Cloud Computing Integrated with Testing to Ensure Quality

R Kavitha*, N Kannan2, R Nazneen3 and H A Zubar4

*1,3Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, Tamil Nadu.
2Department of Computer Science and Engineering, Jayaram College of Engineering and Technology, Trichy, Tamil Nadu.
3Department of Computer Science and Engineering, Knowledge Institute of Technology, Salem, Tamil Nadu.

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Cloud data is growing popular day by day. Cloud data is one of the continuous explosions of large volume of data that are generated, processed, stored and accessed by applications that handle instantaneously, several concurrent transactions of data. The transition from structured relational data to voluminous unstructured, non-semantic and highly complex data remains a great challenge to data managers, data workers, data analysers to hold and organize cloud data. Creators and analytics are working with it using several upcoming frameworks and technological supports. Test designers and testing squads are also included in this development. Testing big data is one of the biggest challenges faced by organizations because of lack of knowledge on what is to be tested and how much data is to be tested. Hence, the focus is on the testing of big-data deployed in cloud. The data to be tested and the tool to be used are determined. The tool chosen for analysis is Zoho Reports and the testing tool employed is Red Gate’s ANTS performance profiler. The data deployment and retrieval are done through the web services.

Keywords: Big data, Cloud data, ANTS performance profiler.

Introduction

Enormous, voluminous, vast, complex, heterogeneous are some of the common terms that are perceived when Big Data is thought of. Big Data is the continuous explosion of large volume of data that are generated, processed, stored and accessed by applications that handle instantaneously several concurrent transactions of data. A transition from structured relational data to voluminous unstructured, non-semantic, but essentially, highly complex data remains a great challenge to data managers, data workers, data analyzers to hold and organize such Big Data. The basic process and construction of the cloud computing is explained as shown in the fig. 1. Whether static or dynamic, Big Data possesses four characteristics. They are volume, variety, velocity and veracity of data processing. Volume is the enormity of data, variety is the heterogeneity of data, velocity is the rate of transfer (speed) of data that comes in, flows within and goes out, and veracity is the trust worthiness of the data or information. Social Networking sites, Patenting websites, Geographical and Spatial data processing applications, remote sensing and meteorological systems have gone forward to collect data in fraction of a second and all of them are considered veracity data. Though system architects and designers are researching better ways to master Big Data, Test Architects and Test Engineers are also not far away from facing Big Test Data.

Relative work

Testing-as-a-service (TaaS) is a new model which provides testing capabilities to end users1. In this paper a prototype of TaaS over cloud is developed, and the performance is tested by increasing the work load. Scheduling and dispatching algorithms

*Author for correspondence
E-mail: neethupiny08@gmail.com

Fig. 1- Cloud Computing process and Construction
are used for the purpose. Users can save the cost of complicated maintenance and upgrading effort, and the service providers can upgrade their services without affecting the end-users. ASTORIA framework is a novel solution to the problems and challenges in the automatic performance and scalability testing of RIAs. In this work, a new working prototype for ASTORIA is built and used for conducting experiments. The paper demonstrates how ASTORIA framework is used for load testing of RIAs. In addition to load testing, the framework can also be used to perform other types of performance and scalability testing of RIAs, such as endurance testing, stress testing, and spike testing. Basically, software testing is expensive and time-consuming. It is tough to test a distributed web service in the real world. To overcome this issue, this paper proposes a framework, which integrates both cloud computing and performance testing technologies. First, the client presents the architecture of the cloud-based performance testing system for the web services (CPTS). CPTS is a portable, extensible and easy-to-use framework for generating and submitting test workloads to computing clouds. Then, the client shows the process of how to use CPTS to run a performance test and presents the concept of dynamic migration in CPTS. Finally, the client presents his/her experiences with CPTS in Amazon EC2. The client finds that the CPTS allows a user to easily set up and test the web services system on the cloud and improve the test effectively. Expertus has been used to study three distributed applications on five IaaS clouds with over 10,000 different hardware, software, and virtualization configurations. The flexibility and extensibility of Expertus shows that new clouds, applications, and software packages can easily be incorporated. The tool is usable by with a user can quickly change an existing specification to run the same experiment with different settings. Virtual Office application is chosen as an example to perform experiment of testing the scalability in turn maintaining the performance. To make the Virtual Office online and to support simultaneous users, the application is tested for scalability by making maximum users logged-in. Now the high activity test suite is run to make sure that the application can support the load of users.

The Virtual Office application is a computer-simulated 3D environment which can be shared simultaneously by multiple geographically distributed users. Being virtually collocated in the same synthetic space, users may interact with each other. The main advantage of the virtual world is its ability to mimic real life scenarios where individuals can interact in similar ways for the same purposes that they would do in real life without being limited by physical distance. The Key advantages of this cloud based environment are the lowered total cost of ownership while buying a large server and gaining dynamic access to resources as needed without the laborious provisioning wait period that impede worker productivity and organizational competitiveness. This paper proposes a performance-based pattern for programmers to develop high-quality parallel applications with ease. Programs developed by this approach can utilize cloud information to adaptively distribute workloads within a program. Experimental results show that the obvious effectiveness of the approach. Instead of proposing a new loop scheduling scheme or a novel data mining algorithm, a general pattern of workload distribution is provided. The applications involve Matrix Multiplication, Data Mining techniques like Association Rule mining, classification, cluster analysis etc. The well-known application of association rule mining is market basket analysis, which can extract the customer buying behaviours by discovering what items they buy together. The managers of shops can place the associated items at the neighbouring shelf to raise their probability of purchasing. For example, milk and bread are frequently bought together. The Map Reduce Programming Model can be used to process large-scale data sets in cloud environments. The primary advantage of this approach is that a programmer can easily develop high performance programs to execute on cloud environment. This paper provides a virtual machine based energy-efficient data centre architecture for cloud computing. Experimental results show that when the workloads have 30% performance decrease, varying number of physical machines can be shutdown to save the energy. Java server obtains the most obvious effect as it has kind of CPU intensive workloads and can receive balanced scheduling by the CPU scheduler. The usage of virtualization and resource time-sharing enable clouds to serve with a single set of physical resources, a large user base with different needs. Thus, clouds
have the potential to provide to their owners, the benefits of an economy of scale. However, the use of virtualization and resource time-sharing may introduce significant performance penalties for the demanding scientific computing workloads. Hence, in this paper the performance of cloud computing services for scientific computing workloads is analysed. The Climate Data Portal is modern, robust, and scalable software which is workable today and extensible to meet requirements identified for the future.

Implementation

ASP.net and C# .net are used for the purpose of writing the coding part. The connectivity between the pages is given via Windows communication foundation (WCF). The Windows Communication Foundation (WCF), previously known as "Indigo", is a runtime and a set of APIs (application programming interface) in the .NET Framework for building connected, service-oriented applications. WCF is a tool often used to implement and deploy a service-oriented architecture (SOA). It is designed using service-oriented architecture principles. It is used to support distributed computing where services have remote consumers. Clients can consume multiple services; services can be consumed by multiple clients. Services are loosely coupled with each other. Services typically have a WSDL interface (Web Services Description Language) that any WCF client can use to consume the service, regardless of which platform the service is hosted on. WCF implements many advanced Web services (WS) standards such as WS-Addressing, WS-Reliable Messaging and WS-Security. With the release of .NET Framework 4.0, WCF also provides RSS Syndication Services, WS-Discovery, routing and better support for REST services. WCF supports interoperability with WCF applications running on the same Windows machine or WCF running on a different Windows machines or standard Web services built on platforms such as Java running on Windows or other operating systems. SQL server is used for the purpose of storing the databases of the account holders in a table format including details like the name of the account holder, the pin number, the balance in the main account etc. The account created by the user as per the available data. SQL (Structured Query Language) is a special-purpose programming language designed for managing data held in a relational database management system (RDBMS). The Zoho Office Suite is a Web-based online office suite containing word processing, spreadsheets, presentations, databases, note-taking, wikis, customer relationship management (CRM), project management, invoicing, and other applications developed by ZOHO Corporation (formerly Advent Net Inc.), a US-based company. Zoho Reports is online business intelligence and reporting application in the suite. It can "create charts, pivots, summary and other wide-range of reports through a powerful drag & drop interface". The report created for the uploaded file. When dealing with BTD, planning & designing a test environment and strategy has to be prioritized. Automated tests conventionally involve recording and playback. However, refining and customizing the recorded scripts requires technical expertise, and the biggest bottleneck using scripts is that it cannot be scaled up to test big data. Scaling up Big Test Data sets, without proper planning and design, will lead to delayed response time, which might result in timed-out test execution. In order to resolving the scaling up issue with BTD, action based testing (ABT) is proposed. In ABT, tests are treated as actions in a test module. The actions are pointed towards keyword along with the parameters required for executing the tests. It is to be ensured that the test modules are unambiguous, and unique, so that the actions are well-managed and non-redundant. This is in its infant level, and needs POCs to be done on BTD environment. The data structure taken into consideration can be anything like a student database including the details of a student e.g. name, residential address, mobile number, landline number, marks obtained in 10th, 12th, and individual semester grades, eligibility for placement, pass/fail criteria, strength in each department, overall rank etc. It can also be an employee database containing details like name of the employee, residential address, salary & other benefits, increments, previous employment details, work experience etc. It can also be a hospital database containing the records of the patients or it can refer to the accounts of shopkeepers in stalls etc. The cloud is created using ASP.net server and SQL. The coding is written using .Net which is the front end. SQL server is used as the back end. The users, in order to upload their files in the cloud, have to purchase a space in the cloud. WCF/ASP.net web services are given for connectivity. After space is purchased, the user can login to the cloud as an existing user and he can upload/download any file into the cloud through
Table 1—Memory utilization

<table>
<thead>
<tr>
<th>Running Time</th>
<th>Total size of live objects</th>
<th>Unused memory</th>
<th>Largest fragment detected</th>
</tr>
</thead>
<tbody>
<tr>
<td>After 0.32 sec</td>
<td>1.106 MB</td>
<td>1.21 MB</td>
<td>24.11 KB</td>
</tr>
<tr>
<td>After 1.36 sec</td>
<td>1.093 MB</td>
<td>1.221 MB</td>
<td>24.11 KB</td>
</tr>
</tbody>
</table>

his folder. But this facility is limited to the corresponding user space only. The data file which is uploaded can be analysed by using a suitable Online Analytical Processing Tool (OLAP). The OLAP tool chosen here belongs to Zoho.com. Performance testing is where the cloud is tested for performance in terms of memory and CPU utilization in each fraction of time. Hence, the cloud is subjected to Performance Testing where the cloud is tested using a suitable testing tool. ANTS memory and performance profiler, owned by Red Gate is used to check the memory utilization and the CPU utilization, so that the user can be aware of the amount of memory utilized while checking the execution accordingly. Data uploaded by the user has analysed and the status of unused memory has indicated in Table 1 and graphically explained in the fig. 2.

Conclusion and Future work

Cloud computing has been one of the fastest growing parts in IT industry. It is necessary to evaluate performance and security risks that cloud computing is threatened with, since manipulators are alarmed about security problems that exist with the prevalent implementation of cloud computing. Result based methods become popular in industry and academia to evaluate cloud computing schemes, application performances and their security. Several emulators have been precisely developed for performance analysis of cloud computing environments, including Cloud Sim, Green Sim, Network Cloud Sim, Cloud Analyst, EMUSIM, SPECI, GROUDSIM, and DC Sim. Cloud testing is becoming the latest research topic in cloud computing and software engineering. Conventional testing for performance plays a big role in the on-going process of evaluating the basic performance and stability of cloud applications. Since cloud data is huge in size and it comes from Multi-Tenant, the data should be verified and tested by deploying a Testing as a Service in the cloud. Cloud testing is deployed in multi-levels. The load tests, web tests are significant and provide real advantages for cloud based applications. Ultimately, the web based business with the IT is successful because of Testing deployed in cloud. The simulation of the cloud testing can be obtained by SOASTA testing tool. The QA professional, performance testing engineers are testing the cloud by setting, building, executing and analysing the cloud data or storage mass.

References


