An Effective Distribution of Resources Through Scheduling to Cloud Users

Ms.T.Primya[1], S.S.Arthi[2], J.Saranya[3], N.Geerthana[4]
[1, 2, 3, 4] Department of Computer Science and Engineering
[1, 2, 3, 4] Dr.N.G.P.Institute of Technology Coimbatore.

Abstract*- Multi-tenancy is one of the key features of cloud computing, which provides scalability and economic benefits to the user. Over the decades, the rapid development of broadly defined computer technologies, both software and hardware is observed. Unfortunately, software solutions are regularly behind in comparison to the hardware. On the other hand, the modern systems are characterized by a high demand for computing resources and the need for customization for the end users. As a result, the traditional way of system construction is too expensive, inflexible and it doesn't have high resources utilization. Present article focuses on the problem of effective use of available physical and virtual resources based on the resource sharing through cloud computing platform. A number of conducted experiments allowed to evaluate computing resources utility and to analyze performance depending on the allocated resources. In this paper work scheduling, can be done through the priority of the work.*

Keywords- Cloud computing, Multitenancy, Virtual Machine, cloud-based workflow scheduling (CWSA), policy-based workflow

I. INTRODUCTION

Cloud computing is a type of computing that depends on sharing computing resources rather than having local servers or personal devices to handle applications. Cloud computing is comparable to grid computing, a type of computing where unused processing cycles of all computers in a network are harnesses to solve problems too intensive for any stand-alone machine.

In cloud computing, the word cloud is used as a metaphor for "the Internet," so the phrase cloud computing means "a type of Internet-based computing," where different services such as servers, storage and applications are delivered to an organization's computers and devices through the Internet.

Cloud computing is a general term for the delivery of hosted services over the internet. Cloud computing enables companies to consume a compute resource, such as a virtual machine (VMs), storage or an application as a utility just like electricity.

Architecture diagram shows the relationship between different components of system. This diagram is very important to understand the overall concept of system. Architecture diagram is a diagram of a system, in which the principal parts or functions are represented by blocks connected by lines that show the relationships of the blocks. They are heavily used in the engineering world in hardware design, electronic design, software design, and process flow diagram.

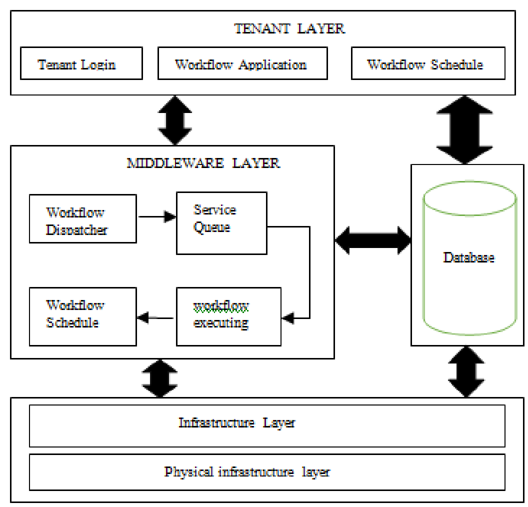

Figure 1. System Architecture

II. LITERATURE SURVEY

Multi-tenancy is one of the key features of cloud computing, which provides scalability and economic benefits to the end-users and service providers by sharing the same cloud platform and its underlying infrastructure with the isolation of shared network and compute resources. However, resource management in the context of multi-tenant cloud computing is becoming one of the most complex task due to the inherent heterogeneity and resource isolation. This paper proposes a novel cloud-based workflow scheduling (CWSA) policy for compute-intensive workflow applications in multi-tenant cloud computing environments, which helps minimize the overall workflow completion time, tardiness, cost of execution of the workflows, and utilize idle resources of cloud effectively. The proposed algorithm is compared with the state-of-the-art algorithms, i.e., First Come First Served (FCFS), EASY Backfilling, and Minimum Completion Time (MCT) scheduling policies to evaluate the performance. Further, a proof-of-concept experiment of real-world scientific workflow applications is performed to demonstrate the scalability of the CWSA, which verifies the effectiveness of the proposed solution. The simulation results show that the proposed scheduling policy improves the workflow performance and outperforms the aforementioned alternative scheduling policies under typical deployment scenarios.[1]

In this paper, the conceptual architecture of a SaaS platform that enables executing of configurable and multitenant SaaS application is proposed. Even though most of organizations utilize a standardized SaaS application developed by a SaaS developer, each of tenants would have unique requirements regarding service components. The platform provides several features for configuring these aspects of SaaS software such as organizational structure (role sets and access control), user interface, data model, workflow, and business logic. To satisfy multitenancy of SaaS application, we applied metadata driven architecture proposed by Force.com.[2]

The volumetric growth of data complexity is increasing day by day. The computational world is becoming massive and needs scalable and efficient systems. Data management is an important stage to accelerate the petabytes processing. Such environment requires scientific work flows to compose and manage those volumetric data sets. The study of scientific workflow in the context of multi-tenant cloud orchestration environment provides control flow, data flow, and new requirements of system development and discovery of new services. We explore a framework of scientific workflow for multi-tenant cloud orchestration environment that deals with semantic-based workflow as well as policy-based workflow.[3]

The author studies the complexity of the problem of allocating modules to processes in a distributed system to minimize total communication and execution costs. He shows that unless P=NP, there can be no polynomial-time epsilon -approximate algorithm for the problem, nor can there exist a local search algorithm that requires polynomial time per iteration and yields an optimum assignment. Both results hold even if the communication graph is planar and bipartite. On the positive side, it is shown that if the communication graph is a partial k-tree or an almost-tree with parameter k, the module allocation problem can be solved in polynomial time.[4]

Task scheduling and resource allocation are two of the most important issues in grid computing. In a grid computing system, the workflow management system receives inter-dependent tasks from users and allocates each task to an appropriate resource. The assignment is based on user constraints such as budget and deadline. Thus, the workflow management system has a significant effect on system performance and efficient resource use. In general, optimal task scheduling is an NP-complete problem. As a result, both scheduling time and solution quality are improved. Results are presented which show that the proposed method has better performance compared to similar techniques.[5]

Cloud computing is gaining tremendous momentum in both academia and industry. The application of Cloud computing, however, has mostly focused on Web applications and business applications; while the recognition of using. In this paper, we analyze why there has been such a gap between the two technologies, and what it means to bring Cloud and workflow together; we then present the key challenges in running Cloud workflow, and discuss the research opportunities in realizing workflows on the Cloud.[6]

Workflows have emerged as a paradigm for representing and managing complex distributed computations and are used to accelerate the pace of scientific progress. A recent National Science Foundation workshop brought together domain, computer, and social scientists to discuss requirements of future scientific applications and the challenges they present to current workflow technologies.[7]

In this paper, we present two novel scheduling algorithms for a bounded number of heterogeneous processors with an objective to simultaneously meet high performance and fast scheduling time, which are called the Heterogeneous Earliest-Finish-Time (HEFT) algorithm and the Critical-Path-on-a-Processor (CPOP) algorithm. The HEFT algorithm selects the task with the highest upward rank value at each step and assigns the selected task to the processor, which minimizes its earliest finish time with an insertion-based approach. On the other hand, the CPOP algorithm uses the summation of upward and downward rank values for prioritizing tasks. Another difference is in the processor selection phase, which schedules the critical tasks onto the processor that minimizes the total execution time of the critical tasks. In order to provide a robust and unbiased comparison with the related work, a parametric graph generator was designed to generate weighted directed acyclic graphs with various characteristics.[8]

Traditional scheduling research usually targets make span as the only optimization goal, while several isolated efforts addressed the problem by considering at most two objectives. In this paper we propose a general framework and heuristic algorithm for multi-objective static scheduling of scientific workflows in heterogeneous computing environments. The algorithm uses constraints specified by the user for each objective and approximates the optimal solution by applying a double strategy: maximizing the distance to the constraint vector for dominant solutions and minimizing it otherwise. We analyze and classify different objectives with respect to their impact on the optimization process and present a four-objective case study comprising make span, economic cost, energy consumption, and reliability.[9]

We consider the problem of opportunistically scheduling low-priority tasks onto underutilized computation resources in the cloud left by high-priority tasks. To avoid conflicts with high-priority tasks, the scheduler must suspend the low-priority tasks (causing waiting), or move them to other underutilized servers (causing migration), if the high-priority tasks resume. The goal of opportunistic scheduling is to schedule the low-priority tasks onto intermittently available server resources while minimizing the combined cost of waiting and migration. Moreover, we aim to support multiple parallel low-priority tasks with synchronization constraints. Under the assumption that servers' availability to low-priority tasks can be modelled as ON/OFF Markov chains, we have shown that the optimal solution requires solving a Markov Decision Process (MDP) that has exponential complexity, and efficient solutions are known only in the case of homogeneously behaving servers. In this paper, we propose an efficient heuristic scheduling policy by formulating the problem as restless Multi-Armed Bandits (MAB) under relaxed synchronization. We prove the index ability of the problem and provide closed-form formulas to compute the indices. Our evaluation using real data center traces shows that the performance result closely matches the prediction by the Markov chain model, and the proposed index policy achieves consistently good performance under various server dynamics compared with the existing policies.[10]

III. EXISTING SYSTEM

The problem of scheduling tasks on multiple resources has been extensively studied in parallel and distributed systems, cluster and grid computing, and in recent years to a lesser extent in cloud computing. The methodology adopted varies according to the characteristics of the workload (e.g., batch workload or online workload, large/medium/small size, and frequency), characteristics of resources (e.g., physical/ virtual resources, number of nodes, and networks), performance metrics of interest, and scheduling based on multi agent systems. Several studies considered in heuristics algorithm, e.g., list scheduling, clustering, and task duplication. Examples of list scheduling include Heterogeneous Earliest- Finish-Time (HEFT) and Fast Critical Path (FCP) scheduling for a single workflow. A list scheduling heuristic combined with multi-objective optimization was proposed in for scheduling workflow in grids and clouds. Well known examples of task duplication based algorithms include and task duplication-based scheduling algorithm for network of heterogeneous systems (TANH)

1. DISADVANTAGES OF EXISTING SYSTEM

Does not achieve key-exposure resistance in cloud storage auditing. The key is easily hack by anyone. Gives unnecessary processing burden.

IV. PROPOSED SYSTEM

There exists a plethora of workflow management systems. However, many of their features are optimized for conventional grid and cluster computing to execute single/multiple job(s) or workflow and thus may not be able to obtain most of the key aspects of cloud computing, while such systems suffer from limited resource provisioning. Although there are few works addressing workflow scheduling on clouds, they were not designed in the context of multi-tenancy. Given the emergence of diverse sets of scientific workflow applications each belonging to different domains, a multi-tenant aware and flexible workflow platform is needed to cost-effectively execute/deploy the workflow applications of multiple tenants. There exists a plethora of workflow management systems. However, many of their features are optimized for conventional grid and cluster computing to execute single/multiple job(s) or workflow and thus may not be able to obtain most of the key aspects of cloud computing, while such systems suffer from limited resource provisioning. Although there are few works addressing workflow scheduling on clouds, they were not designed in the context of multi-tenancy. Given the emergence of diverse sets of scientific workflow applications each belonging to different domains, a multi-tenant aware and flexible workflow platform is needed to cost-effectively execute/deploy the workflow applications of multiple tenants.

CWSA algorithm is the algorithm works as follows. Initially, the resource nodes are sorted in descending order based on their computational speeds. The objective to do so is to select the lowest execution cost for ready workflow tasks. The scheduler checks the task dependency at scheduling time to verify which tasks can be scheduled one after another. This is done through a depth-first search. When the workflow is submitted to the scheduler, the workflow tasks will be inserted into a service queue. The ready workflow tasks are sorted according to a deadline priority.

2. ADVANTAGES OF PROPOSED SYSTEM

Achieve key-exposure resistance in cloud storage auditing, public audit ability -- to verify the correctness of the cloud data on demand without retrieving a copy of the whole data.

V. PROPOSED ALGORITHM

Cloud Workflow Scheduling Algorithm (CWSA): The algorithm works as follows. Initially, the resource nodes are sorted in descending order based on their computational speeds. The objective to do so is to select the lowest execution cost for ready workflow tasks. The scheduler checks the task dependency at scheduling time to verify which tasks can be scheduled one after another. This is done through a depth-first search. When the workflow is submitted to the scheduler, the workflow tasks will be inserted into a service queue. The ready workflow tasks are sorted according to a deadline priority.

VI. SYSTEM DESIGN

A data flow diagram (DFD) is a graphical representation of the "flow" of data through an information system. It differs from the flowchart as it shows the data flow instead of the control flow of the program. A data flow diagram can also be used for the visualization of data processing. The DFD is designed to show how a system is divided into smaller portions and to highlight the flow of data between those parts.

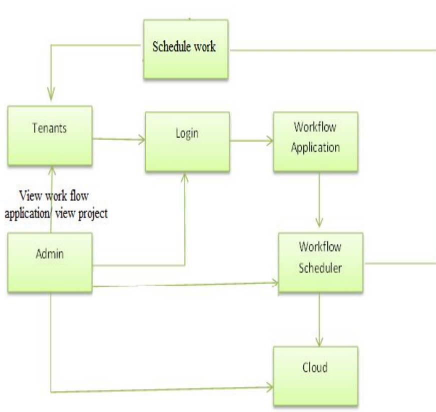

Figure 2. Data flow diagram

VII. RESULTS AND DISCUSSIONS

The result and discussion of the proposed system are as follows:

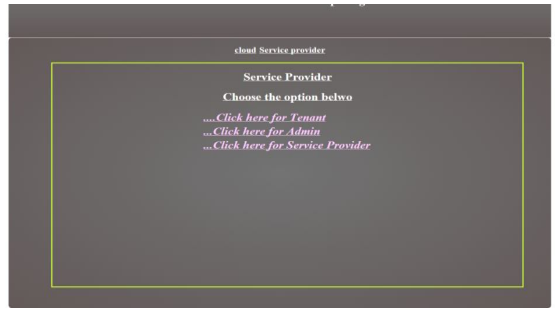

Figure 3. Tenant login

Figure 4. Submission of workflow application

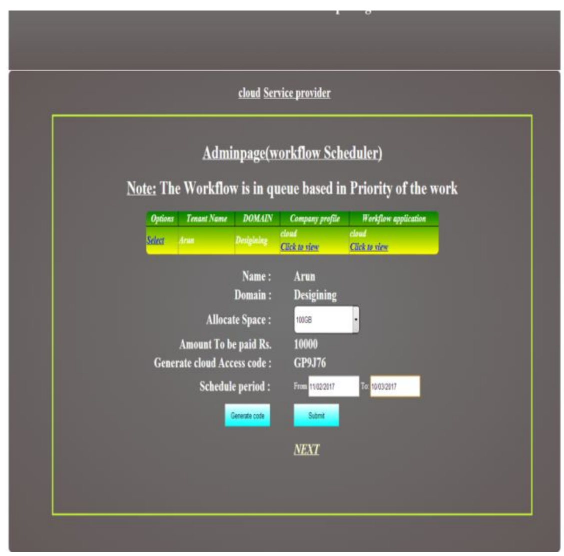

Figure 5. View workflow application

Figure 6. View scheduled work by tenant

Figure 7. Admin view the work submitted by the tenant

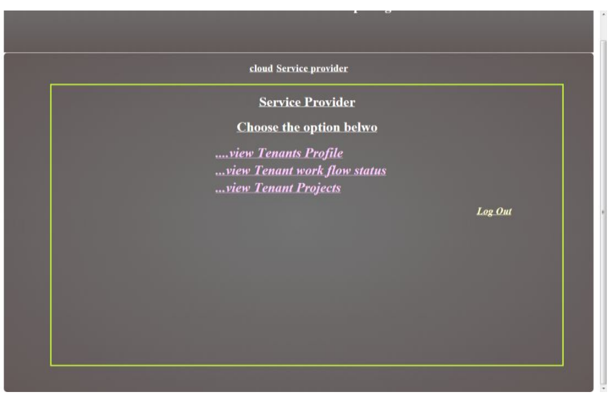

Figure 8. Service provider

VIII. CONCLUSION AND FUTURE WORK

Cloud computing has been widely recognized as an essential computing paradigm to execute compute- and data intensive business process workflow (e.g., media processing, analytics pipelines, orchestration of services, coordinating resources, people, information, and systems) and scientific workflow applications for processing of large sets of scientific data, as witnessed by the recent work on Amazon SWF (Simple Workflow Service). In this paper, we introduced a four-layered workflow scheduling system. A novel CWSA scheduling policy was proposed for scheduling workflow applications in a multitenant cloud computing environment. An analysis of different performance metrics was carried out. An extensive simulation was performed to evaluate the performance of the proposed scheduling policy. The performance of the CWSA was then compared with different scheduling policies to highlight the performance and robustness of the proposed solution. The obtained results show that our CWSA outperforms other scheduling policies. Importantly, CWSA was shown to utilize computational resources properly by reducing idle time of cloud resource nodes. Thus this paper provides CWSA technique for works scheduling system according to the priority of the work. In future the work can be scheduled simultaneously to all the tenants according to the available resources.

REFERENCES

[1] Bhaskar Prasad Rimal,Martin Maier,"Workflow Scheduling in Multi-tenant Cloud Computing Environments",IEEE Trans. On Parallel and distributed systems,April.2015

[2] I. Foster, Y. Zhao, I. Raicu, and S. Lu, "Cloud computing and grid computing 360-degree compared," in Proc., IEEE Grid Computing Environments Wksp, Nov. 2008, pp. 1–10.

[3] Bhaskar Prasad Rimal,Mohamed A. EI-Refaey,"A framewok of scientific workflow management systems for multi-tenant cloud orchestration environment",IEEE Infrastructures for collaborative enterprises,Aug.2010.

[4] D. Fernandez-Baca, "Allocating modules to processors in a distributedsystem," IEEE Trans. Software Eng., vol. 15, no. 11, pp.1427–1436, Nov. 1989.

[5] Yong Zhao,Xubo Fei,I. Raicu,Shiyong Lu,"Opportunities and challenges in running scientific workflows on the cloud,"IEEE Cyber-Enabled distributed computing and knowledge discovery,Nov.2011.

[6] Y. Zhao, X. Fei, I. Raicu, and S. Lu, "Opportunities and challengesin running scientific workflows on the cloud," in Proc., IEEE Cyber-Enabled Distrib. Comput. and Knowledge Discovery, Oct. 2011, pp..

[7] Yolanda Gil,Ewa Deelman,Mark Ellisman,Thomas Fahringer,"Examining the challenges of scientific workflows",IEEE Trans on Computer.,vol.40,Dec 2007.

[8] Haluk Topcuouglu,Salim Hariri,Min-you Wu,"Performance-Effective and Low-Complexity Task Scheduling for Heterogeneous Computing,"IEEE Trans

on Parallel and distributed systems.,vol.13,March 2002.

[9] Hamid Mohammadi Fard,Radu Prodan,Juan Jose DurilloBarrionuevo,"A Multi-objective Approach for Workflow Scheduling in Heterogeneous Environments",IEEE Cluster,Cloud and Grid Computing,June.2012.

[10] Ting He,Shiyao Chen,Hyoil Kim,"Scheduling Parellel Tasks onto Opportunistically Available Cloud Resources",IEEE Cloud Computing,Aug.2012.