
Web Monitoring Tool for Transaction Processing Systems

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Abstract

A Transaction Processing (TP) application is a set of transaction programs designed to automate activities of an organization. Today, a number of different TP applications such as banking, inventory control, insurance etc. are being developed and used by different organizations and, new ones are emerging all the time. Growing demand for on-line services on the Internet made TP systems of great significance. There are millions of websites that provide TP services to the world. The critical aspect of such websites is the availability of website to the end users. This research is focused at the development of a web monitoring tool for websites that host TP applications. This web monitoring tool can be used to identify the parameters that affect the performance of the website. The tool tests and analyzes the website by tracking and, reports the diagnostic information to the provider of the website. It helps to improve one's e-commerce in the market. i.e. trading or facilitation of trading in products or services using internet. The tool helps ensure 24 X 7 accessibility of website, to website providers and visitors of the website. The tool provides functionalities such as sitemap generation, identify issues in HTML tags, view pages visited by customers, show web page load time, total traffic of the website, number of unique visitors and return visitors, total clicks and location of the visitor, identify broken links, identify the web page's missing titles, duplicate titles, meta keyword and meta description. The recorded diagnostic information is reported to the website provider in excel and CSV format.

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I. Introduction

Website or web application is a group of web pages where each page contains a set of related information such as text, pictures, music, video etc. Web page is constructed by a bunch of codes such as HTML, CSS and JS which is used to describe the structure of the web page. A web site hosting TP application can be made available for public access[1]. For public access, it should be hosted on a web server. For hosting in web server, it requires a domain name or static IP address. Using this IP address, end user can access website and web pages. Domain name is an Internet address which is called as URL (Uniform Resource Locator). Web pages are accessed through the browsers such as Internet explorer, Google chrome etc. A browser is a program that takes code from a particular web page and analyzes and, projects it to the user on the screen. Web pages are accessed by the web browsers through the HTTP (Hypertext Transfer Protocol). Websites are owned by a single person or an organization through which their facilities are provided to the consumers. The required users access the specific website to obtain specific requirements. The provider, in order to improve his website accessibility in the market, needs to provide advertisement about the facilities that are provided through the website and make the website well-known. For this purpose an analysis, such as location of accessibility, domain of accessibility, traffic on website etc. must be captured for the website by tracking [2].

Most of the business transactions are being automated today. The availability of websites providing such transaction services to the end user plays vital role in revenue generation to the business. If the website is unavailable or not accessible to the end user, then the user gets frustrated of using that website and may approach other websites providing similar services and the business provider has the threat of losing the customer. Therefore, a web monitoring tool is required to verify that the website is accessible to its users. The tool reports website errors and statistics to the provider of the site. The web monitoring tool also helps to generate a sitemap structure of the website that is accessible to the users and the search engines like Google, Yahoo etc.

The tool provides the information that helps to correct errors associated with the website faster and provide information to improve website accessibility so that website provider can improve his trading in the market. Web monitoring tool also helps the provider of the website to capture the performance information which can be used to benchmark the website. The captured parameters can be provided in the form of reports, charts and graphs[3].

There are some standards that are specified by the popular search engines to improve the website and web application performances as stated below

- Create unique and accurate web page title.
- Make use of the meta description and meta tags.
- Improve web site structures easier to navigate.
- Write quality content as text images and heading tags appropriately [4].
- Search engine helps in only organic search results, not paid.

Website provider must have to ensure that the website functionality and content works properly and, has reduced critical problems. If the issues increase on the website, then web provider may lose genuine end users [5]. One of the primary goals of the website provider is to provide proper information and functionality to the potential customer around the world on 24X7 bases. The broken web pages may not even satisfy the search engines. If the website does not fulfill the search engine standards, then it loses ranking into the search engines [6, 7] like Google, Yahoo etc.

Related work

There are many research carried out to develop a monitoring tool giving attention to solve the problems that are related to the performances of the website. Among which some of the monitoring tools provide network related information such as network drop, working of routers etc. And some other tools provide database related information such as the time taken to retrieve the data from the database, consistency level checking etc. These monitoring tools always charge depending upon the services they provide. Some windows monitoring tools are also available to manage windows based products and services. The web monitoring tool of the proposed type is unique in the literature that tracks the website and reports the diagnostic information to the website provider; which helps the provider to improve his business in the market.

II. Implementation

This section gives a brief of the tools and technologies used for the implementation, flow diagram of the system followed by its implementation details.

A. Tools And Technologies Used

The specific requirements of the tool implementation are Web Server, Browser, Personal computer, Domain name/Static IP address, Internet 24 X 7 and XAMPP server. We have used the tools Cs3 editor, JetBrains Webstrom editor for the implementation. The programming languages used is PHP, Javascript, HTML, CSS, AJAX, Jquery, and XML. The implementation platform is Windows/Linux OS, MySQL, Web development Plug-ins, Web browsers and Apache Web Server. The system configured with 2Gb RAM, 40Gb Hard Disk and Intel i5 processor is used for the development.

B. Flow Diagram of the System

The flow diagram of the system developed is as shown in fig. 1. As the Website monitoring tool is launched through any domain, the website provider has to sign into the tool registration for monitoring. Once registered, the site becomes accessible to the tool for monitoring. As the website or web application's URL is provided to the tool, the tool authenticates the specific user to ensure security.

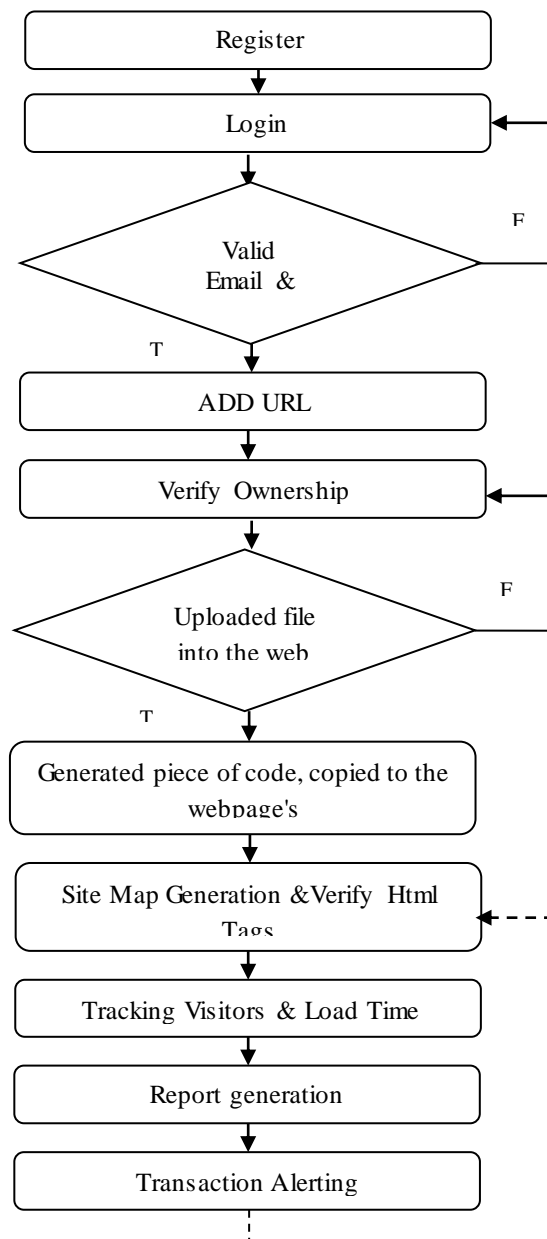
The tool provides a code snippet which needs to be inserted in the web page to be monitored. The website is tracked in its entirety for performance in the market and, errors associated with the website and other issues related to its poor performance are notified to the tool user [8]. The system provides diagnostic information of the monitored website to its provider by means of graph and text. This report can be downloaded in Excel or CSV format which can be sent via email.

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C. Sitemap Generation

The tool takes domain URL as an input. After a click on Submit URL button, a function implemented in the tool directly goes to the default home page of that web application and entirely reads it. The function identifies the entire web link associated in that home web page. This is done by identifying all <href> tag used in the home page. After identifying all the links of that home page the tool takes all that links as an input again. The same function is recursively performed on that links and identifies other links associated with that links. This is continued until all the links of the entire web application is identified. Here each links are stored into a stack and when the same link is occurred again then it is ignored. By considering all these links a site tree is constructed which

results in generation of sitemap and the users are provided with the option to download the generated site map in text format. As the URL is submitted to the tool a crawl code is implemented on the web application which has a function to generate the sitemap. By this sitemap the user can understand the structure of the web application and user can improve the design of the application as required and can improve its quality. The code snippet reading the web page is as shown below.

```
curl_setopt($ch,CURLOPT_URL,$url);  
    curl_setopt($ch,CURLOPT_RETURNTRANSFER,1);  
    $data = curl_exec($ch);  
    identifying sub pages.  
    explode("<a",$html);
```

D. Showing Access Location

When end users use specific web application and that web application's URL is submitted as input to the tool, a piece of code is implemented on the web application which scans the entire application. When this application is accessed by any person from any location and since the system is connected to the network, we can access the IP address of the system. For accessing the system's location through web application that is registered to our tool, a website is implemented in our tool. That website is able to access the location of the system that uses web application through the network when system's IP address is provided as input to it. Our tool provides information about how the user is accessing the web application; whether they are directly accessing it by its URL or they are coming from other domain. It also provides information about the locality of the users accessing the web application. This is very useful information so that they can manage the advertisement and promotions of the web application to improve their market. The website and function that is implemented for accessing location is as shown below:

\$ip = [End user ip address]

\$query = @unserialize(file_get_contents('http://ip-api.com/php/'.\$ip)); using this function & ip-api.com we get the all parameters of location, country, city, (isp) service provide.

E. Showing Load Time

When the end user access the web application ,tool keeps track on start time and end time of access; i.e the time when the user clicks on website(start time) and the time after the web page is completely loaded(end point).The start time is subtracted from the end time to get load time of website in milliseconds. How fast it loads the website is browser dependent. The output time is displayed as a result. The function for implementing load time is as shown below.

```
var loadtime;
window.onload = function(){
  setTimeout(function(){
    var t = performance.timing;
    loadtime = t.loadEventEnd - t.responseEnd;
  }
}
```

F. Tracking Visitors OS

A script is implemented in our tool for tracking visitor's OS. When website is registered to our tool, a piece of code is implemented in the index page of the application. This piece of code includes the function of script, which is used to identify operating system in which application is loaded. As the application loads in particular system the function which is implemented in the index page also loads and identify environment in which the application is running. Load time and operating system identification helps to improve performance related issues. The domain from which application is accessed, the browser and the OS on which application is loaded is displayed. The script for tracking visitors OS is as shown below:

```
var nVer = navigator.appVersion;
navigator.sayswho= (function(){
  var N= navigator.appName, ua= navigator.userAgent, tem;
  var M=
    ua.match(/(opera|chrome|safari|firefox|msie)\/?\s*(\.\d+(\.\d+)*)/i);
  if(M && (tem= ua.match(/version\/([\.\d]+)/i))!= null) M[2]= tem[1];
  M= M? [M[1], M[2]]: [N, navigator.appVersion, '-?'];
  return M;
})();
```

III. Usage

The Web monitoring tool provides or reports the performance issues related to the TP website continually and projects it in a one dashboard. Real time reports such as new clicks, number of unique visitors to the website, location accessing the website etc. can be obtained using this tool. The tool helps web improvisation and a way to build its own trend in the e-commerce market for the web services. It also helps find the root cause of poor performance of the system. It can demonstrate that the system meets performance criteria and reduction of repetitive work. By monitoring the TP website through this tool, it is made sure that the customer has an uninterrupted experience on the tested site, which leads to an increase in on-site clicks through different domains. The tool offers rich statistics that shows the total impression and clicks rate on the specific site. It helps to identify which page of the site visited the most, by the customer. It also provides an idea to the providers of the web application about its performance and how it is improved and advertised, on the basis of location in a statistical manner, to increase their sales[9].

The tool will be further enhanced to attract many website providers to get registered with the tool. To get service of this tool, the website provider just needs to register with the tool by specifying their name, email id and contact number and then they need to login using their email id

and password. If login fails then it redirects to the login page. After a successful login the provider needs to add his website URL to the tool. The tool verifies the ownership of the website by generating a unique file which is uploaded to the website provider's web server. The website provider needs to download this file and click verify button so that the tool automatically checks the unique file which is uploaded in the web server and provides another code snippet which is to be copied into the web provider's webpage. This code helps the tool to track the user website. By successfully verifying the ownership of the website the user is allowed to check sitemap of their website and also user are allowed to check the unique visitors, total traffic of the website which are provided on the dashboard. The user can also check load time of their website. All these issues are alerted through the email. Using this information user can improve their website performance and help the visitors for better browsing experiences.

IV. Results and Snapshots

The website provider must login to the tool when launched in the website to make the tool to execute in his system. Then the tool takes web URL of the site as input and generates a code which is to be copied in the user's web server. The website will be verified by the tool automatically. The snapshot of this ownership verification phase is shown fig. 2. The website provider is given a link to download the HTML verification file. Then the provider has to upload the file to the given link after filling the necessary fields. Verification is initiated by the tool when the verify button is pressed. These steps are essential to authenticate the web provider.

Fig. 3 shows the dashboard of the tool. The parameters on the dashboard are updated online depending on the events that happen in the website. When a new visitor visits the site, the Newclick window is automatically updated. This information helps the web provider to improve or to provide a better advertisement that attracts the web users. Web providers can plan their strategies to market their website depending on the location of the visitors. The web provider can also improve the website by modifying or specifying a correct site tree which makes end user to feel a better browsing experience [10,11]. The dashboard also has the other windows like bounce rate, Browser and OS and, unique visitors. These windows are explored on click. It also provides crawl statistics.

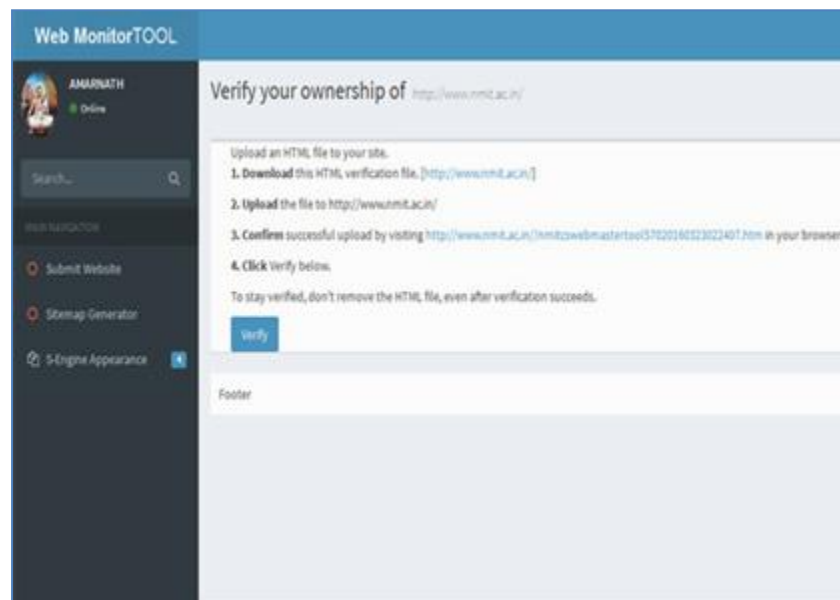


Fig.2: Verification of ownership



Fig.3: Dashboard

Fig. 4 shows the sitemap of the website lifesecond4u.com which is used for the test purpose. After the verification step, the tool can generate sitemap of the website. If any broken link is present in the website, then it is not accessible to the end users. The sitemap can be downloaded by clicking the download button.

Sitemap List		
⌵	http://lifeseure4u.com/	2016-02-22 02:36:12 Download
⌵	http://lifeseure4u.com/	2016-02-22 03:11:16 Download
⌵	http://lifeseure4u.com	2016-03-20 23:03:16 Download
⌵	http://lifeseure4u.com/	2016-04-05 03:36:29 Download

Fig.4: Tool generated sitemap for user website

As shown in fig. 5, the tool also tells from which location the visitors are accessing the website. It also reports how many end users are using the website from that location.

Country By Vistors	
Back	
⌵ Argentina	1 Visitors
o Córdoba	1 Visitors
⌵ Brazil	17 Visitors
o Bela Cruz	1 Visitors
o Belo Horizonte	1 Visitors
o Campinas	1 Visitors
o Catalao	2 Visitors
o Contagem	2 Visitors
o Criciúma	1 Visitors
o Marília	1 Visitors
o Mirandópolis	1 Visitors
o Montes Claros	1 Visitors
o Natal	1 Visitors
o Rio de Janeiro	2 Visitors
o Salvador	1 Visitors
o Sao Goncalo	1 Visitors

Fig.5. Locations of the visitors.

Fig. 6 shows the time taken by the website to load in user system and reports the times which will be in milliseconds including details of the internet service provider and browser[12].

Load Time		
Back		
⌵	http://lifeseure4u.com/inner.php?q=2 Bharti Airtel	Firefox,45.0 1873 ms
⌵	http://lifeseure4u.com/inner.php?q=1 Bharti Airtel	Firefox,45.0 484 ms
⌵	http://lifeseure4u.com/inner.php?q=5 Bharti Airtel	Firefox,45.0 488 ms
⌵	http://www.lifeseure4u.com/ Bharti Airtel	Chrome,38.0.2125.102 6484 ms
⌵	http://www.lifeseure4u.com/ Bharti Airtel	Chrome,38.0.2125.102 347 ms

Fig. 6: Load time.

Fig. 7 shows the operating system used by the visitors to access the website. This information helps to make the website responsive. A responsive website is one that provides the best viewing and interaction experience. A responsive website also provides easy reading and navigation with a minimal resizing, and scrolling across a wide range of devices. The range of devices may vary from desktop computer monitors to mobile phones.

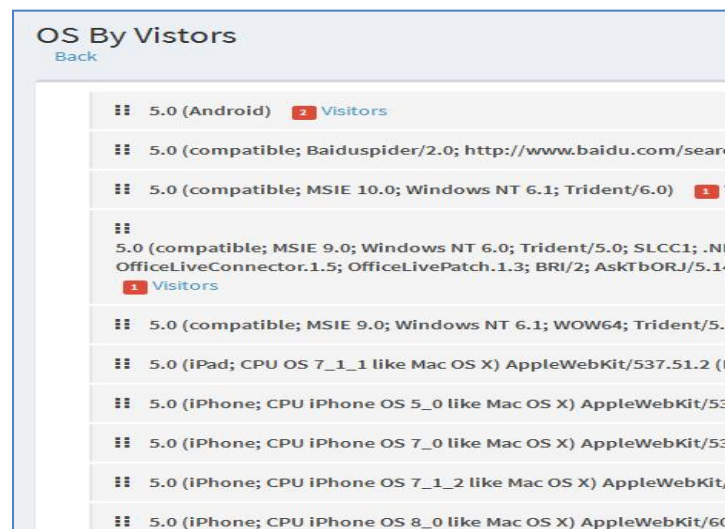


Fig.7: The operating system used by the visitor

V. Conclusions

In this competitive and rapid developing e-commerce market operational research and analysis must be made about the website's operation in the market for the survival with competitors and maintain our own trend in the market. The specific organization that provides TP service through web must maintain good quality of their websites in different domains and must have an idea about the performance of websites in the market and their market improvement. Web diagnostic report provided by the implemented tool helps web provider to extract the information required to improve their business. In general, the tool helps in analyzing the number of visitors, pages visited and the number of times the page is visited, location of end users, the operating systems of the visitors and the site from which they access the website. This information can be used to update the website and provide the specific solutions to the website performance issues.

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