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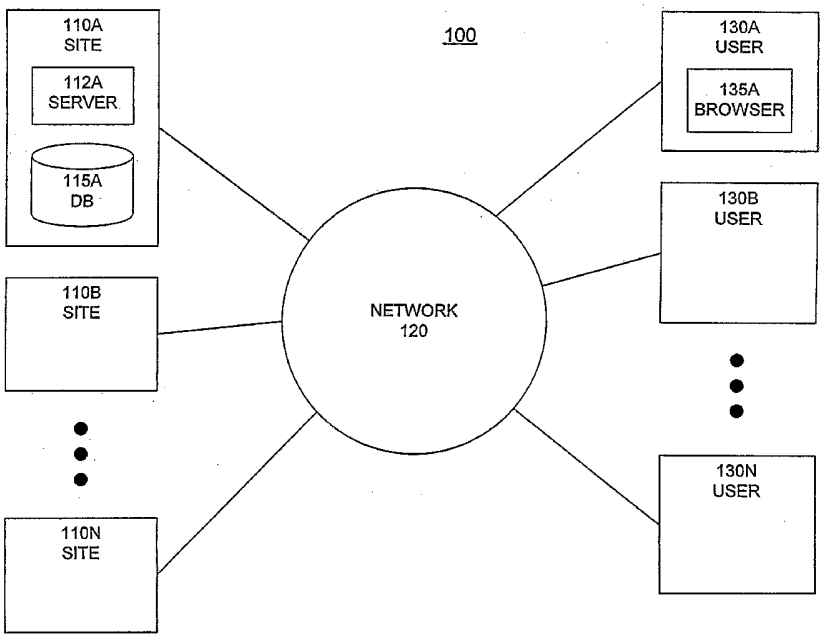
(54) Title: VALUE SYSTEM FOR DYNAMIC COMPOSITION OF WEB PAGES



(57) Abstract: Web pages are dynamically composed in order to increase the overall value of the web page. In one approach, the overall value of the web page is a function of the actual values of the web page components that compose the web page. These, in turn, are functions of the nominal value of the page components and of an effectiveness of the components on the web page. The actual values of the page components are expressed in a same unit of measure, thus facilitating direct comparison of their relative values.

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VALUE SYSTEM FOR DYNAMIC COMPOSITION OF WEB PAGES

CROSS-REFERENCE TO RELATED APPLICATION

This application claims priority to U.S. Provisional Patent Application Serial No. 60/483,191, filed June 27, 2003. This application also claims priority to U.S. Patent Application Serial No. 10/758,969, filed January 15, 2004.

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates generally to composing web pages in response to user requests. More specifically, it relates to dynamically composing web pages in order to increase the overall value of the web pages.

2. Description of the Related Art

Web pages on the Internet are typically statically composed. In many cases, a web page is laid out by a web designer, loaded onto a web site, and then forgotten. Requests for the web page can return the same web page over and over again, even if more relevant information is available. Some web sites have dynamic feeds of content, in which content (or ads) are provided on a dynamic basis. For example, stock quotes can be continuously updated or a headline news article can be periodically changed. However, the layout of the overall web page, including which components are on the web page and the placement of those components (including the placement of the stock quote or ad) typically is static. There is no attempt to optimize the overall value of the web page on an on-going basis.

From another point of view, many web sites are filled with information and links to other locations via ads and/or content links. The intent of each link is to provide the user with an option to take a click action to reach something of value to him. However, the user can only click once on any given web page, regardless of how many links are available. Hence, in some sense, a web page is more valuable if the most important links are the easiest to click on. Statically composed web pages

typically do not meet this criterion because they are static. What is important for one user may not be important for another, and what is important also changes over time.

In addition, the relevancy of different web pages can change over time. For example, a sports site and a music site typically are not that related. As a result, statically composed sports web pages and music web pages typically would not have many links between them. However, the Dixie Chicks sang at Super Bowl 2003 and for a brief period of time they were covered by various sports sites. For many of these sports sites, there was not enough time to manually insert related links, for example to web pages showing Dixie Chicks videos or other related music information. These links would have been both relevant and valuable during that period.

This capability is especially valuable to web sites that can provide a number of vertical properties. In the Super Bowl – Dixie Chicks example, a web site might offer both sports and music destinations. In this example, sports represents one vertical property and music repersents another vertical property. The integration of the two vertical properties (sports and mustic) would have resulted in more value than the sum of the parts because of the synergy between the two vertical properties during that period. More generally, large web sites, such as those with many vertical properties, can have access to a large number of individual page components that can be assembled in many different combinations to compose web pages. Currently, such web pages are statically composed.

Given the above background, what is need in the art are systems and methods for dynamically composing web pages in order to increase the overall value of web pages.

SUMMARY OF THE INVENTION

The present invention overcomes the limitations of the prior art by dynamically composing web pages in order to increase the overall value of the web page. In one approach, a web page is composed of various page components (*e.g.*, content, links, ads, *etc.*), which shall be referred to as page components. A set of candidate components for the web page is identified, with each candidate component having a nominal value. A subset of the candidate components is selected for placement on the web page as the page components. The selection is based on increasing an actual page value of the web page. The actual page value is a function of the actual values of the page components. Each of these, in turn, is a function of the nominal value of the web

page component and of an effectiveness of the page component on the web page. The actual values of the page components are scaled such they are expressed in a same unit of measure. This faciliates direct comparison of the relative values of page components.

In one specific embodiment, the actual page value equals a sum of the actual values of the page components. Further, the actual value of each page component equals the nominal value of the page component multiplied by the effectiveness of the page component on the web page. The nominal value of each page component can be determined by attributes associated with the user request. However, the nominal value of a respective page component is independent of the interaction between the respective page component and other page components. For example, the nominal value of a respective page component does not account for the clutter that the respective page component contributes to a web page. Clutter is accounted for by the effectiveness term. The nominal value of a page component can depend on any of a number of factors or any combination of such factors. Represntative factors include, but are not limited to, financial impact, user request relevancy, relevancy to the user's demographic or behavioral profile, which version of the page component is being used (*e.g.*, a streamlined narrowband version versus a more comprehensive broadband version of the page component), page component size, and an estimate of the "catchiness" of the page component. Like the nominal value of a page component, the effectiveness of a page component can depend on a number of effectiveness factors, or any combination of such effectiveness factors. Representative effectiveness factors, include, but are not limited to, interaction with other page components (*e.g.*, clutter or synergy) and where the page component was placed on the web page. In one specific approach, the dynamic composition begins with a default page (*e.g.*, the statically composed page) and then selectively eliminates page components in order to increase the actual page value.

In another aspect of the invention, different page components are registered before they are available for use in dynamically composing pages. Other aspects of the invention include systems and computer readable media corresponding to the methods described above.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention has other advantages and features that will be more readily apparent from the following detailed description of the invention and the appended claims, when taken in conjunction with the accompanying drawings, in which:

FIG. 1 is a block diagram of a system suitable for use with the present invention.

FIG. 2 is an event trace for dynamically composing web pages in accordance with one embodiment of the present invention.

FIG. 3 is a flow diagram of a method for dynamically composing a web page according to an embodiment of the invention.

FIG. 4A is a graphical representation of a web page that is statically composed.

FIG. 4B is a table showing a page value calculation for the page in FIG. 4A in accordance with an embodiment of the present invention.

FIG. 5A is a graphical representation of a web page that is dynamically composed in accordance with an embodiment of the present invention.

FIG. 5B is a table showing a page value calculation for the web page in FIG. 5A.

FIG. 6A is a graphical representation of a web page that is statically composed.

FIG. 6B is a graphical representation of a web page that is is dynamically composed in accordance with the present invention.

FIG. 7A is a graphical representation of a web page that is statically composed.

FIGS. 7B and 7C are graphical representations of web pages that are dynamically composed in accordance with the present invention.

FIG. 8A is a graphical representation of a web page that is statically composed.

FIGS. 8B and 8C are graphical representations of web pages that are dynamically composed in accordance with the present invention.

FIG. 9 is a block diagram of a system architecture for dynamically composing web pages in accordance with an embodiment of the presnet invention.

FIG. 10 is a flow diagram illustrating a method for operating the system of FIG. 9.

DETAILED DESCRIPTION OF THE INVENTION

FIG. 1 is a block diagram of an examplary system 100 suitable for use with the present invention. FIG. 2 is an event trace illustrating the operation of system 100. Generally speaking, system 100 includes a number of sites 110A-N and users 130A-N that communicate with each other over network 120. Referring to FIG. 2, in step 210A, user 130 sends a request to a site 110. Upon receiving this request (step 210B), site 110 dynamically composes all or a portion of a web page (step 220). Then, in step 230A, site 110 makes the dynmically constructed web page (or portion thereof) accessible to user 130. In optional step 230B, user 130 accesses the web page.

In the specific embodiment shown in the interior of block 220, the web page is dynamically composed 220 in a two stage process. The web page will be constructed from page components. Site 110 can select from a large number of possible page components in step 222. In the first stage (step 222), site 110 narrows down the universe of possible page components to a discrete set of candidate components. For example, if the request received in step 210B relates to Disneyland, the discrete set of candidate components can include articles about Walt Disney or Disneyland, ads for vacation packages or airfare, and links to related sites or other parts of the same site. Page components that can be excluded from the candidate set might include articles about Hillary Clinton, ads for expensive jewelry, and links to financial sites.

In the second stage (step 224), site 110 selects a subet of page components from the set of candidate components for placement on the web page. The selection is

made on the basis of increasing the overall value of the web page. The overall value of the web page is determined by a summation of a score that is assigned to each page component placed on the web page. Each candidate component has a nominal value that reflects the value of that page component, typically without taking into account the interaction of page components on a web page. The actual value of a page component on a web page can be different from the nominal value. In fact, typically, the actual value of a page component on a web page is lower than the nonimal value for the page component. For example, a page component that is lost in excessive clutter will be less effective. Therefore, such a page component will have an actual value that is less than its nominal value. In some instances, it is possbile for the actual value of a page component on a web page to be higher than the nominal value for the page component. For example, a page component that has high synergy with another page component on a web page can be highly effective and therefore have an actual value that is greater than its nominal value. However, it should be noted that the two synergistic page components can possibly reduce the effectiveness of other page components on the web page. Such loss in effectiveness of these other page components would be reflected in the actual values of these other page components. In any event, the actual page value is a function of the actual values of the individual page components. Further, the actual value of each respective individual page component on the web page is a function of both the nominal value of the respective page component and a measure of the effectiveness of the individual page component on the web page.

In one specific embodiment, network 120 (Fig. 1) is the Internet. Representative sites 110 can be Yahoo!'s various properties, including but not limited Launch!, News, Finance, *etc.* Users 130 include individuals who access the Internet, typically by browsers 135. Examples of browers 135 include such as Netscape Navigator (Netscape Communications Corporation, based in Mountain View, California) and Microsoft Internet Explorer (Redmond, Washington). Users 130 can also include other entities, such as software agents, spiders or bots that access sites under software control. Sites 110 transmit web pages to users 130 in response to user requests. A typical site architecture is shown in FIG. 1. A web server 112 provides an interface to Network 120 and a database 115 contains information about the page components used to compose pages. The page components themselves may or may not be included as part of database 115.

It should be noted that FIG. 1 is simplified for clarity. For example, users 130 and sites 110 are shown as separate entities. In fact, the same entity can play both the role of a user and of a site. Entities can also take on different roles in different contexts. In addition, the roles of user and/or site can be distributed and/or divided among many different entities. For example, in order to compose and serve a page to a user 130, a site 110 may request an article from another site (note the site 110 is acting as a user in this context), obtain ads from a third party ad server, and obtain some graphics and links from its internal database. The site itself may also be distributed for redundancy and/or performance reasons. For example, large sites, such as Yahoo!, typically run different web properties from different servers and use an architecture that is more sophisticated than that shown in FIG. 1. Multiple servers, databases, load balancers, *etc.* can be used to implement an actual site 110.

As further clarification, although the Internet will be used as the primary example in this disclosure, the invention may be used with other systems also. For example, entities 110 and 130 can communicate with each other over separate communications networks or dedicated communications channels, rather than through the common network 120 of FIG. 1. Alternately, various parts of system 100 can be implemented by mobile components and may not be permanently attached to a communications network. For example, user 130 may interact with the other entities via a wireless connection.

Returning to the Internet example, FIGS. 3-8 illustrate various examples comparing static composition to dynamic composition of pages in response to the same request. FIG. 3 is a flow diagram of an exemplary dynamic composition method 320 suitable for use in the presnet invention. In method 320, an identification of a suitable default page for a given user request is made in step 322. For example, the default page can be the statically composed page that would be served in the absence of dynamic composition. The page components in the statically composed web page are used as the candidate components for the dynamically composed web page. The nominal value, effectiveness and actual value of the page components as placed on the default page are calculated in step 324, as the actual starting page value.

Next, a loop comprising steps 326-340 seeks to improve the actual page value by eliminating relatively ineffective page components found in the default web page of step 322. In some embodiments, a page component with the lowest effectiveness, based on calculations 324, is eliminated in step 326 on a trial basis. The page is laid

out again in step 328 with the remaining page components. In step 330, the page component effectiveness, actual page component value, and actual page value is recalculated for the trial page. In this example, the elimination of a page component does not affect the nominal values of the remaining page components. Therefore, there is no need to recalculate nominal values of the remaining page components. If the new page value is higher 340 than the old page value, the page component is permanently eliminated and the loop is repeated for the next least effective page component. If the new page value is lower 340 than the old page value, the old page composition is used 342. That is, the trial elimination of the page component is not accepted and the process completes.

This approach tries to identify and eliminate page components that do not positively enhance the value of the page, thus reducing clutter. The goal is a simpler page that is more relevant, easier to navigate, and produces a higher value to the user. In this environment, paid ads ideally would also be of greater value to the advertisers because they would be more relevant and there would be less clutter to detract from the ads. The combination of these two factors ideally should increase the rates charged for those ads, as well as create a more compelling advertising medium.

Approaches other than the one shown in FIG. 3 can also be used to dynamically compose a page. For example, some approaches do not use the loop defined by steps 326-340. Rather, a non-iterative method is used to select which candidate components are used to compose the page. In one approach, the formulations for the nominal value and effectiveness of candidate components can yield closed form solutions for the page with the highest actual page value. In another approach, heuristic methods can be used to select the candidate components.

FIG. 4A is a graphical representation of a page that is statically composed. In this example, the user begins on a News page that contains links to various top news stories. The user clicks on the link to a SARS story. FIG. 4A shows the corresponding page. The page is statically composed because the selection and placement of the page components does not change in an effort to increase the overall value of the page. However, the page components themselves may be dynamic. For example, the specific offers in the "Weekly Specials" ad at the south end of the page may rotate, or the content of the news article "SARS Roundup" may change as the news story is updated by reporters. However, the page composition itself is static.

Note that the page contains a number of different types of page components, including content, links and ads. Each of these page component types can be further subdivided. Examples of content include articles (*e.g.*, news articles), images (*e.g.*, maps), tables (*e.g.*, TV listings), charts (*e.g.*, stock analysis), multimedia (*e.g.*, video clips), and interactive scripts (*e.g.*, games). Examples of links include lists of links (*e.g.*, search results), internal links to other parts of the same property (same website), links to third party properties (third party web sites), navigational links (to help navigate the web site) and functional links (*e.g.*, the "compose" button in Y! Mail, or the Sign In link in Y! My). Examples of ads include external ads (*e.g.*, ads for third parties), house ads (*e.g.*, ads for Yahoo!), performance ads, and sponsored listings.

Different page components serve different purposes. For example, requested content is typically the focus of the user experience and should not be overwhelmed by other page components. Navigational links help put the page in context and functional links implement various functions on the page. House ads promote or integrate other web sites that are co-owned by the same entity but at the same time compete with one another and with external ads, which typically generate direct revenue to an entity.

In order to optimize or at least increase the overall value of a web page, tradeoffs between different page components must be made. In the present invention, a common value system is used to facilitate this tradeoff. The values of the different page components are expressed using the same unit of measure. In this way, different web page components can be directly compared and tradeoffs can be made in a systematic and even automated manner.

FIG. 4B is a table showing the calculation of the value of the page in FIG. 4A using one specific type of common value system. Each page component has a nominal value that is provided in column 3 of the table. In this example, the nominal value can change as a function of the request or the user profile of the user generating the request. For example, the SARS Story has a nominal value of 95 because the request was a link to the SARS story. If the request had been a link to an unrelated news story, the nominal value of the SARS story would have been lower. As another example, the Health Insurance Ad has a nominal value of 80 because it has strong relevancy to SARS, but it would have a lower nominal value in the context of non-health news stories. The nominal value of the Health Insurance Ad might also vary depending on the user profile and/or the CPM rate for the ad. For example, the nominal value might be higher for a user that was in the target demographic group or

for ads with higher CPM rates. As a final example, the DSL ad is a house banner ad that is randomly placed on pages. It would likely have the same nominal value of 40 when placed on some other news page. The nominal value of the "More Top Stories News" link likely is also approximately constant across different news stories.

The nominal value of a page component depends one or more of a number of factors and, therefore, the exact formulation of the function used to compute the nominal value can vary. However, financial impact, relevancy and form are factors that are considered when determining the nominal value in preferred embodiments of the present invention.

Financial impact. Examples of financial impact are revenues generated (*e.g.*, the effective cost per Mil rate for paid ads) and costs (*e.g.*, payments made to third parties for use of their content). Here, cost per Mil means means the cost per 1000 ads. A CPM of 1 means a cost of $1 for 1000 ads. House ads can also be valued by financial impact, for example on the basis of a charge back cost or an opportunity cost for displacing a paid ad.

Relevancy. Relevancy can take a number of forms. For instance, relevancy to the request, relevancy to the page that generated the request, and/or relevancy to a user profile, to name a few. Examples of user profiles include demographic profiles and behavioral profiles. Relevancy can also be measured in different ways. For example, one simple approach is based on matching keywords or other subject matter descriptors. If the request concerns SARS, and a page component is explicitly targeted to the keyword SARS, there will be high relevancy. A similar approach can be used for user profiles. If the user is in demographic category X (*e.g.*, as determined by either self-reported data or based on the user's behavior) and the page component is targeted to category X, there will be high relevancy.

Context matching can also be used to determine relevancy. The idea behind context matching is that a page component becomes part of the page if the context is relevant. For page components that are part of a web site, relevancy can be determined based on conventional search engine technology, such as is available from Inktomi, Y! Search, Autonomy, Google and Overture. For page components that cannot be analyzed based on their position on the web, relevancy can be determined by context matching technologies, such as those developed by Applied Semantics and ContextWeb.

Form. Form refers to the impact of the page component. Different types of page components have different amounts of impact on the web page. For example componens that are text links, static banners, banners with motion, or have high-tech special effects each have a different amount of impact. Size and shape of the page component typically also impacts the nominal value. For page components that have multiple versions, (*e.g.*, a text version, an image version, and a high bandwidth video version) the nominal value can be different for each version of the page component. However, bigger, fancier and faster is not always better, particularly when user bandwidth constraints are considered.

Whatever the factors used to determine the nominal value, the different factors are combined to construct a single nominal value for the page component. In one approach, the nominal value can simply be the weighted sum of the different factors. The unit of measure can vary. In FIGS. 4B and 5B, the nominal values are expressed in unitless dimensions. However, one alternative is to express the nominal value in dollars per impression.

Returning to FIG. 4B, in this example, the nominal value of a page component is not affected by the placement of the page component on the page or what other page components are placed on the web page. Thus, page components that appear in both FIGS. 4A and 5A have the same nominal value, regardless of their placement and the overall page composition. One advantage of this approach is that the nominal value of page components need not be recalculated for different trial page compositions.

The effectiveness value is the factor that accounts for placement, page composition, *etc.* One hundred percent effectiveness means that the page component realizes its full nominal value in the page composition. Less than one hundred percent effectiveness means that some effectiveness is lost. Effectiveness can be lost, for example, due to cropping of the page component, peripheral or below the fold placement, or distraction from other page components. Greater than one hundred percent effectiveness can mean the page component has some synergistic effect with another page component on the web page. In FIG. 4B, the actual page component value of each page component and the actual page value of the entire page are respectively calculated as:

$$\text{Actual page component value} = \text{Nominal component value} \times \text{Effectiveness} \quad (1)$$

$$\text{Actual page value} = \sum \text{Actual component values} \quad (2)$$

The page effectiveness can be defined as

$$\text{Page effectiveness} = \sum \text{Actual component values} / \sum \text{Nominal component values} \quad (3)$$

The effectiveness also depends on a number of factors and its exact formulation can vary. However, placement and clutter are factors that are usually considered when determining the effectiveness. For placement, the effectiveness of a page component typically depends on whether it is placed above the fold, below the fold, north, south, east, west, center, etc. Here, that portion of the web page that above the fold is defined as that part of a web page that is visible without any scrolling upon first viewing the web page.

Clutter is created when too many page components are included on a web page. The less important page components distract from the more important page components. For example, referring to FIG. 4A, the "Full Coverage box" in the southwest corner distracts from the main news article and is not particularly relevant. This manifests itself in FIG. 4B as a lower effectiveness factor for the SARS Story. Empirical experiments can be used to model the influence of clutter on the effectiveness factor.

Alternately, simple mathematical models can be formulated. One mathematical model is to use the sum of the squares of the areas occupied by different page components as a measure of lack of clutterer. The higher this factor, the less clutter there is. For example, if the page has a total area of 100, it can be occupied by one page component with an area of 100 or by one hundred page components each with an area of 1. The 1-component page has a factor of $100^2 = 10{,}000$. The 100-component page has a factor of 100 $(10^2) = 100$. As such, the 1-component page is much less cluttered than the 100-component page.

Returning to FIG. 4B, note that the main page component, the SARS Story, has an effectiveness of only fifty percent. This is in part due to the clutter created by the vast number of other page components. Each of these other page components contributes some to the overall page value, but not enough to compensate for the decrease in effectiveness of the main page component. Overall, the page has an actual page value of 66.9 and a page effectiveness of only twenty percent.

FIG. 5A is a graphical representation of a page that is dynamically composed, reducing the overall clutter. As such, the web page illustrated in FIG. 5A represents a dynamically composed analog of the static web page illustrated in FIG. 4A. FIG. 5B is a table showing the value calculation for the web page illustrated in Fig. 5B. The actual page value has improved from 66.9 to 100.3, an increase of nearly fifty percent over the web page of FIG. 4A. The page effectiveness has also risen significantly, from twenty percent to forty-three percent. Even though the total number of page components and the nominal page value have decreased, the actual page value and effectiveness have increased.

Other definitions of nominal value, effectiveness and actual value will be apparent. For example, in an alternate approach, the effect of placement is accounted for in the nominal value rather than in the effectiveness factor. Alternately, the effect of placement can be ignored altogether in order to simplify calculations. As another example, the nominal values of different page components can be expressed in different units of measure and then converted to a common unit of measure for the actual values. For example, the nominal value of external ads can be expressed in effective CPM and the nominal value of news articles expressed in relevancy on a scale of 0 to 1.0. A conversion factor between the two can be used so that page components from each of the two classes can be summed in order to compute a page value.

FIGS. 6-8 are further examples of static versus dynamic composition. Figs. 6A, 7A, and 8A illustrate statically composed pages. Figs. 6B, 7B, 7C, 8B, and 8C represent dynamically composed counterparts.

FIG. 6 is an example from Y! Launch. In FIG. 6A, the request is a search in Launch.yahoo.com for "Madonna." In FIG. 6B, the following changes have been made to increase the value of the page. The north banner (Jason Mraz) 610 is removed in order to allow for more real estate "above the fold." This increase in real estate allows revenue-generating content (Discography) 620 to move above the fold, significantly increasing the effectiveness of this content. On the west side, generic links (News, Interviews, etc.) 612 are replaced by specific contextual redirects 622 to Y! Shopping, Tickets, Messenger, Auctions, Chat, Groups, Search and Classifieds. The east side advertisement 614 for Friskies is replaced by an advertisement 624 that has a higher relevancy to the user's behavioral profile.

FIG. 7 is an example from Y! News. These pages are generated in response to a search request for "Madonna." Fig. 7A represents the static web page that is created without dynamic composition. FIG. 7B represents a dynamically constructed web page that was consructed taking into consideration that the user profile of the requester indicates that the user has a broadband connection. FIG. 7C represented a dynamically constructed web page that was constructed taking into consideration that the user has a relatively low speed dial-up connection. Thus, the web page of FIG. 7C has page components that are best viewed using a high speed connection. For instance, in FIG. 7B, a high broadband music video module 720 is served. In contrast, in FIG. 7C, a relatively simple Y! Shopping module 730 is served instead. In both figures, the "Related Sites" module 722 is customized via contextual search results with links to Y! Launch, Tickets, Shopping, Photos, and Y! Platinum. The east side advertisement 714 in FIG. 7A is replaced by adverstiment 724 in FIGs. 7B and 7C. Advertisment 724 has higher relevancy, based on a combination of the user's demographic profile and contextual search result. Note that in this example, page components 720 and 722 were added to the dynamically composed page without significantly reducing the effectiveness of the main page component, the search listing.

FIG. 8 is an example from Y! Tickets. In this example, the user is looking for tickets to a Spurs/Lakers game. FIG. 8A illustrates the static web page generated for this request. In alternative examples, the user profile indicates that the user is either (i) in San Jose but from San Antonio (FIG. 8B) or in San Antonio (FIG. 8C). Accordingly, the web page is dynamically composed based on the user's residence. In FIG. 8B, the west side content 810 is replaced by a weather module 820 that shows the weather in San Antonio as well as a Y! Travel module 822. The weather module 820 is targeted to the contextual result "San Antonio." The Y! Travel module 822 is pre-populated with San Jose as the departure city and San Antonio as the destination city. The north banner ad 824 is chosen to increase the relevancy of its content. In FIG. 8C, the San Antonio user presumably does not need plane tickets to San Antonio, so the Y! Travel module 822 is not served. Instead, a Get Local Module 832 is served to provide local information.

FIG. 9 is a block diagram of an example system architecture 900 for dynamically composing pages. System 900 includes a content management server 910 and database 915, an ad management server 920 and database 925, and a runtime

server 930 and database 935. System 900 also includes site properties 940A-N. Y! Travel, Y! News, Y! Finance, *etc.* are examples of properties 940 for the Yahoo! site.

System 900 has the following architecture. Each server 910, 920, 930 can access its respective database 915, 925, 935. Content management server 910 and ad management server 920 also communicate with runtime server 930, which in turn communicates with properties (web sites) 940. With respect to the outside world, users (such as 130 of FIG. 1) access properties 940. Content providers interact with the system via the content management server 910, and ad providers (both third party and internal ad providers) interact with the system via the ad management server 920. System 900 is merely exemplary. Other architectures will be apparent. For example, some or all advertisment providers and/or content providers might interact directly with runtime server(s) 930 as well.

Returning to the Yahoo! Internet example for the moment, servers (*e.g.*, 910, 920, 930) preferably are implemented as yapache servers running on FreeBSD Intel boxes in a distributed environment. Corresponding databases 915, 925, 935 can take various formats, including flat file, MySQL and Oracle. Management servers 910 and 920 use a private network connection (*e.g.*, not the Internet) to communicate with the runtime server 930, as does the runtime server 930 in its communications with the properties 940. The properties 940 are implemented on separate web servers (not shown in FIG. 9), which do the actual communications with the runtime server 930.

As described previously, users generally access the Yahoo! properties 940 via browsers or by software controlled agents, spiders, *etc.* Providers of content and/or ads can access the management servers 910 and 920 in a number of ways. They can provide information about their page components manually, for example by filling out and submitting forms or by submitting information according to a predefined template. Alternately, information can be transmitted via a predefined API interface to the management servers 910, 920. As another alternative, crawlers (or similar technology) that traverse different page components on a network can discover information about the page components and then report back to the management servers 910, 920.

In more detail, exemplary system 900 operates as shown in FIG. 10. Management servers 910, 920 receive information describing different page components in step 1010. In this example, advertisements are handled by the advertisement management server 920 and database 925, and all other page components are handled by the content management server 910 and database 915.

This is a natural division because ads, particularly paying ads, often have significantly different characteristics or warrant significantly different processing than other types of page components. However, the division is not required and other architectures can be used. Management servers 910, 920 process the information and store corresponding records in databases 915, 925.

Management servers 910, 920 also push the relevant subset of records to runtime server 930, which processes these records and stores them in database 935. Runtime server 930 is responsible for responding to requests from properties 940. Therefore, it is preferable for runtime database 935 to store only the information needed to respond to these requests, in order to optimize the response time. The process of making a page component available to runtime server 930 is referred to as registration 1020. Once a page component is registered, it is available to compose web pages. When runtime server 930 receives a request from a property (step 1030), it dynamically composes a page (step 1040), for example using the methods described above. In step 1050, the pabe is served.

The various databases can be updated in many ways. In a preferred approach, components (or updates to components) that come from active providers will be sent to the relevant management server 910, 920 by the provider. This can occur via an applications program interface (API) to management server 910, 920, by the provider submitting forms or templates, or by other means. Management servers 910, 920 push or otherwise transmit these changes to runtime server 930 in a real-time or near real-time manner, as opposed to accumulating changes and making periodic batch updates. As a result, the changes typically will take effect in near real-time.

Information also can flow in the other direction. For example, providers and others typically can access management servers 910, 920 to review their components, the effectiveness of their ad campaigns, *etc.* Information about the performance of components, such as the click-through rate, the number of impressions, *etc.*, typically is collected by properties 940 and flows back through the system for reporting and analysis purposes. This empirical feedback can also be used to adjust the nominal value and/or effectiveness calculations described above.

In one specific example, components are registered through a registration API or site, either automatically or partially manually, depending on how much information is already available on the page stamps for the components. Take third party web pages as an example. At one extreme, a process crawls through the pages of

a property to collect and infer the necessary information for registration. At the other extreme, the web site owner manually registers only selected pages of the site. A mix of these two methods is also possible. For example, a web site may stamp its pages with a flag signifying whether they are to be exposed. The crawler process registers the pages that are to be exposed. Incomplete registrations can be identified and the web site notified to complete the registration.

The following are some examples of the type of registration information that can be provided for a page component:

Component Name – Name provided by the component provider

Category Type – Typically predefined (*e.g.*, News, Music, Sports, *etc.*). In one implementation, the Category Type maps directly to a property (web site).

Category SubType – As defined by each property. For example, in News, the subtypes may be "current-events", "business", "sports", *etc.* These are also predefined.

Creation Date – Date when component was first registered.

Expiration Date – Date on which component should be deregistered. Component should not be used after the Expiration Date.

Target Parameters – Parameters that describe the profile of target users for this component. For example, this field might be defined as males, 18-24, professional. Alternatively, if left blank, the component provider believes the component is appropriate to all audiences.

Required bandwidth rating – The minimum data bandwidth required for this component, for example modem, DSL, T1, *etc.*

Recommended bandwidth rating – The recommended minimum data bandwidth for good user experience.

Value parameters – Parameters that can be used in the value calculation. For example, certain components may have nominal values assigned by the component provider. The revenue rate for ads can be included as a value parameter.

Versions supported –Which versions are available for this component. For example, possible values might include Text-link reference, Icon and Text reference, Short version, and Long version.

Keyword(s) – One or more keywords that describe the category matches for this component. This field can also be used for contextual matching of relevant content and ads. Other types of subject matter descriptors can also be used.

These are examplary definitions. Other types of information can be provided. In addition, the information provided can depend on the type of page component.

In addition to the description of the page component, the page component itself is also provided. Page omponents can have multiple versions. The following are examples of different versions:

Text-Link reference –A text link reference with an appropriate title.

Icon and Text reference – Similar to a text-link reference along with a reference to an approved and predefined icon.

Short version – This could include graphics and content as appropriate but is brief in nature. For example, a shopping item may have all fields necessary to describe the item, show a picture of the item, and allow shopping transactions from the spot. Additionally, this typically will provide a link to the full detailed component.

Long version – Long version of the component as may be appropriate. For example, Launch! may provide a window for displaying a complete music video without having to click and go to a reference site.

Each of the versions may have a portion that is dynamic, for example provided by a live feed. Thus, registering a version does not necessarily mean that the entire version is stored in one of the databases. Rather, the version may include pointers for different subcomponents and/or it may be automatically updated by a push from the component provider.

Management servers 910, 920 preferably process this information to prepare it for runtime server 930 and also preferably perform *a priori* calculations. For example, the information provided can be converted to a different format, or even enhanced, to faciliate searching. Various indices and/or reverse indices can be assembled in advance. In addition, keywords submitted by the component provider can be converted to a standardized set of keywords, or additional keywords applicable to the component may be added. As another example, the management servers 910, 920 can precalculate value or relevancy parameters that do not depend on run-time factors. For example, CPM values for paid ads or indirect revenue opportunities for a link to another property can be calculated in advance. In this way, the real-time calculation burden on the runtime server 930 is reduced. In the example of FIG. 9, runtime server 930 is also coupled to a relevancy engine 932 and a profiling engine 934, which handle relevancy calculations and profile matching, respectively.

Overall system 900 maintains an active database of all registered components and schedules the components for searching and/or inclusion with other components. When runtime server 930 receives a request from a property 940, the server typically will request both ads and content links given specific information about the page requested by the user along with user specific information passed via other sources, for example user cookies. Runtime server 930 uses the information passed to it to find relevant ads and content for the given page, and then optimizes the page value as described above.

Runtime server 930 can use information beyond what is provided in the component registration. For example, link tracking analysis, eCPM data, pageview statistics, specific user behavior as tracked by the system, and contextual matching techniques are additional capabilities that can be used by runtime server 930 in its value evaluation. Keyword and content matching can be used to identify information that can be integrated into a coherent web page. Link tracking analysis provides a measure of cross-property relevance, which can be used to sort multiple qualified

content deliverables. Effective CPM can be used to update the value. Pageview statistics also give a quantitative measure on the importance of a content deliverable.

The high value page is sent to the property (web site) that originated the request. System 900 preferably also tracks user behavior and/or page and component effectiveness once the page is delivered. For example, in one implementation, the link tracking system 950 tracks all link follow-through on Yahoo! pages. Links include ads, text links, and forms (*e.g.* search box), for example. Link clicks as well as link views are tracked. Link tracking can be used to provide empirical feedback on the value of different components and/or combinations of components. It can also be used as an experimental test bed to test different models of relevance and/or value. For example, a test link can be set up between specific content on a page to other content on another page, and the click-through rate tracked to assess the effectiveness of the first page. This information can also be tracked on a user bases as well as in aggregate for the pages overall.

The present invention can be implemented as a computer program product that comprises a computer program mechanism embedded in a computer readable storage medium. For instance, the computer program product could implement the flowcharts illustrated in Figs 3. and 10. This computer program product could be stored on a CD-ROM, magnetic disk storage product, or any other computer readable data or program storage product. The software modules in the computer program product can also be distributed electronically, via the Internet or otherwise, by transmission of a computer data signal (in which the software modules are embedded) on a carrier wave.

Although the detailed description contains many specifics, these should not be construed as limiting the scope of the invention but merely as illustrating different examples and aspects of the invention. It should be appreciated that the scope of the invention includes other embodiments not discussed in detail above. Various other modifications, changes and variations which will be apparent to those skilled in the art may be made in the arrangement, operation and details of the method and apparatus of the present invention disclosed herein without departing from the spirit and scope of the invention as defined in the appended claims. Therefore, the scope of the invention should be determined by the appended claims and their legal equivalents. Furthermore, no element, component or method step is intended to be dedicated to the public regardless of whether the element, component or method step is explicitly recited in the claims.

We Claim:

1. A method for building a web page comprising:
receiving a request from a user;
dynamically composing a web page in response to the request; and
making the web page available to the user.

2. The method of claim 1 wherein the step of dynamically composing a web page comprises:
identifying a set of candidate components for the web page, each candidate component in the set of candidate components having a nominal value; and
selecting a subset of the candidate components for placement on the web page as page components, wherein the selecting is determined by an optimization of an actual page value of the web page, wherein
the actual page value of the web page is a function of a respective actual value of each page component placed on the web page and wherein an actual value of a page component placed on the web page is determined by a function of a nominal value of the page component and of an effectiveness of the page component on the web page.

3. The method of claim 2 wherein the actual value of each page component placed on the web page is in a common unit of measure.

4. The method of claim 1 wherein the step of receiving a request from a user comprises receiving the request via a browser.

5. The method of claim 2 wherein the subset of candidate components include one or more of a content page component, a link page component, and an advertisement page component.

6. The method of claim 2 wherein:
the actual page value equals a sum of the actual values of the page components on the web page; and

the actual value of each page component on the web page equals the nominal value of the page component multiplied by the effectiveness of the page component on the web page.

7. The method of claim 2 further comprising determining a nominal value of a candidate component in said subset of the candidate components, wherein the nominal value is a function of an aspect of the request.

8. The method of claim 2 further comprising determing a nominal value of a candidate component in said subset of the candidate components that is an advertisment page component as a function of a revenue generated by placement of the advertisement on the web page.

9. The method of claim 2 further comprising determining a nominal value of a candidate component in said subset of the candidate components as a function of a relevancy of the candidate component to the request.

10. The method of claim 9 wherein:

the request was generated by a requesting web page; and

the step of determining a nominal value of the candidate component as a function of a relevancy of the candidate component to the request comprises determining a nominal value of the candidate component as a function of a relevancy of the candidate component to the requesting web page.

11. The method of claim 9 wherein the candidate components is a content candidate component.

12. The method of claim 9 wherein the step of determining a nominal value of the candidate component comprises determining a nominal value of the candidate component based on a relevance of the candidate component to a demographic profile of the user.

13. The method of claim 9 wherein the step of determining a nominal value of the candidate component comprises determining a nominal value of the candidate component as a function of a geographic location of the user.

14. The method of claim 9 wherein the step of determining a nominal value of the candidate component comprises determining a nominal value of the candidate component as a function of a relevance of the candidate component to a behavioral profile of the user.

15. The method of claim 9 wherein:

the candidate component has multiple a plurality of versions; and

the step of determining a nominal value of the candidate component comprises determining a nominal value of the candidate component as a function of the version of the candidate component placed on the web page.

16. The method of claim 2 further comprising:

tracking user follow-through on the web page; and

updating the nominal value of a page component on the web page in response to the tracking.

17. The method of claim 16 where the step of tracking user follow-through on the web page comprises tracking link follow-through on the web page.

18. The method of claim 2 wherein the effectiveness of a page component is a function of a placement of the page component on the web page.

19. The method of claim 2 wherein the effectiveness of a page component is a function of the identity of another page component on the web page.

20. The method of claim 2 wherein:

the step of identifying said set of candidate components for the web page comprises identifying page components used in a default composition of the web page; and

the step of selecting a subset of the candidate components for placement on the web page as page components comprises selectively eliminating candidate components based on increasing the actual page value of the web page.

21. The method of claim 2 wherein the step of selecting a subset of the candidate components for placement on the web page as page components comprises:

for at least one page component, selecting a version of the page component.

22. The method of claim 21 wherein the step of selecting a version of the page component is a function of an available bandwidth for the user.

23. The method of claim 1 wherein the step of dynamically composing a web page in response to the request comprises:

using a static composition for a portion of the web page; and

dynamically composing a remainder of the web page in response to the request.

24. The method of claim 1 wherein the request uniquely identifies a web page.

25. The method of claim 1 wherein the request comprises a search request.

26. The method of claim 1 wherein the step of making the web page available to the user comprises transmitting the web page to the user.

27. The method of claim 1 wherein:

the step of receiving a request from a user comprises receiving a request from the user via the Internet;

the step of dynamically composing a web page in response to the request comprises dynamically composing a web page in response to the request; and

the step of making the web page available to the user comprises transmitting the web page to the user via the Internet.

28. A method for building a database of components for use in building a web page in response to a request from a user, the method comprising:

receiving information describing a plurality of components;

registering the plurality of page components in a database of page components to reflect the received information;

receiving a request from a user;

identifying a set of candidate components from the database of page components, each candidate component having a nominal value;

selecting a subset of the candidate components for placement on the web page as page components, wherein the selecting is determined by an optimization of an actual page value of the web page, wherein

the actual page value of the web page is a function of a respective actual value of each page component placed on the web page and wherein an actual value of a page component placed on the web page is determined by a function of the nominal value of the page component and of an effectiveness of the page component on the web page; and

making the web page available to the user.

29. The method of claim 28 wherein:

the step of receiving a request from a user comprises receiving a request from a web server on behalf of a browser operated by the user; and

the step of making the web page available to the user comprises identifying the subset of candidate page components to the web server for composition of the web page.

30. The method of claim 28 wherein:

the received information comprises a category for classifying a page component in said plurality of page components; and

the step of identifying a set of candidate components from the database of page components comprises identifying the candidate component based at least in part on the category of a page component in the database of page components.

31. The method of claim 28 wherein:

the received information comprises a plurality of versions of the page component in the pluralty of page components; and

the step of selecting a subset of the candidate components for placement on the web page as page components comprises selecting a specific version of the page component.

32. The method of claim 31 wherein the received information further comprises a bandwidth ratings for a version of the page comonent in the plurality of versions of the page component.

33. The method of claim 28 wherein for at least some of the components, the received information comprises relevant date information for the component.

34. The method of claim 28 wherein:

the received information comprises a target demographic for a page component in the plurality of page components; and

a nominal value for the page component is a function of a match between the target demographic and a demographic profile of the user.

35. The method of claim 28 wherein:

the received information comprises a subject matter descriptor for a first page component; and

the step of identifying a set of candidate components from the database of page components comprises identifying the first page component based at least in part on the subject matter descriptor for the first page component.

36. The method of claim 35 wherein the subject matter descriptor comprises a keyword.

37. The method of claim 28 wherein the received information is in a format based on a predefined template.

38. The method of claim 28 wherein the received information is received via a predefined application program interface.

39. The method of claim 28 wherein the step of receiving information describing the plurality of page components comprises:

crawling through a network of web pages; and

generating information describing the page components within the network of web pages.

40. A computer system for building a web page in response to a request from a user, the system comprising:

a runtime database containing runtime information describing a plurality of components that can be used to compose a web page; and

a runtime server coupled to the runtime database, the runtime server comprising:

instructions for receiving a request from a user;

instructions for accessing the runtime database to dynamically compose a web page in response to the request; and

instructions for making the web page available to the user.

41. The system of claim 40 wherein the runtime server further comprises:

instructions for identifying a set of candidate components for the web page, each candidate component having a nominal value; and

instructions for selecting a subset of the candidate components for placement on the web page as page components,

wherein the selecting is determined by an optimization of an actual page value of the web page, wherein

the actual page value of the web page is a function of a respective actual value of each page component placed on the web page and wherein an actual value of a page component placed on the web page is determined by a function of the nominal value of the page component and of an effectiveness of the page component on the web page.

42. The system of claim 41 wherein the runtime server further comprises:

instructions for calculating the actual page value as a sum of the actual values of the page components on the web page; and

instructions for calculating the actual value of a page component as the nominal value of the page component multiplied by the effectiveness of the page component on the web page.

43. The system of claim 41 further comprising:

a relevancy engine coupled to the runtime server, the relevancy engine comprising instructions for determining a nominal value of a candidate component as a function of a relevancy of the candidate component to the request.

44. The system of claim 41 further comprising:

a profiling engine coupled to the runtime server, the profiling engine comprising instructions for determining a nominal value of at least one candidate component as a function of a relevance of the candidate component to a demographic profile of the user.

45. The system of claim 41 further comprising:

a profiling engine coupled to the runtime server, the profiling engine comprising instructions for determining a nominal value of at least one candidate component as a function of a relevance of the candidate component to a behavioral profile of the user.

46. The system of claim 41 further comprising:

a link tracking system coupled to the runtime server comprising instructions for tracking link follow-through on the web page, wherein

the runtime server further comprises instructions for updating the nominal value of a page component in response to an instance of the instructions for tracking.

47. The system of claim 41 wherein the effectiveness of a web page component is a function of an identity of another page component on the web page.

48. The system of claim further comprising:

a management server coupled to the runtime server and adapted to receive information describing the components;

wherein the management server and the runtime server are further for registering the components.

49. The system of claim 48 wherein the management server is further for pushing changes to component registration to the runtime server.

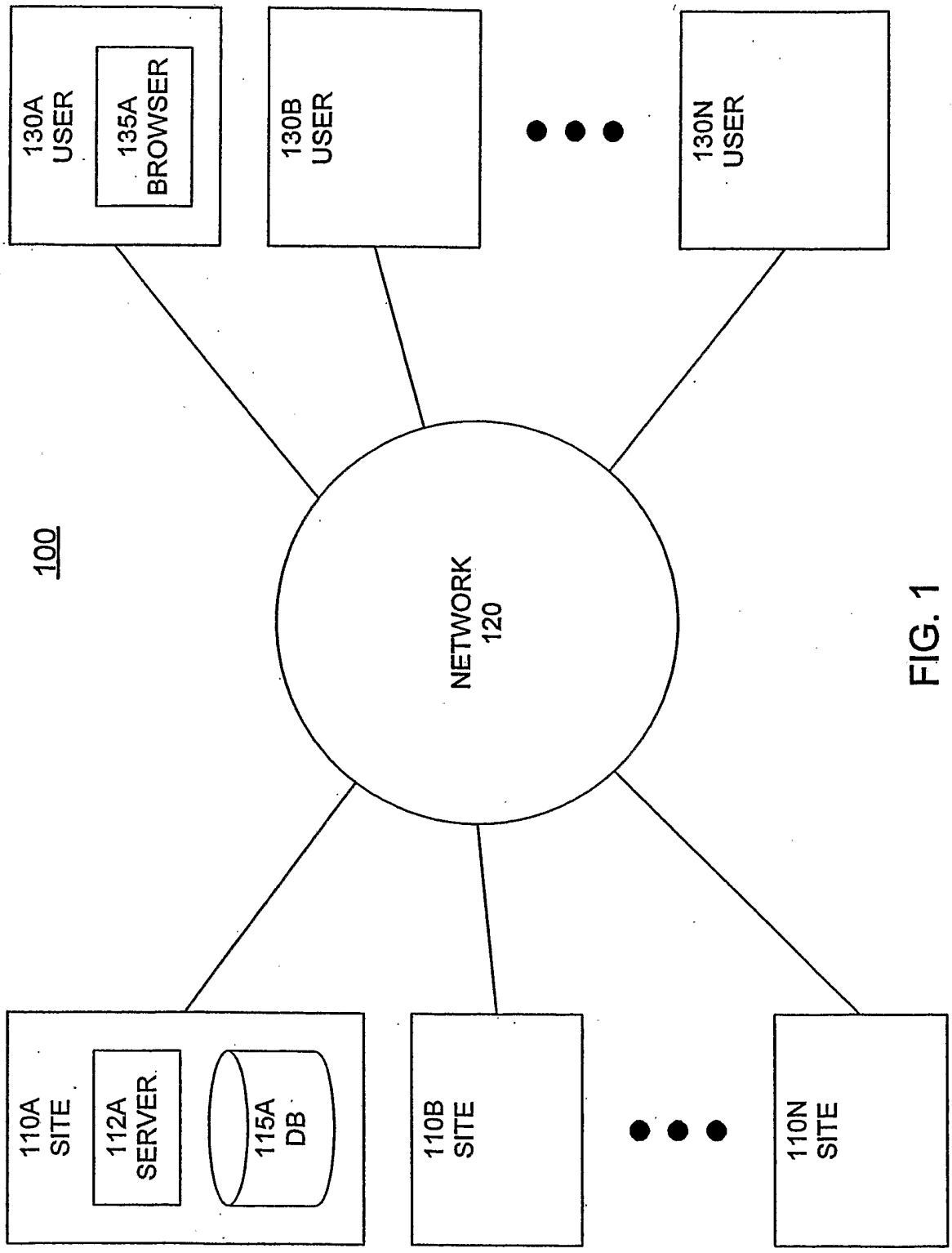

100
130A USER
135A BROWSER
130B USER
130N USER
NETWORK 120
110A SITE
112A SERVER
115A DB
110B SITE
110N SITE

FIG. 1

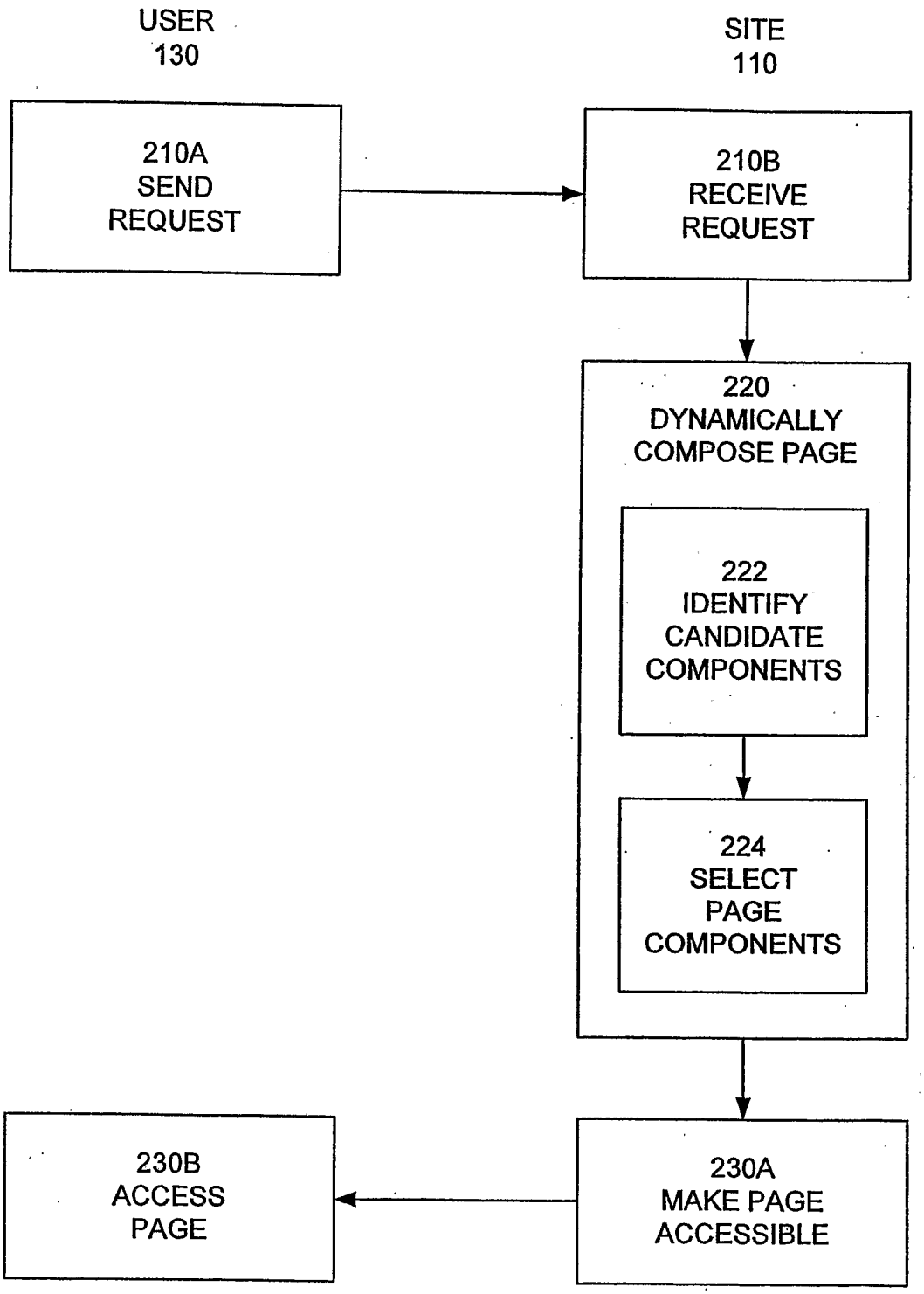

USER
130
SITE
110
210A
SEND
REQUEST
210B
RECEIVE
REQUEST
220
DYNAMICALLY
COMPOSE PAGE
222
IDENTIFY
CANDIDATE
COMPONENTS
224
SELECT
PAGE
COMPONENTS
230B
ACCESS
PAGE
230A
MAKE PAGE
ACCESSIBLE

FIG. 2

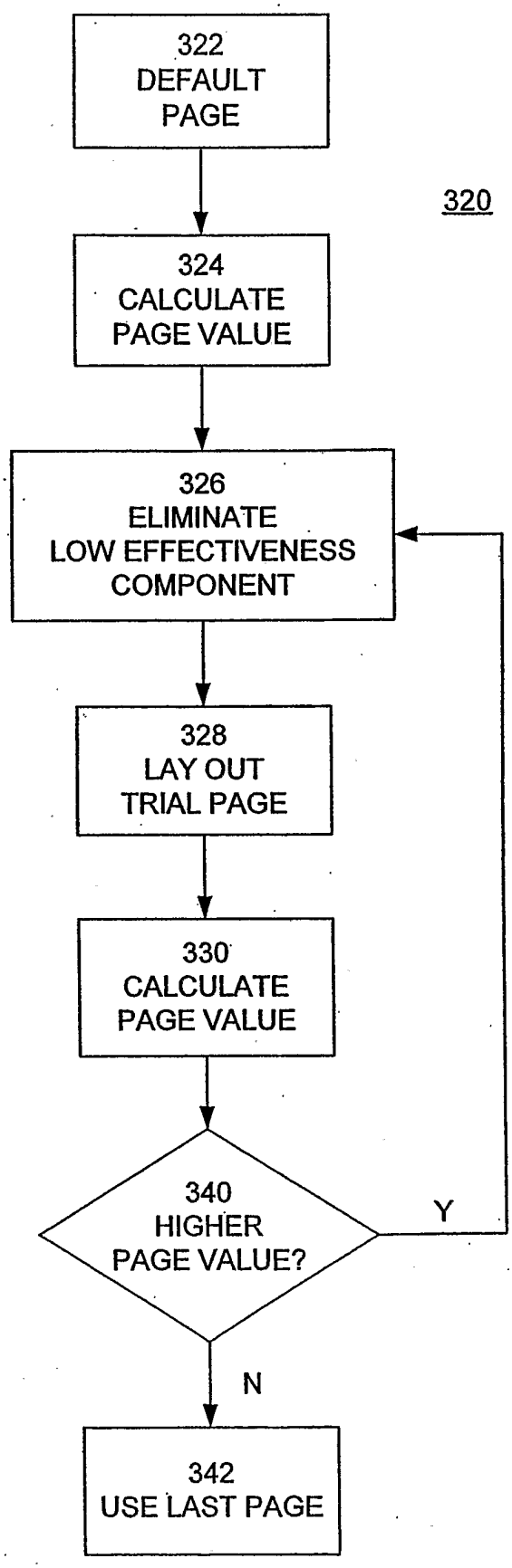

322
DEFAULT
PAGE
320
324
CALCULATE
PAGE VALUE
326
ELIMINATE
LOW EFFECTIVENESS
COMPONENT
328
LAY OUT
TRIAL PAGE
330
CALCULATE
PAGE VALUE
340
HIGHER
PAGE VALUE?
Y
N
342
USE LAST PAGE

FIG. 3

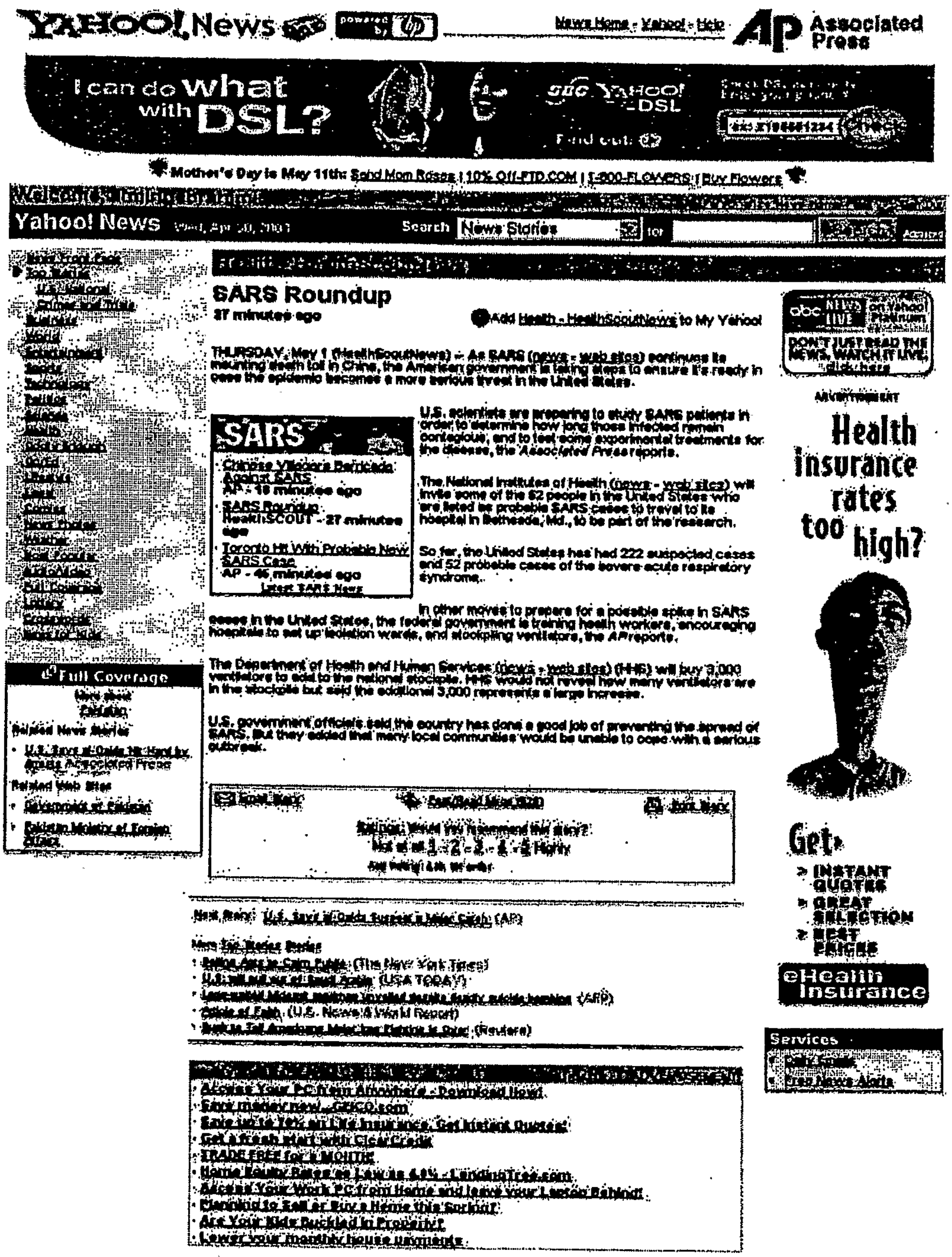

YAHOO! News
News Home - Yahoo! - Help
Associated Press
I can do what with DSL?
Mother's Day is May 11th: Send Mom Roses | 10% Off-FTD.COM | 1-800-FLOWERS | Buy Flowers
Yahoo! News
Search News Stories for
SARS Roundup
27 minutes ago
Add Health - HealthScoutNews to My Yahoo!
THURSDAY, May 1 (HealthScoutNews) -- As SARS (news - web sites) continues its mounting death toll in China, the American government is taking steps to ensure it's ready in case the epidemic becomes a more serious threat in the United States.
U.S. scientists are preparing to study SARS patients in order to determine how long those infected remain contagious, and to test some experimental treatments for the disease, the Associated Press reports.
The National Institutes of Health (news - web sites) will invite some of the 52 people in the United States who are listed as probable SARS cases to travel to its hospital in Bethesda, Md., to be part of the research.
So far, the United States has had 222 suspected cases and 52 probable cases of the severe acute respiratory syndrome.
In other moves to prepare for a possible spike in SARS cases in the United States, the federal government is training health workers, encouraging hospitals to set up isolation wards, and stockpiling ventilators, the AP reports.
The Department of Health and Human Services (news - web sites) (HHS) will buy 3,000 ventilators to add to the national stockpile. HHS would not reveal how many ventilators are in the stockpile but said the additional 3,000 represents a large increase.
U.S. government officials said the country has done a good job of preventing the spread of SARS. But they added that many local communities would be unable to cope with a serious outbreak.
SARS
Chinese Villagers Barricade Against SARS
AP - 19 minutes ago
SARS Roundup
HealthSCOUT - 27 minutes ago
Toronto Hit With Probable New SARS Case
AP - 46 minutes ago
Latest SARS News
Full Coverage
Related News Stories
Related Web Sites
Pakistan Ministry of Foreign Affairs
Health insurance rates too high?
Get
INSTANT QUOTES
GREAT SELECTION
BEST PRICES
eHealth Insurance
Services
Free News Alerts
Access Your PC from Anywhere - Download Now!
Save money now...GEICO.com
Get a Fresh Start with ClearCredit
TRADE FREE for 1 MONTH
Home Equity Rates as Low as 4.9% - LendingTree.com
Access Your Work PC from Home and leave your Laptop Behind!
Planning to Sell or Buy a Home this Spring?
Are Your Kids Buckled in Properly?
Lower your monthly house payments

FIG. 4A

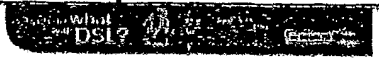
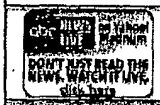
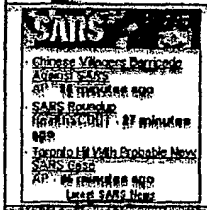
Component	Type / Category	Potential Value	Effectiveness	Actual Value
SARS Story	Content	95	50%	47.5
	North banner DSL House Ad	40	15%	6.0
	East banner News House Ad	20	5%	1.0
	Sky banner Health Insurance External Ad	80	10%	8.0
	Link to News videos on SARS	20	10%	2.0
News Front Page	Generic News navigation Link	5	2%	0.10
Top Stories	Generic News navigation Link	2	2%	0.04
U.S. National	Generic News navigation Link	2	2%	0.04
Crimes and Trials	Generic News navigation Link	2	2%	0.04
Business	Generic News navigation Link	2	2%	0.04
World	Generic News navigation Link	2	2%	0.04
Entertainment	Generic News navigation Link	2	2%	0.04
Sports	Generic News navigation Link	2	2%	0.04
Technology	Generic News navigation Link	2	2%	0.04
....	Generic News navigation Link	2	1%	0.02
Full Coverage (about Pakistan)	Generic News Link	2	4%	0.08
	Ratings Box	5	2%	0.10
Next Story: Bush Arrives in Calif. For Iraq Speech	News Link	2	2%	0.04
More Top Stories	News Link	4	1%	0.04
12 SARS Patients Report Relapses	Related news link	40	4%	1.6
U.S. not ready to say was is over	News Link	2	1%	0.02
....	News Links	2	1%	0.02
ChaseR Platinum Visa: 0% APR	Text Link Ad	2	1%	0.02
What will it take to save for a college education?	Text Link Ad	2	1%	0.02
TRADE FREE for a MONTH!	Text Link Ad	2	1%	0.02
Home Equity Rates as Low as 4.0%	Text Link Ad	2	1%	0.02
	Page Totals	343	20%	66.9

FIG. 4B

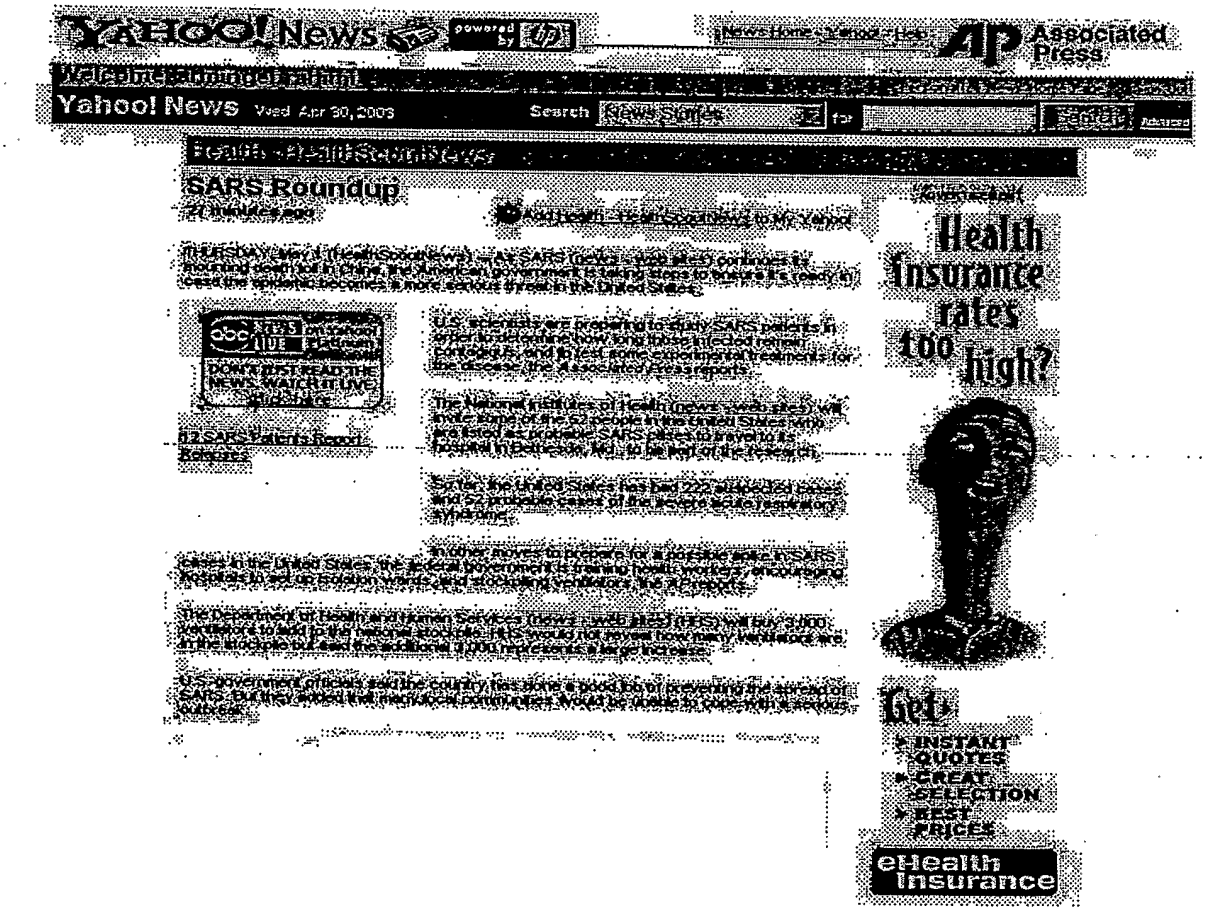

YAHOO! News
Yahoo! News
SARS Roundup
Health Insurance rates too high?
Get
INSTANT QUOTES
GREAT SELECTION
BEST PRICES
eHealth insurance

FIG. 5A

SARS Story	Content	95	80%	76.0
12 SARS Patients Report Relapses	Related news link	40	10%	4.0
	Sky banner Health Insurance External Ad	80	20%	16.3
	East banner News House Ad	20	20%	4.0
	Page Totals	235	43%	100.3

FIG. 5B

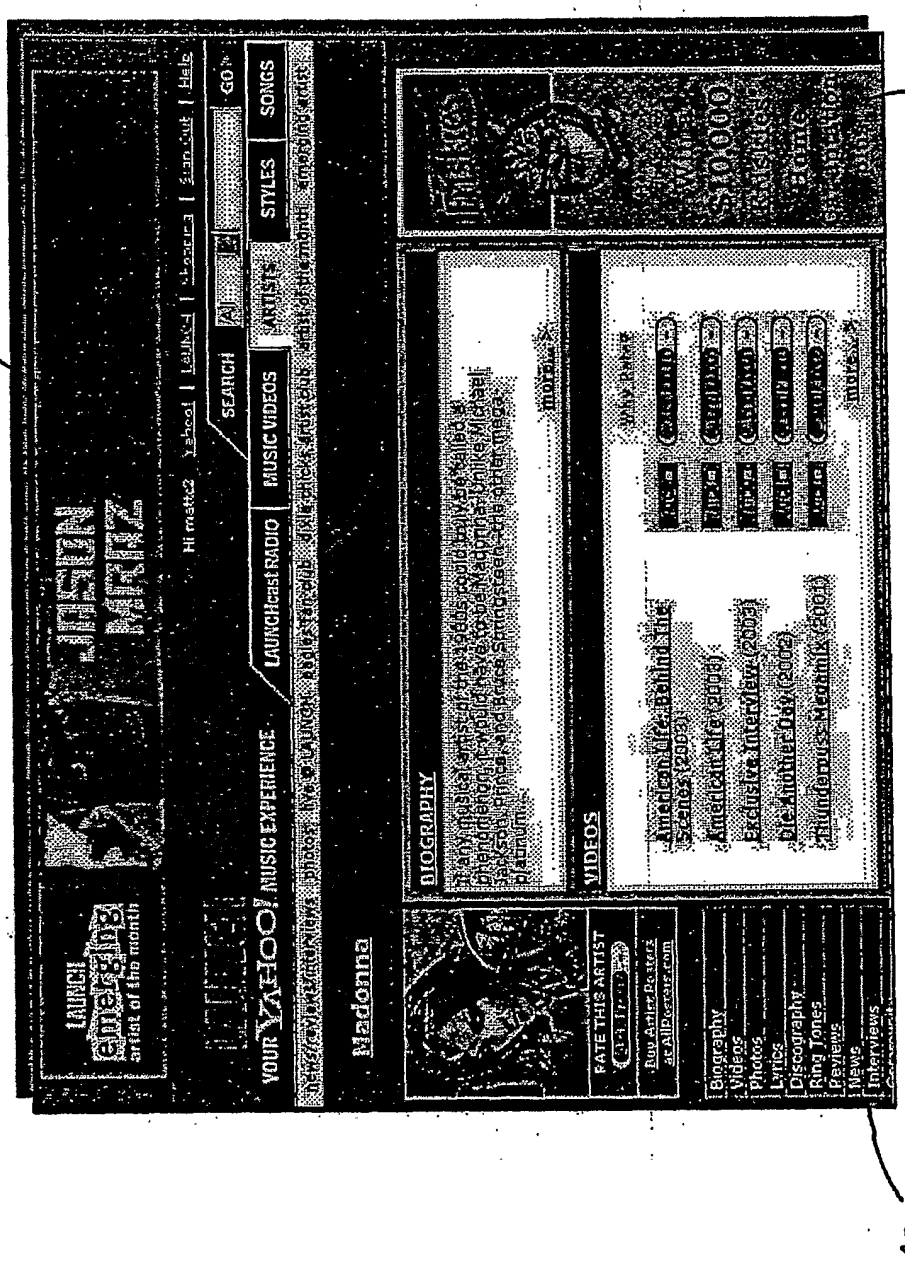

610
614
62
LAUNCH
emerging
artist of the month
MRNZ
YOUR YAHOO! MUSIC EXPERIENCE
LAUNCHcast RADIO
MUSIC VIDEOS
ARTISTS
STYLES
SONGS
SEARCH
GO
Madonna
BIOGRAPHY
VIDEOS
RATE THIS ARTIST
Biography
Videos
Photos
Lyrics
Discography
Ring Tones
Reviews
News
Interviews
American Life: Behind the Scenes (2003)
American Life (2003)
Exclusive Interview (2003)
Die Another Day (2002)
Thunderpuss Megamix (2001)

FIG. 6A

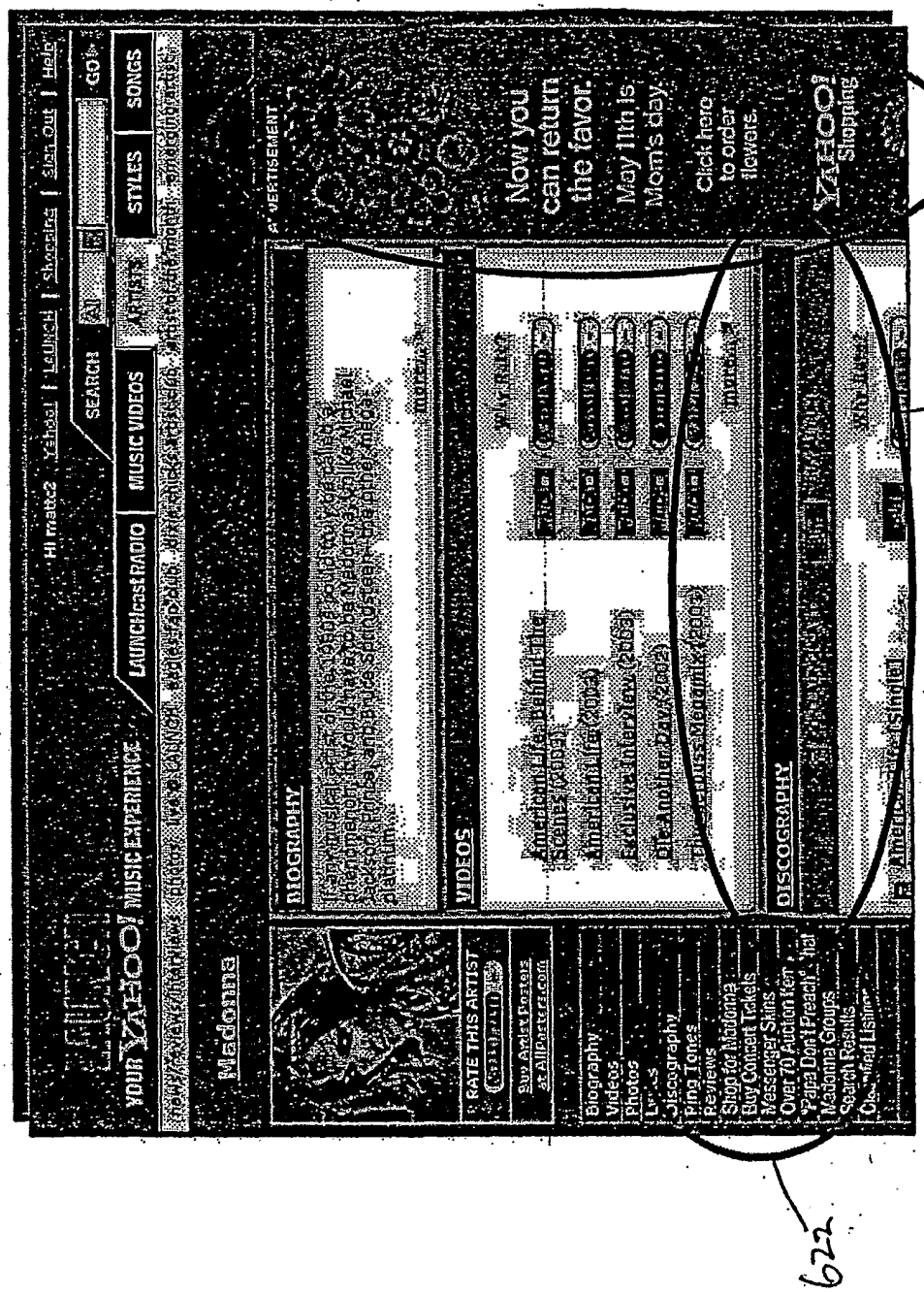

YAHOO! MUSIC EXPERIENCE
LAUNCHcast RADIO
MUSIC VIDEOS
ARTISTS
STYLES
SONGS
SEARCH
Madonna
BIOGRAPHY
VIDEOS
DISCOGRAPHY
Now you can return the favor.
May 11th is Mom's day.
Click here to order flowers.
YAHOO! Shopping
622
620
624

FIG 6B

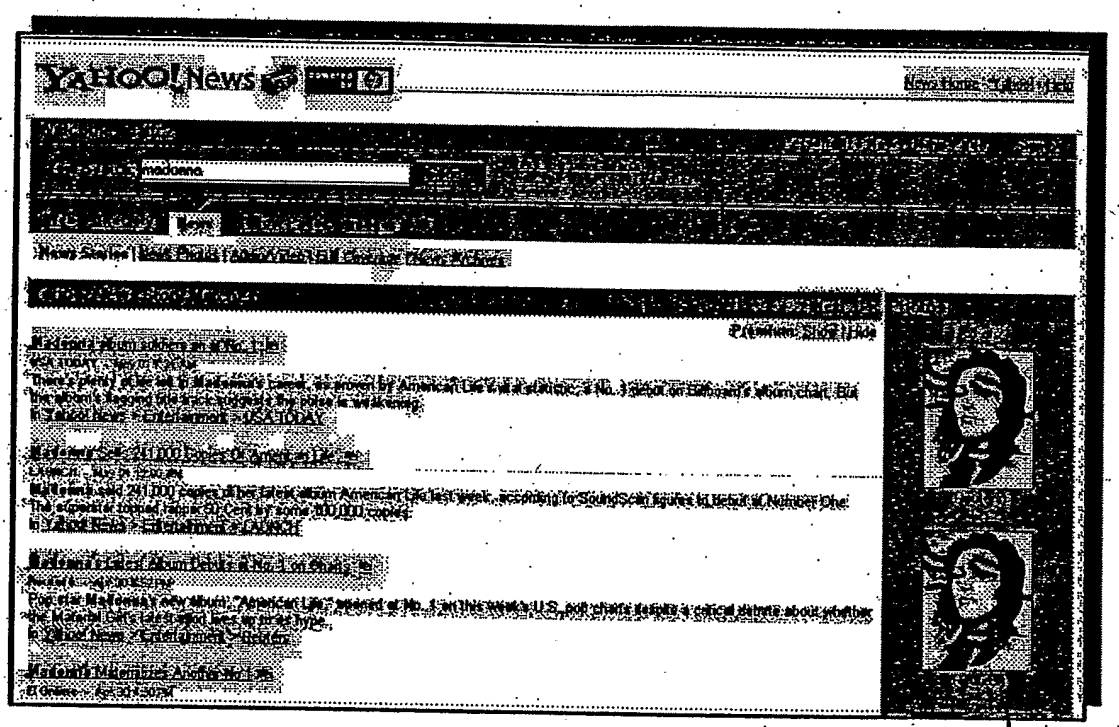


FIG. 7A

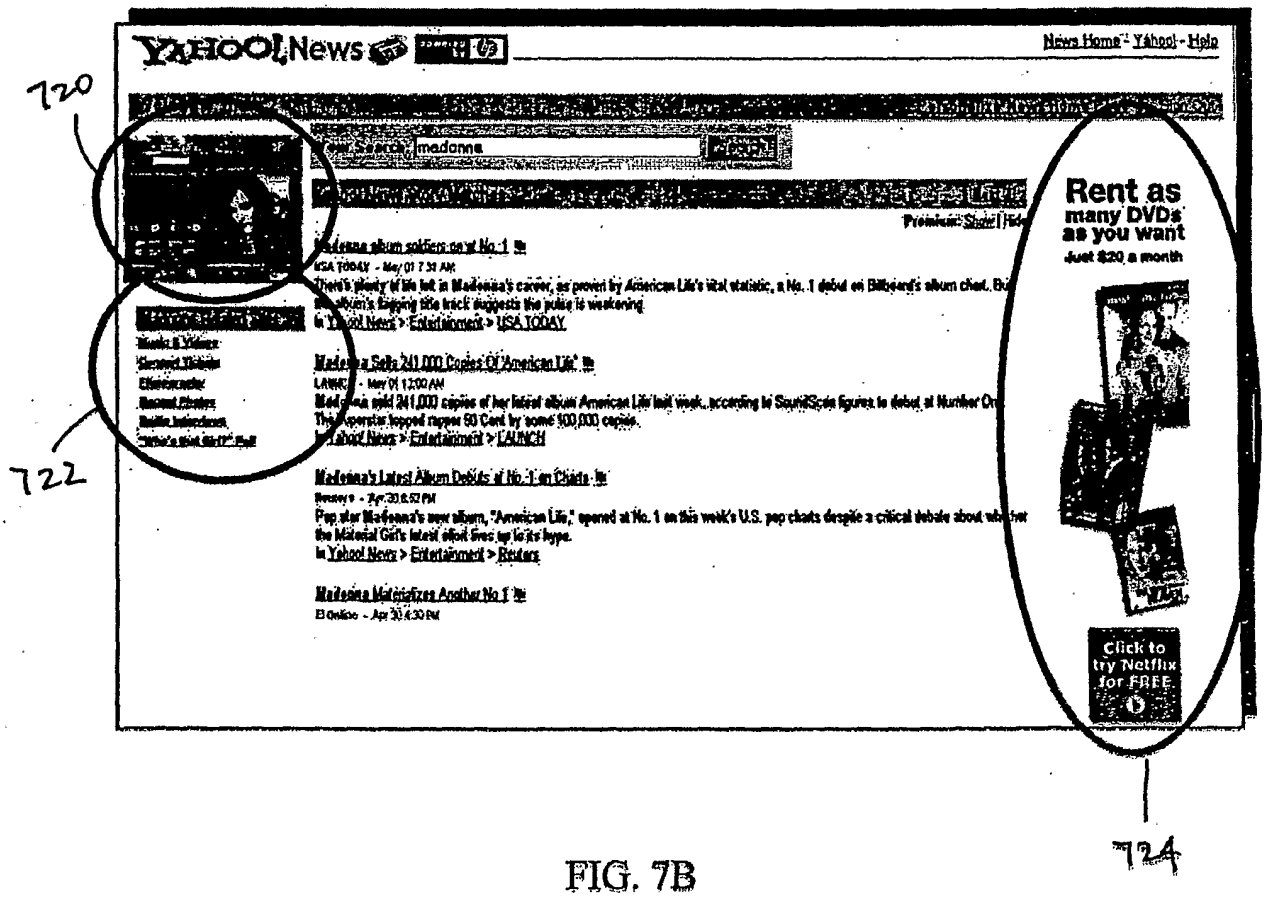

720
722
724
YAHOO! News
News Home - Yahoo! - Help
madonna
Rent as many DVDs as you want
Just $20 a month
Click to try Netflix for FREE

FIG. 7B

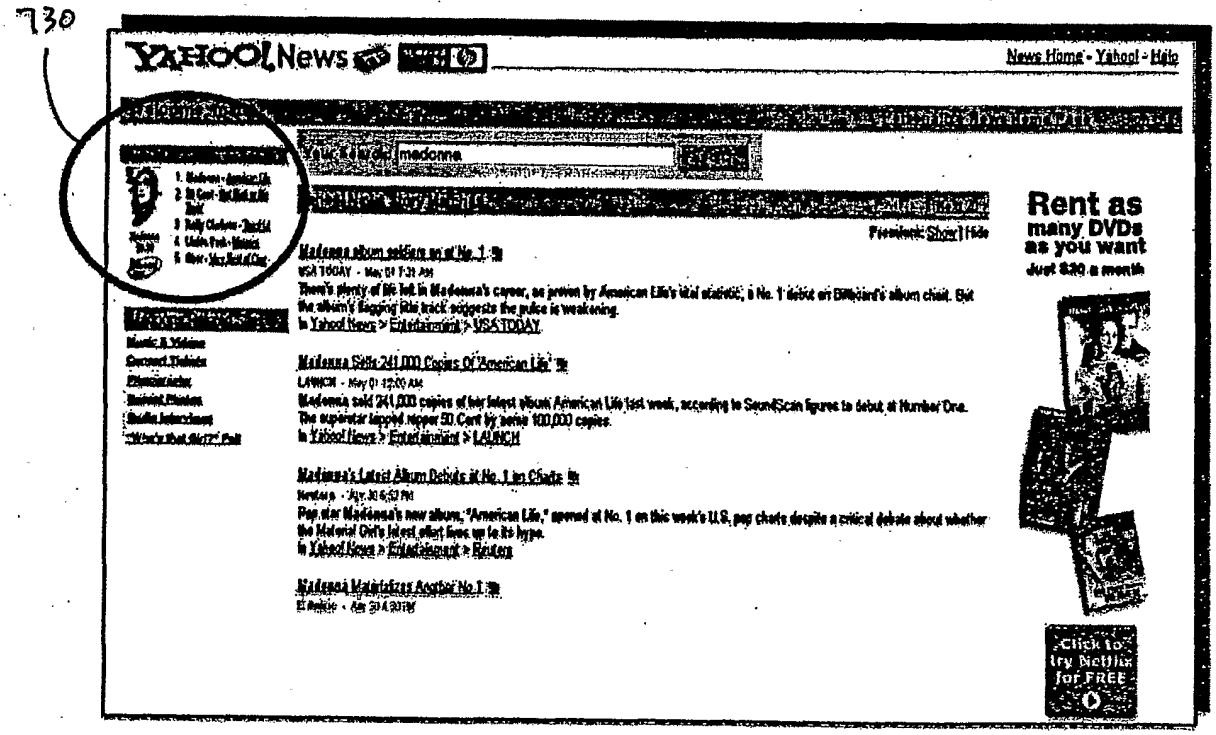

730
YAHOO! News
News Home - Yahoo! - Help
madonna
Madonna album soldiers on at No. 1
Madonna Sells 241,000 Copies Of 'American Life'
Madonna's Latest Album Debuts at No. 1 on Charts
Madonna Maintains Another No. 1
Rent as many DVDs as you want
Just $20 a month
Click to try Netflix for FREE

FIG 7C

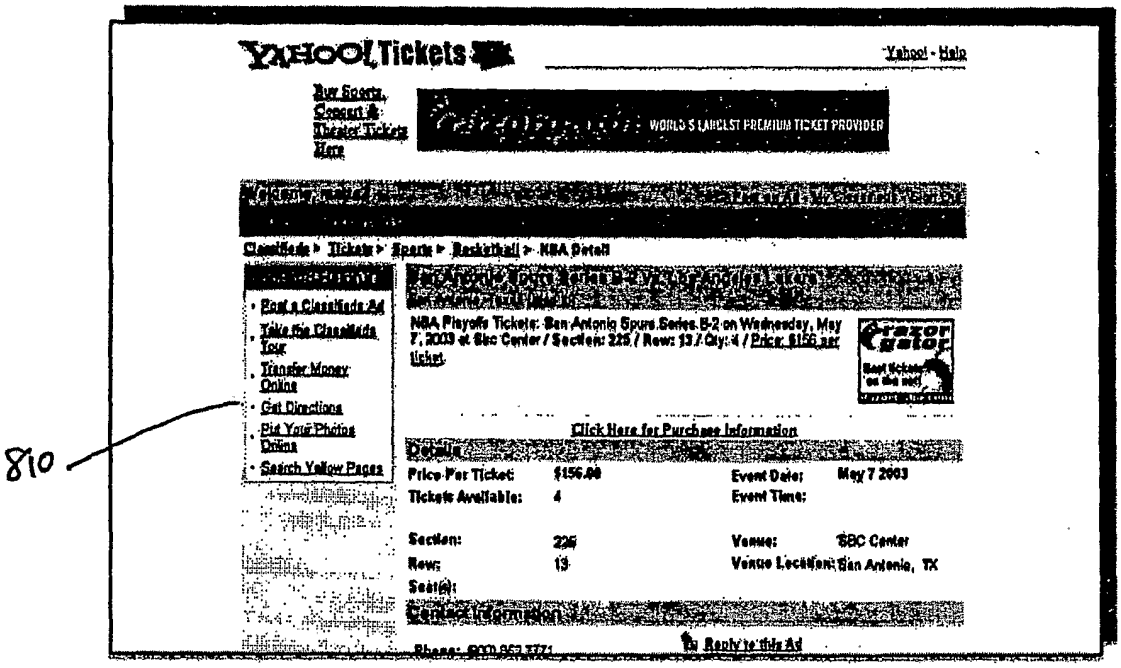

YAHOO! Tickets
Yahoo! - Help
WORLD'S LARGEST PREMIUM TICKET PROVIDER
Classifieds > Tickets > Sports > Basketball > NBA Detail
Post a Classifieds Ad
Take the Classifieds Tour
Transfer Money Online
Get Directions
Put Your Photos Online
Search Yellow Pages
NBA Playoffs Tickets: San Antonio Spurs Series 2-2 on Wednesday, May 7, 2003 at Sbc Center / Section: 226 / Row: 13 / Qty: 4 / Price: $156 per ticket.
Click Here for Purchase Information
Price Per Ticket: $156.00
Tickets Available: 4
Event Date: May 7 2003
Event Time:
Section: 226
Row: 13
Seat(s):
Venue: SBC Center
Venue Location: San Antonio, TX
Reply to this Ad
810

FIG. 8A

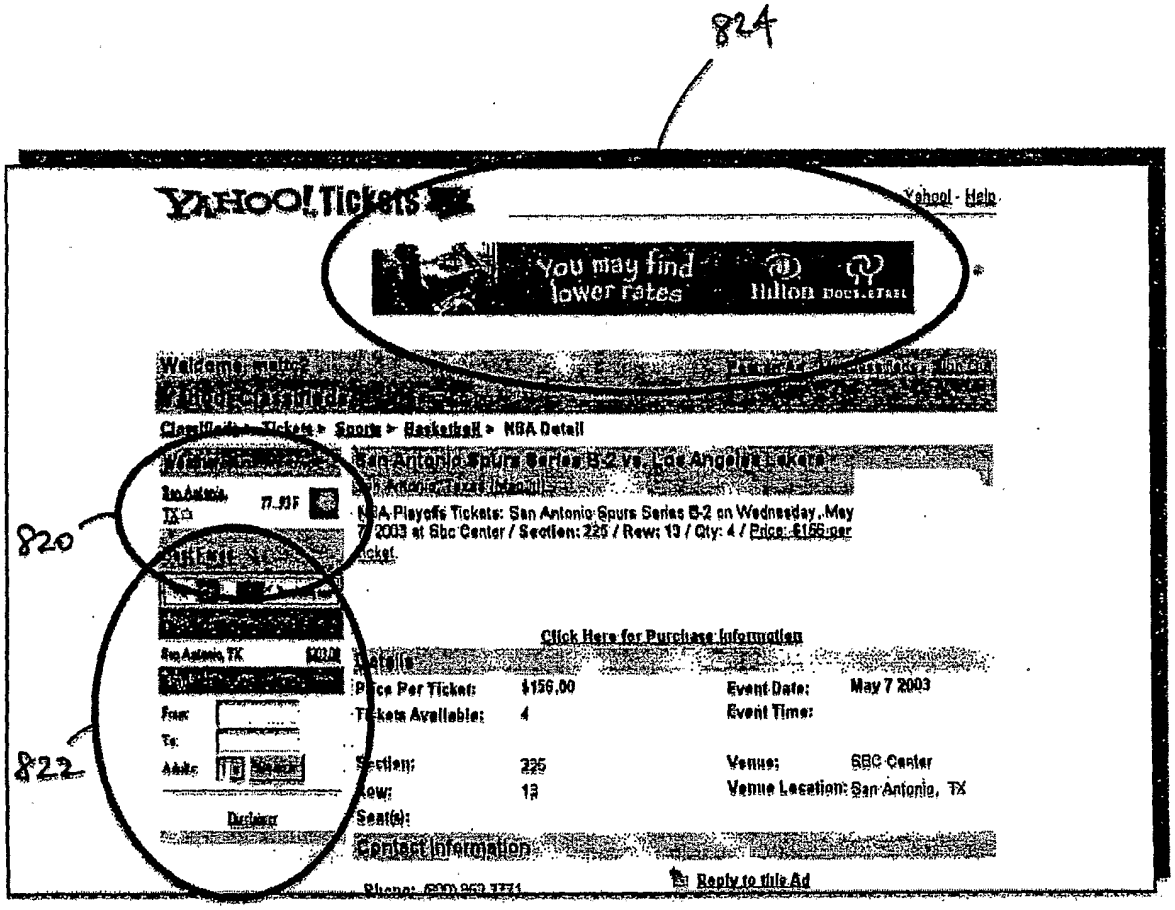

824
YAHOO! Tickets
Yahoo! - Help
You may find lower rates
Hilton
Sports > Basketball > NBA Detail
820
822
Click Here for Purchase Information
Price Per Ticket: $156.00
Tickets Available: 4
Section: 225
Row: 13
Seat(s):
Event Date: May 7 2003
Event Time:
Venue: SBC Center
Venue Location: San Antonio, TX
Contact Information
Reply to this Ad

FIG. 8B

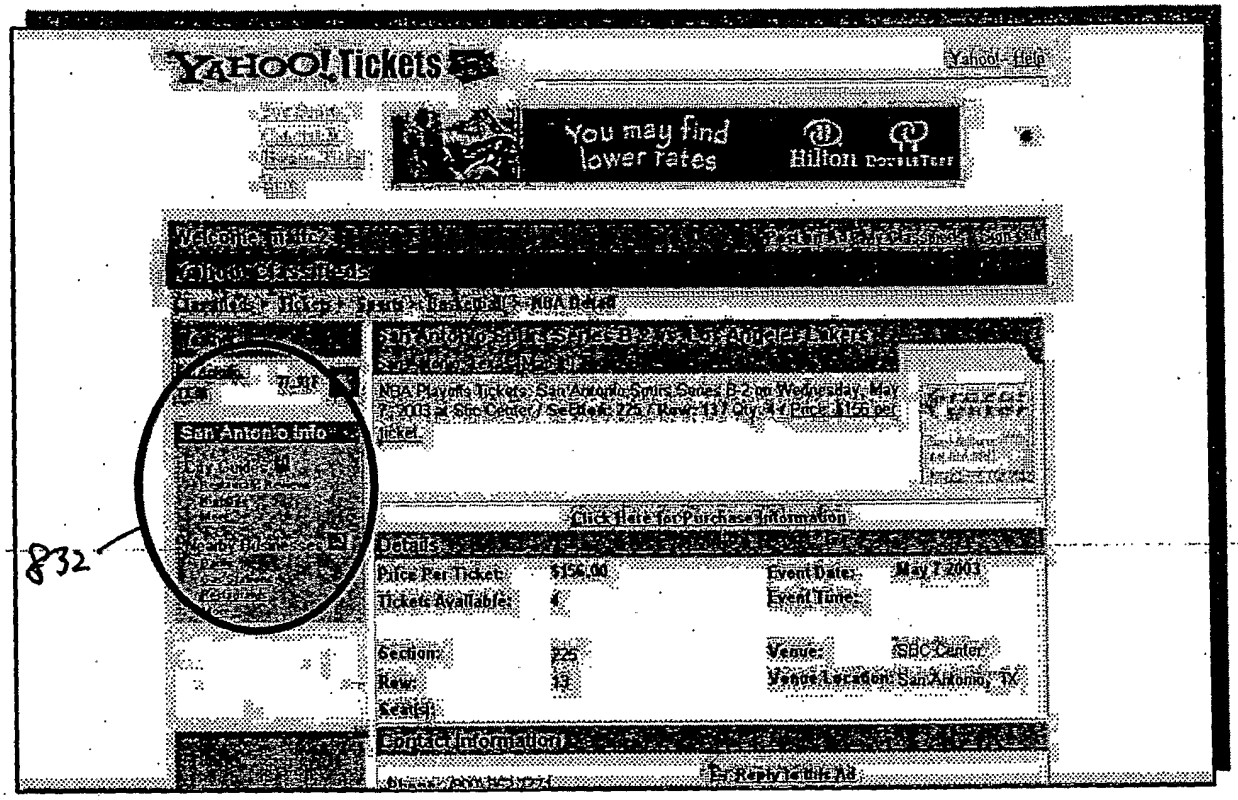

YAHOO! Tickets
Yahoo! Help
You may find lower rates
Hilton
San Antonio Info
832
Click Here for Purchase Information
Price Per Ticket:
Tickets Available:
Event Date:
May 7 2003
Event Time:
Section:
225
Row:
13
Venue:
SBC Center
Venue Location:
San Antonio, TX
Contact Information

FIG. 8C

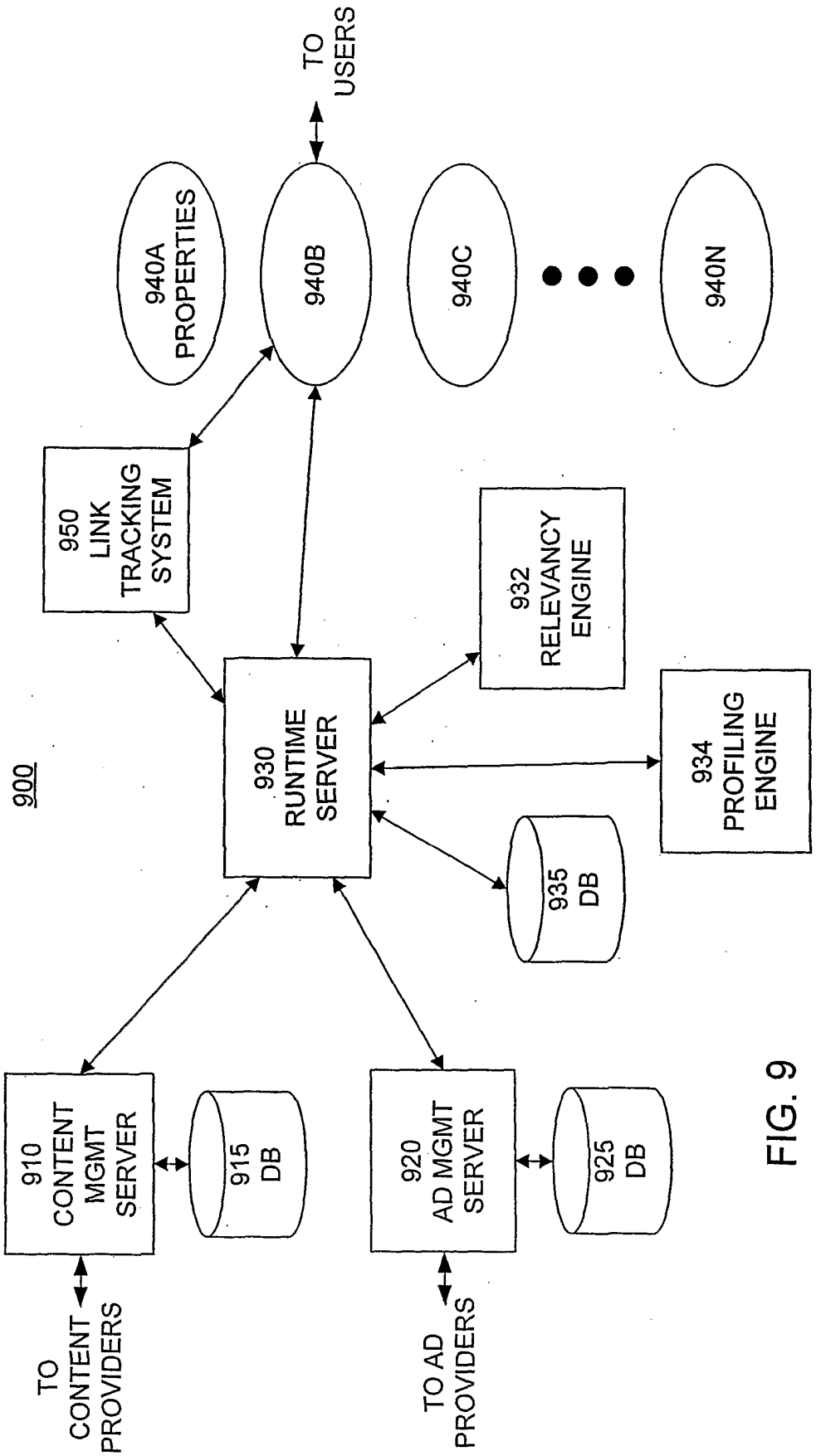

900
TO USERS
940A PROPERTIES
940B
940C
940N
950 LINK TRACKING SYSTEM
930 RUNTIME SERVER
932 RELEVANCY ENGINE
934 PROFILING ENGINE
935 DB
910 CONTENT MGMT SERVER
915 DB
920 AD MGMT SERVER
925 DB
TO CONTENT PROVIDERS
TO AD PROVIDERS

FIG. 9

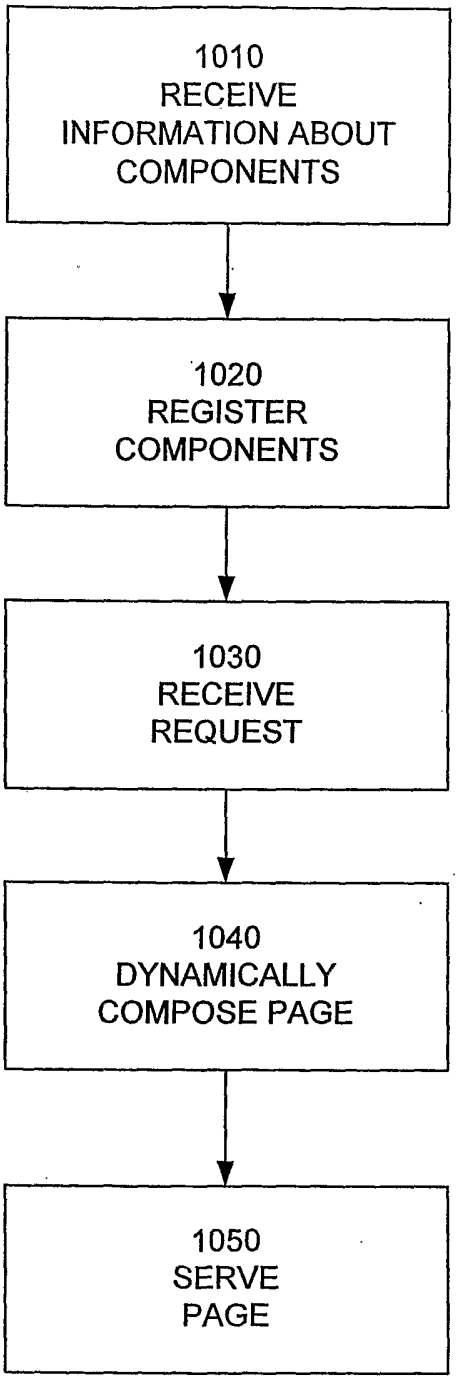

1010
RECEIVE
INFORMATION ABOUT
COMPONENTS
1020
REGISTER
COMPONENTS
1030
RECEIVE
REQUEST
1040
DYNAMICALLY
COMPOSE PAGE
1050
SERVE
PAGE

FIG. 10