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A Comparison of Database Performance of MariaDB and MySQL with OLTP Workload

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Abstract— **Information and data are increasing and has rapid growth as we now are in big data era. Database management system becomes a major part of data centers. This paper compared the performance of an open source database management system between MySQL and MariaDB. The testing environment is Xen 4.4 virtual machine using OLTP-Simple and OLTP-Seats as the benchmark data. Our experiment results show that MySQL has significantly better performance than MariaDB. MySQL performance rate are doubled at 1,000 threads of OLTP-Simple with 4 workers of OLTP-Seats while the resource consuming were similar in all cases. Therefore, MySQL version 5.6 has better performance than MariaDB version 10.0.21.**

Keywords— Performance Analysis; Database; MySQL; MariaDB;

I. INTRODUCTION

The rising demand for data and information making data management are essential in everyday life such as personal medical information in social media, medical data, and business data. The amount of information brings about the developing of database management programs in both the commercial and open source. The most widely known include Oracle, PostgreSQL, DB2, MySQL, MariaDB and SQLite. This research studied only an open source that is gaining popularity include MySQL and MariaDB by measuring the performance of the management system databases between MySQL and MariaDB. However, for PostgresSQL not be discussed in this research because preliminary tests showed a clearly less performing work for the current version of the test by using Sysbench. This research provided resources with performance applications in real situation. During the past year, MySQL was acquired by Oracle Sphinx Technologies Inc (2001-2015) with a new name and MariaDB develop into later versions. At the same time MySQL has also developed as well. The point of interest for present information is to measure performance by measuring instrumentation with very basic program Sysbench and measurement tasks with true on-line transaction processing (OLTP) [1]. There are many forms such as Social Network, online shop, auction, and flight. To test the performance, this research created workload in the databases. Therefore, the result showed performance with researchers studied the use of memory resources and CPU usage. The tests on the structure of a virtual machine management application called Xen 4.4 format which called Para-virtualization. The structure is considered for the known as Cloud computing, also provided for in the modern data center.

The findings were presented for comparing the performance of services in a multi-thread with a different number with the choice of workload of flight booking services which is highly active as an alternative to the use of databases, both in choosing the next update for database management.

II. LITERATURE REVIEW

A. MariaDB

Reports from the different MariaDB database management system has been cited as having improved performance and shortcomings of MySQL. For example, a research showed that MariaDB can improve compression performance of compression performance for flash devices, improves storage efficiency, and improve power efficiency and CPU utilization [2]. Another research of MariaDB Galera Cluster which geographically distributed across data center and Linux Virtual Server (LVS)-Tunnel showed optimized weighted round robin algorithm as the load balancer [3].

Therefore, it is hypothesized that the research attention and test results by Jan Lindstrom [4] found that the higher the efficiency MariaDB. But the version that can be installed using real MariaDB 10.0.21 and MySQL 5.6 was released recently. The test program only LinkBench which are not mentioned in most of the resources of the processor and the main memory in any way.

B. Xen

Xen, an open source application, is a hypervisor using a microkernel design. It has been developed by Citrix Systems, Inc. since 2546 and now in version 4.4.2. It is providing services that allow multiple computer operating systems to execute on the same computer hardware at the same time. A research proposed a design of system virtualization for ARM CPU architecture and described implementation of prototype called Xen on ARM using Xen hypervisor. Secure and nonsecure guest Linux virtual machines are executing under Xen on ARM isolated with each other and virtualization overhead [5]. Those were executed on mobile phone.

C. OLTP

OLTP-Bench has developed a tool for measuring database performance in view of the database provider of cloud computing. It called database-as-a-service (DBaaS) and it can create multiple workload types for example, transactional web-oriented and feature workload testing [6]. It is commonly testing used such as Twitter Epinions, Online-Airline-Ticket and Wikipedia. The tests are considered a real time services that can be adjusted as the researcher needed. This research used those methods to compare the performance of MySQL and MariaDB.

III. Research Method

The research tried to measure performance with the use of resources and workload by Sysbench [7] and OLTP-Bench software [8].

A. Testing Design

The research used Dell PowerEdge R200 (Xeon X3360 @ 2.83 GHz RAM 4GB) to create a virtual machine on the Xen 4.4. The computer had some features application which include 3 vCPU, RAM 2.5 GB, installed MariaDB 10.0.21 and MySQL 5.6. To test the application workload, the research used OLTP-Simple, Sysbench, OLTP-Seats, and OLTP-Bench program from the workload of the booking flight online with the database of seat workload structure.

B. Seats workload

The workload was created for the flight booking by setting scale factor of 100 since the test load to full PC performance testing and putting activity weights. The activity weights including seat selection 35%, reservation 20%, amended bookings 15%, cancellation 10%, amended customer data 10%, and finding flight 10%. The test contained structured as shown in Table I., and Fig.1 for comparing test between 2 - 4 workers.

TABLE I. Database of Seat Workload

Tables	Columns	Primary Keys	Indexes	Foreign Keys	Trans	#Joins
8	170	9	5	12	6	6

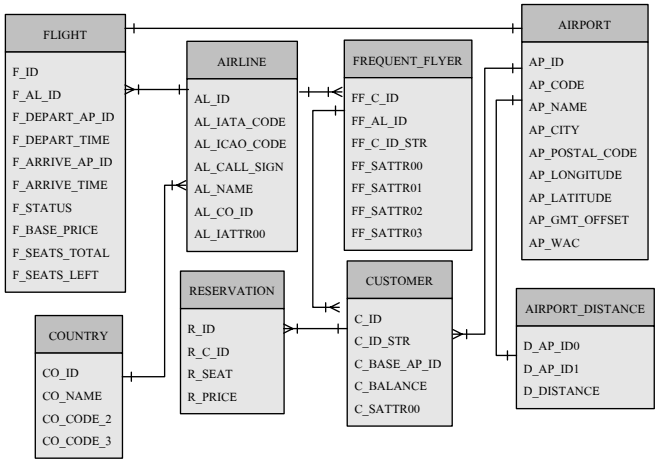

Fig. 1. Database Diagram

Fig.1 shows the relationship of the eight tables in relation to major keys including customers, flight schedules, airport, and airline services. The most connected was in majority of one to many relations.

IV. Results

A. The performance

The performance presented in accordance with the test program with the transactions per second as show in Table II and the results of the use of resources between different MariaDB and MySQL workload, with OLTP-Simple and OLTP-Seats.

DBMS	MariaDB 10.0.21	MySQL 5.6
	Transactions per sec	*Transactions per sec*
OLTP-Simple(100 Thread)	21,727.57	20,949.555
OLTP-Simple(500 Thread)	23,014.81	23,386.365
OLTP-Simple(1,000 Thread)	12,409.36	23,242.125
OLTP-Seats(2 Workers)	148.02	162.97
OLTP-Seats(3 Workers)	158.28	197.01
OLTP-Seats(4 Workers)	116.44	248.67

TABLE II. Performance Comparison between MariaDB and MySQL

Table II shows that MariaDB had effective testing workload with OLTP-Simple. The results show that MariaDB is higher level when thread 100 and 500, but decreased when thread 1,000, less than 50% of MySQL. It was clear that the workload with OLTP-Seats of MariaDB decreasing in 2,3, and 4 workers for the resource usage of the database, each series would be presented in the next section.

B. The test results with the workload of the OLTP-Simple by using Sysbench.

The performance of the using processor and memory resources presented in the graph of a relational database, MariaDB and MySQL in Fig. 2 and Fig. 3 by the left axis indicated the usage of processor, the right axis indicated the use of memory, and time.

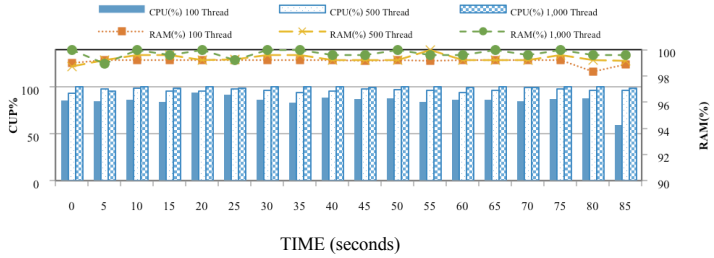

Fig. 2. CPU and RAM consumption of MariaDB testing by OLTP-Simple.

Results of the central processing unit of the MariaDB database for OLTP-Simple test have maximum of 1,000 threads, but the memory was similar between 98-100%.

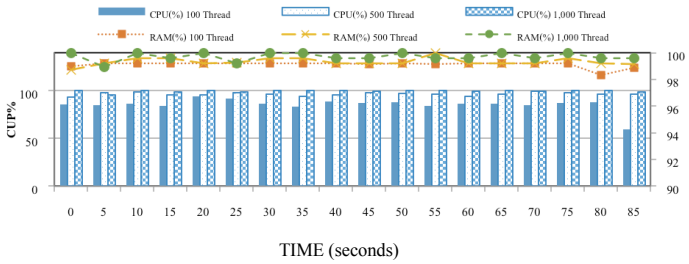

Fig. 3. CPU and RAM consumption of MySQL testing by OLTP-Simple.

Results of the central processing unit of the MySQL database for OLTP-Simple test have maximum of 1,000 threads, but the memory was similar between 98-100% same as MariaDB.

C. *The test results with the workload of the OLTP-Seats by using OLTP-Bench.*

The measurement of resource utilization of processor and memory in the form of relational graph of MariaDB database showed in Fig. 4, and MySQL in Fig. 5. The left axis was the usage of central processing unit and right axis was the usage of memory.

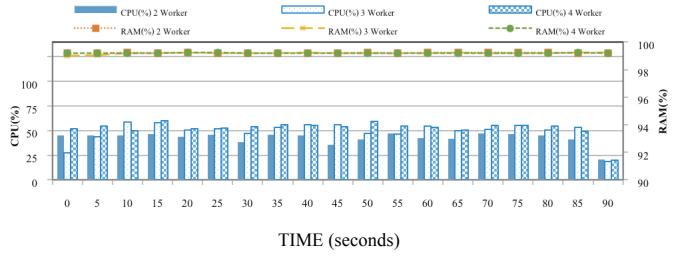

Fig. 4. CPU and RAM consumption of MariaDB testing by OLTP-Seats.

Workload OLTP-Seats for MariaDB database using the processor at 50%, but using full of the memory. MySQL was using the same amount of resources. It can be said that there is a similar resource management for both processor and memory.

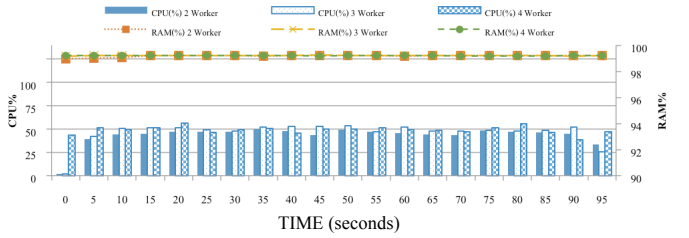

Fig. 5. CPU and RAM consumption of MySQL testing by OLTP-Seats.

V. Conclusion

The results of this research showed that the performance of the MariaDB and MySQL installed on Virtual Manager Virtual Machine Xen 4.4 with workload OLTP-Simple and OLTP-Seats, in the initial test series in transactions per second, concluded that MySQL has higher performance than MariaDB in providing a virtual machine with 3 vCPU RAM 2.5 GB in the tested case by simulated users with configurations thread and worker. The research found that when increase the value, MySQL had been effective in providing higher performance and MariaDB and double in the case of OLTP-Simple (1,000 Thread) and OLTP-Seats (4 Worker). For resource consumption aspect, there was the same consumption of the processor and memory. We can say that MySQL version 5.6 had higher performance than MariaDB 10.0.21 with the same resource in a single device. For a future work, the researcher will test the ability of MariaDB in terms of capable of providing a group or cluster.

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