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Enhanced Model for Security and Privacy based Ranking for Cloud SaaS Services

By

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A Thesis

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Abstract

Cloud computing is a rapidly growing technology used for storing large amount of data over distributed system with the ease of accessing data at anytime and anywhere. One of the main advantages that users are not worried for data accessing, processing and its storage and maintenance as all these tasks are related to service providers. Security and privacy can be considered as one of the major issues in migrating to the cloud computing. Providers are responsible for security and privacy service that can be providing to the users to ensure high Quality of Service (QoS) in the systems and ensure that data is secure.

Due to the diversity number in cloud service offering by cloud providers, security and privacy characteristics are different from providers to other one. This diversity in services makes it very difficult for customers to determine efficient providers and choose the appropriate services. So there is a need for an effective model to assist cloud clients to select the suitable provider that meet their needs of security and privacy. Ranking cloud services is used to perform this task.

Ranking is the process of arranging and classifying several cloud services within the cloud, then compute the ranking values of these services based on the quality of service required by clients and features of the cloud services. The objective of this research is to propose an enhanced security and privacy based ranking model to assist users to choose the best services they need based on security and privacy features. The proposed model combines the attributes for cloud computing field and information security field. The applicability of the proposed model is evaluated using SMI cloud Toolkit. The experimentation results of the proposed model were very promising.

المستخلص

الحوسبة السحابية هي تكنولوجيا سريعة النمو تستخدم لتخزين كمية كبيرة من البيانات عبرأنظمة موزعة مع سهولة الوصول للبيانات في أي وقت وفي أي مكان.ومن أهم مميزاتها ان مستخدميها غير قلقين للوصول للبيانات ومعالجتها وتخزينها وصيانتها بحيث أن جميع هذه المهام يتم ربطها بمزودين الخدمات. وتعتبر الأمن والخصوصية واحدة من معوقات الهجرة الى الحوسبة السحابية ، كما يجب أن يكون مزودين الخدمات مسؤولين عن خدمات الأمن والخصوصية التي يتم منحها للمستخدمين لضمان جودة خدمة النظام وايضا ضمان البيانات الأمنة.

وبسبب التنوع في عدد خدمات الحوسبة السحابية التي تقدم من قبل مزودين الخدمات، وايضا الإختلاف في خصائص الأمن والخصوصية . أصبح من الصعب للغاية بالنسبة للمستخدمين تحديد كفاءة مقدمي الخدمات واختيار الخدمات المناسبة.لذلك يجب أن يكون هناك نموذج فعال لمساعدة المستخدمين على تحديد الخدمات التي تلبي احتياجاتهم من الأمن والخصوصية،حيث تم تقيم النموذج باستخدام عملية التصنيف **(Ranking)**.

عملية التصنيف هي عملية ترتيب وتصنيف العديد من الخدمات داخل السحابة، ومن ثم حساب قيم الترتيببناءعلى نوعية الخدمة المطلوبة من قبل العملاءوخصائص هذه الخدمات السحابية. يهدف هذا البحث البإنشاء نموذج تصنيف لحساب الامن والخصوصية، ومساعدة المستخدمين على اختيارأفضل الخدمات التي يحتاجونها. حيث ان هذا النموذج المقترح يجمع بين سمات مجال الحوسبة السحابية ومجال أمن المعلومات.تم تقييم النموذج المقترح بإستخدام أدوات خاصة تسمى(**SMI Cloud Toolkit**)،وكانت نتائج التجارب التي تحصلنا عليها واعدة جدا.

1.1 Overview

This chapter introduces the research work, state the problem, research objectives, research significant and describes the thesis structure.

1.2 Problem Background

Cloud computing refers to both the applications delivered as services over the Internet and the system (hardware and software) that provide these services. The service itself is referred to as Software as a Service (SaaS). The data center hardware and software is what we will call a cloud. When a cloud is made available to the general public it's called a public cloud. The term private cloud refers to internal data centers of a business or other organization which is not available to the general public. Thus, cloud computing is the sum of SaaS and utility computing, but does not include small or medium-sized data [1].

Ranking is an approach that is used to predict the best possible service by collecting, comparing and ordering the related values of these services. It's a key factor to evaluate cloud services [2].

Security and privacy is one of the major issues in migrating to cloud computing. Companies and user in cloud computing concerned about sensitive data how can be stored secure. Cloud providers must ensure that they get the security aspects right to prevent breaches due to security vulnerabilities in the application or through malicious employees. Measuring security and privacy is critical to ensure high Quality of Service (QoS) in the systems and ensure that data is secure.

1.3 Problem Statement

Several cloud providers are offering different cloud services by different security and privacy mechanisms. These makes the cloud clients find it difficult to select the provider that has the best security and privacy. There is a need for a new security and privacy based ranking model to assist cloud clients to select the suitable provider.

1.4 Research Objectives

The objectives of this research are:

i. To review the current research on ranking cloud SaaS services.
ii. To propose an enhanced model for security and privacy based ranking model in cloud SaaS services.
iii. To evaluate the applicability of the proposed model.

1.5 Scope

This study was conducted to provide a ranking model to measure the security and privacy under the quality of service (QoS) for software as a service (SaaS). This is done to a number of cloud service providers to determine specific features in order to distinguish the best usable service.

1.6 Thesis Structure

This thesis contains six chapters. Chapter two gives an overall idea of cloud computing and SaaS ranking in cloud computing. Chapter three describes the research methodology. Chapter four describes the proposed enhancement model for measuring SaaS security and privacy. Chapter five describes the applicability of the proposed model. We concluded in chapter six.