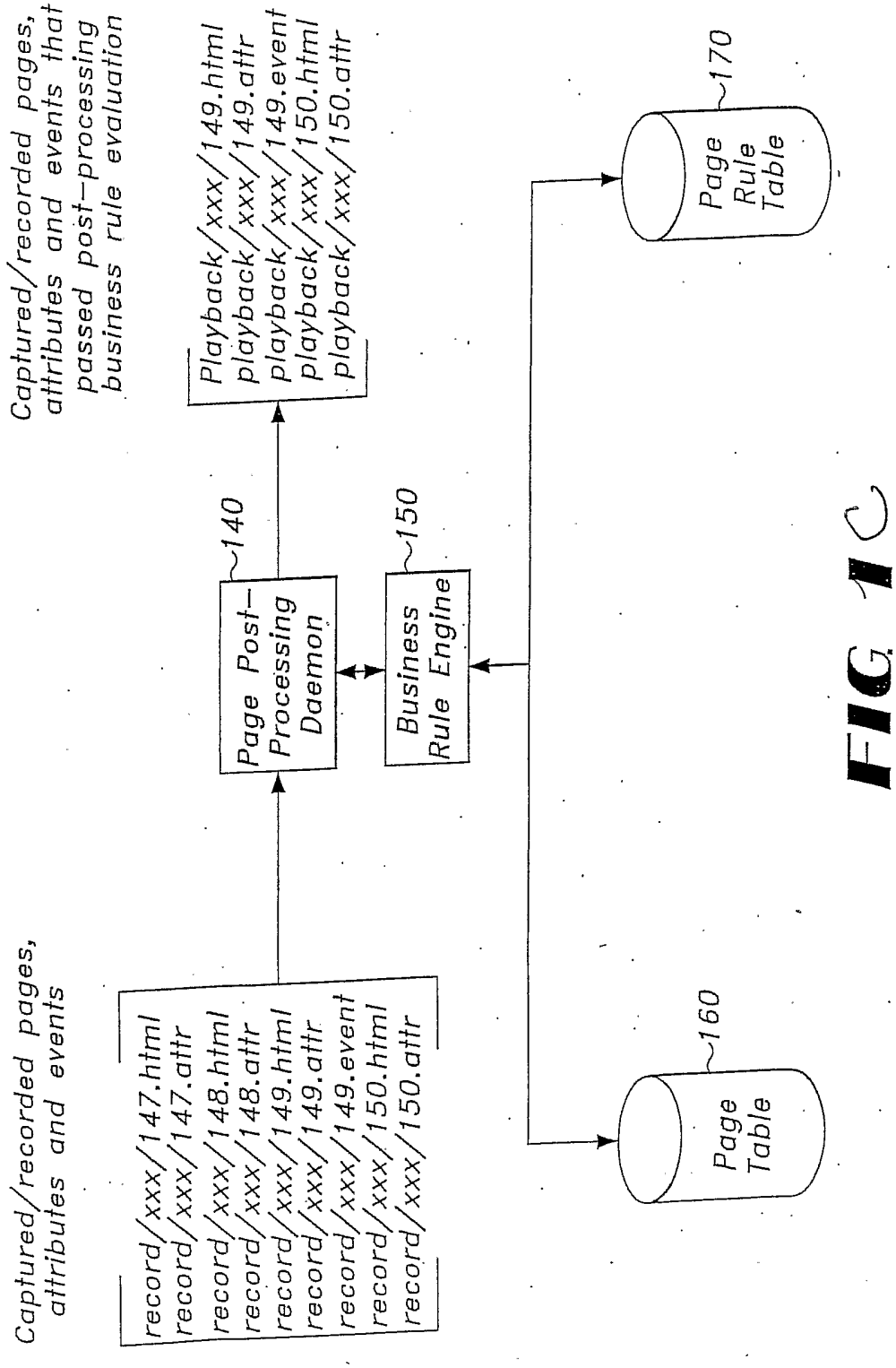

Captured/recorded pages, attributes and events
record/xxx/147.html
record/xxx/147.attr
record/xxx/148.html
record/xxx/148.attr
record/xxx/149.html
record/xxx/149.attr
record/xxx/149.event
record/xxx/150.html
record/xxx/150.attr
Page Post-Processing Daemon
140
Business Rule Engine
150
Captured/recorded pages, attributes and events that passed post-processing business rule evaluation
Playback/xxx/149.html
playback/xxx/149.attr
playback/xxx/149.event
playback/xxx/150.html
playback/xxx/150.attr
Page Table
160
Page Rule Table
170

FIG 1C

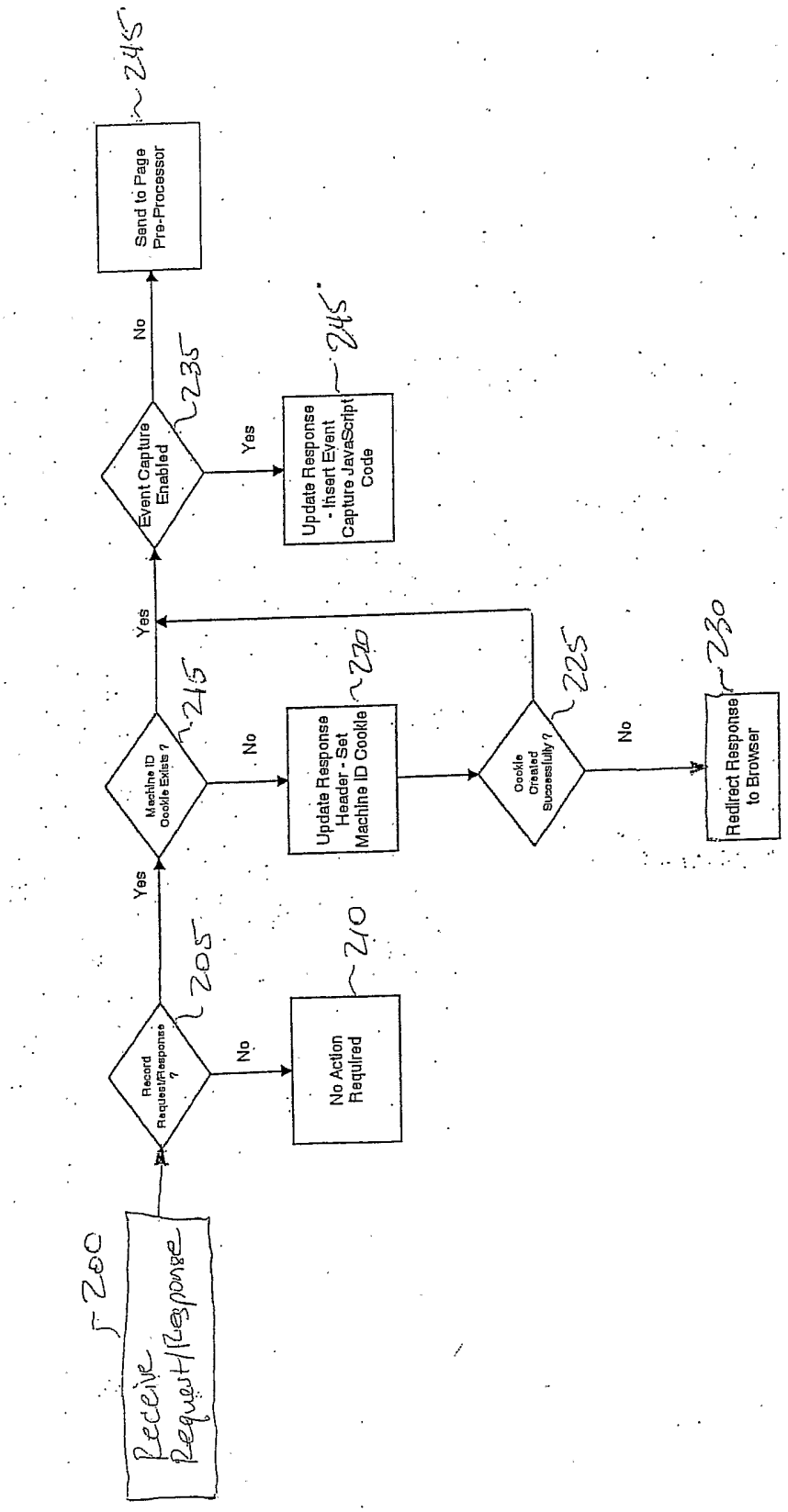

Receive Request/Response
200
Record Request/Response ?
205
No
No Action Required
210
Yes
Machine ID Cookie Exists ?
215
No
Update Response Header - Set Machine ID Cookie
220
Cookie Created Successfully ?
225
No
Redirect Response to Browser
230
Yes
Event Capture Enabled
235
Yes
Update Response - Insert Event Capture JavaScript Code
245
No
Send to Page Pre-Processor
245

FIG. 2A

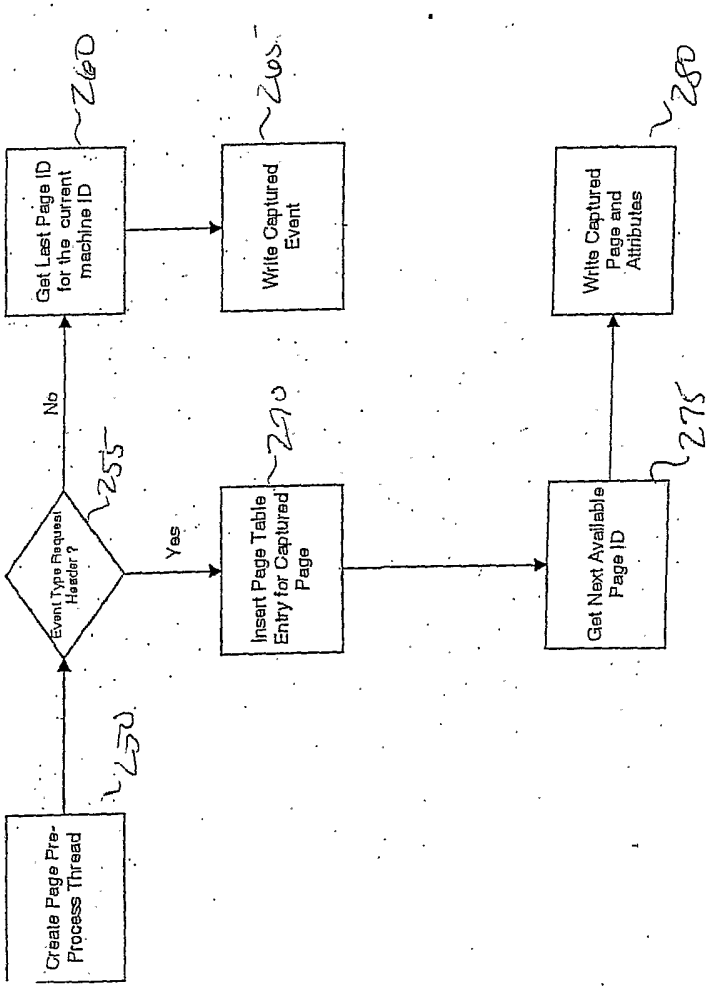

Create Page Pre-Process Thread
Event Type Request Header ?
No
Yes
Get Last Page ID for the current machine ID
Write Captured Event
Insert Page Table Entry for Captured Page
Get Next Available Page ID
Write Captured Page and Attributes

FIG. 2B

Machine Id	Page Id	Page Status	Page Path	Page Create Date
XXX	147	1	...	...
XXX	148	1	...	...
XXX	149	1	...	...
XXX	150	1	...	...

FIG. 3A

Page Rule Id	Page Id	Rule Id
1	147	1
2	148	2
3	149	2

FIG. 3B

Session Id	Page Id	Number of pages
147	xxx	2
147	xxx	5
154	xxx	1

FIG. 3C

Machine ID	Page ID	Page Status	Session ID	Page Create Date
XXX	147	1		07/01/00 08:00:00AM
XXX	148	1		07/01/00 08:01:00AM
XXX	149	1		07/01/00 08:03:00AM
XXX	153	1		07/01/00 08:05:00AM
XXX	156	1		07/01/00 08:10:00AM
XXX	205	1		07/01/00 09:00:00AM
XXX	208	1		07/01/00 09:01:00AM
XXX	211	1		07/01/00 09:03:00AM

FIG 4A

Machine ID	Page ID	Page Status	Session ID	Page Create Date
XXX	147	3	YYY	07/01/00 08:00:00AM
XXX	148	3	YYY	07/01/00 08:01:00AM
XXX	149	3	YYY	07/01/00 08:03:00AM
XXX	153	3	YYY	07/01/00 08:05:00AM
XXX	156	3	YYY	07/01/00 08:10:00AM
XXX	205	1	0	07/01/00 09:00:00AM
XXX	208	1	0	07/01/00 09:01:00AM
XXX	211	1	0	07/01/00 09:03:00AM

FIG 4B

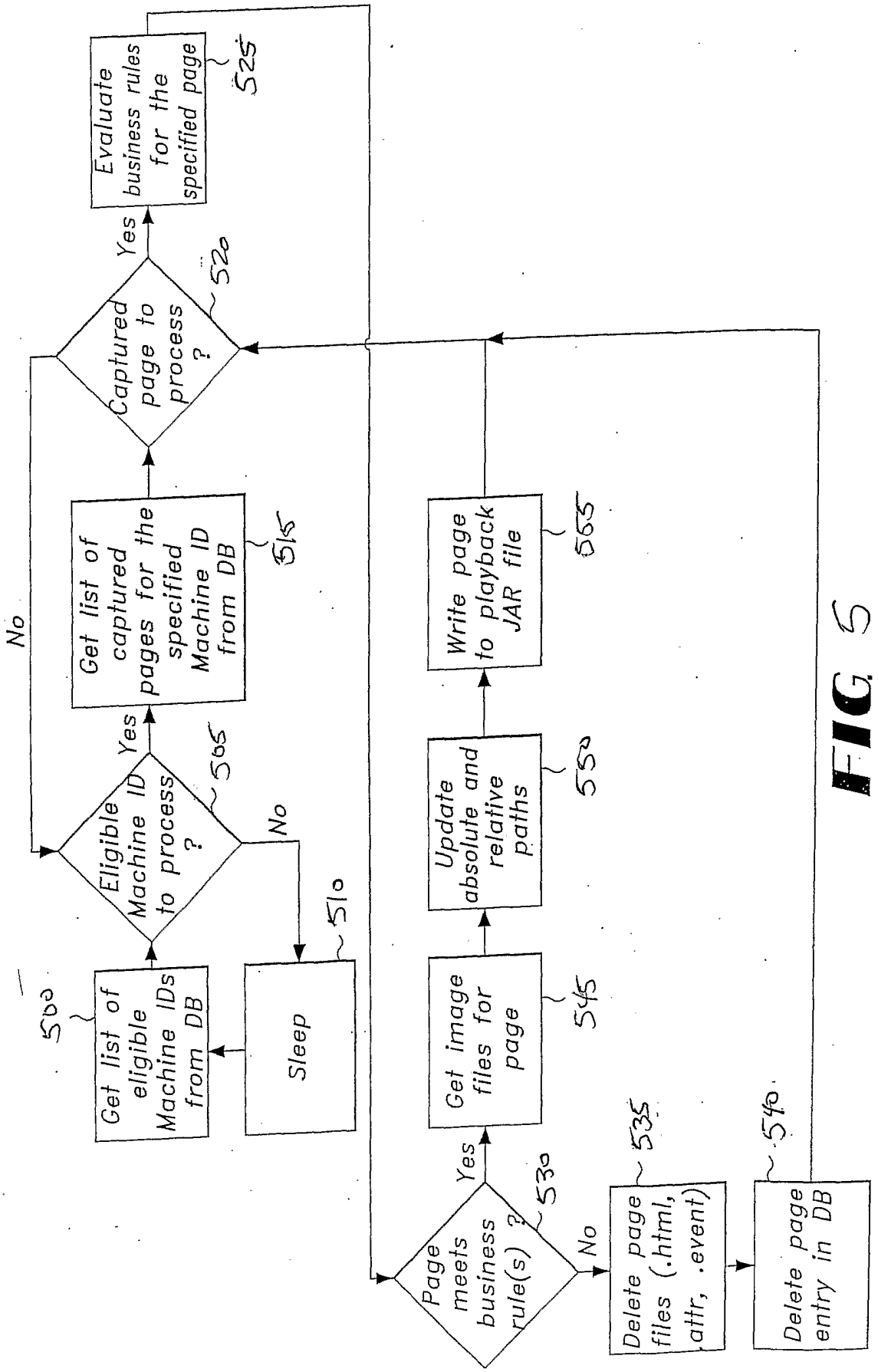

Get list of eligible Machine IDs from DB
500
Sleep
510
Eligible ID Machine to process ?
505
Yes
No
Get list of captured pages for the specified Machine ID from DB
515
Captured page to process ?
520
Yes
No
Evaluate business rules for the specified page
525
Page meets business rule(s) ?
530
Yes
No
Get image files for page
545
Update absolute and relative paths
550
Write page to playback JAR file
555
Delete page files (.html, .attr, .event)
535
Delete page entry in DB
540

FIG 5

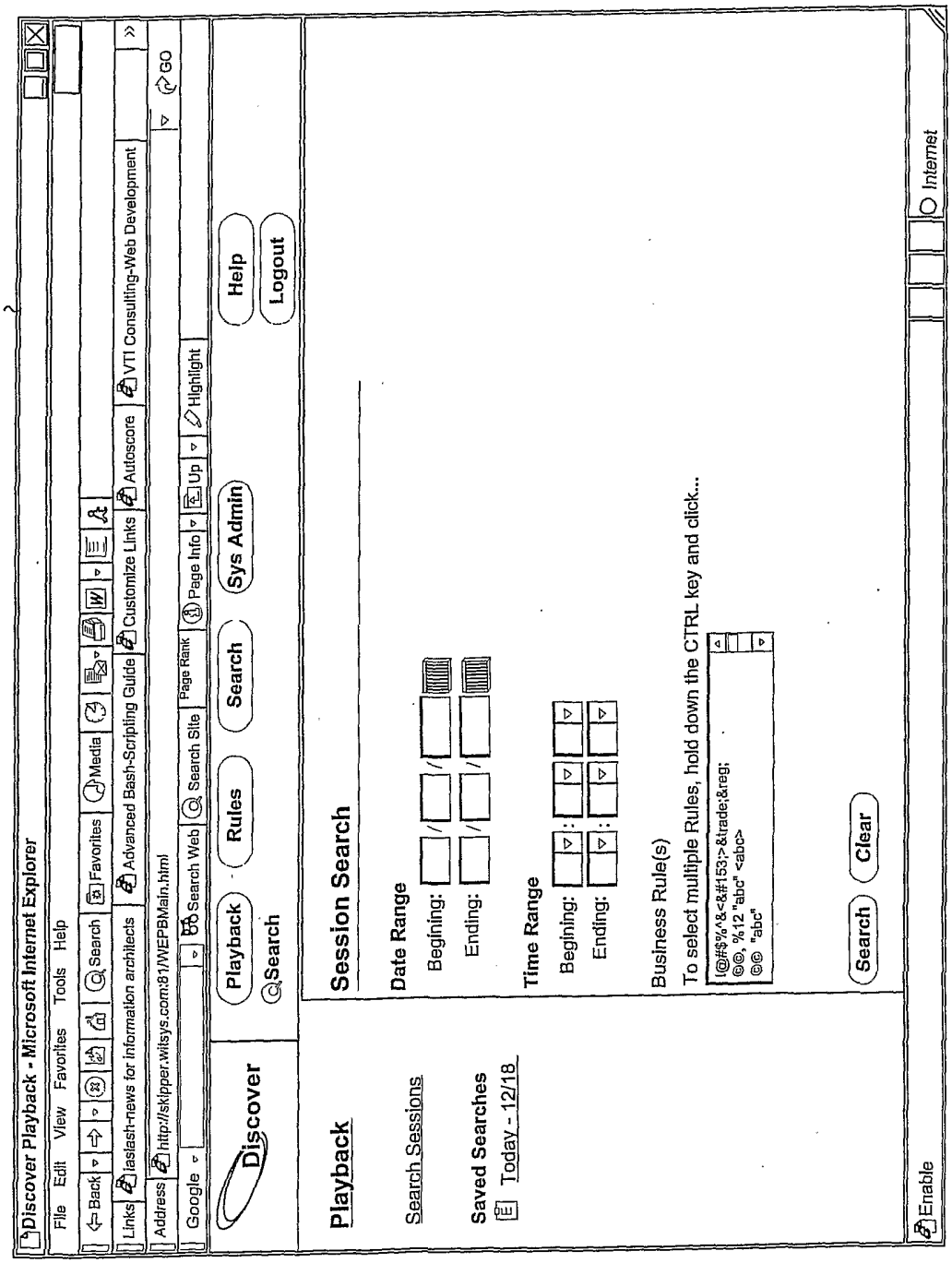

600
Discover Playback - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites Media
Links laslash-news for information architects Advanced Bash-Scripting Guide Customize Links Autoscore VTI Consulting-Web Development
Address http://skipper.wilsys.com:81/WEPBMain.html
Google Search Web Search Site Page Rank Page Info Up Highlight
Discover
Playback
Search
Rules
Search
Sys Admin
Help
Logout
Playback
Search Sessions
Saved Searches
Today - 12/18
Session Search
Date Range
Begining:
Ending:
Time Range
Begining:
Ending:
Business Rule(s)
To select multiple Rules, hold down the CTRL key and click...
Search
Clear
Enable
Internet

FIG 6A

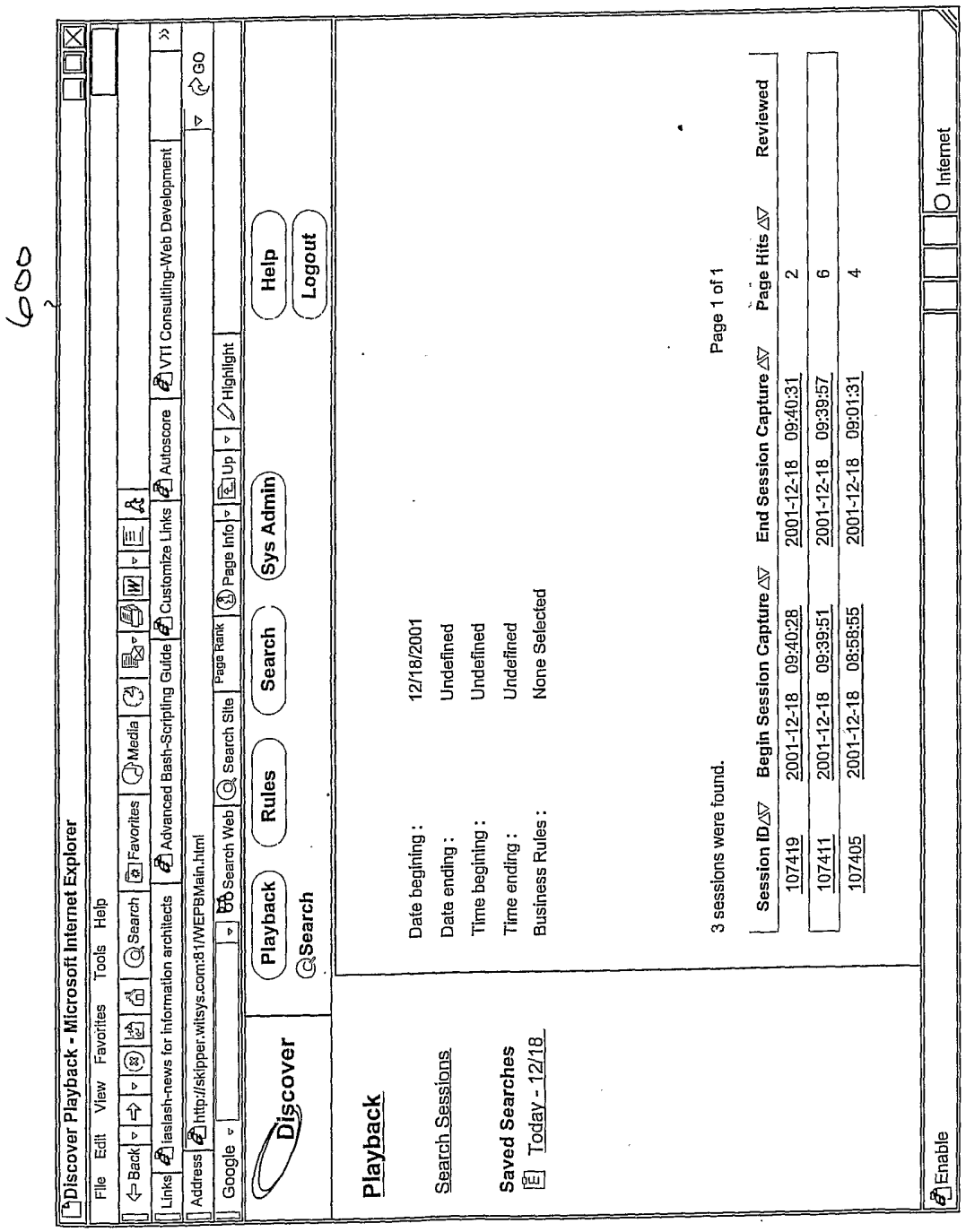

600
Discover Playback - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites Media
Links laslash-news for information architects Advanced Bash-Scripting Guide Customize Links Autoscore VTI Consulting-Web Development
Address http://skipper.witsys.com:81/WEPBMain.html GO
Google Search Web Search Site Page Rank Page Info Up Highlight
Discover
Playback
Search
Rules
Search
Sys Admin
Help
Logout
Playback
Search Sessions
Saved Searches
Today - 12/18
Date begining : 12/18/2001
Date ending : Undefined
Time begining : Undefined
Time ending : Undefined
Business Rules : None Selected
3 sessions were found.
Page 1 of 1
Session ID Begin Session Capture End Session Capture Page Hits Reviewed
107419 2001-12-18 09:40:28 2001-12-18 09:40:31 2
107411 2001-12-18 09:39:51 2001-12-18 09:39:57 6
107405 2001-12-18 08:58:55 2001-12-18 09:01:31 4
Enable
Internet

FIG 6B

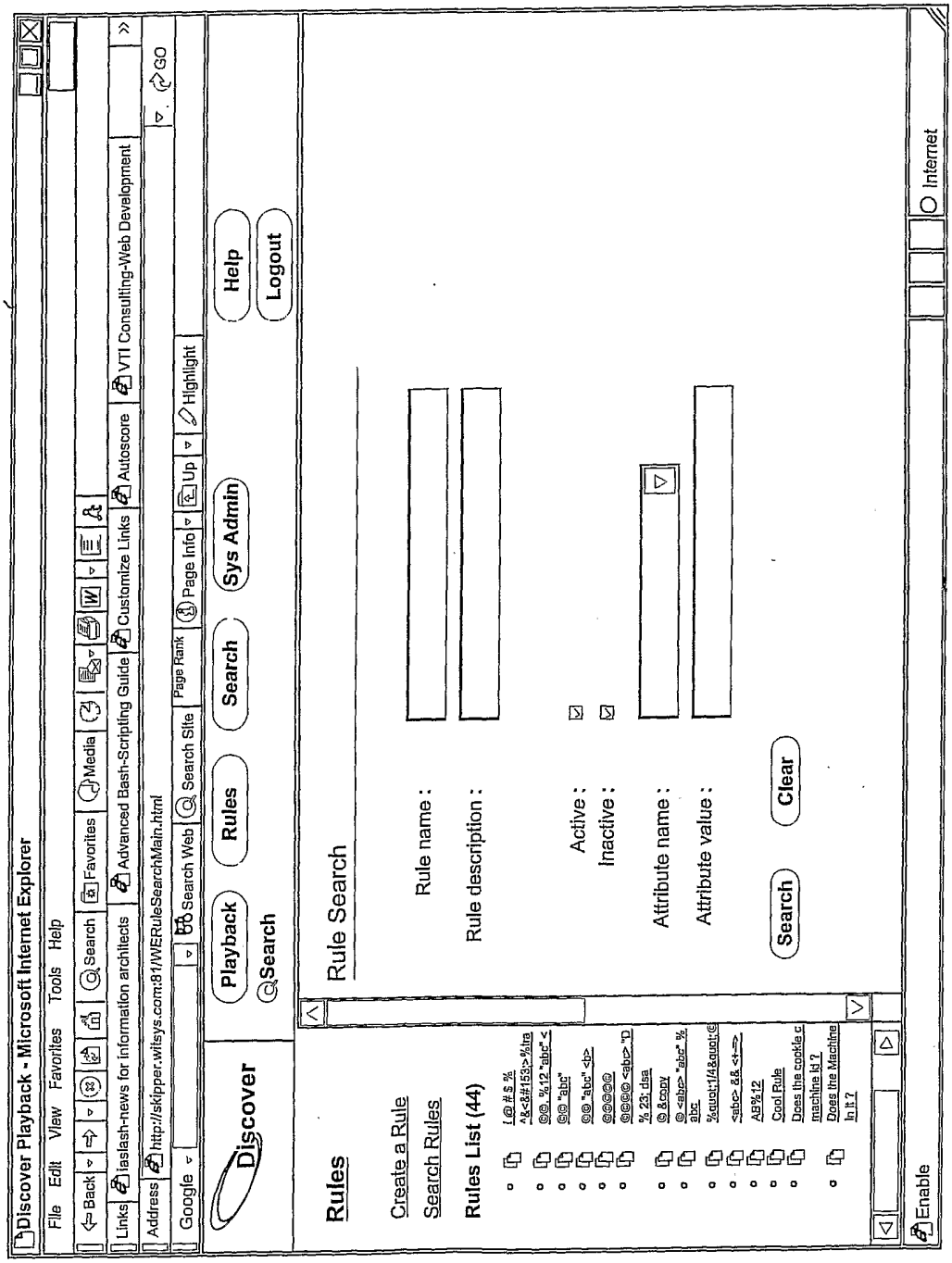

Discover Playback - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Discover
Playback
Search
Rules
Search
Sys Admin
Help
Logout
Rules
Create a Rule
Search Rules
Rules List (44)
Rule Search
Rule name :
Rule description :
Active :
Inactive :
Attribute name :
Attribute value :
Search
Clear
Enable
Internet

FIG 6C

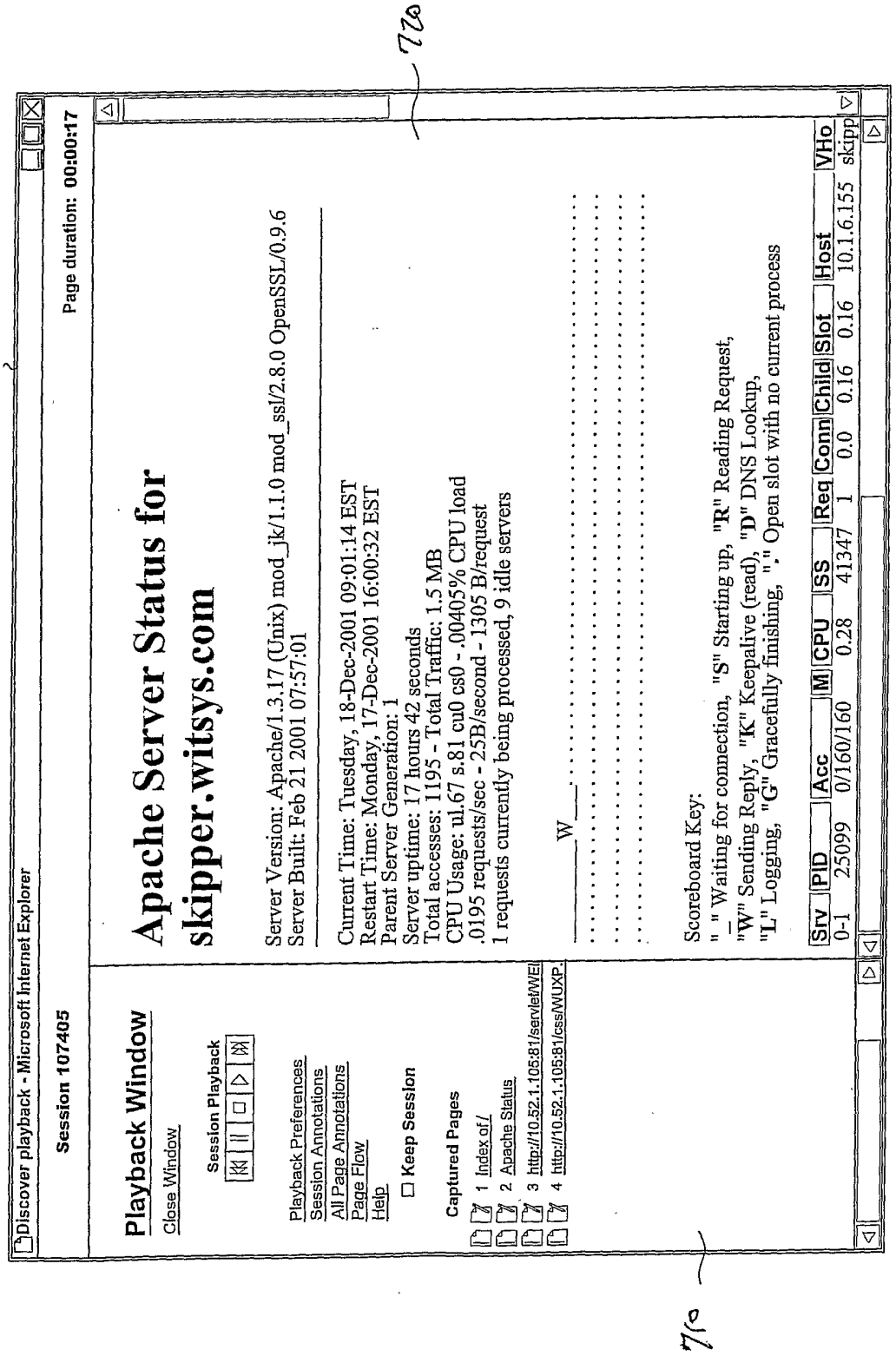

700
Discover playback - Microsoft Internet Explorer
Session 107405
Page duration: 00:00:17
Playback Window
Close Window
Session Playback
Playback Preferences
Session Annotations
All Page Annotations
Page Flow
Help
Keep Session
Captured Pages
1 Index of /
2 Apache Status
3 http://10.52.1.105:81/servlet/WEI
4 http://10.52.1.105:81/css/WUXP.
Apache Server Status for skipper.witsys.com
Server Version: Apache/1.3.17 (Unix) mod_jk/1.1.0 mod_ssl/2.8.0 OpenSSL/0.9.6
Server Built: Feb 21 2001 07:57:01
Current Time: Tuesday, 18-Dec-2001 09:01:14 EST
Restart Time: Monday, 17-Dec-2001 16:00:32 EST
Parent Server Generation: 1
Server uptime: 17 hours 42 seconds
Total accesses: 1195 - Total Traffic: 1.5 MB
CPU Usage: u1.67 s.81 cu0 cs0 - .00405% CPU load
.0195 requests/sec - 25B/second - 1305 B/request
1 requests currently being processed, 9 idle servers
_____W___.....
Scoreboard Key:
"_" Waiting for connection, "S" Starting up, "R" Reading Request,
"W" Sending Reply, "K" Keepalive (read), "D" DNS Lookup,
"L" Logging, "G" Gracefully finishing, "." Open slot with no current process
Srv PID Acc M CPU SS Req Conn Child Slot Host VHo
0-1 25099 0/160/160 0.28 41347 1 0.0 0.16 0.16 10.1.6.155 skipp
710
720

FIG 7A

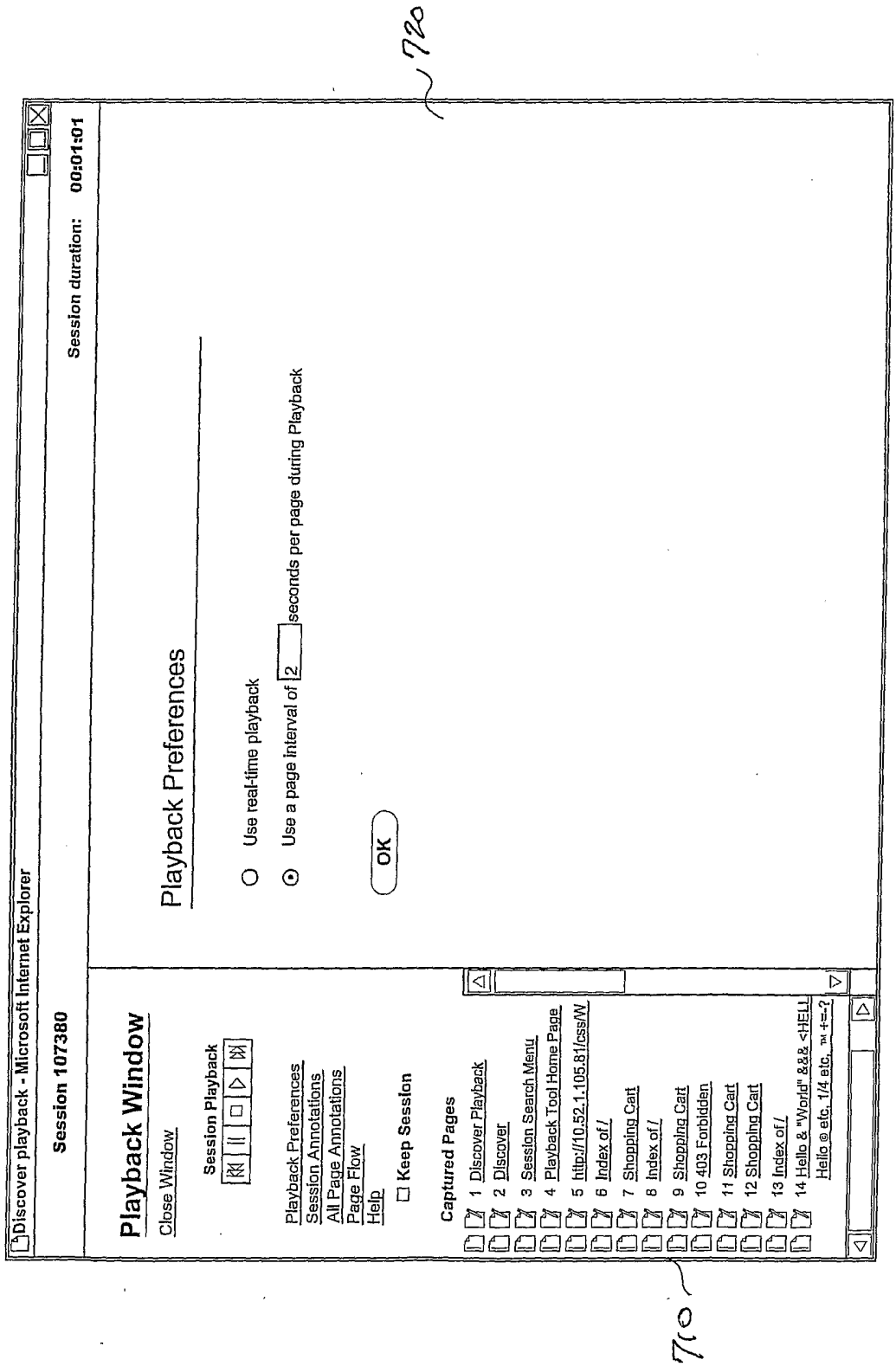

Discover playback - Microsoft Internet Explorer
Session 107380
Session duration: 00:01:01
Playback Window
Close Window
Session Playback
Playback Preferences
Session Annotations
All Page Annotations
Page Flow
Help
Keep Session
Captured Pages
1 Discover Playback
2 Discover
3 Session Search Menu
4 Playback Tool Home Page
5 http://10.52.1.105.81/css/W
6 Index of /
7 Shopping Cart
8 Index of /
9 Shopping Cart
10 403 Forbidden
11 Shopping Cart
12 Shopping Cart
13 Index of /
14 Hello & "World" &&& <HELL
Hello @ etc. 1/4 etc. ™ +=-?
Playback Preferences
Use real-time playback
Use a page interval of 2 seconds per page during Playback
OK
710
720

FIG 7B

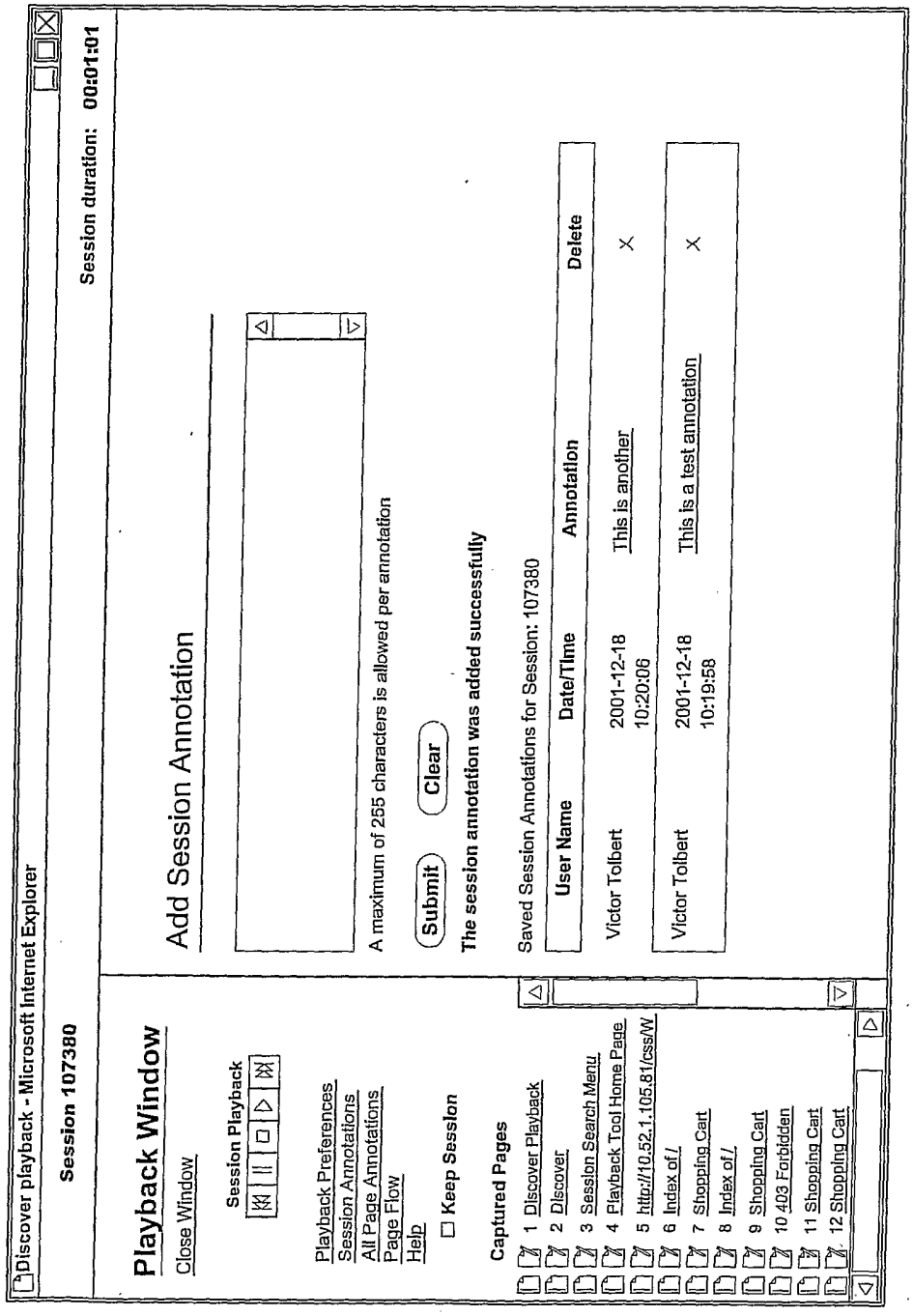

Discover playback - Microsoft Internet Explorer
Session 107380
Session duration: 00:01:01
Playback Window
Close Window
Session Playback
Playback Preferences
Session Annotations
All Page Annotations
Page Flow
Help
Keep Session
Captured Pages
1 Discover Playback
2 Discover
3 Session Search Menu
4 Playback Tool Home Page
5 http://10.52.1.105.81/css/W
6 Index of /
7 Shopping Cart
8 Index of /
9 Shopping Cart
10 403 Forbidden
11 Shopping Cart
12 Shopping Cart
Add Session Annotation
A maximum of 255 characters is allowed per annotation
Submit
Clear
The session annotation was added successfully
Saved Session Annotations for Session: 107380
User Name
Date/Time
Annotation
Delete
Victor Tolbert
2001-12-18 10:20:06
This is another
X
Victor Tolbert
2001-12-18 10:19:58
This is a test annotation
X

FIG 7C

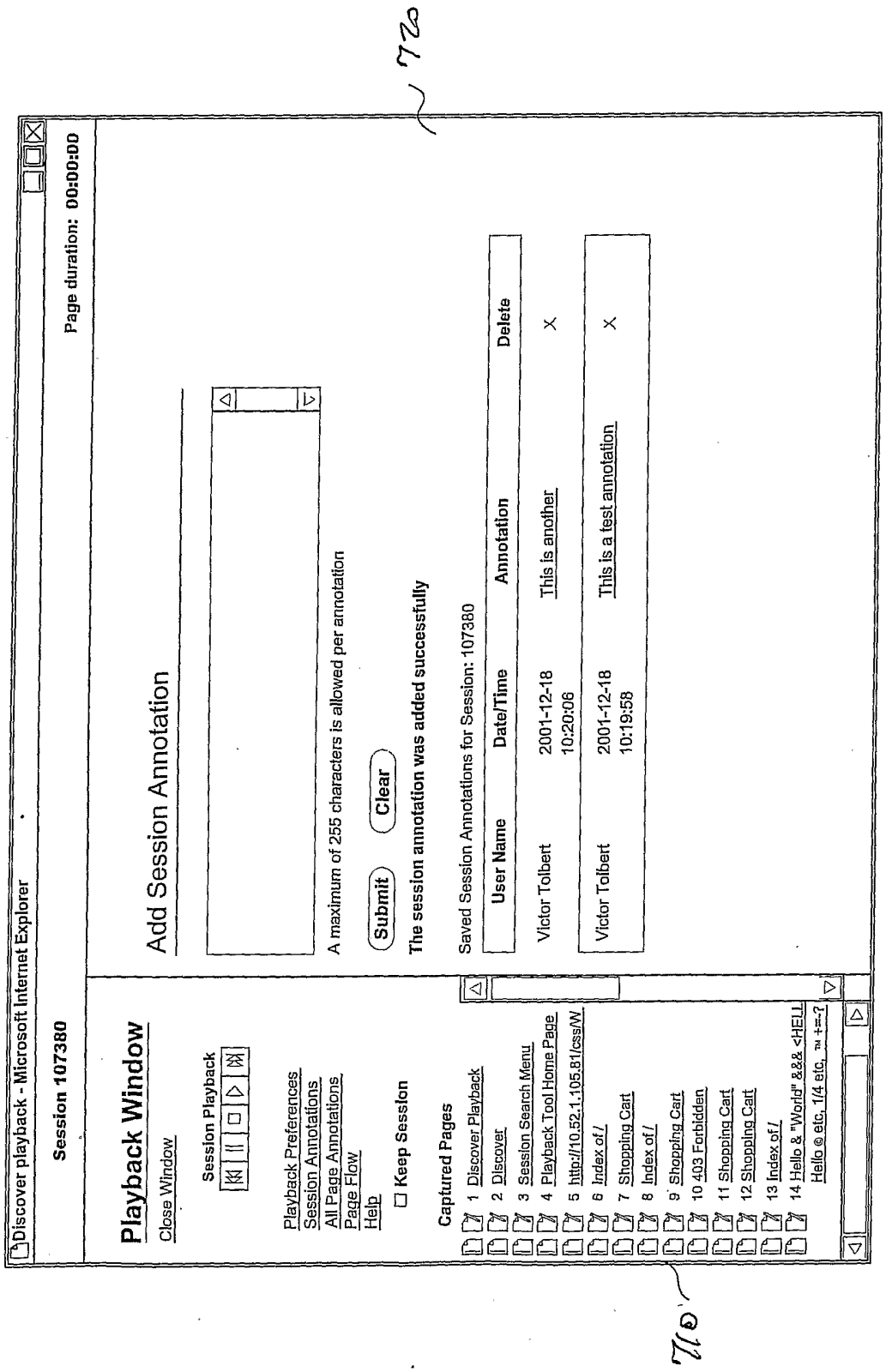

Discover playback - Microsoft Internet Explorer
Session 107380
Page duration: 00:00:00
Playback Window
Close Window
Session Playback
Playback Preferences
Session Annotations
All Page Annotations
Page Flow
Help
Keep Session
Captured Pages
1 Discover Playback
2 Discover
3 Session Search Menu
4 Playback Tool Home Page
5 http://10.52.1.105.81/css/W
6 Index of /
7 Shopping Cart
8 Index of /
9 Shopping Cart
10 403 Forbidden
11 Shopping Cart
12 Shopping Cart
13 Index of /
14 Hello & "World" &&& <HELL
Hello © etc, 1/4 etc, ™ +=-?
Add Session Annotation
A maximum of 255 characters is allowed per annotation
Submit
Clear
The session annotation was added successfully
Saved Session Annotations for Session: 107380
User Name
Date/Time
Annotation
Delete
Victor Tolbert
2001-12-18 10:20:06
This is another
X
Victor Tolbert
2001-12-18 10:19:58
This is a test annotation
X
710
720

FIG. 7D

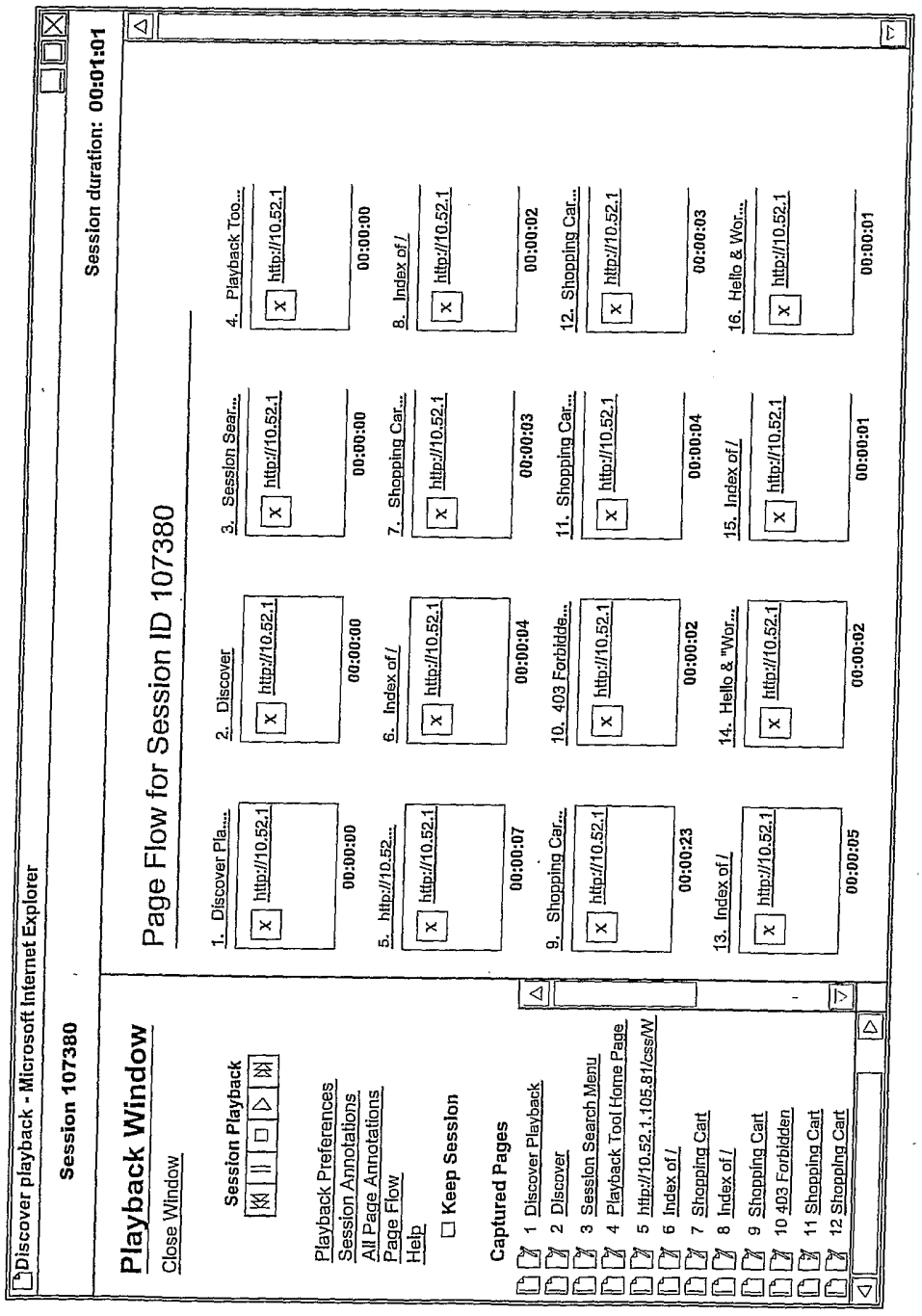

Discover playback - Microsoft Internet Explorer
Session 107380
Session duration: 00:01:01
Playback Window
Close Window
Session Playback
Playback Preferences
Session Annotations
All Page Annotations
Page Flow
Help
Keep Session
Captured Pages
1 Discover Playback
2 Discover
3 Session Search Menu
4 Playback Tool Home Page
5 http://10.52.1.105.81/css/N
6 Index of /
7 Shopping Cart
8 Index of /
9 Shopping Cart
10 403 Forbidden
11 Shopping Cart
12 Shopping Cart
Page Flow for Session ID 107380
1. Discover Pla...
2. Discover
3. Session Sear...
4. Playback Too...
5. http://10.52...
6. Index of /
7. Shopping Car...
8. Index of /
9. Shopping Car...
10. 403 Forbidde...
11. Shopping Car...
12. Shopping Car...
13. Index of /
14. Hello & "Wor...
15. Index of /
16. Hello & Wor...
http://10.52.1
00:00:00
00:00:07
00:00:00
00:00:04
00:00:03
00:00:02
00:00:23
00:00:02
00:00:04
00:00:03
00:00:05
00:00:02
00:00:01
00:00:01

FIG 7E

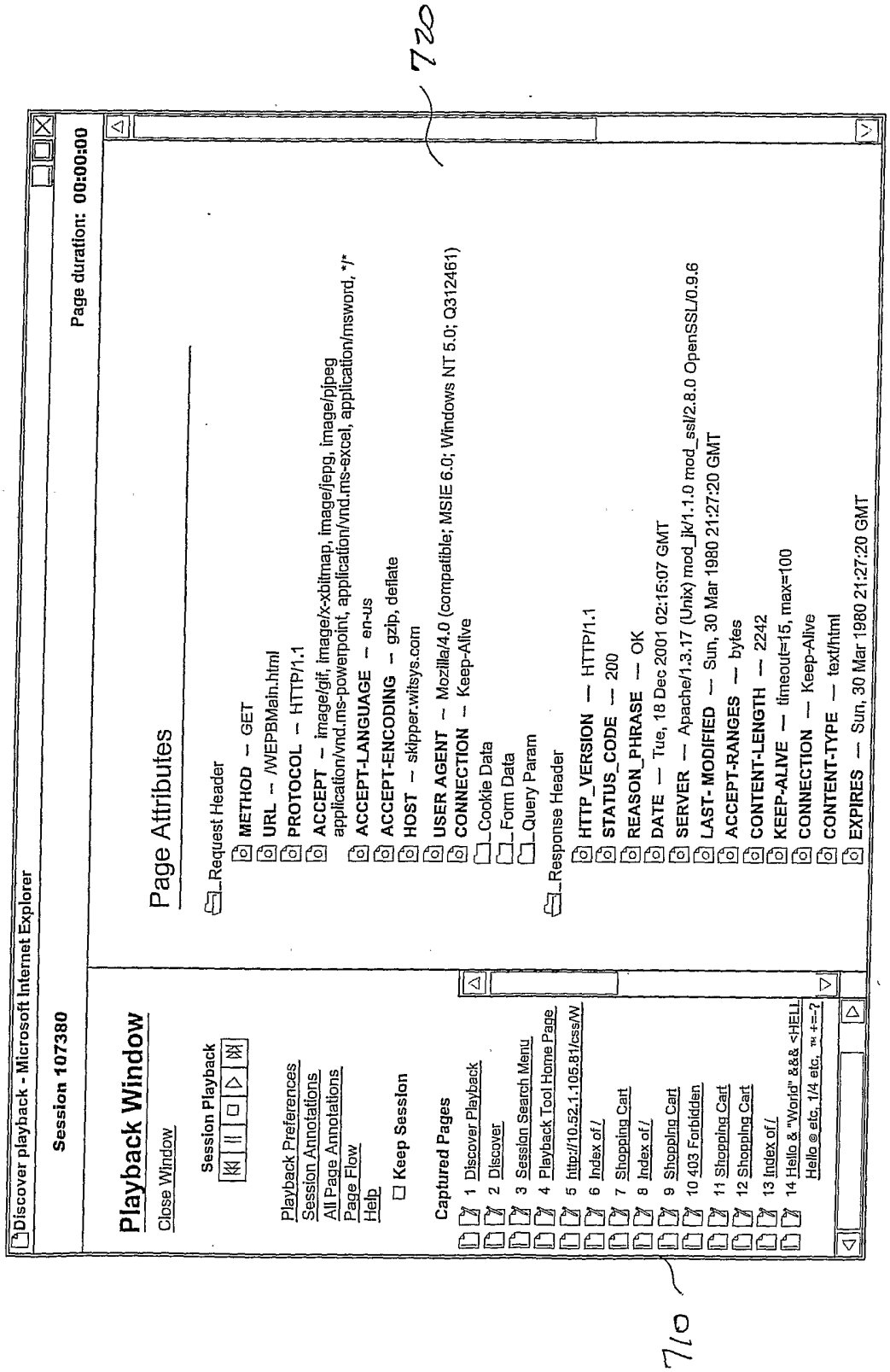

Discover playback - Microsoft Internet Explorer
Session 107380
Page duration: 00:00:00
Playback Window
Close Window
Session Playback
Playback Preferences
Session Annotations
All Page Annotations
Page Flow
Help
Keep Session
Captured Pages
1 Discover Playback
2 Discover
3 Session Search Menu
4 Playback Tool Home Page
5 http://10.52.1.105.81/css/W
6 Index of /
7 Shopping Cart
8 Index of /
9 Shopping Cart
10 403 Forbidden
11 Shopping Cart
12 Shopping Cart
13 Index of /
14 Hello & "World" &&& <HELL
Hello @ etc. 1/4 etc. ™ +=-?
Page Attributes
Request Header
METHOD -- GET
URL -- /WEPBMain.html
PROTOCOL -- HTTP/1.1
ACCEPT -- image/gif, image/x-xbitmap, image/jpeg, image/pjpeg application/vnd.ms-powerpoint, application/vnd.ms-excel, application/msword, */*
ACCEPT-LANGUAGE -- en-us
ACCEPT-ENCODING -- gzip, deflate
HOST -- skipper.witsys.com
USER AGENT -- Mozilla/4.0 (compatible; MSIE 6.0; Windows NT 5.0; Q312461)
CONNECTION -- Keep-Alive
Cookie Data
Form Data
Query Param
Response Header
HTTP_VERSION -- HTTP/1.1
STATUS_CODE -- 200
REASON_PHRASE -- OK
DATE -- Tue, 18 Dec 2001 02:15:07 GMT
SERVER -- Apache/1.3.17 (Unix) mod_jk/1.1.0 mod_ssl/2.8.0 OpenSSL/0.9.6
LAST- MODIFIED -- Sun, 30 Mar 1980 21:27:20 GMT
ACCEPT-RANGES -- bytes
CONTENT-LENGTH -- 2242
KEEP-ALIVE -- timeout=15, max=100
CONNECTION -- Keep-Alive
CONTENT-TYPE -- text/html
EXPIRES -- Sun, 30 Mar 1980 21:27:20 GMT
710
720

FIG 7F

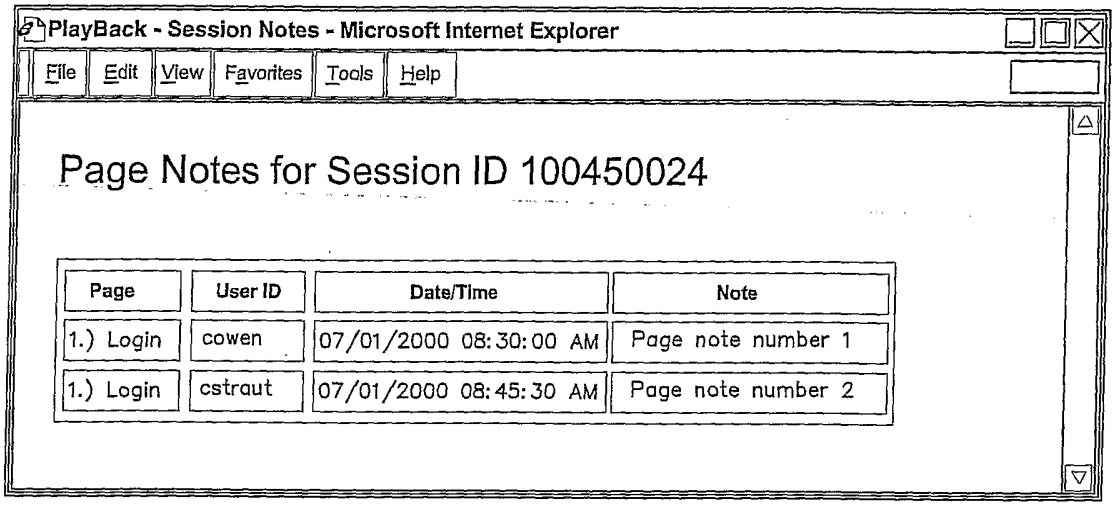

PlayBack - Session Notes - Microsoft Internet Explorer
File
Edit
View
Favorites
Tools
Help
Page Notes for Session ID 100450024
Page
User ID
Date/Time
Note
1.) Login
cowen
07/01/2000 08:30:00 AM
Page note number 1
1.) Login
cstraut
07/01/2000 08:45:30 AM
Page note number 2

FIG 7G

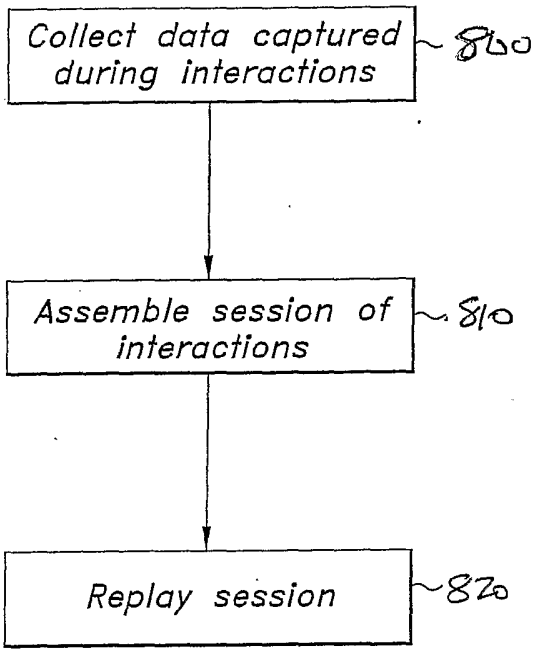

Collect data captured during interactions
800
Assemble session of interactions
810
Replay session
820

FIG. 8

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US03/02541

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) :G06F 13/00
US CL :709/227, 219, 224

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 709/202, 203, 217, 223, 329

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EAST

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 6,286,046 B1 (BRYANT) 04 September 2001, cols 1-2.	1-97
Y	US 5,809,250 A (KISOR) 15 September 1998, cols 1-9.	1-97

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

*	Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A"	document defining the general state of the art which is not considered to be of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E"	earlier document published on or after the international filing date	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&"	document member of the same patent family
"O"	document referring to an oral disclosure, use, exhibition or other means		
"P"	document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search	Date of mailing of the international search report
18 APRIL 2003	12 MAY 2003

Name and mailing address of the ISA/US	Authorized officer
Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231	VIET VU
Facsimile No. (703) 305-3230	Telephone No. (703) 305-9600

Form PCT/ISA/210 (second sheet) (July 1998)★