Quality Analysis of Mobile Web Server

E B Setiawan, A Setiyadi, R Wahdiniwaty
Universitas Komputer Indonesia, Indonesia.

ek@email.unikom.ac.id

Abstract. There are many mobile web servers that can be used, whether it is a mobile web server that is free or paid. This research aims to analyze the quality of three mobile web servers consisting of one paid mobile web server and two other web servers that are obtained free of charge. To measure the quality of a mobile web server in this study using Apache JMeter tools and Web Application Performance Testing (WAPT). Based on the results of testing, it was found that the quality of paid mobile web servers was better compared to the quality of free mobile web servers based on values obtained using Apache JMeter, paid mobile web server is faster looking from sample times, latency and connect time result. When tested using WAPT, paid mobile servers also have better results based on the value of successful hits and average response time. The results of this assessment will depend on the type of smartphone that uses in the implementation hardware, so the value of the test results can be different if implemented on a different smartphone.

1. Introduction
The quality of the mobile web server needs to be known to determine which webserver to use. Without having a good web server, a website cannot be adequately displayed [1]. The web server can be software that is on a server to provide services or services to the client. The web server will send a response from what the client has requested in the form of a website page [2], which is generally in the form of an Html document. A web server is different from the server. If the server is hardware, the webserver is software [3] [4].

Many web servers can be used, including Apache web server, Nginx, Microsoft IIS, and LiteSpeed webserver. The Apache web server can be optimized [5] to serve requests from users so that it can be superior to other web servers in terms of data transfer [6]. Some web servers are generally implemented on a server computer that has high specifications because the server must serve many requests from the client [7] [8]. Besides web servers based on desktop computers, currently, there are also several web servers based on mobile smartphones, both smartphones that use the Android operating system, and iOS. This research is focused on researching the Android smartphone mobile webserver because smartphones with the Android operating system still control the smartphone market in Indonesia with a 94% market share [9].

Currently, several web server applications are running on the Android mobile platform, both paid and free. However, from several available web server applications, it is still unknown which mobile web server application has the best quality. This research was conducted to find out which mobile server web application has the best quality using Apache Jmeter and Web Application Performance Testing (WAPT) tools so that it can provide recommendations when using a mobile web server.
2. Research Method

The mobile web server used in this research focused on smartphones running on the Android platform. Three web servers were used as research objects, namely BitWeb server, penguin PHP / MySQL server, and KickWeb server. Whereas to evaluate the three web servers using the Apache JMeter application and Web Application Performance Testing (WAPT). Some general characteristics of the three can be seen in Table 1. The information presented in Table 1 is based on observations from Google Play on January 30, 2019.

| Information         | Bit Web server | Penguin Web Server | KickWeb server |
|---------------------|----------------|--------------------|----------------
| Rating              | 4.1            | 4.2                | Not specified  |
| Status Payment      | paid           | free               | free           |
| Minimum version     | Android 4.0    | Android 4.1        | Android 2.3    |
| Size                | 23 MB          | 15 MB              | 19 MB          |

Table 1. Characteristic for each webserver

Stages of this research can be seen in Figure 1.

Figure 1. Stages of research conducted

2.1 Determining a Web Server Mobile as a Research Object

In this stage, which mobile web server will be determined first, which will be used as the object of research. The criteria used as the determination of the mobile web server used are based on the status of
payment whether free or paid, based on rating ratings of users who have used it and based on the minimum required the platform. Of the three criteria determined the mobile web server used in this study is the Bit Web server, Penguin server, KickWeb server.

Bit Web server is a web server application for android, including LIGHTTPD as a web server, PHP as a PHP server, MYSQL as a MySQL server, PHPMyAdmin as a MySQL Client, and MSMTTP as an SMTP Client. It is all packed into one application called the Web Bit Server. This application is easy to run on an Android device, with just one click we can run web applications with PHP scripts and MySQL databases. Bit web server is a paid application.

Penguin Php / MySQL server, which in this research will be abbreviated as Penguin Web Server, is small and light enough to be used, so it will be easy to run and test our PHP scripts on a mobile smartphone, besides that it can also run PHPMyAdmin on our Android device offline. This application can be obtained by downloading it on the Google Play Store for free, but from some people who have tried this application, it states that it is still not optimal if it is run on an Android device version 8.0.

KickWeb Server is also one of the Android-based web server facilities that we can get for free by downloading it on the Google Play Store. The minimum requirements for us to be able to run the application on Android are that the internal memory must be available at least 50MB, and the minimum Android API 9 (Gingerbread).

2.2 Determine Web Server Quality Testing Tools
After the mobile web server is used, the next step is to determine what tools will be used to test the quality of the mobile web server. The determination criteria for selecting testing tools are seen from the features they have, as well as the suitability of the testing scheme carried out. Based on the results of the analysis, it is determined that the webserver quality testing tools to be used are Apache JMeter and Web Application Performance Testing (WAPT).

Apache JMeter is a performance measurement tool for client/server environments. Apache JMeter is a desktop application that runs on a Java VM that can measure system performance and load-test from client/server applications. What we can measure with Apache JMeter includes the performance of HTTP (web applications), FTP, JDBC, even EJB, SOAP or COBRA. With Apache Jmeter we can simulate a hefty workload on the client/server system that we are developing, including the server and its network. Although made with Java, Jmeter can test web applications written with all web programming languages such as JSP / Servlet, PHP, ASP, Cold Fusion, CGI, and Ruby.

Web Application Performance Testing (WAPT) is a software testing tool used to test stress levels on a web. This application is easy to use and cost-effective for testing websites, from personal business applications that are used for web portals, web servers, server applications, database storage. WAPT can make a load test in a few minutes.

2.3 Determining the Mobile Web Server Quality Measurement Method
The method used in measuring the quality of mobile web servers in this study is using five web pages as test material. The five web pages are stored on each mobile web server, namely the bit web server, penguin web server, and kick web server. Each page is then accessed through a web browser installed on the computer. Thus, the computer's web browser will access 15 pages. Criteria that become a reference in evaluating the quality of mobile web servers will be different between Apache JMeter and WAPT testing tools. The evaluation criteria of Apache JMeter are based on sample time, latency and connect time, while the assessment criteria from WAPT are based on success sessions, success pages and avg response time.

2.4 Implementation
Before the process of implementing the webservice and the testing tools, the smartphone device and the specifications of the computer devices to be used are used beforehand. The smartphone device used to implement the three mobile web servers is using the LG-G Flex D958 smartphone with a Qualcomm MSM8974 Snapdragon 800 Quad-core 2.26 GHz chipset. Computer devices used to access the web server using a web browser have an Intel Pentium Dual-Core 2.20 GHz processor specification.
2.5 Mobile Web Server Quality Measurement
The quality measurements of the three mobile web servers in this study used Apache JMeter and WAPT tools, and their quality measurements were in accordance with the quality measurement method discussed in point 2.3.

2.6 Analysis of the results of quality measurements and determination of final conclusions
In this stage, analysis of the results of the quality measurements of web servers, penguin web servers, and kick web servers is carried out. From the three mobile web servers, it is seen which ones get the best results so that they can be used as the final conclusions in the form of web servers which have the best quality so they can be recommended for use.

3. Result and Discussion
The implementation of the installation process of the three mobile web servers can be seen in Figure 2.

![Figure 2. Implementation of all three mobile web servers](image-url)

After the installation process is complete, the next step is to compare the quality of the three android web servers using the Apache JMeter and WAPT testing tools. Comparison of test results using Apache JMeter can be seen in Table 2.

### Table 2. Comparison of mobile web server testing results using Apache JMeter.

| Thread Name | Sample Times (ms) | Latency (ms) | Connect Time (ms) |
|-------------|-------------------|--------------|-------------------|
|             | BitWeb Penguin KickWeb | BitWeb Penguin KickWeb | BitWeb Penguin KickWeb |
| Home 1-1    | 145 399 690       | 144 399 687   | 114 303 442       |
| Home 1-2    | 30 206 531       | 30 206 528   | 11 112 282       |
| Home 1-3    | 25 24 319        | 25 23 316    | 9 12 92         |
| Home 1-4    | 217 21 133       | 179 18 130   | 70 7 5          |
| Home 1-5    | 38 20 29         | 37 20 27     | 20 7 5          |
Graphically, the comparison of the results of the quality of the mobile web server tested using Apache JMeter can be seen in Figure 3. From the graph can be seen the comparison of each parameter value assessed for each mobile web server. The smaller the value obtained, the webserver has better quality.

From the tests carried out using Apache JMeter shown in table 2 and figure 3, it was found that out of the 5 pages tested with a total of 45 test items, Bit Web Server generally had better quality than other mobile web servers. It is seen from several testing criteria Bit Web Server, which gets the least value, so it can be said to be faster in terms of sample time, latency and connect time.

Besides testing with Apache JMeter, it is also done with WAPT tools. Comparison of test results with WAPT tools can be seen in Table 3 below.

| Summary                  | Web Server Android              |
|--------------------------|---------------------------------|
|                          | Bit Web Server | Penguin Server | KickWeb Server |
| Profile                  | Home           | Home           | Home           |
| Successful sessions      | 220            | 211            | 138            |
| Successful pages         | 224            | 216            | 143            |
| Successful hits          | 6652           | 6415           | 4185           |
| Total Kbytes sent        | 3238           | 3003           | 1955           |
| Total Kbytes receive     | 921079         | 884733         | 576995         |
| Avg response time        | 5.79           | 6.08           | 9.35           |
| Result                   | Success        | Success        | Success        |

From the tests conducted with the WAPT test tool on the Web Server Bit, Penguin Php / MySQL Server and KickWeb Server, it can be concluded that the Bit Web Server is better than the other Web Servers, it can be seen from Successful hits that are higher that are equal to 6652 and have the Average response faster time which is equal to 5.79 seconds. Based on testing that has been done using Apache JMeter and WAPT, it can be seen that the application of the mobile web server Bit Web Server has better quality than the two other mobile web servers tested.

The test results depend on the hardware specifications of the smartphone used so that the parameters used in the test are also tailored to the needs. The parameters tested will be different from the assessment.
of the webserver on the server computer [10]. However, the same latency assessment criteria are also used to determine the quality of a web server, both mobile and computer-based.

4. Conclusion
Based on the results of the testing, it was found that the quality of the Android mobile web server that was obtained paid from PlayStore, had a better quality when compared to other mobile web servers obtained for free.

Acknowledgments
We are wishing to acknowledge to UNIKOM and DRPM KEMENRISTEKDIKTI for support this research using grant Penelitian Terapan 2019.

References
[1] Stamatakis, A. (2014). RAxML version 8: a tool for phylogenetic analysis and post-analysis of large phylogenies. Bioinformatics, 30(9), 1312-1313.
[2] Daniyanto R et al 2018 Pengembangan Komponen Media Uploading untuk mendukung E-Elearning Pada Kondisi Jaringan Dinamis Jurnal Teknik ITS 6 2 566-71.
[3] Choi Y and Chan A 2015 PROVEAN web server: a tool to predict the functional effect of amino acid substitutions and indels Bioinformatics 31 16 2745-47.
[4] Tang Z et al 2017 GEPIA: a web server for cancer and normal gene expression profiling and interactive analyses Nucleic acids research 45 W98-W102.
[5] Martinez-Álvarez A et al 2015 Tuning compilations by multi-objective optimization: Application to apache web server Applied Soft Computing 29 461-70.
[6] Aziz A and Tampati T 2015 Analisis Web Server untuk Pengembangan Hosting Server Institusi: Pembandingan Kinerja Web Server Apache dengan Nginx Multinetic 1 2 12-20.
[7] Dehne F et al 2018 VOLAP: A Scalable Distributed Real-Time OLAP System for High-Velocity Data IEEE Transactions on Parallel and Distributed Systems 29 1 226-39.
[8] Beamer S et al 2015 Locality exists in graph processing: Workload characterization on an ivy bridge server IEEE International Symposium 56-65.
[9] Soegoto, E. S., & Pamungkas, R. S. (2018, August). Web-based Information System Services in a Textile Industry. Vol. 407, No. 1, p. 012060.
[10] Soegoto, E. S. (2018, August). Implementing Laravel framework website as brand image in higher-education institution. Vol. 407, No. 1, p. 012066