Performance Evaluation of Malaysian University Website

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Abstract

In recent years, many people have devoted their efforts to the issue of Web site performance. Web performance testing can be divided into many categories. It is usually performed in different aspects such as user interface, functionality, interface compatibility, load/stress, and security. This research investigates Malaysian university performance of the website under the World Wide Web environment. In the World Wide Web environment, we measure real data and obtain response time via the evaluation procedure. This research conducts some tests to measure the performance of a web site via a website test. To get results on the performance of a Web site, we measure some data from the calculate page size, composition, and download time, markup validation ,number of broken link, and number of link connected to the site. Based on the observation result indicates that web sites performance of the Malaysian University website is relatively low compared to world class university website.

Keywords: Web site performance, web performance testing, web design

1. Introduction

Optimization of a website have a very strong relationship with an optimization of hardware, software, and webpage design. The optimization of webpage is very important for the website, especially a website which has very dynamic content. Website designer plays an important factor for determining the perfomance of the website, there are several rules that has to be followed during the website development, such as :

- Webpage which has small size page will be ownloaded faster compare than bigger size page.
- Webpage which has small picture size will be downloaded faster than the website with big picture size
- Web User will not tolerate a long waiting time for downloading for downloading web pages

Competition among universities demands all the universities to provide good services for the users. Having an effective and efficient websites is the priority for a service institution. A good service hopefully will increase the value of satisfaction and give an impact for the performance of work. There are so many factors influence the performance of the web and most of it is outside the control of website designer. Download time of the website will be determined web page design, web server, hardware of the client, software configuration, and characteristics of the internet router which connect user and the website [1]. One survey mentioned some factors that influence the unsatisfactory level of user 1) failed to find related information 2) by using website with lack of user friendliness 3) by using websites which has a very slow download time [2]. The previous two factors deal with the navigation and the location in the webpage, while the third factor deal with the problem of download time that is common for user of the internet. One of the research finding mention that website which has slow download time less attractive compare than website with faster download time [3]. In the recent time the average time of the connection speed is 5Kbps (*kilobytes per second*). This facts give an implication that one web page with 40Kb page size will be downloaded during 8 second. This matters in accordance with the 'eight second rule', this 8 second is a normal time for loading webpage and will not be tolerable from the user. This result are supported by many research result mentioned that tolerable download time in the user side is 8.57 with standard deviation 5.9 second [4]. There are many factors affected the satisfaction of internet user during the downloading process of the website [5], which are:

- Time required for finishing download one web page. The satisfaction level will reduce if the process of

downloading take times and this is because of there are so many picture in the web

- User will have uncertainty in term of time needed for download time. This uncertainty will add dissatisfaction toward internet user and it will give an negative effect to the intention using this service [6], this means that information about download time will be needed by user.

Providing information related with waiting time is very important for user. For the long download time, it is better to provide information about how many percentage of the webpage already downloaded and how many hours needed to complete this task [5]. Broken links on the webpage also are another factor that always downgrades the performance of website. Each page usually has references or *links* or connections to other pages. These may be *internal or external* web site. A user expects each link to be *valid*, meaning that it leads successfully to the intended page or other resource. While broken links affect everyone, some rely on them more than others; for example, professional researchers and academics find this problem frustrating, because even after a few months many citations in a publication will have moved or been deleted. In a 2003 experiment, discovered that about one link out of every 200 disappeared each week from the internet [7]. About 3% of the objects in digital libraries were no longer accessible after one year [8]. Such inactive article references affect the credibility of the work and hence its value to the community.

Number of links to website improves access growth and helps to generate traffic. Search engine such Google make us a citation analysis to rank hits, then a website which has a many links to it will have a higher ranking compare than a website with a few links. This indicator can be used to measure the performance of web site [9].

$$PR(A) = (1-d) + d(PR(t1)/C(t1) + ... + PR(tn)/C(tn))$$

t1 – tn = are pages linking to page A
C = is the number of outbound links that a page has
D = is a damping factor, usually set to 0.85.

Number of the links, or link popularity is one of the off page factors that search engines are looking to determine the value of the webpage. Most of search engine will need a website to have at least two links pointing to their site before they will place it to their index, and the idea of this link popularity is that to increase the link popularity of a website, this website must have large amount of high quality content.

Methodology

his research stages will start with problem identification followed by research procedure and sample of data explanation.

1. Problem identification

Every webpage design has their own characteristics and this characteristic has drawbacks and benefits. There is a mechanism for measuring the effects of the webpage component toward the performance of website. This mechanism will measure size, component, and time needed by the client for downloading a website. The main factor that will influences this download time are *page size* (bytes), number and types of component, number of server from the accessed web. Research conducted by IBM can be used as a standard for performance measurement [10]

Table1. Standard of the website performance

Measured Factors	Standard
Average server response time	< 0.5 second
Number of component per page	< 20 objects
Webpage loading time	< 30 second
Webpage size in byte	< 64K

Standard international download time for this performance can be used as a reference to categorize the tested webpage

Table2. Ranking dial-up modem page download times from world class to unacceptable

loading time (seconds)	Criteria
< 10	Excellent
10-15	Very Good
15-20	Good
20-25	Enough
25-30	Slow
> 30	Poor

After we have done with data, and then continued by testing of data.

2. Web Diagnostic Tools

In this research we used widely available website performance tool and webpage speed analyzer online service (http://www.websiteoptimization.com). List of performance measured and reported by this service include total size, total objects and number of objects (HTML, images, CSS, scripts), and download times on a 56.6kbps connection, another available online tools

that we used are http://validator.w3.org/checklink which was utilised in order to monitor broken links in the HTML code of the portals, while the W3C's *HTML validator* (http://validator.w3.org) was used to validate the HTML code of the portals. The last online service used was www.linkpopularity.com. Link popularity is used to determine the amount and quality of links that are made to a single website from many websites. In every test, this report will give an assessments and recommendations to meet the requirement.

3. Sample Data

In order to get the data for this research, we examined the entire Malaysian University websites, and for the comparison of the performance we also examined world class university websites based on The Times Higher Education Supplement (THES). By doing this approach it was felt that measures of the performance could emerge.

Result and Discussion

The results of the websites performance test based on load time, size, and number of items are showed in table 1. The data in table 1 shows that most of the websites in Malaysia can not meet the acceptable standard. The table 3 showed that 8.33%, 2.77% and 16.7% out of 36 Malaysian Universities passed the standard, while for the comparison the word class universities reached 50%, 25%, and 46.4% for the same categories.

Table3. Testing Result for Websites Performance Based on Criteria

Website Performance Category	**Σ of Malaysian Universities websites(n=36)**	**Σ of word universities websites(n=28)**
Load time (<30 seconds)	3(8.33%)	14(50%)
Size (<64 Kbytes)	1(2.77%)	7(25%)
Number of items (<20 items)	6(16.66%)	13(46.4%)
Markup Validation (no error)	0(0%)	6(21,5%)
broken link(n)	16(50%)	12(42.8%)

Implementation of the W3C's HTML validator highlighted that only none of the Malaysian University website had HTML 4.01 valid entry page, most of it did not have DOCTYPE declarations, while for world universities showed a better result 21.5%. Consequences of this problem will be on the portability and development of the website. In term of broken link, Malaysian universities have a better performance, by having 50% free broken link, while on the world class universities 42.8%.

Table4. Testing Result for Number of link in search engine

Number of link		Malaysian University	World Class University
Google	<1000	36/37	0
	>1000	1/37	28/28
	> 10000	0	1/28
Yahoo	<10000	29/37	0
	>100000	0	21/27
	>1000000	0	2/28

The table 4 showed that World Class University outperformed Malaysian Universities in term of link popularity, 100% of World Class University has more than 1000 links using google search engine, while only 1 of Malaysian University reach that figure. By using yahoo search engine, none of Malaysian Universities has 100000 links, while 78% World Class University reach this level.

Conclusion

In this paper we evaluate the performance of Malaysian university websites and word class university websites as a comparison. Using a series of online diagnostic tolls, we examined six performance criteria in the websites. The result of this study confirmed that the website presence of Malaysian Universities is neglecting performance and quality criteria. It is clear in our research that more effort is required to meet with these criteria in the context of website design. This suggests that web designers responsible for university website should follow and encourage the use of recognised guidelines when designing website. To get results on the performance of a Web site, we measure sample data from universities in Malaysia and world and calculate page size, number of item, load, mark validation, and broken link. Future research directions lie in evaluating websites from the cultural perspective, since culture has an impact upon a website. Moreover because the ultimate determinant of website performance is the users, future directions for this research also involve the objective and subjective views of the university website from user's perspective.

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