NEW ASPECTS OF COMPUTERS

Proceedings of the 12th WSEAS International Conference on COMPUTERS

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Recent Advances in Computer Engineering
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Preface

This book contains the proceedings of the 12th WSEAS International Conference on COMPUTERS which was held in Heraklion, Greece, July 23-25, 2008. This conference aims to disseminate the latest research and applications in Programming Languages, High Performance Languages, Operating Systems, Hardware Engineering, Supercomputing, Parallel Computing Systems Architectures, Software Evaluation Standards, Distributed Multimedia, Digital Speech Processing, Statistical Methods for Signal Processing, Tele-automatic control, E-commerce, Tele-medicine and medical informatics, Tele-healthcare, Computational linguistics, Computer networks, Interconnection Networks, Optical Interconnection Networks, Broadband Networks, Mobile Networks, Network Applications, Distributed Real Time Systems, Distributed Data Base, Computational Biophysics and other relevant topics and applications.

The friendliness and openness of the WSEAS conferences, adds to their ability to grow by constantly attracting young researchers. The WSEAS Conferences attract a large number of well-established and leading researchers in various areas of Science and Engineering as you can see from **http://www.wseas.org/reports**. Your feedback encourages the society to go ahead as you can see in **http://www.worldses.org/feedback.htm**

The contents of this Book are also published in the CD-ROM Proceedings of the Conference. Both will be sent to the WSEAS collaborating indices after the conference: **www.worldses.org/indexes**

In addition, papers of this book are permanently available to all the scientific community via the WSEAS E-Library.

Expanded and enhanced versions of papers published in this conference proceedings are also going to be considered for possible publication in one of the WSEAS journals that participate in the major International Scientific Indices (Elsevier, Scopus, EI, ACM, Compendex, INSPEC, CSA .... see: www.worldses.org/indexes) these papers must be of high-quality (break-through work) and a new round of a very strict review will follow. (No additional fee will be required for the publication of the extended version in a journal). WSEAS has also collaboration with several other international publishers and all these excellent papers of this volume could be further improved, could be extended and could be enhanced for possible additional evaluation in one of the editions of these international publishers.

Finally, we cordially thank all the people of WSEAS for their efforts to maintain the high scientific level of conferences, proceedings and journals.

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Specification and Implementation of Dynamic Web Site Benchmark In Telecommunication Area

Prof. Dr. EBADA SARHAN* Prof. Dr. ATIF GHALWASH*
MOHAMED KHAFAGY**

* Computer Science Department, Faculty of Computers & Information, Helwan University, EGYPT
** Computer Science Department, Faculty of Information Systems & Computer Science, 6th October University,6 October, EGYPT
M_H_KHAFAGY@HOTMAIL.COM

Abstract: - Whenever we talk about the internet, it goes without question that web sites with dynamic contents such as (e-commerce, telecom etc.) are more substantial compared to static content web sites. So, the need of more benchmarks that will guide us in the research in this area must have features like minimum response time, fault tolerance, distribution, efficiency, flexibility, security and compatibility. This paper presents architecture, implementation and performance of new benchmarks for evaluating the performance of web sites with dynamic content.

We implement the TPC-W specification for building dynamic-content applications (C# and Oracle 10g Database). We also provided a client simulator that allows dynamic content web server to be driven with various workloads. This benchmark has the ability to study the clustering for dynamic contents, compare different application implementation methods, and study the effect of different workload characteristics on the servers' performance.

Key-Words: - Dynamic sites, Benchmark, Telecommunication, Performance, Replication, response time

1 Introduction

With With the growth of dynamic web sites, (see fig.1) especially in telecommunications area such as (PC2CALL, NET2Phone, etc.) [1] We tsum have some features like minimum response time, fault tolerance, distribution, efficiency, flexibility, security and compatibility [2, 3, 4] so we need a benchmark for evaluating the performance of dynamic web sites in this area. TPC-W and other benchmarks [5] provide a specification for benchmarking but these benchmarks do not consider the service time as correctness criteria. The response time is used to describe the database performance. The response time is an important criterion of telecommunication web sites, because the client expects to receive the response within a short time. In this paper we present a benchmark that can be used to evaluate database performance for telecommunication sites with dynamic content. The model covers most important features of dynamic web site and telecommunication requirements using TPC-W specification. In addition to the measurement of response time, the client emulator invokes oracle performance view that collects CPU, memory and I/O (input and output).

The outline of the rest of the paper is presented as the following: Section (2) describes the telecommunication requirements and describes benchmark specifications. Section (3) describes the client emulator tool. Section (4) describes our experimental environment, both in terms of software, hardware, workloads and application sizing. Section (5) analyzes the results for the benchmark. In section (6) we discuss related work and conclusions in section (7).

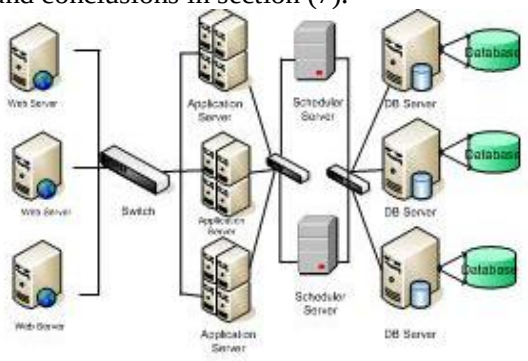

Fig.1 Architecture for Dynamic Content Web Site

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2 Telecommunication Site Benchmark

The presented Telecommunication site benchmark implements the core functionality of a Telecommunication site [8, 3]: call, browsing the history, favorite list, price list and updating the favorite list. The user sessions require registration to begin the call or the browsing. The user can call any number of calls according to the user's price list , the user's account is updated every minute during his call, the user can also browse his history of calls according to the date he wants, and he can browse and update his favorite list any time.

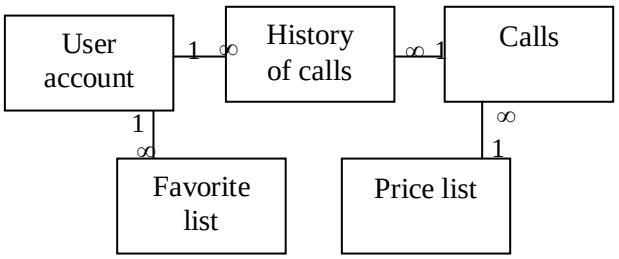

Fig.2 schema of the benchmark

The components of the database consist of five classes: user account, history of calls, calls, favorite list numbers and price list. The relationships among these classes are defined in (fig.2). This diagram is a logical description of the classes. Physical implementation of the database contains four tables: user account info, history of calls, favorite list numbers and price list. The users account information table records contain the account ID, password, and credit (see Table 1). Every call is stored in the history of calls table, which includes the account ID, date of call, start time, end time, duration and the cost of the call (see Table 2). Favorite list number table contains account ID and favorite number (see Table 3). The Price list table records the cost of calls depending on the location by storing location, code and cost of minute (see Table 4).

The presented telecommunication site defines popular operations (read operation, write operation and multiple read and write operation) [9]. The user can browse (read) account info, price list, history of calls and favorite numbers. Moreover, the user can update (write) favorite list and the system can update the account of the user in every call (multiple read and write).

Data Attribute	**Description**
Account No	Unique identifier to user
Password	Password of account
Credit	Amount of credit in the account

Table 1 User account

Data Attribute	**Description**
Account No	Unique identifier to user
Date	Date of call
Start time	Time that call started
End time	Time that call ended
Duration	Duration of call
Cost	Cost of this call

Table 2 History of calls

Data Attribute	**Description**
Account No	Unique identifier to user
Favorite No	No of Telephone

Table 3 Favorite list

Data Attribute	**Description**
Location	Name of location
Code	Telephone code
Cost of minute	Cost of minute

Table 4. Price list

3 Workload Generation Tool

We developed a client emulator that generates workloads for dynamic sites. This tool can be generalized and extended to other benchmarks with the same nature. The workload generated by the client emulator consists of a number of concurrent clients and their interactions with the system under test (SUT) [5]. The number of clients emulated by the tool can be varied according to the load on the SUT. Each emulated client opens a session that remains alive for a period of time, called session time until the connection is closed. The number of requests can be read transactions, write transactions or mix (multiple read and write) transactions. This variety used to cover all possible requests in telecommunication web sites. The number of clients and number of transitions are considered as inputs to the tool. The tool also determines the

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response time between sending request, receiving acknowledgment and collecting oracle dynamic performance view statistics (CPU, memory, I/O, etc.).

4 Hardware and Software Environment

4.1 Software Environment

We use C# to make the site and use thread technique to implement clients' connection. We use Oracle10g as database server.

4.2 Hardware Platform

The Web server and the database server run on an Intel 2.2 GHz Dual core CPU with 2GB RAM, and a Maxtor 160GB 5,400rpm disk drive. A number of 2 GHz Intel machines run the client emulation software. We must have enough client emulation machines to be sure that the clients do not become a bottleneck in any of our experiments. All machines have connected through a switched 10/100Mbps Ethernet LAN and the server connected with 10/1000 Ethernet LAN.

4.3 Workloads and Application Sizing

We presented three different workloads. Browsing contains read-only scripts, calling contains write scripts and *charging* mix read and update. The database contains 10,000 accounts where every client can mix transaction from more than 10,000 mixed transactions randomly for the Telecommunication site. We used three workload mixes: a browsing call history mix made up of only read-only transactions, a site with large number of user base in which 99.5% of users' accesses are read [10]. A Calling mixed that includes write interactions and charging made up of read-write transactions. We always have about 10,000 accounts. We kept a history of 500,000 calls in the History table. We assumed that users give feedback for call transactions. We used the (Delay Time) think time and the session time specified by TPC-W [5].

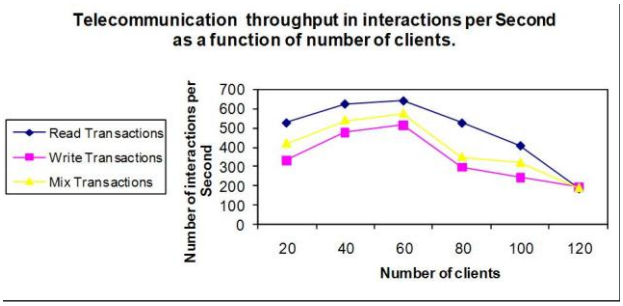

Fig.2 shows the throughput, in interactions per Second, as the number of clients' increases

5 Bottleneck Analysis for Telecommunication Benchmark

Fig.2 shows the throughput and interactions per second, the number of clients for each of the three workload mixes using a benchmark database. The best throughputs are 639, 515, and 575 interactions per second, for the read, write, and mix, respectively

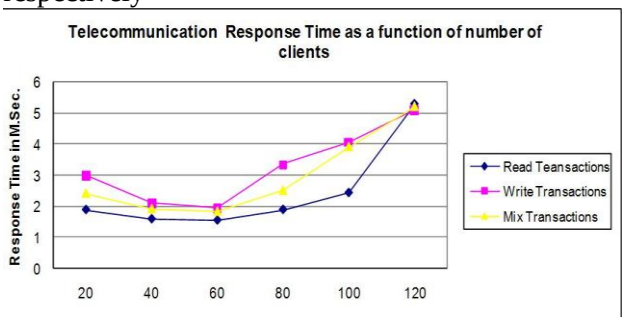

Fig.3 shows the Response Time as the number of clients' increases

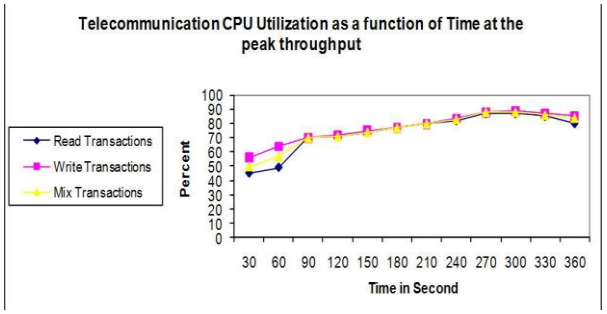

Fig.4 Telecommunication CPU Utilization as a function of Time at the peak throughput

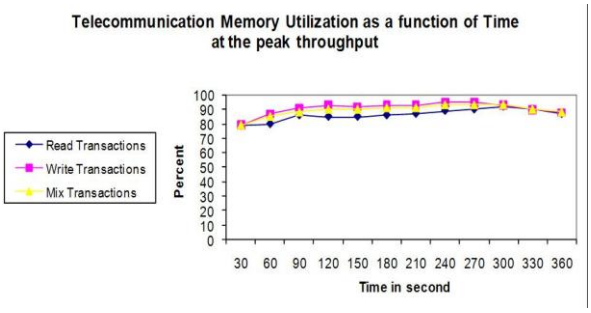

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Fig.5 Telecommunication Memory Utilization as a function of Time at the peak throughput

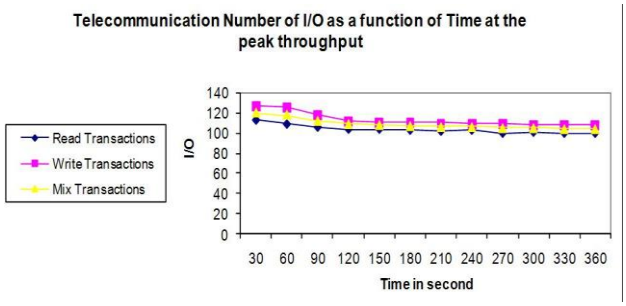

Fig.6 Telecommunication I/O Utilization as a function of Time at the peak throughput

Fig.3 shows the different mixes for the response time as the number of clients increase. From this figure we conclude that the best response time agrees with the maximum throughput 1.5, 1.9 and 1.85 MM Sec for the read, write and mix, respectively.

Fig.4, Fig.5 and Fig.6 show the CPU utilization, memory utilization and number of disk input and output (I/O) at their peak throughput. In these figures we conclude that during a short initial transient period, the database read information from the disk to warm up its cache. After this period, the working set fits in memory and hence disk access will be low.

6 Related Work

For static web sites, we found benchmarks, such as LANR traces [11] and the polygraph benchmark [12], for the research in systems support for static web sites, which also include OS support, caching, and clustering for dynamic web sites we found few benchmarks. Specweb99 [13] is a first-generation dynamic benchmark. Our benchmark is more suitable for current dynamic web sites. Zhang et al. [14] studied load balancing among machines in a dynamic web server cluster, but it uses a read-only workload. The Neptune project [15] studied scalability of clusters for dynamic content, but it did not include benchmark specifications, or a bottleneck analysis like our benchmark.

TPC-W [5] presented benchmark For Dynamic web sites but this benchmark did not compute the response time for transactions. We used the similar workload specified by TPC-W using telecommunication site, also we used C# and Oracle 10g that became popular software to build dynamic web site. Amaza [16] presented three benchmarks for dynamic content sites with different characteristics: an online bookstore, an auction site, and a bulletin board. The online bookstore follows the specification provided by TPC-W. The auction site and the bulletin board, provide their specifications. Amaza benchmarks did not have response time as a measurement tool so it's suitable for e-commerce web site only.

7 Conclusions

We presented a benchmark for dynamic web sites whose characteristics agree with telecommunication sites requirements. We followed the specification provided by TPC-W and implemented the telecommunication dynamic content benchmark and a workload generator tool that allowed us to vary the workload for the dynamic content server. Our benchmark has the ability to study the clustering for dynamic contents, comparison of different application implementation methods, and study the effect of different workload characteristics on the servers' performance.

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