

A Study on the Performance Measurement of Memory

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Abstract. In this paper, Performance comparative-analyzed used Tool accordingly that make up a total of two kinds of environments and created three kinds of conditions, and comparative-analyzed CO2 generated amount each of storage when experiment. Through this study result, when processing of low data I/O, use the product that using a HDD was judged beneficial. Used DRAM-SSD when stored and administered large amount data that is judged to be more effective which reduction in the time.

Keywords: SAN, TPC-H, SSD, HDD, CO2

1 Introduction

Recently, as the amount of data is bulky, study is increasing about storage device and technology that stored and quickly process data of large amount. Difference has occurred in the weak development speed of the HDD and processing speed of CPU, therefore, serious data input/output bottleneck has occurred. that was created to solve a problem is SSD. From the research of by applying HDD and SSD with storage, the difference of data I/O processing performance was progressed by comparing performance of storage device of each.[1-3]

2 Related Technology 2.1

MYSQL

MYSQL is the relative database management system of open source that uses SQL which is standard database quality language, which is very fast, flexible, and easy to use. MYSQL offers client/server environment, and a server installed MYSQL has MYSQL daemon called mysqld, so client program connects via network by this daemon so that it can control data. [4]

2.2 TPC-H

TPC-H is benchmarking tool that to measure how quickly can handle complex SQL. It defines 22 SQL statements and DB schema, and set of data about 1GB. TPC-H benchmark is public performance test that is used SQL that Business-oriented ad-hoc Query and concurrent data modifications made by the combination about large data.

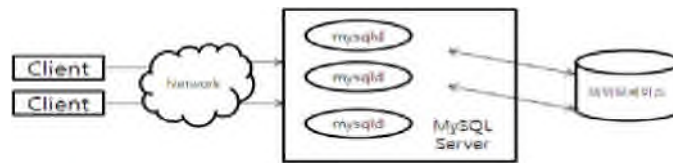


Fig. 1. Performance Structure of MYSQL

3 Experimental environment and conditions

3.1 Experimental conditions

3.2.1 Postmark benchmark condition

As shown in Table 1, performance analysis of HDD storage and DRAM-SSD storage were measured simultaneously power consumption as the target three kinds of standard measurement criteria (Low, Medium, High) of postmark. Measuring the Block Size = 4KB, File Size = 327KB measured at a fixed total of 10 times, the average was calculated.

Table 1. Performance testing condition that using postmark Benchmark

Postmark Test Level	Test condition		
	Subdirectory number	File number	Transaction number
Low	10	10,000	50,000
Medium	10	30,000	50,000
High	100	70,000	100,000

3.2.2 TPC-H condition

Using the TPC-H tool to analyze the performance of three-step procedure has changed compared with values from the final analysis. Load Test is the first step, which make up database and step data store to generate. But, performance analysis did not include results. Next, when Single active user in the Power Test is run the

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Query that was analyzed by measuring the ability. Finally, when Multi active user in the Throughput Test is run Query at same time that was analyzed by measuring the ability. Power TEST and Throughput Test results have combined to analyze the performance of each storage device.

Table 2 is conditions for the through test, figure 7 shows the results of the TPC-H applies will get the block diagram.

Table 2. Conditions for Throughput Test

Database capacity	User number
1GB	2
5GB	2
10GB	3

4 Experiment

4.1 results and analysis using postmark

Table 3 is result measuring total performance time during load occurs from each of level.

Table 3. Postmark performance measurement results

Postmark Test Level	Test results(performance time : Sec)		
	HDD	DRAM-SSD	Rate
Low	15	15	0
Medium	153	34	4.5
High	388	74.33	5.2

4.2 results and analysis using TPC-H

4.2.1 Local environment

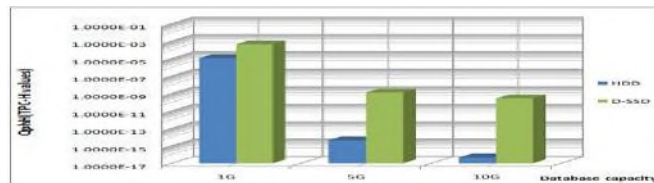


Fig. 2. QphH@size value in the Local environment

As can be seen as a result of figure 2, QphH@size value that can handle ad-hoc queries, find out the difference between less to handle ad-hoc query capabilities of HDD Storage and DRAM-SSD Storage in a small database capacity, but With increasing amount of data to the DRAM-SSD Storage HDD Storage for more than an hour to handle ad-hoc query capabilities that can be seen that much higher.

4.2.2 SAN environment

Performance test results also at SAN environment, performance of storage were few difference in low load database capacity, but DRAM-SSD storage can be seen that much higher which per hour to handle ad-hoc query capabilities more than HDD storage when amounts of data is increasing.

Per hour ad-hoc query capabilities known good HDD storage and DRAM-SSD storage regardless of the database capacity in a SAN environment than the Local environment..

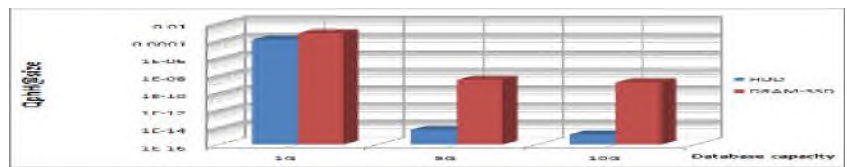


Fig 3. QphH@size value in the SAN environment

4.3 CO2 emission comparison

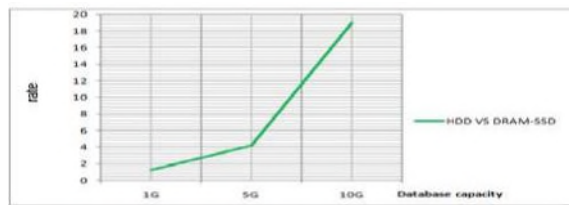


Fig 4. CO2 ratio of HDD and DRAM-SSD

CO2 emissions analysis result during analysis of performance of each storage using Postmark and TPC-H, as shown in Figure 4

5 Conclusion

In this paper, we show the performance analysis results by looking for experiment in many ways DRAM-SSD and HDD. As a result of a postmark benchmark and TPC-H

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analyzed about the HDD storage and DRAM-SSD storage for performance analysis, the performance difference of HDD and DRAM-SSD was little in low data I/O. But, the DRAM-SSD had a better performance than the HDD in large amounts of data I/O.

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