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Survey on Privacy-Aware Cross-Cloud Service Composition For BIG DATA Applications

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ABSTRACT: Cloud computing promises a scalable infrastructure for processing big data applications such as medical data analysis. Cross-cloud service composition provides a concrete approach capable for large-scale big data processing. However, the complexity of potential compositions of cloud services calls for new composition and aggregation methods, especially when some private clouds refuse to disclose all details of their service transaction records due to business privacy concerns in cross-cloud scenarios. Moreover, the credibility of cross-clouds and on-line service compositions will become suspicional, if a cloud fails to deliver its services according to its ‘‘promised’’ quality. In view of these challenges, we propose a privacy-aware cross-cloud service composition method, named HireSome-II (History record-based Service optimization method) based on its previous basic version HireSome-I. In this paper provides the review for comparing various QoS to secure cloud services.

KEYWORDS: Cloud, Service Composition, QoS, Big Data, Transaction History Records

I. INTRODUCTION

Cloud storage is gaining popularity recently. In enterprise settings, we see the rise in demand for data outsourcing, which assists in the strategic management of corporate data. It is also used as a core technology behind many online services for personal applications. Nowadays, it is easy to apply for free accounts for email, photo album, file sharing and/or remote access, with storage size more than 25GB (or a few dollars for more than 1TB). Together with the current wireless technology, users can access almost all of their files and emails by a mobile phone in any corner of the world.

Many cloud service providers (e.g,Amazon, Google, Microsoft, IBM, etc) are now available in the market to provide cloud services such as Governance as a Service (GaaS), Business as a Service (BaaS), Infrastructure as a Service (IaaS), Platform as a Service (PaaS) and Software as a Service (SaaS). Cloud technology stack has also become main stream in enterprise data centers, where private and hybrid cloud architectures are increasingly adopted [1]. However, though cloud computing has tremendous advantages; there are challenges in the area of Quality of Service (QoS).

QoS denotes the levels of performance, reliability and availability offered by an application and by the platform or infrastructure that hosts it. QoS is fundamental for cloud users, who expect providers to deliver the advertised quality characteristics, and for cloud providers, who need to find the right tradeoffs between QoS levels and operational costs. Any violation of service level agreement (SLA) entails a loss for both cloud providers and cloud users [2].

Over provision is often adopted by providers as an approach to satisfy the SLA, but it fails to optimize. Though QoS properties have received constant attention even before the evolution of cloud computing, performance

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and heterogeneity and resource isolation mechanisms of cloud platforms have significantly complicated QoS analysis, prediction and assurance. Thus, several researchers are investigating automated QoS management methods that can leverage the high programmability of hardware and software resources in the cloud[5].

Cross-cloud service composition provides a concrete approach capable for large-scale big data processing. Existing (global) analysis techniques for service composition, however, often mandate every participant service provider to unveil the details of services for network-aware service composition, especially the QoS information of the services. Unfortunately, such an analysis is infeasible when a private cloud or a local host refuses to disclose all its service in detail for privacy or business reasons [8].

II. RELATED WORK

This section we compare our Quality of Service (QoS) with other possible solutions on Secure in Cloud Service

"A QoS-Aware Service Optimization Method Based on History Records and Clustering"

In this paper, present a QoS-aware service optimization method based on history records and clustering, named *QHRC* [1]. We take advantage of QoS history records to generate record composition plans rather than using the tentative QoS values provided by service providers. A modified hierarchical clustering method named H2D-SC algorithm is applied to cluster the QoS history records for each web service, then using the centroids of the clusters to generate record composition plans to speed up the computation. Through the corresponding record composition plans, we rank the service composition plans to get a most qualified composition plan. The application of the EM algorithm or bisecting K-Means algorithm for partitioning the nodes of a H2D-SC hierarchy.

"A History Record-based Service Optimization Method for QoS-Aware Service Composition" [2]

A novel method named *HireSome* is proposed for developing service composition in an credible way. Technically, our methods are promoted by web service's QoS history records rather than the tentative QoS values advertised by the service provider. With some experiments, the feasibility of our proposal is evaluated. Please note that when the scale of history records is very large, the history records of web services should be pre-processed with some filter techniques, otherwise, the computation time of *HireSome* method would be out of the run-time requirements. -

"Selecting Skyline Services for QoS based Web Service Composition " [3]

In this paper, a method for assisting service providers in improving the competitiveness of their services to attract potential clients. Here propose an approach based on the notion of skyline to effectively and efficiently select services for composition, reducing the number of candidate services to be considered. We also discuss how a provider can improve its service to become more competitive and increase its potential of being included in composite applications. Our skyline-based methods are affected by the difficulty of the composition problem, in terms of the number and strength of the specified end-to-end QoS constraints.

"**An Approach for QoS aware Service Composition based on Genetic Algorithms [4],**

Here proposed a GA based approach for QoS aware service composition, determine a set of concrete services to be bound to abstract services contained in a orchestration to meet a set of constraints and to optimize a criterion on QoS attributes. Compared with linear Integer Programming, the most widely adopted approached, GA permits to deal with QoS attributes having non linear aggregation functions. Also, GA is able to scale up when the number of concretizations increases. Finally, to deal with constraints, it is possible to adopt a fitness function with both static and dynamic penalty.

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"QoS-Aware Composition of Web Services: An Evaluation of Selection Algorithms" [5]

A process chooses the optimal candidates. Discusses how the selection can consider different Quality-of-Service (QoS) categories as selection criteria to select the most suitable candidates for the composition. If more than one category is used for optimisation, a multidimensional optimisation problem arises which results in an exponential computation effort for computing an optimal solution. We explain the problem and point out similarities to other combinatorial problems – the knapsack problem and the resource constraint project scheduling problem (RCPSP). Based on this discussion, we describe possible heuristics for these problems and evaluate their efficiency when used for web service candidate selection.

"Run-Time Monitoring of Instances and Classes of Web Service Compositions"[6]

The authors presented a novel approach to the problem of monitoring web services described as BPEL processes. The approach allows for a clear separation of the service business logic from the monitoring functionality. Moreover, it provides the ability to monitor both the behaviours of single instances of BPEL processes, as well as behaviours of a class of instances. The monitors can check temporal, Boolean, time related, and statistic properties. We devise a language that is expressive enough to express formally specifications of all these kinds of monitors, and a technique to automatically generate both instance and class monitors from their specifications, thus supporting their development.

"Quality of Service for Workflows and Web Service Processes"[7]

Present a predictive QoS model that makes it possible to compute the quality of service for workflows automatically based on atomic task QoS attributes. We also present the implementation of our QoS model for the METEOR workflow system. We describe the components that have been changed or added, and discuss how they interact to enable the management of QoS. It includes three dimensions: time, cost, and reliability. The use of QoS increases the added value of workflow systems to organizations, since non-functional aspects of workflows can be described. The algorithm applies a set of reduction rules to a workflow, until only one task remains which represents the QoS for the entire workflow.

"Mixed-Integer Programming for QoS-Based Web Service Matchmaking"[8]

Proposed a QoS-based Web Service (WS) discovery has been recognized as the main solution for filtering and selecting between functionally equivalent WSs stored in registries or other types of repositories. There are two main techniques for QoS-based WS matchmaking (filtering): ontology-based and Constraint Programming (CP)-based. Unfortunately, the first technique is not efficient as it is based on the rather immature technology of ontology reasoning, while the second one is not accurate as it is based on syntactic QoS-based descriptions and faulty matchmaking metrics. In our previous work, we have developed an extensible and rich ontology language for QoS-based WS description. Developed two alternative CP-based QoS-based WS matchmaking algorithms: a unary-constrained and n-ary-constrained one. We claim that Mixed-Integer Programming (MIP) should be used as a matchmaking technique instead of CP.

"Quality Driven Web Services Composition" [9],

Propose a quality-driven Web service composition methodology for ubiquitous computing environment. Our methodology evaluates the quality of Web services in three dimensions- quality of services, quality of contexts and quality of devices. We also introduce EWC (Event-driven Web services Composer) as a comprehensive tool to support our methodology. Our EWC 1) automatically prioritizes Web service candidates based on their quality in services, contexts and devices, 2) selects the optimal web service for a given condition, 3) executes the optimal web services, and 4) monitors and dynamically reconfigures the web services.

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"Reliable QoS Monitoring Based on Client Feedback" [10],

Presented a novel approach to achieve Objective QoS monitoring by aggregating quality ratings from clients within a RM, which provides incentives for the clients to report honestly. Reliable QoS monitoring (and proper penalties computed on the basis of delivered QoS) are therefore essential for the trustworthiness of a service-oriented environment The RM pays clients for submitting quality ratings, and the payments are designed such that lying generates expected losses that offset the potential benefits from misreporting.

"Ranking and Clustering Web Services using Multi-Criteria Dominance Relationships" [11].

Proposed ranking and clustering of Web service search results and proposed methods based on the notion of dominance, which apply multiple matching criteria without aggregating the match scores of individual service parameters. Presented three algorithms for ranking the search results, and two algorithms for selecting the most representative services for clustering, so that the produced clusters reflect the trade-offs between the matched parameters. An extensive experimental evaluation validates the effectiveness and efficiency of our approach.

"QoS-Aware Middleware for Web Services Composition" [12],

Presents a middleware platform which addresses the issue of selecting Web services for the purpose of their composition in a way that maximizes user satisfaction expressed as utility functions over QoS attributes, while satisfying the constraints set by the user and by the structure of the composite service. Two selection approaches are described and compared: one based on local (task-level) selection of services, and the other based on global allocation of tasks to services using integer programming.

III. PROPOSED WORK

In my paper, proposed an enhanced History record-based Service optimization method, named HireSome-II based on the previous basic one of HireSome-I, has been developed for privacy-aware cross-cloud service composition for processing big data applications. It can effectively promote cross cloud service composition in the situation where a cloud refuses to disclose all details of its service transaction records for business privacy issues in cross-cloud scenario

IV. CONCLUSION

For future work, i have planned to apply my method to some specific cloud systems for processing big data applications. Besides, as the privacy preservation for big data analysis, share and mining is a challenging research issue due to increasingly larger volume of datasets in cloud, I have also planned to investigate the scalability of privacy preservation in big data applications with cloud service access.

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