WORKFLOW SCHEDULING BASED ON DEADLINE CONSTRAINTS USING LARAC

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Abstract

Service capacities are usually regarded to be unlimited in cloud computing, which can be used at any time. However, from the CSP's perspective, service capacities are not unlimited. Available service capacities change with workload, i.e., they cannot satisfy user's request at any time when a cloud service is shared by multiple tasks. Only some available time slots are provided for new coming users by CSPs in terms of their remaining capacities. Most of the proposed scheduling algorithm detailed information about tasks such as execution time and remaining time. In this paper, we consider workflow scheduling with deadline and time slots availability in cloud computing. An iterated heuristic framework is presented for the problem under study which mainly consists of initial solution construction, improvement, and perturbation. Three initial solution construction strategies, two greedy- and fair-based improvement strategies and a perturbation strategy are proposed. Different strategies in the three phases result in several heuristics. Experimental results show that different initial solution and improvement strategies have different effects on solution qualities.

Keyword: Workflow, Scheduling, Time slot, Cloud computing.

I.   INTRODUCTION

Cloud computing infrastructures are designed to support the accessibility and deployment of various services oriented application by the user. Resources are generally provided in the form of services, especially in cloud computing. There are two common ways for service delivery: (1) An entire application as a service, which can be directly used with no change. (2) Basic services are combined to build complex application, e.g., Xignite and StrikeIron offer Web services hosted on a cloud on a pay-per use basis. Among a large number of services in cloud computing, there are many services which have same functions and supplied by different cloud service providers (CSPs). However, these services have different non-functional properties. Basic services are rented by user for their complex applications with various resource requirements which are usually modeled as workflows. Better services imply higher costs. Services are consumed based on Service-Level Agreement, which define parameter of Quality of services in terms of pay-per use policy. Though there are many parameters or constraints involved in practical workflow scheduling setting, deadline and time slot are two crucial ones in cloud computing, a new market-oriented business model, which offers high quality and low cost information services. WSDT problem is similar to the Discrete Time/Cost Trade-off Problem (DTCTP). Generally, longer execution time implies cheaper in cloud computing for the DTCTP. However, this is not true for the WSDT. In other words, the fastest schedule of the WSDT does not mean the highest total cost in a pricing model where the cost is in the inverse proportion to the execution time.

II.   RELATED WORK

Cloud computing is a new market-oriented business model which provides elastic computing and storage resources on demand. Though this kind of computing paradigm becomes increasingly important for computation-intensive tasks in big data, much attention has been paid on scientific work-flows. The computation time of existing methods is high because all the information about tasks such as execution time and remaining time must be known before the scheduling and partitioning process.

Deadline constrained workflow scheduling is one of the most popular scheduling problems in cloud computing. Appropriate services are selected for all the activities in the involved workflow to maximize objectives. Minimizing time delay, cost and time-cost-trade-off are common objectives. Service selection for workflow scheduling considering both time and cost was modeled as the Discrete Time/Cost Trade-off Problem (DTCTP). Each workflow can be fulfilled by more than one service, which consists of a service pool. Generally, workflows are represented by Direct Acyclic Graphs (DAG's). Deadlines are usual constraints for workflow scheduling.

(i) Deadlines of the workflow applications need s to be met.
(ii) Unreserved time slot is crucial for resource utilization from the perspective of service providers.
(iii) Utilization of time slots in reserved intervals should be improved to avoid renting new resources.

Task Scheduling is a major problem in scientific workflows execution. The scheduling algorithms are presented to balance the load on CPUs, maximize CPU usage, and to minimize a workflow total execution time.
Capacity of hardware resources and performance requirement should be considered while assigning resources to workflow application. The scope concept to measure hardware capability and to calculate minimum performance requirement for workflow tasks execution. Though there are many parameters or constraints involved in practical workflow scheduling setting, deadline and time slot are used to reduces the time taken to complete the tasks.

III.   PROPOSED WORK

The main goal of task scheduling is finding proper tasks mapping to available resources. A scheduling model based on the deadline constraints. It is reducing execution time and failure rate of scientific workflows in cloud environments under constant budget.

Workflow scheduling with deadline and time constraint depends on both finish times of all predecessors and available time slot of the services. Estimating the transfer time can be done using the amount of data to be transmitted, and the bandwidth and latency information between services. Workflow schedule such that it minimizes the execution cost and yet meets the time constraints imposed by the user.

Iterated Local Adjusting Heuristic framework is proposed and it consist of time slot filtering, Initial Solution Construction, Solution Improvement and Perturbation. It presents three initial solution construction strategies, two improvement methods and one perturbation strategy. It guarantees the completion of maximum number of task before missing their deadlines using minimum information to minimize the execution time and failure rate of the scientific workflows.

Path computation is used identifies which path has to choose and easy way to track the data to be quick in order. Enumeration Tree Structure are process of accessing or collecting the data in one by one step it consuming the time take place. It can individual access data. Three proposed system has enhance the node speed, node transaction capacity and node free state. Work Flow Calculation is used to reduce the calculation part and check how to calculate the work speed. Analyses the part of heuristic framework result much greater. When it compare to the proposed system is much more efficient and data collection is faster, it enhance the speed result to be reliable, scalable.
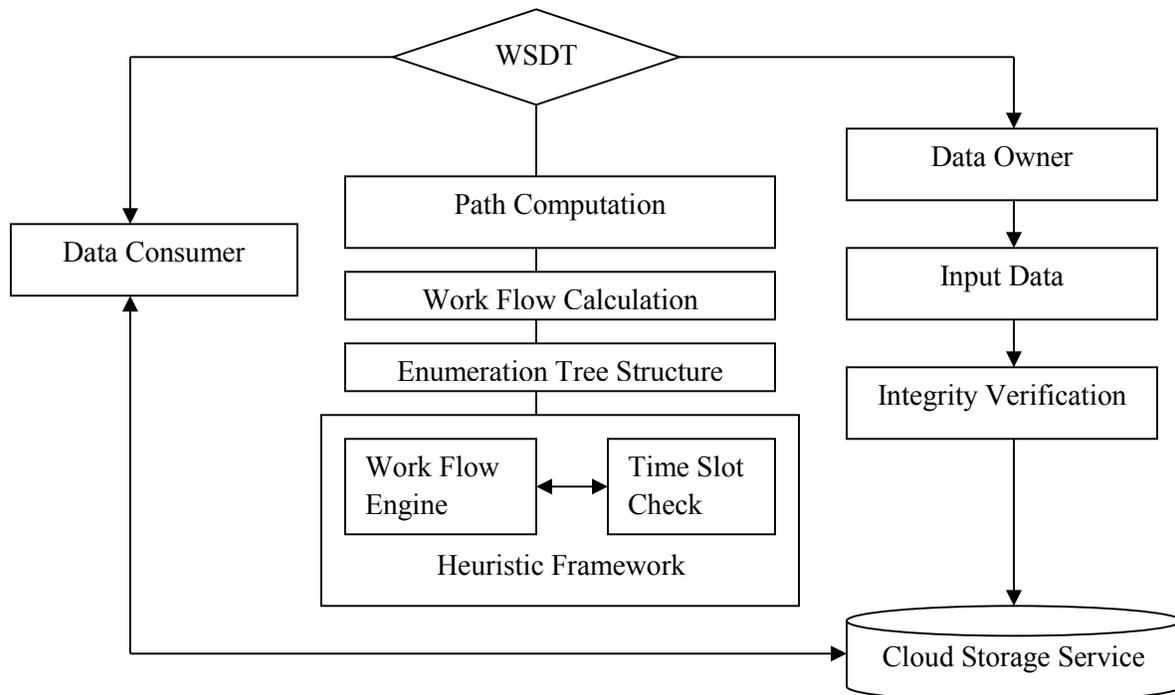
Figure 1: Architecture diagram

3.1   Cloud Service Providers

Resources are generally provided in the form of services, especially in cloud computing. Cloud computing is used to deliver the hosted services over the Internet. Cloud services are categorized into three categories such as Infrastructure as a service, Platform as a services and Software as services. IaaS is cloud service model in which an organization outsources the physical equipment used to support operations, including storage, hardware, servers and networking components. The Cloud service provider owns the equipment and they are responsible for running and maintaining that equipments. The client can pay according their usage. Using PaaS model, cloud service provider rent hardware, operating systems, and storage and network capacity over the Internet.

3.2   Heuristic Framework

The heuristic primarily serve the purpose of reducing the effort associated with a task. Heuristics can be classified according to a small set of effort-reduction principles. The framework to build upon

current models of heuristics, examine existing heuristics in terms of effort-reduction and outline the current research methods can be used to extend an effort-reduction framework to solve the problem, learning or discovery the practical methods. Whereas finding an optimal solution is impossible. Heuristic can be mental shortcuts that ease the cognitive load of making a decision. As the computation cost is inversely proportional to the computation time, the cost is higher for those resources that complete the task quicker. Depending on the number of task completed, the ready list is updated, which will now contain the tasks whose parents have completed execution.

3.3   Workflow scheduling problem with Deadlines and Time slot availability

Services capacities are usually regarded to be unlimited in cloud computing, which can be used at any time. However, from the CSP's perspective, service capacities are not unlimited. Available service capacities change with workloads. Only some available time slots are provided for new coming users by CSP's in terms of remaining capacities. WSDT is concerned with the automation of procedures whereby files and data are passed between participants according to a defined set of rules to achieve an overall goal. A workflow management system defines, manages and executes workflows on computing resources. The best service for each task of the workflow to create an optimized schedule that ends before the deadline and has the minimum overall cost in the deadline distribution phase. Time slot utility function is designed to map consumers and providers choice for different time slots. In general, a consumer can have multiple sets of acceptable time-slot preferences.

3.4   Data Service User

Users, who have data to stored in the cloud and rely on the cloud for data computation, consist of both individual consumers and organization. The user data services is a REST-based set of operations that provide authenticated access to user resources and entities such as user's devices, subscribed services, and speed dials, from the unified Communications configuration database. An environment that provides processing, storage, networking, management and the distribution of data within an enterprise. Data center services fall into two categories are services provided to data center or services provided from a data center.

IV.   RESULT & DISCUSSION
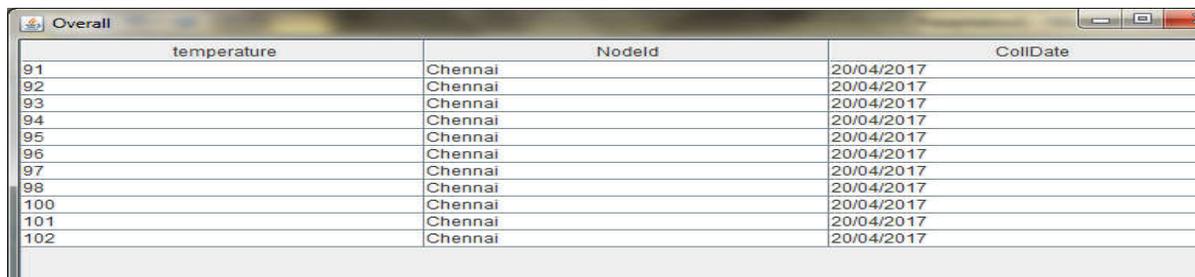
temperature	NodeId	CollDate
91	Chennai	20/04/2017
92	Chennai	20/04/2017
93	Chennai	20/04/2017
94	Chennai	20/04/2017
95	Chennai	20/04/2017
96	Chennai	20/04/2017
97	Chennai	20/04/2017
98	Chennai	20/04/2017
100	Chennai	20/04/2017
101	Chennai	20/04/2017
102	Chennai	20/04/2017

Figure 2: Results

Result view,indicate the view of temperature with node id and date. It shows the Maximum values of temperature occurred with high speed.

V.　CONCLUSION

This article considered workflow scheduling with deadline and time slots constraints in cloud computing to minimize total costs. The problem was modeled as the WSDT which is more practical than the DTCTP. It proved than the WSDT had different properties from the DTCTP. The ILAH framework was proposed for the NP-hard WSDT. Three initial solution construction strategies were developed among which the MCARF and the MACF showed more effective than the initial solution construction. Two improvement strategies, the FIH and the GIF were introduced which had similar influences on the solution improvement. The FIH was very effective for improving poor solutions. By integrating the worst and best initial solution construction strategies with the two improvement strategies, four ILAH-based algorithms were developed. Though the EFTF was the worst initial solution construction strategy, it was strange that the EFIG showed the best performance. However, the EGIH obtained the worst performance. In addition, the EFTF was not sensitive to instance parameters while the EGIH was affected by most of the parameters.

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