Online ISSN : 0975-4172
Print ISSN : 0975-4350

Global Journal

of Computer Science and Technology: B

Cloud & Distributed

Autonomic Grid Environment

Cloud Access Control

Highlights

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Discovering Thoughts, Inventing Future

VOLUME 14 ISSUE 1 VERSION 1.0

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Global Journal of Computer Science and Technology: B
Cloud & Distributed

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Volume 14 Issue 1 (Ver. 1.0)

Open Association of Research Society

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Contents of the Volume

Global Journal of Computer Science and Technology: B
Cloud and Distributed
Volume 14 Issue 1 Version 1.0 Year 2014
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals Inc. (USA)
Online ISSN: 0975-4172 & Print ISSN: 0975-4350

Load Balancing and Job Migration Algorithms for Autonomic Grid Environment

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Abstract- Resource management and load balancing are the main areas of concern in a distributed, heterogeneous and dynamic environment like Grid. Load balancing may further cause Job migration or in some cases resubmission of Job. In this paper a number of job migration algorithms have been surveyed and studied which have resulted because of the Load balancing problem. A comparative analysis of these algorithms has also been presented which summarizes the utility and applicability of different algorithms in different environment and circumstances.

GJCST-B Classification: C.1.4

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Load Balancing and Job Migration Algorithms for Autonomic Grid Environment

Paritosh Kumar [α], Pankaj Kumar [σ] & Monika Singh [ρ]

Abstract- Resource management and load balancing are the main areas of concern in a distributed, heterogeneous and dynamic environment like Grid. Load balancing may further cause Job migration or in some cases resubmission of Job. In this paper a number of job migration algorithms have been surveyed and studied which have resulted because of the Load balancing problem. A comparative analysis of these algorithms has also been presented which summarizes the utility and applicability of different algorithms in different environment and circumstances.

I. Introduction

Grid has a number of resources working independently with different processing capability and processes different workloads accordingly. Grid computing joins all the scattered resources into a large problem solving heterogeneous environment for different types of applications, which can run in parallel. Considering the whole distributed system as one unit, workload should be evenly distributed over all the resources as per the configuration of the system, to minimize the job execution time. Therefore, Load balancing and resource management are major areas of concern for a Grid environment.

Main objective of load balancing is to optimize the response time of the application by which workload would be maintained according to resources. There are broadly three reasons which are the major causes of load balancing, resubmission of jobs and job migration; heterogeneity of resources, dynamic nature of resource's performance and diversity of applications in case of Grids [3]. This is even more crucial in computational Grid where the main concern is to fairly assign jobs to resources and to minimize the difference between the heaviest and the lightest resource load [4].

This paper presents a survey of job migration algorithms and techniques, which is done to balance the load in a Grid environment. It also compares and construes the applicability of each technique as per the requirement. The paper is organized as: Section 2 contains background of load balancing, and job migration. In Section 3, existing job migration algorithms are discussed. In the section 4, describe the proposed load balancing algorithm. Finally Section 5 concludes the paper and provides the future scope of work.

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II. Load Balancing and Job Migration

Load balancing is main area of concern in distributed environment whereas job migration is one of the best solutions to handle load balancing problems.

a) Load Balancing

An important issue of distributed and heterogeneous environment is the efficient assignment of tasks and utilization of resources, commonly referred to as load balancing problem [13].

Load balancing is required to disperse the resource's load evenly so that maximum resource utilization and minimum task execution time could be possible. This is very crucial concern in distributed environment to fairly assign jobs to resources. Generally, load balancing mechanisms can be broadly categorized as centralized or decentralized, dynamic or static, and periodic or non periodic [5]. All load balancing methods are designed such as, to spread the load on resources equally and maximize their utilization while minimizing the total task execution time. Selecting the optimal set of jobs for transferring has a significant role on the efficiency of the load balancing method as well as Grid resource utilization. This problem has been neglected by researchers in most of previous contributions on load balancing, either in distributed systems or in the Grid environment [7].

Job migration is the only efficient way to guarantee that submitted jobs are completed reliably and efficiently in case of process failure, processer failure, node crash, network failure, system performance degradation, communication delay; addition of new machines dynamically even though a resource failure occurs which changes the distributed environment [12].

Load balancing strategies aim to adapt the load optimally to the environment. However, they mainly consider the application running on a parallel, homogeneous system.

b) Job Migration

Grid is inherently a dynamic system where environmental conditions are subjected to unpredictable changes like system or network failures, system performance degradation, addition of new machines, variations in the cost of resources etc. Job migration is

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the next step when there is no proper scheduling or resubmission of jobs. Whenever any resources encounter problem, then job migration to the next eligible system is suggested. Migration behavior of jobs lead to the assumption that small sites tend to migrate resourcedemanding jobs, while large sites confine to pass only small jobs to the central job pool. Job migration is the only efficient way to guarantee that the submitted jobs are completed and that the user restrictions are met [10].

Job migration mechanisms, which take the nondedicated and dynamic natures of Grids into consideration, become important for optimizing the application performance [13]. Job monitoring, rescheduling and check pointing are some steps involved in job migration. Job monitoring contains all performance related data of all the resources so that it could initiate the migration. Further this information is reported to the rescheduler, which evaluates if it is worth Migrating the job, and in that case, decides a new allocation for the job. Check pointing is capturing a snapshot of the state of a running job, in such a way that the job can be restarted from that state in a later time in case of migration.

III. Survey of Existing Job Migration Algorithms

There are many mechanism but only five mechanism is surveyed here which is surveyed here. Which are Virtual machine migration, node reconfiguration method, check pointing, Robin-hood algorithms and load based graph method.

a) Virtual Machine Migration (Live Migration)

In Virtual machine migration snapshots of machine are sent to other machine that's why it is called the virtual machine migration. There are two methods for virtual machine migration. First one is live migration and second one is regular migration [1]. In live migration, running domain between the different host machines is migrated without stopping the job. In between it stops job and gathers all required data then resumes. But this happens only in same layer –layer network and IP subnet. In regular migration generally stop the job then migrated.

An important aspect of this mechanism is to make the run-time job migration with non-dedicated shared resources in dynamic Grid environment. Virtual machine migration provides high isolation, security and customization environment in which administrator privileges the user to execute the work. Ether IP and IP tunneling are required while migrating in this mechanism. This algorithm redistributes the load coming to any particular node, which may be the old connected node or newly added node for that load.

b) Node reconfiguration by User Level Thread Migration

This mechanism makes application workload migrate from source node to destination node, and then let source node depart from original computing environment .There are two mechanism for this, first one is node reconfiguration by user-level thread migration and another one is node reconfiguration by kernel level thread migration. Node reconfiguration by user level thread migration has been discussed in this survey.

There is two-implementation fashion of node reconfiguration. One is synchronous method and the other is asynchronous method. In synchronous method, all nodes are paused during reconfiguration. On the other hand, in asynchronous method all nodes continue to work simultaneously with reconfiguration. Synchronous method may make performance down even though it is easier to design. Alternatively, better performance can be obtained by asynchronous method as long as more attention paid to correctly maintain the order of node reconfiguration messages [1].

Information regarding redistribution of workload and how to add/delete nodes is present in the implementation of node reconfiguration mechanism. With the help of user level thread migration, which is already supported by the thread package workload, is redistributed here. Same as virtual machine migration, node reconfiguration mechanism also needs to transfer in memory states from source node to destination node.

c) Check-Pointing Approach

Checkpoint is defined as a designated place in a program at which normal processing is interrupted specifically to preserve the status information necessary to allow resumption of processing at a later time. By periodically invoking the check pointing process, one can save the status of a program at regular intervals. If there is a failure one may restart computation from the last check point thereby avoiding repeating the computation from the beginning. The process of resuming computation by rolling back to a saved state is called rollback recovery [2].

There are three types of check pointing implementations: kernel-level, user-level and application level. These implementations differ in level of transparency, efficiency and mechanism used to initiate checkpoint and restart. In kernel level check pointing user does not have to change the application at all so least efficient, because system does not have the knowledge about the application. Developer achieves user level check pointing, and he puts or implements some set of procedures that handle check pointing and restart. Developer knows all about the application that's why this approach is more efficient. The developer itself achieves application-level check pointing. This appr-oach is the most efficient, because developer has detailed knowledge about application.

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This is very useful in case of preemption and migration and is used in making fault tolerant systems. Most common benefit of the check pointing technology is the high level of fault tolerance offered by the applications that can be check pointed. Besides it used to recover from failures, check pointing is also used in playback debugging distributed programs, migrating processes in a multiprocessor system, software rejuvenation and optimistic simulation.

Check pointing balances the load of processors in a distributed system; processes are moved from heavily loaded processors to lightly loaded ones. Check pointing process periodically provides the information necessary to move it from one processor to another.

d) Robin Hood: An Active Objects Load Balancing Mechanism for Intranet

Robin Hood algorithms present a new totally non centralized solution, multicast channel to communicate, and synchronize the processors and proactive tools to migrate jobs between them. Proactive techniques are very useful and provide the mobility and security in uniform framework. This work focuses on dynamic load balancing. Main objective of this algorithm is to improve the decision time in non-centralized environment.

In this mechanism two basic things have been considered, first one to know about the local load and second one transfer the load from high dense node to the less loaded node. This uses the non-centralized architecture and non-broadcasting of the balance of each node to reduce the overload in network. This is totally non-centralized load balancing mechanism, using the proactive library for the migration of jobs, and a multicast channel for node coordination.

e) Load Graph Based Transfer Method

Load based graph method is based on network graph where each node is represented with its load, whereas load can be the number of users, average queue length or the memory utilization. It uses analytic model and single load determination policy throughout the system and load is determined on the basis of memory utilization and average queue length. This algorithm is based on three layered structure. Top layer is load balancing layer which takes care of token generation, taking decision about task transfer; middle one is called monitoring layer and acts as an interface between top and middle and monitors load changes and third one called communication layer which take care of actual task transfer.

Here token is generated on the basis of outgoing and incoming edges and initialized on the basis of some specific value HWM & LWM (Highest Water Mark, Lowest Water Mark). Specific values are decided on the basis of load value of neighbors. Nodes having load value greater than HWM and are local maxima or nodes having load value less than LWM and are the local minima, can initiate token [9].

Maximum message transfer per node, if N is number of nodes and X is maximum message transfer per node

Total message transfer =NX

And transfer of task will occur only if there would be proper load difference between the nodes as

1. La - Lb > M where M is the required

Load difference for the task transfer.

Token will be generated if following conditions will be satisfied

1. For nth node (Load) n > L where L is maximum Load where load balancing is not required.
2. (Load) n > Σ sum of load of all nodes

If both conditions are satisfied then the token is generated in more than sixty percent of the cases where load imbalance exists token finds out the proper node for the task transfer which improves the system performance[9]. In this algorithm along with the task transfer among the neighboring nodes with the token transfer method care is taken to avoid the starvation of those nodes for which neighbors are not suitable for the task transfer.

The major parameter, network-partitioning issues along with inter-cluster and intra-cluster transfers for decision making of load balancing for the transfer is considered here.

IV. Proposed Load Balancing Algorithm

Proposed load balancing algorithm is developed considering main characteristics like performance, throughput, and resource utilization.

a) Architecture of Load Balancing System

This section discusses about the architecture of load balancing algorithm-imposed system. Figure 4.2 presents a pictorial view of the system. Monitor server uses monitoring tool to gather information about all the connected nodes. This resource information is managed, processed and updated to a database. This information is accessed through web pages and is presented to the users. The web pages can be accessed from any nodes at the same network.

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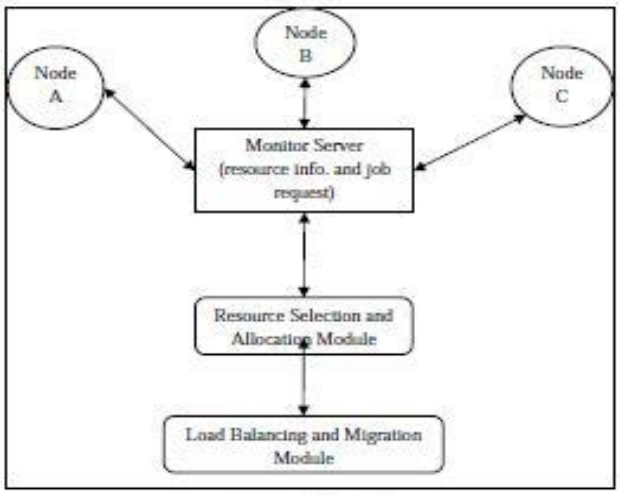

Figure 4.1 : System Overall Architecture

Server node gets all information from the nodes via monitoring tool and updates the database. Web pages are created and hosted on local network using Apache HTTP server to provide the resources information to users, any system on local network running Apache HTTP server can access these web pages. This is shown in figure:

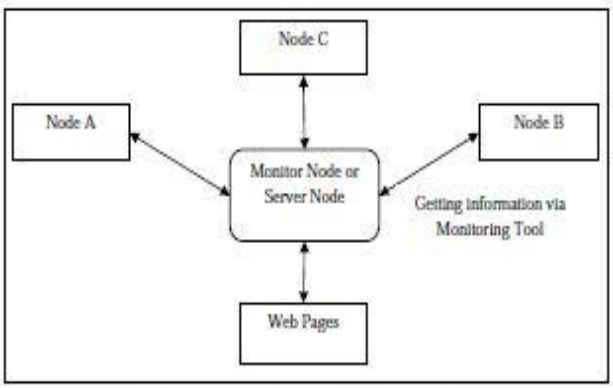

Figure 4.2

b) Design of Proposed Load Balancing Algorithm

Pseudo code and flow chart of the proposed load balancing algorithm. Proposed algorithm for load balancing is given below:

Begin
(Initiating activity happens)
(Load balancing start)
Monitoring info. And job request (n resources & n jobs)
Create job queue
If (job req. not matched with resource.)
Job goes to main queue
Else
Assigned job to resource
If (Machine failure)
Job goes to main queue with check-pointed data
Else
Job completed
End

c) Complexity of Proposed Load Balancing Algorithm

Complexity is a measure of the performance of an algorithm in term of CPU time and memory usage. In this case computational complexity has been considered as this algorithm is for grid environment.

Computational Complexity: To measure computational complexity computation number should be known.

By Big-O notation

Above proposed algorithm have equation like this

$N3+N2+N+C$, where C is constant

According to Big-O notation

$f(n) = O(N3) + O(N3) + O(N) + O(C)$,C is constant

$f(n) = O(N3)$

Another formula to find out complexity of algorithm

Complexity = No. Of closed loop = 3;

Another formula to find out Complexity of algorithm

Complexity = No. of decision making statements + 1;

Complexity = 2 +1 =3;

V. Conclusion

Load balancing is a key issue in grid resource management and results in job migration or re-submission of job. In this paper load balancing and job migration algorithms have been surveyed and studied which have been designed for different scenarios. Based on all these algorithms new algorithm have been introduced, considering main characteristics like performance, throughput, and resource utilization.

Different algorithms do well in their respective contexts like multiple token policy results in optimal resource selection and minimum migration time where as Robin-hood provides better security and check-pointing provides good results for fault tolerant systems.

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Global Journal of Computer Science and Technology: B
Cloud and Distributed
Volume 14 Issue 1 Version 1.0 Year 2014
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals Inc. (USA)
Online ISSN: 0975-4172 & Print ISSN: 0975-4350

Agile Software Development and Testing: Approach and Challenges in Advanced Distributed Systems

By P. Rajasekhar & Dr. R. Mahammad Shafi
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Abstract- More and more companies are adopting Agile methods as a flexible way to introduce new software products. An important part of any software project is testing. Agile testing may have similar aims as traditional software testing, but the structure of the team is different, testers need to support quality infusion through entire team. Test automation and selection of test tool can help project teams deliver more effectively, and in shorter timescales. The challenges in testing of cloud are visible also in the tools for automatic test case execution. This paper addresses some of these challenges and also highlights every aspect of software testing process in Agile development.

Keywords: *agile methods, unit testing, cloud testing.*

GJCST-B Classification: *K.6.3*

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P. Rajasekhar [α] & Dr. R. Mahammad Shafi [σ]

Abstract- More and more companies are adopting Agile methods as a flexible way to introduce new software products. An important part of any software project is testing. Agile testing may have similar aims as traditional software testing, but the structure of the team is different, testers need to support quality infusion through entire team. Test automation and selection of test tool can help project teams deliver more effectively, and in shorter timescales. The challenges in testing of cloud are visible also in the tools for automatic test case execution. This paper addresses some of these challenges and also highlights every aspect of software testing process in Agile development.

Keywords: *agile methods, unit testing, cloud testing.*

I. Introduction

In general Software engineering involves the design, develop, maintenance and documentation of software systems. Software engineering can be viewed as an approach that combines computer science and the customer to develop a set of tools and techniques to solve problems [2]. As we notice the methodologies continually looking for ways building delivery models which offer their customers workable, innovative solutions which provide competitive advantage. During early 1990s, the methodologies war was between object-oriented (OO) design and traditional development models. Developing applications in complex environments presents challenges that never before faced by the management gurus. There are complexity results from the inherent complexity nature of applications themselves. For example internet based applications are highly distributed- may contain components written in a variety of languages deployed across machines with different architectures and operating systems. In its early days the proponents of OO argued that its widespread adoption would allow for greater flexibility in software development for distributed networked applications than earlier structured techniques. Many researchers and professionals involved in promoting the OOP techniques. However Object-Oriented Programming (OOP) technology is not a software development model; OOP does enhance the effectiveness of earlier software development models. As Software development involved more critical, dynamic and customer centric projects, new challenges are emerged which effects the growth of companies. These difficulties include more customer involvement, changing nature of customer requirements, projects with tight deadlines and over budgets. With the existence of such problems, the OOP technology cannot satisfy the objectives of software development companies. A number of IT professionals started to work individually on new approaches to develop software. Currently Agile is one of the highly practiced methodologies. Trends in distributed software systems have gained increasing importance in recent years have been for software to move to much larger venues in the web, cloud and mobile applications. One way to handle software development in an ever changing environment is by imbibing Agile methodologies as part of development process.

The Agile software development methods evolved in the mid-1990s as a reaction against heavyweight waterfall model of development. The early implementations of agile methods include Extreme programming (Beck), Scrum (Schwaber), Crystal (Alistair Cockburn), Feature Driven Development, Agile Modeling. These are now typically referred to as agile methodologies, after the Agile Manifesto Published in 2001. The formulation of Agile Manifesto occurred when a group of IT professionals with similar ideas and objectives met in Salt Lake City, Utah, USA, and issued so called the Agile Manifesto [9].

Agile Manifesto

We are uncovering better ways of developing software by doing it and helping others do it. Through this work we have came to value:

- Individuals and interactions over processes and tools
- Working software over comprehensive documentation
- Customer collaboration over contract negotiation
- Responding to change over following a plan

That is, while there is value in the items on the right, we value the items on the left more.

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II. End-to-End SDLC with Agile Methodology

There are a number of different Agile methodologies (XP, Scrum etc.,), each with its own combination of practices. All these methods follow the core principles of Agile manifesto with common goal and values. Agile methods emphasize working software as a primary measure of progress. In his book, Extreme Programming Explained [1], Beck proposes twelve different ideas that are key to his form of agile development. These key factors provide agility to a project aiming at speed, communication, group effort, customer feedbacks. Agile software development process is a conceptual framework for software engineering where the entire project is divided into smaller pieces or in iterations, each of which handled separately [3].Software development during one unit of time is referred to as an iteration, each defining its own set of tasks(features) that combine to make requirements.

In Agile development user stories describes the system requirements. Using these high level user stories, team will create a useful map of the full system that is valuable for telling big stories about the end to end use of the entire system .Then the system is divided into different iterations during the release planning step. Iterations are short time frames that typically last from one to four weeks, each iteration involves a cross functional team working in all areas of development: design, coding, testing. An iteration might not add enough functionality to warrant a market release, but the goal is to have an available release with minimal bugs. When the iteration is developed and tested, the system is sent to the customer for feedback. The customer provides his/her feedback in the form of stories and again the same steps are followed later. When the required levels of functionalities are delivered then customer stops writing stories and development stopped. Multiple iterations might be required to release a product or new features(Figure-1). Every release should be as small as possible, containing the most valuable business requirements (Beck, Kent 2000).

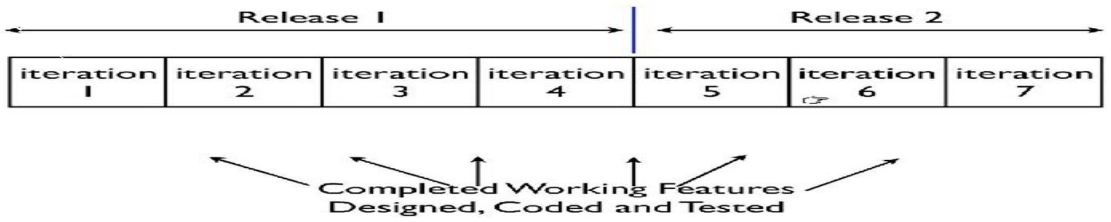

Figure 1 : Releasing Planning with Multiple Iterations

III. Software Testing and Quality Assurance in Agile Development

In Agile methods there is no specific testing phase, instead integrates testing into development process [5].Programmers do some integration testing and also unit testing while developing the iteration. The incremental feature acceptance (acceptance test) is usually done by the customer. This minimizes overall risk and allows the project to adapt to changes quickly [4]. A highly practiced QA activity in Agile method rely on customer feedback. According to Agile manifesto people are more important than process and tools; customer interaction at every level is important aspect of an Agile process. The following (Figure-2) explains the testing activities in Agile method during one iteration.

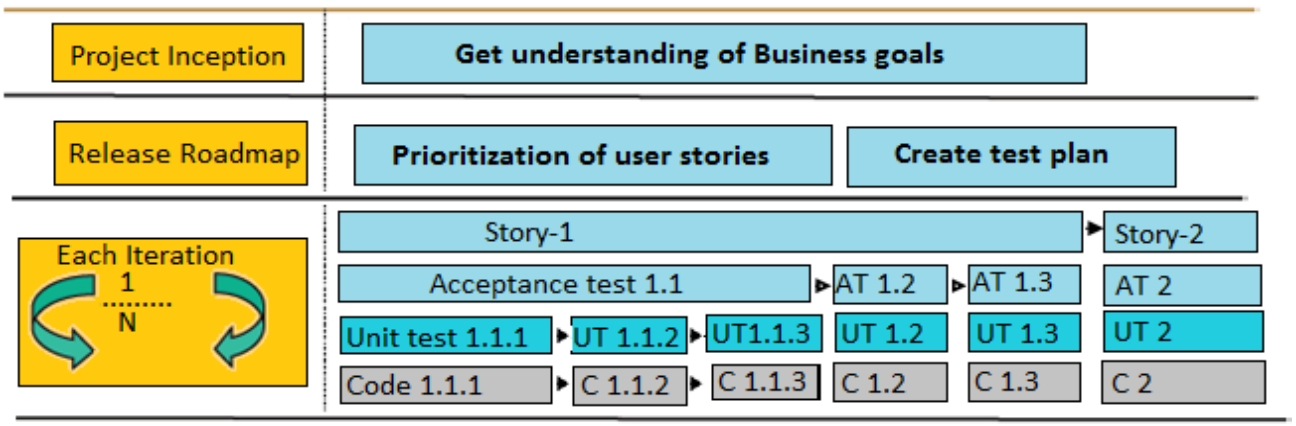

Figure 2 : Testing activities during one iteration

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Software quality assurance is the systematic activities providing evidence of the fitness for use of the total software product. Different Agile methods follow different strategies in practice. These practices are broadly summarized as follows:

a) *Unit testing:* One typical way of software quality assurance is developer testing: developers test their code as they write, often in the form of unit testing. Unit testing is a good way to communicate over issues in the code under development without waiting for other units to be available, provides fault detection at a lower cost comparing to do so at a later stage [6].

b) *Automation:* Manually writing test cases can be tedious and rigorous documentation (keep track of testing results) must be maintained. The execution of the manual tests and the examination of the results can be error-prone and time consuming. When schedule pressures rise, manual testing often gets forgotten. Since delivering projects efficiently without unit testing is nearly impossible, developers could employ automated tools for unit testing. Projects based on Agile have multiple releases which each need repeated testing of units under development during integration. Apart from automating unit tests, one can introduce the automation in some or part of the acceptance testing and integration testing. So, automating tests can be very beneficial and is emphasized in agile development.

c) *Test Driven Development (TDD):* Another important quality assurance activity in some Agile methods is early testing. Test-driven development (TDD) is a type of unit test in which programmers write test cases and actual tests before they start programming (Beck 1999, Extreme Programming 2002a). It contains short iterations and test cases are developed first then code is written to make pass those test cases. TDD uses automated tests that can then be used as regression tests whenever a new build is done. One difference, however, between TDD and traditional unit testing is that the test programs are written before the application code is written.

IV. Agile Testing and Testing Challenges

In the previous section we described some of the useful testing and quality assurance activities in Agile methods. It's a common misconception that Agile projects don't need a rigorous approach to testing. But if we compare Agile with other traditional approaches, then we will come to know that from testing perspective Agile methods have lacked in different important aspects of software testing process[7]. In Agile development there is no specific role defined for tester and often testers are treated as junior developers. A good tester has many distinguishing feature that make difference with developer. In [7] the authors say that Agile development can be benefited through a team of professional testers.

Agile Testing is a software testing practice that follows the principles of Agile software development. Agile Testing involves a cross-functional Agile team actively relying on the special expertise contributed by testers. This allows the combined team to better meet the project's defined business, software usability, quality, and timeline objectives.

Unit tests are foundations of any Agile projects, effective unit test can be done with automation. The more the team can automate the testing, the faster they can move on to the next developments. But testing in an Agile way is not without its challenges, are left in utilizing the automated tools in some applications. Testing in complex distributed environment like cloud testing poses significant challenges for a tester to perform unit testing with an automated test generation tool. Moving the application to the cloud will in some cases present some differences in how to implement a certain test or test case depending on the cloud environment. Often, a test case requires the system under test to have a certain internal state as a starting point of the test case. A big challenge for the tester is to achieve the required state prior to test case execution. Another problem with Agile methodologies is that testing is not done in a fixed pattern at the end of the development phase, but instead after each package or integration of packages. Hence a project based on Agile methodology, planned tests must be creative in order to allow adaptation to the changes as well as the schedule.

V. Conclusion

Studying the role of testing and identifying a set of issues when building and testing complex distributed database systems in a cloud, the focus of our thesis, is the least researched area. Very few papers have been published that focus directly on software testing of cloud applications. The main result revealed by our primary study is that for developing and providing a system aimed for the cloud is effective with Agile development process. But it is critical that an Agile tester who is expected to test the quality and performance of cloud applications has a good understanding of what makes a Cloud Computing application and distributed architecture, as well as a good understanding of the tools available and their strengths and weakness for testing different types of cloud applications. To support our work an additional research goal was made to evaluate the applicability and support of various techniques and open source tools for advanced distributed database testing like in a cloud environment.

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Global Journal of Computer Science and Technology: B
Cloud and Distributed
Volume 14 Issue 1 Version 1.0 Year 2014
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals Inc. (USA)
Online ISSN: 0975-4172 & Print ISSN: 0975-4350

Kerberos: Secure Single Sign-on Authentication Protocol Framework for Cloud Access Control

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Abstract- Cloud is a relatively new concept, so it is unsurprising that the security of information and data Protection concerns, network security and privacy still need to be addressed fully. The cloud allows clients to avoid hardware and software in Investments, gain flexibility, and cooperation with others, and to take advantage of sophisticated Services. However, security is a big problem for cloud clients especially access control; client profiles management and access services provided by public cloud environment. This article we are proposing an authentication model for cloud based on the Kerberos V5 protocol to provide single sign-on and to prevent against DDOS attacks in the access control system. This model could benefit by filtering against unauthorized access and to reduce the burden, computation and memory usage of cloud against authentication checks for each client. It acts as a trust third party between cloud servers and clients to allow secure access to cloud services. In this paper we will see some of the related work for cloud access control security issues and attacks. Then in next section we will discuss the proposed architecture.

Keywords: role based access control, authentication protocol, authentication server, key distribution centre, single sign-on.

GJCST-B Classification: C.2.2

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Kerberos: Secure Single Sign-on Authentication Protocol Framework for Cloud Access Control

Yaser Fuad Al-Dubai [α] & Dr. Khamitkar S. D [σ]

Abstract- Cloud is a relatively new concept, so it is unsurprising that the security of information and data Protection concerns, network security and privacy still need to be addressed fully. The cloud allows clients to avoid hardware and software in Investments, gain flexibility, and cooperation with others, and to take advantage of sophisticated Services. However, security is a big problem for cloud clients especially access control; client profiles management and access services provided by public cloud environment. This article we are proposing an authentication model for cloud based on the Kerberos V5 protocol to provide single sign-on and to prevent against DDOS attacks in the access control system. This model could benefit by filtering against unauthorized access and to reduce the burden, computation and memory usage of cloud against authentication checks for each client. It acts as a trust third party between cloud servers and clients to allow secure access to cloud services. In this paper we will see some of the related work for cloud access control security issues and attacks. Then in next section we will discuss the proposed architecture.

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I. Introduction

Cloud computing and cloud technology is the dominant and highly paced technology of present scenario with the highly robust service infrastructure that can provide cloud based integrated services like service on demand for resource computation, storage or cumulative storage of resource or data and exceedingly vigorous network communications in the cloud technology[1], the calculations of possessed resources are assumed and are facilitated as the services over the communication channels or the internet services. Few specific scientific societies also states cloud computing in diverse description, such as "a service infrastructure that operates for facilitating an omnipresent, convenient, on demand resource access of certain distinct network to a collective collection of computing resources and system frameworks [2]. For getting the proficient cloud based services over internet services it can provide a swift and decidedly proficient system with least resource administration activities and minimum interface of service providers. Most of current application require the client to memorize and utilize different set of credentials (e.g. client name/password or tokens) for each application he/she wants to access. However, this approach is inefficient and insecure with the exponential growth in the number of applications and services a client has to access both inside corporative environments and at the internet. Mainly, it is difficult for a corporation to manage potentially multiple authentication solutions and databases individually used by each application. Furthermore, most clients tend to rely on the same set of credentials for accessing all of their systems, posing a serious security threat since an attacker who discovers these credentials can easily access all of the client's applications [3].

In a single sign-on platform, the client performs a single initial (or primary) sign-on to an identity provider trusted by the applications he wants to access. Later on, each time he wants to access an application, it automatically verifies that he is properly authenticated by the identity provider without requiring any direct client interaction. Single sign-on solutions eliminate the need for clients to repeatedly prove their identities to different applications and hold different credentials for each application. Furthermore, a well designed and implemented single sign-on solution significantly reduces authentication infrastructure and identity management complexity, consequently decreasing costs while increasing security [4].

The dominant problem with cloud computation is its access control mechanism for ensuring security information and overall system security. for controlling an assortment of time-sensitive actions frequent cloud utilities such as workflow management and the operations with real-time databases, the characteristics of access control are needed so as to be improved with the most favorable and efficient temporal constraints. in this paper work and the developed system framework the system optimization has been aggravated by the prerequisite of a decidedly vigorous and efficient access control scheme that could congregate and can assuage the protection concerns in cloud environment with enhanced trust intensity for abundant cloud based applications and numerous service segments.

Kerberos authentication protocol the ticket and the authenticator. This leads to a discussion of the two authentication protocols: the initial authentication of a client to Kerberos (analogous to logging in), and the protocol for mutual authentication of a potential

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consumer and a potential producer of a network service. This paper we are proposing an authentication model for cloud based on the Kerberos v5 protocol to provide single sign-on and to prevent against DDOS attacks in the access control system and benefit by filtering against unauthorized access and to reduce the burden, computation and memory usage of cloud against authentication checks for each client. it acts as a trust third party between cloud servers and clients to allow secure access to cloud services.

The rest of this article is organized as the following: section 2 discusses the problem statement challenges and issues, section 3 discusses the review related work, section 4 designed the Kerberos authentication with role based access control KARBAC framework for cloud applications, section 5 Kerberos for single sign-on authentication, finally in section 6 obtain the advantages of proposed framework.

II. Proplem Statement

In enterprise systems, a pressing issue is the lack of an efficient, generic application-level model that supports unified access control frameworks for client-to-system interactions. Traditional security models are not capable of addressing some of the new challenges posed by modern enterprise systems. One of the problems is that most of the existing security models are influenced by the subject operation object paradigm. A typical feature of the paradigm is that permissions are forwarded in state of the accessible permission to certain participants or beneficiary in particular access modes. Such kinds of type of permission representation have made the security management of enterprise systems more complicated because of the heterogeneous characteristics of the resources being available in authentication. Therefore, they are not appropriate for sustaining a integrated access control architecture that takes into consideration of diverse resources from numerous domains [5].

We important aspect of an access control model is the capability to prop up an extensive assortment of precautions policies. In a distributed system, a variety of security policies are specified to ensure data confidentiality and integrity, and to convey business rules, some of them must be specified in a fine-grained manner. As for one illustration, in case one cloud client ass or requests for access its allied service, but it can get access to once certain defined part of overall service, be delivering permission or unwelcoming the client request would be unfortunate. In a similar case, a service can only be accessed within a certain time frame. A security system is required to provide more precise authorization services to satisfy both business requirements and security requirements of the enterprise. However, current business applications/ systems do not have a systematic way of defining access control to such fine granularity. The existing RBAC models and their extensions are unable to provide fine-grained access control for enterprise systems, such as controlling the content of client input and system output.

III. Related Work

This is matter of fact that in any research activity the exploration and deep study of existing approaches plays a significant role, therefore consideration this factor in mind the author of this thesis has performed a deep rooted survey for the role based access control mechanism and specially the access control approaches to be employed for cloud environment. The study made on existing systems provides the well-defined and crisp knowledge about the strength as well as the weakness of the existing approaches and thus the new optimum system can be built. The literature survey conducted for role based access control and its allied processes has been given in this section, as follows:

Lan Zhou et al [6] addressed trusted administration and enforcement of role-based access control policies on data stored in the cloud. Role-based access control (RBAC) simplifies the management of access control policies by creating two mappings; roles to permissions and clients to roles. Recently crypto-based RBAC (C-RBAC) schemes have been developed which combine cryptographic techniques and access control to secured data in an outsourced environment [7]. In such schemes, data is encrypted before outsourcing it and the cipher text data is stored in the untrusted cloud. This cipher text can only be decrypted by those clients who satisfy the role-based access control policies. However such schemes assume the existence of a trusted administrator managing all the clients and roles in the system. Such an assumption is not realistic in large-scale systems as it is impractical for a single administrator to manage the entire system. Though administrative models for RBAC systems have been proposed decentralize the administration tasks associated with the roles, these administrative models cannot be used in the C-RBAC schemes, as the administrative policies cannot be enforced in an untrusted distributed cloud environment. In this paper, the researchers proposed a trusted administrative model AdC-RBAC to manage and enforce role-based access policies for C-RBAC schemes in large-scale cloud systems. The AdC-RBAC model uses cryptographic techniques to ensure that the administrative tasks such as client, permission and role management are performed only by authorized administrative roles. Their proposed model uses role-based encryption techniques to ensure that only administrators who have the permissions to manage a role can add/revoke clients to/from the role and owner-

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can verify that a role is created by qualified administrators before giving out their data. We show how the proposed model can be used in an untrusted cloud while guaranteeing its security using cryptographic and trusted access control enforcement techniques.

IV. Designed Framework

After an analysis of the relevant existing work we have designed the Kerberos Authentication with Role Based Access Control KARBAC framework for cloud applications. Figure 1 shows the design of the it's easy for clients to protect their resources in accordance with its security and access control requirements.

The designed framework provides a policy specification module to Cloud clients to define access control on its resources using RBAC policy format then the Kerberos authorization server component stores and generate access control decisions based on the RBAC policy file [8].

The framework implements various time-based semantics of temporal hierarchies and separation of duty constraints or that is effective to perform well even in minimality situations. It explained the detailed of the components and the Kerberos protocol required for communication between these components as follows:

a) Cloud Client

a cloud client is a person or entity who uses various cloud applications deployed by vendors of various cloud services to its customers. Cloud client creates stores and shares resources with other applications or clients. Module specifications policy exists on the client's computer to provide client interface and tools to create, edit and manage access control to resources. And policies are dynamically formed in back end using RBAC policy. Policy specifications module act as policy information point (PIP) in Designed System.

b) Authentication Protocol

The authentication protocol is responsible for verifying client identities. Authentication is provided as a guest service in the system design, and can be achieved via any standard authentication protocol. In this solution, we recommended Kerberos V5 authentication protocol also at the same time called as Key Distribution Centre (KDC). Kerberos protocol uses strong cryptography so that a client can prove its identity to a server (and vice versa) across an insecure network connection. After a client and server have used Kerberos to prove their identity, they can also encrypt all their communications to assure privacy and data integrity, as they go about their business[9,10]. The KDC contain of two main steps as we illustrate as the following :

- Authentication Server (AS): The first step of the KDC is AS. Cloud client (principal) initially requests a ticket to the KDC by giving it is name, an expiration time until when the authentication will remain valid, the cloud service required (tgs) and some other information, is not mentioned here for clarity the KDC if found the cloud client in it is database, replies with two steps:

– Cloud client ticket contains a session key SA, KDC, the expiration time and it is tgs cloud service name, all encrypted using the secret key of the principal KA. The expiration time usually working day or eight hours, gives a period of time during which the tickets will be valid.

– Granting ticket contains the session key SA, KDC, the expiration time and the name of the cloud customer, all encrypted using the secret key for the KDC. This is what is known as a TGT. The principal unable to decrypt the TGT, and will be used later to request tickets for the other cloud services. As it is encrypted the cloud customer cannot read the data inside. If tries to modify it, the KDC will not be able to decrypt it and it will be refused.

- Ticket Granting Server (TGS): The second step of the KDC is the distribution of tickets it called the TGS. Once authenticated the cloud client who requests a specific application such as telnet or FTP first asks the KDC. It does not query the cloud service directly. This request to the KDC it contains several fields:

– An authenticator consist of: a timestamp and checksum encrypted with the session key SA, KDC, which was obtained earlier in the KDC, shared between the cloud customer and the KDC. This proves the identity of the cloud customer since he is the only one to know this session key. The checksum proves the authentication message has not been modified during the transiting. The timestamp confirms the message is recent, and is used to prevent "reply" attacks, since anyone can Interception of data across the network and use it at a later time. Typically, the KDC must responds within five minutes for a message to be accepted. This is why it is important to have a good time synchronization across your network where is implemented the Kerberos AS to the cloud computing. Consider the use of Protocol such as NTP (Network Time Protocol) to keep it accurate.

– TGT received during the authentication exchange with the KDC. It is used by the KDC to verify the cloud customer's name. If the cloud client name present in the TGT does not match with related the session key and this means the cloud client has been impersonated and the KDC is unable to decrypt the authenticator. Also the KDC verifies the validly by checking the expiration time of the authentication.

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– The Cloud Server name to which the cloud client wants to establish a connection.
– An expiration time for the TGT.

The KDC responses to the cloud client (principal) with two tickets:

– The cloud client ticket contains a new session key SA, B that the cloud customer and the cloud server will be used to verify each other's identity and to encrypt their sessions. The ticket also encloses the cloud service name and the expiration time of the new ticket. All of these items encrypted using the key SA, KDC shared between the cloud client and the KDC, known only to the cloud client.
– The server ticket that contains the same session key SA , B as mentioned above , the cloud client's name and time of the expiration of the ticket . The server ticket being encrypted with the cloud service's secret key KB, only known to the server. It is then under the responsibility of the cloud client to send a server ticket to the cloud server.

c) Gateway

This component acts as a proxy between the clients of cloud and the components designated for the security services. It manages connections and sessions for cloud clients and deal with access requests to the cloud applications and gets access control decisions from the authorization server. Since this component intercepts all messages between the various components, so we also added Policy Enforcement Features in it.

d) Authorization Server

The Authorization server then stores access control policies defined by the clients of cloud (in terms of resources) and cloud applications (regarding registered clients). It also generates access control decisions based on those policies stored using RBAC policy engine. It consists of a policy storage module that stores and manages access control policies, and working as a Policy Administration Point (PAP) and Policy Retrieval Point (PRP) in System Designer. Authorization server also contains a policy decision module which is a Policy Decision Point (PDP), it creates access control decisions by evaluating access request against the stored policies. It also implements various time-based semantics of temporal hierarchies and separation of duty constraints or SoDs that is effective to perform well even in minimality situations.

e) Cloud Application

the cloud application provides cloud clients different services. It allows them to create, upload and share resources (documents, files, images, etc.) with other clients or applications. The designed framework the cloud application has a delegated it access control functionality to the client and authorization server. All access control decisions are created by authorization server on behalf of a cloud application. It contains a repository of resources, and is only responsible for storage resources that are created or uploaded by clients.

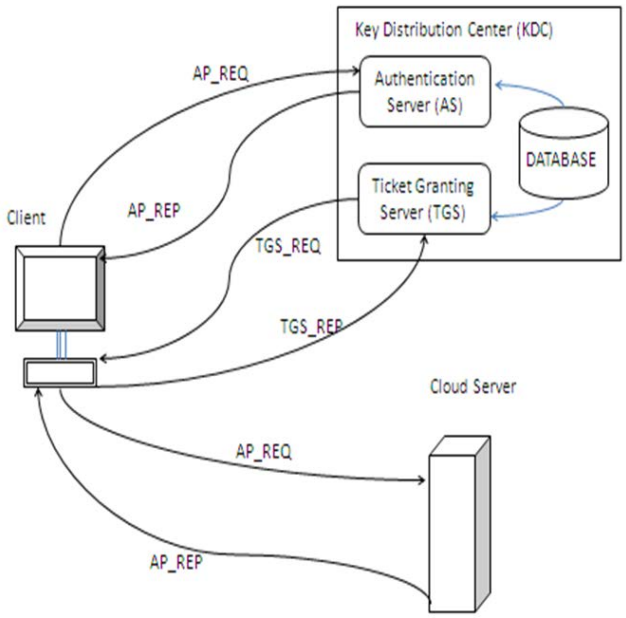

Figure 1 : Kerberos Authentication with Role Based Access Control

V. Kerberos for Single Sign-on Authentication

The main Aim of this model is for the authentication clients before access to the service and to find the source of the attack DDOS. Check your client name and password just is not enough for the cloud computing environment, such as distributed and shared. Kerberos is a network authentication protocol and provides a single sign-on facility to clients as well. Kerberos was one of the first single sign-on solutions proposed in the literature and implemented as a network service. It is formally described as a network authentication system, initially designed for providing single sign-on to network services.

A Kerberos "realm" infrastructure is composed by an Authentication Server, a Ticket Granting Server and a set of service providers. The Authentication Server is responsible for verifying the user's identity while the Ticket Granting Server generates tickets for authenticated users [11]. The service providers are simply networked servers that authenticated users are allowed to access. The two servers act together as an identity provider, handing the user an authentication ticket that he can use to sign-on to the relying service providers. In fact, the sign-on process in Kerberos is extremely complex, requiring several interactions between the user and the servers (which can be combined into an identity provider).

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Although it provides a nice practical single sign-on solution, Kerberos infrastructure management is extremely complex, being prone to several mistakes that may severely compromise security. Both the identity provider (composed by the Kerberos servers) and all the service providers must be tightly time synchronized. These rules out the utilization of Kerberos as a single sign-on framework for distributed applications that may reside in the internet or the cloud. Furthermore, Kerberos relies solely on unproven symmetric encryption mechanisms to authenticate users and maintain session state. It may also be possible to impersonate users and steal authentication tickets through simple network based attacks.

VI. Advantages of Proposed System

- All the encryptions could be done using the proposed cryptographic algorithm. Since the current Kerberos system uses a standard symmetric key encryption algorithm.
- It is easy for an intruder to find out the key and decrypt. But when the proposed system is used, only the authorized persons, who have the decryption algorithm, could only decrypt the encrypted text. Any other intruder, who wants to perform off-line attack, will not be able to do so because this algorithm protects the message in a much stronger way using variable block cipher with cipher block chaining mode.
- It is very difficult to decrypt the message even with the algorithm available. Because this algorithm gives an extra layer of protection with a password. The chances of password guessing approach for any intruder are nullified because the proposed system does not store the password of the client anywhere in the hard disk. Hence no attempt can be made to find it out.
- By integrating the proposed system with the smart card technology, some of the Kerberos systems problems may be overcome.
- The whole idea is to enhance the security of Kerberos authentication by authenticating the client directly at the beginning and before the granting of the initial ticket, so that one client cannot have the ticket of another. And, the use of smart card requires client logging into the system not only by recalling a password, but also to be in possession of a token.

Another way to enhance security is to use biometric technology with the proposed system in the smart card. Biometrics information of the cardholder can be placed on the card, so that the smart card can corporate with biometrics scanner to authenticate the client directly at the first stage of processing. Before granting the initial ticket, this authentication could take place, to avoid any intruder to pretend as the cardholder. The proposed system, which combines the techniques of cryptography and steganography, could be applied to embed the biometrics information of the cardholder into his photograph in the smart card. Since this algorithm provides a robust protection to the information against attacks, the biometrics details could not be easily trapped by any fraudulent.

VII. Conclusion

In this paper we have designed the Kerberos Authentication with Role Based Access Control framework for cloud applications also we present the problem of the access control security which effected on cloud environment , which is Essentially easy for clients to protect their resources in accordance with its security and access control requirements. The proposed framework provides a policy specification module to cloud clients to define access control on its resources using RBAC policy format then the Kerberos authorization server component stores and generate access control decisions based on the RBAC policy file .also we are designed an authentication framework for cloud based on the Kerberos V5 protocol to provide single sign-on and to prevent against DDOS attacks in the access control system. Although benefit by filtering against unauthorized access and to reduce the burden, computation and memory usage of cloud against authentication checks for each client. It acts as a trust third party between cloud servers and clients to allow secure access to cloud services.

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Global Journal of Computer Science and Technology: B
Cloud and Distributed
Volume 14 Issue 1 Version 1.0 Year 2014
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals Inc. (USA)
Online ISSN: 0975-4172 & Print ISSN: 0975-4350

A Review on Dynamically Changing the Quality of Service Requirements for SOA based Applications in Cloud

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Abstract- Service Oriented Applications have the ability to change their constituent services dynamically. This implies that they have the ability to change both, their functionality and their Quality of Service attributes dynamically. We present a Cloud-based-Multi-Agent System (Clobmas) that uses multiple double auctions, to enable applications to self-adapt, based on their Quality of Service requirements and cost restraints. Quality of Service attributes needed to provided, maintained, monitored at run time. A double auction is a two-sided auction, i.e., both the buyers and the sellers indicate the price that they're willing to pay and accept, respectively. If any application uses self adaptation mechanism then it exhibits a high Quality of Service. Here we design a market mechanism that allows applications to select services, in a decentralized manner.

Keywords: self-adaptation, cloud-based-multi-agent system double-auction, decentralized.

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A Review on Dynamically Changing the Quality of Service Requirements for SOA based Applications in Cloud

L. Venkateswara Reddy [α] & C.Rajeev [σ]

Abstract- Service Oriented Applications have the ability to change their constituent services dynamically. This implies that they have the ability to change both, their functionality and their Quality of Service attributes dynamically. We present a Cloud-based-Multi-Agent System (Clobmas) that uses multiple double auctions, to enable applications to self-adapt, based on their Quality of Service requirements and cost restraints. Quality of Service attributes needed to provided, maintained, monitored at run time. A double auction is a two-sided auction, i.e., both the buyers and the sellers indicate the price that they're willing to pay and accept, respectively. If any application uses self adaptation mechanism then it exhibits a high Quality of Service. Here we design a market mechanism that allows applications to select services, in a decentralized manner.

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I. Introduction

Over the past several years, interest has grown considerably in new techniques and technology for improving the task of creating and maintaining high-quality software. These efforts have arisen in response to a growing sense among application developers that traditional approaches are inadequate. Such new methods for improving software efficiency and predictability include intentional programming, evolutionary programming, model-based programming, and self-adaptive software. Some traditional approaches have not been worth-full in improving our ability to produce better code more affordably. Rather, the problem has been that one's reach always exceeds the grasp. As hardware capabilities improve and our understanding of how to apply computation to problems improves, we continually try to solve more difficult problems, driving up the complexity of solutions and overrunning the ability of our tools to manage the complexity.

Self-adaptive software [3] having its own behavior and changes behavior when the evaluation indicates that it is not accomplishing what the software is intended to do, or when better functionality or performance is possible. This implies that the software has multiple ways of accomplishing its purpose and has enough knowledge of its construction to make effective changes dynamically. Such software should include functionality for evaluating its behavior and performance, as well as the ability to preplan and reconfigure its operations to improve its operation. Self-adaptive software should also include a set of components for each major function, along with descriptions of the components, so that system components can be selected and scheduled dynamically [2], in response to the evaluators. .

Service-based applications will operate in a highly-dynamic world [4]. Systems will need to operate correctly despite of unexpected changes in factors such as environmental conditions, user requirements, technology, legal regulations, and market opportunities. They will have to operate in a constantly evolving environment that includes people, content, electronic devices, and legacy systems. They will thus need the ability to continuously adapt themselves in an automated manner to react to those changes. Adaptation must be achieved in an automatic fashion.

Service-based applications should exhibit self-healing, self-optimizing, and self-protecting capabilities. In addition, they should be able to predict problems, such as potential degradation scenarios, future faulty behavior, and deviations from expected behavior, and move towards resolving those issues before they occur. This means that future service-based applications will need to become truly proactive.

Self-adaptive software uses a closed-loop mechanism. This loop, called the adaptation loop, [6] consists of several processes, as well as sensors and effectors. This loop is called the MAPE-K loop in the context of autonomic computing, and includes the Monitoring, Analyzing, planning and Executing functions.

We evaluate Cloud-based-Multi-Agent System (Clobmas) [5] in two stages. The first stage of evaluation is functional evaluation. This is to ensure that Clobmas meets the core objectives that it was set up to fulfill. The second stage of evaluation is to judge whether Clobmas

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possesses desirable non-functional properties. Clobmas satisfies the functional, and scalability goals, and not that it optimizes.

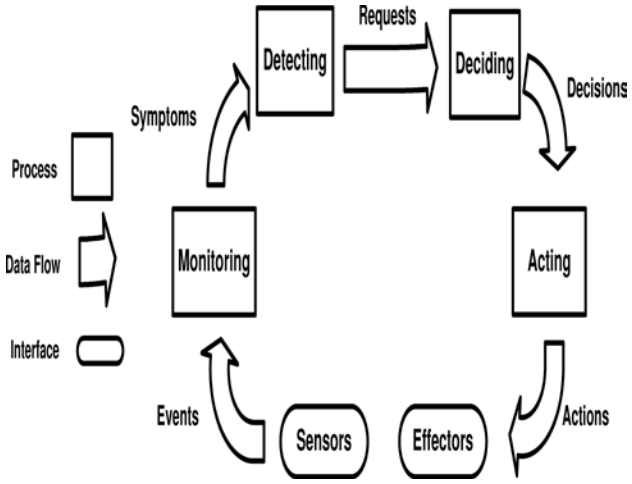

Figure 1 : Four adaptation processes in self-adaptive software

Control theory-based paradigm gives a framework [1] for specifying and designing software that controls itself as it operates. Based on this paradigm, their self-controlling software model supports three levels of control: Feedback, Adaptation, and Reconfiguration. All the software subsystems interact with an environment that could be the external physical world or another layer of the computer system. Such environments can be characterized as dynamic systems. The essence of a dynamic system is that its output depends on the system's state. So, the system does not shift dramatically from one output to another (in response to changes in the input) but exhibits some form of inertia (because of the dependence on state).

Adaptation is possible in such a manner that the architected should be able to:

- Dynamically identify changed requirements, which will necessitate runtime adaptation.
- Initiate the search for new services, which better address the changed requirements.
- Substitute old web-services for new web-services.

Service-Oriented Architecture has brought about a paradigm shift in the way we think about creating an application. Instead of linking programs and libraries at statically, we are now able to specify the functionality that the component parts should have, and the application can be dynamically composed using web-services. A web-service is a self-describing computational entity that can be used to perform various kinds of functions. These can be composed together, in a specific order, to deliver some functionality.

A web service is so-called because it uses web-based standards like XML, SOAP, etc to achieve its communication and data exchange, thus allowing the application location and platform independence. This allows an application to search a service repository for service that it wants, and then bind to it. This dynamic binding allows for the notion of an application changing the QoS properties that it exhibits, at runtime. Depending on the task at hand, or the budgetary resources or any other Quality of Service restraints that the architect imposes, the application can potentially pick an appropriate service and achieve its functional and non-functional targets.

a) Buyer Agent

A trading agent that is responsible for fulfilling one Abstract Service. The Buyer Agent bids for, and buys a Concrete Service. The amount that the Buyer-Agent is prepared to pay is called the bid price and this is necessarily less than or equal to its budget. The combination of bid price and the QoS attributes demanded is called the Bid.

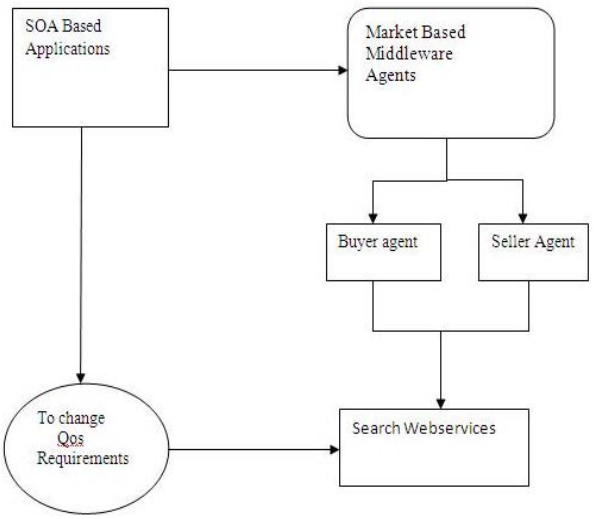

Figure 2 : Architecture for changing the Quality of Service requirements in cloud.

b) Seller Agen

A trading agent that sells a Concrete Service. A Seller Agent is responsible for only one Concrete-Service. Based on demand and supply, the Seller Agent adjusts the price at which it is willing to sell the Concrete Service. The amount that a Seller Agent is preparedto accept, is called the ask price. This is necessarily greater than or equal to its cost. The combination of ask price and the Qo S attributes offered, is called the Ask.

c) Market Agent

A trading agent that implements trading rounds for a market. It accepts Bids from Buyer Agents, and Asks from Seller Agents. It performs matching of Bids and Asks.

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II. The Market Mechanism

We can view applications as either a buyer of web-services with certain quality-attributes, or a seller that is capable of delivering those quality attributes at a certain cost. The resource allocation problem can be set up as a optimization problem, where the buyers need to maximize their Quality Attribute, given that they have a limited budget while sellers have a limited capacity to sell. We treat the universe of web-services as an economy, consisting of several marketplaces, several buyers, Several sellers. All their actions are rational and will result in a non-negative utility for them. The marketplace operates a continuous double auction (CDA) [7] which brings buyers and sellers together, and decides when a transaction should take place and at what price.

a) The Buyer

This is the application that we are primarily concerned about. This is the application that re-configures its architecture through the process of buying web-services. The application receives a relative weighting amongst the Quality Attributes that it is concerned about.

b) The Seller

This is the application that sells web services to the highest bidder. This application has a minimum 'ask' price, below which it is not economical for the seller to sell. This is so due to the fact that computation, storage and data transfer all have a cost in the cloud. These are all paid by the seller's web service.

c) The Marketplace

This is an application that resides in the cloud, and acts as the meeting point for buyers and sellers. Our condition of Individual Rationality (IR) means that this application does not exist for selfless purposes. That is, it gains some amount of money by virtue of bringing buyers and sellers together. The more the number of transactions that occur, the more it earns.

There are various challenges in ensuring Quality Attributes (QA) of applications hosted in the cloud and hence the perceived quality of service of the cloud as a whole. We advocate a self- management/optimization architecture driven approach to ensure that Quality Attributes are met. The approach uses Service Level Agreements (SLA) and Utility Theory to direct the self-optimization. We will propose more accurate application of multi-attribute utility theory to SLA negotiation. This would enable simulations of a cloud with negotiating web-services, thus allowing us to test our idea of low-level self-optimization leading to an emergent higher level optimized application state in the cloud. If successful, this would lead to long-lived applications in the cloud being more bouncily to change, and successfully adapting to changing Quality attribute optimization needs.

III. Conclusions

Cloud-based service-oriented applications have the potential to self-adapt their Qo S, depending on demand. Using a market-based mechanism maps nicely to the real-world situation of unpredictable change of Quality of Service requirements, costs involved in adaptation and adaptation by competing applications. Service-based applications will thus have to continuously adapt themselves to react to changes in their context and to address changing user requirements. Adaptation must be achieved in an automatic fashion. Service-based applications should exhibit self-healing, self-optimizing, and self-protecting capabilities. Services in the cloud a are moving from a fixed-price package to a more flexible, auction-based approach.

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- Large Images must be in One Column
- Numbering of First Main Headings (Heading 1) must be in Roman Letters, Capital Letter, and Font Size of 10.
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You can use your own standard format also.
Author Guidelines:

1. General,

2. Ethical Guidelines,

3. Submission of Manuscripts,

4. Manuscript's Category,

5. Structure and Format of Manuscript,

6. After Acceptance.

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1. Choosing the topic: In most cases, the topic is searched by the interest of author but it can be also suggested by the guides. You can have several topics and then you can judge that in which topic or subject you are finding yourself most comfortable. This can be done by asking several questions to yourself, like Will I be able to carry our search in this area? Will I find all necessary recourses to accomplish the search? Will I be able to find all information in this field area? If the answer of these types of questions will be "Yes" then you can choose that topic. In most of the cases, you may have to conduct the surveys and have to visit several places because this field is related to Computer Science and Information Technology. Also, you may have to do a lot of work to find all rise and falls regarding the various data of that subject. Sometimes, detailed information plays a vital role, instead of short information.

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- If well known procedures were used, account the procedure by name, possibly with reference, and that's all.

Approach:

- It is embarrassed or not possible to use vigorous voice when documenting methods with no using first person, which would focus the reviewer's interest on the researcher rather than the job. As a result when script up the methods most authors use third person passive voice.
- Use standard style in this and in every other part of the paper - avoid familiar lists, and use full sentences.

What to keep away from

- Resources and methods are not a set of information.
- Skip all descriptive information and surroundings - save it for the argument.
- Leave out information that is immaterial to a third party.

Results:

The principle of a results segment is to present and demonstrate your conclusion. Create this part a entirely objective details of the outcome, and save all understanding for the discussion.

The page length of this segment is set by the sum and types of data to be reported. Carry on to be to the point, by means of statistics and tables, if suitable, to present consequences most efficiently.You must obviously differentiate material that would usually be incorporated in a study editorial from any unprocessed data or additional appendix matter that would not be available. In fact, such matter should not be submitted at all except requested by the instructor.

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Content

- Sum up your conclusion in text and demonstrate them, if suitable, with figures and tables.
- In manuscript, explain each of your consequences, point the reader to remarks that are most appropriate.
- Present a background, such as by describing the question that was addressed by creation an exacting study.
- Explain results of control experiments and comprise remarks that are not accessible in a prescribed figure or table, if appropriate.
- Examine your data, then prepare the analyzed (transformed) data in the form of a figure (graph), table, or in manuscript form.

What to stay away from

- Do not discuss or infer your outcome, report surroundings information, or try to explain anything.
- Not at all, take in raw data or intermediate calculations in a research manuscript.
- Do not present the similar data more than once.
- Manuscript should complement any figures or tables, not duplicate the identical information.
- Never confuse figures with tables - there is a difference.

Approach

- As forever, use past tense when you submit to your results, and put the whole thing in a reasonable order.
- Put figures and tables, appropriately numbered, in order at the end of the report
- If you desire, you may place your figures and tables properly within the text of your results part.

Figures and tables

- If you put figures and tables at the end of the details, make certain that they are visibly distinguished from any attach appendix materials, such as raw facts
- Despite of position, each figure must be numbered one after the other and complete with subtitle
- In spite of position, each table must be titled, numbered one after the other and complete with heading
- All figure and table must be adequately complete that it could situate on its own, divide from text

Discussion:

The Discussion is expected the trickiest segment to write and describe. A lot of papers submitted for journal are discarded based on problems with the Discussion. There is no head of state for how long a argument should be. Position your understanding of the outcome visibly to lead the reviewer through your conclusions, and then finish the paper with a summing up of the implication of the study. The purpose here is to offer an understanding of your results and hold up for all of your conclusions, using facts from your research and generally accepted information, if suitable. The implication of result should be visibly described. Infer your data in the conversation in suitable depth. This means that when you clarify an observable fact you must explain mechanisms that may account for the observation. If your results vary from your prospect, make clear why that may have happened. If your results agree, then explain the theory that the proof supported. It is never suitable to just state that the data approved with prospect, and let it drop at that.

- Make a decision if each premise is supported, discarded, or if you cannot make a conclusion with assurance. Do not just dismiss a study or part of a study as "uncertain."
- Research papers are not acknowledged if the work is imperfect. Draw what conclusions you can based upon the results that you have, and take care of the study as a finished work
- You may propose future guidelines, such as how the experiment might be personalized to accomplish a new idea.
- Give details all of your remarks as much as possible, focus on mechanisms.
- Make a decision if the tentative design sufficiently addressed the theory, and whether or not it was correctly restricted.
- Try to present substitute explanations if sensible alternatives be present.
- One research will not counter an overall question, so maintain the large picture in mind, where do you go next? The best studies unlock new avenues of study. What questions remain?
- Recommendations for detailed papers will offer supplementary suggestions.

Approach:

- When you refer to information, differentiate data generated by your own studies from available information
- Submit to work done by specific persons (including you) in past tense.
- Submit to generally acknowledged facts and main beliefs in present tense.

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Methods and Procedures	Clear and to the point with well arranged paragraph, precision and accuracy of facts and figures, well organized subheads	Difficult to comprehend with embarrassed text, too much explanation but completed	Incorrect and unorganized structure with hazy meaning
Result	Well organized, Clear and specific, Correct units with precision, correct data, well structuring of paragraph, no grammar and spelling mistake	Complete and embarrassed text, difficult to comprehend	Irregular format with wrong facts and figures
Discussion	Well organized, meaningful specification, sound conclusion, logical and concise explanation, highly structured paragraph reference cited	Wordy, unclear conclusion, spurious	Conclusion is not cited, unorganized, difficult to comprehend
References	Complete and correct format, well organized	Beside the point, Incomplete	Wrong format and structuring

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ISSN 9754350

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