Abstract

Data warehouse is a practice of storing important data of Client the client may be a Business to Business (B to B) or Business to client (B to C). The data warehouse is responsible to store, manage, and process data, rather than a local server or a personal computer. Data warehouse faces many security issues and is considered unreliable by the Users because of its insecure communication between the CSP and the Users. Cloud computing is the practice of using a network of remote servers hosted on the Internet. There is many deployment models used in cloud computing such as IAAS (Infrastructure As A Service), PAAS, SAAS etc. In our project we are concentrating only on IAAS deployment model. This project will provide an effective and a trustworthy solution for such a problem. This project focuses on providing a mediator between the User and the CSP for solving the above discussed problem. The mediator will be responsible for authentication and will be able to generate a mutually verified Bill per session. It will also be responsible to check if the services are provided according to the SLA. The mediator will help the User and CSP to verify everything. It will act like a third party hence it will be unbiased towards CSP or the User. This will intern provide a strong trust factor between the CSP and the User.
1 Introduction

1.1 Understanding Cloud Computing?
Cloud Computing is a general term used to describe a new class of network based computing that takes place over the Internet. It uses the Internet as a medium for communication and for virtual transfer of hardware, software and networking services to clients.
A 'cloud' is an elastic execution environment of resources involving multiple stakeholders and providing a metered service at multiple granularities for a specified level of quality (of service). Cloud computing is a subscription-based service where you can obtain networked storage space and computer resources. Cloud computing development offers a cost-efficient, secure alternative to traditional hardware infrastructures. Rather than managing your on-site infrastructure, cloud computing development allows you to instead concentrate on your core business. Using the Internet, it can be utilized for communication and transport by providing hardware, software and networking services to clients.

1.2 Cloud Computing Service Models
I. Infrastructure as a Service (IaaS) also referred to as Resource Clouds, provide (managed and scalable) resources as services to the user – in other words, they basically provide enhanced virtualization capabilities.
II. Platform as a Service (PaaS), provide computational resources via a platform upon which applications and services can be developed and hosted. PaaS typically makes use of dedicated APIs to control the behaviour of a server hosting engine which executes and replicates the execution according to user requests (e.g. access rate). As each provider exposes his / her own API according to the respective key capabilities, applications developed for one specific cloud provider cannot be moved to another cloud host – there are however attempts to extend generic programming models with cloud capabilities (such as MS Azure).
III. Software as a Service (SaaS), also sometimes referred to as Service or Application Clouds are offering implementations of specific business functions and business processes that are provided with specific cloud capabilities, i.e. they provide applications / services using a cloud infrastructure or platform, rather than providing cloud features them. Often, kind of standard application software functionality is offered within a cloud.

1.3 Cloud Computing Deployment Models
There are four main types of cloud deployment models:
I. Public cloud: The cloud computing resource is shared outside, anyone can use it and some payment maybe needed.
II. Private cloud: It is complementary to public cloud; private cloud's resource is limit to a group of people, like a staff of a company etc.
III. Hybrid cloud: This is a mixture of previous two clouds, some cloud computing resource is shared outside but some don't.
IV. Community cloud: This is a special cloud to make use of cloud computing features. More than one community shares a cloud to share and reduce the cost of computing system.
2. Problem Definition & Existing Methodology For Billing

- **Problem Definition**: "To build a user and Cloud Service Provider (CSP) friendly system which records and accounts for the usage of cloud resources utilized by the user by providing Cloud Transaction Administrator (CTA) which acts as a non-biased mediator between the user and the CSP as well as provides precautionary measures against 2 major cloud user security threats of unauthorized user and malicious insider."

- **Existing Methodology For Billing**: We have referred the existing billing system of IBM and Amazon. It is not a user oriented billing system. The reports are generated on a monthly basis. It highlights the storage charges, download charges, rental charges and so on. But it doesn't highlight the actual amount of and types of resources being used by the customer. The user cannot monitor his actual usage nor can he verify the bills on a per session basis. Thus the user can't be sure of whether the services are being provided to him according to the SLA, or whether he is making optimum usage of his resources or if he really requires the currently billed amount of resources or if anyone is misusing his resources such as an unauthorized user or a malicious insider which are explained below. There are some billing systems which provide some facilities to tackle these problems such as JBilling. However these are not free of cost.

3 Modules in project

There are three main modules or components in Cloud User Transaction Security (CUTS).

They are:

I. **User**: The User is a registered client of the CSP who is eligible to be provided access to the resources provided by the CSP according to the Service Level Agreement (SLA). The User can request resource related services from the CSP and is dependent on the CTA to monitor the various transactions taking place between him and the CSP.

II. **CTA**: The CTA or the Cloud Transaction Administrator looks after authentication, proper resource delivery and finally analysis of the bill generated by the CSP. Its sub-modules include Authentication, Resource Manager, SLA Monitor (S-Mon) and Billing Agent.

III. **CSP**: The CSP or the Cloud Service Provider provides the resource related services (IaaS in our case) after consulting with the CTA. Finally at the end of the session, it sends the generated bill to CTA for verification.

4 Scope Of The Project

I. **Security**: Security is one of the major issues due to which people are still hesitant to benefit from cloud computing. CUTS not only address the 2 major security issues for cloud users but also provides effective ways of combating with them. Thus CUTS is not only protecting against those threats but is completely preventing them from occurring as well.
II. **Accounting**: CUTS provides a per session billing for cloud users on the basis of the amount of resources used. The amount of resources used is not calculated depending upon just the number of CPU cycles, or time elapsed since session start of CSP based assurance of resource deployment. It rather actually monitors the usage of resources and then calculates the bill thus being able to verify and validate any mistakes in the bill generated by the CSP so that there is no repudiation on either's part.

III. **Authentication**: CUTS provides a unique methodology of authorizing and authenticating of users. The technique which is used in CUTS makes authentication much more secure and reliable without increasing the overhead too much or without the installation of some expensive hardware and without the risk of user's password being stolen or leaked.

IV. **Resource Delivery**: CUTS also consists of a resource manager which looks after resource delivery on part of CSP. It is responsible for checking whether the CSP is providing the resources as promised in the SLA or not. On the other hand, it is also responsible for checking whether the user is authorized to access the resources which he is requesting for as well.

### 5 System Design

#### 5.1 Architecture

It consists of 3 modules

I. Cloud Transaction Administrator (CTA)

II. Cloud Service Provider (CSP)

III. User

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**Figure 5.1**: Architecture of CUTS
Step 1: User service check in – to CSP  
Step 2: CSP sends request to confirm authentication to CTA  
Step 3: SLA (Service Level Agreement) check access rights of the users and confirms the Authentication and give permission to deploy resources  
Step 4: CSP provides resources to users  
Step 5: User request for service checkout to CSP  
Step 6: After service checkout  
CTA generates Bill and report of violation usage etc and sends it to user

6 Technical Specification

6.1 Advantages
a. Being unbiased and thus useful for all parties i.e. the users and the CSPs involved in Cloud Computing.
b. Malicious insider will be detected and service will be barred as well as unauthorized access will not be allowed.
c. SLA monitor will have a forgery resistive monitoring mechanism in which even an admin of cloud system cannot modify or falsify the logged data.
d. Resources will be properly managed by the Resource Manager along with a session wise billing system.

6.2 Application
a. CUTS provide a safe and transparent transaction environment to both the user and CSP.
b. In an organization it will be helpful to monitor the users and/ or employees which will help prevent unwanted unfair practices taking place.
c. It will help to bridge the gap between them by fulfilling the consumer's requirements and overcome their concerns as well as that of the CSPs.
d. It will be of great qualitative advantage to the CSPs as it will comply to their needs and help prevent the exploitation of their clients.
e. This will definitely encourage more and more people to adapt Cloud in their work environment and thus become a catalyst in increasing the CSPs clientele thus providing a great marketing advantage.

7 Conclusion

An intensive research was initiated during the design and development of our system. Cloud computing is an upcoming and fast emerging field which has made the IT sector sit up and take notice. It is still in its initial stages and has a lot of potential to expand. It has brought the world closer with the help of internet. Hence we decided to explore and work in this field.  
In Analysis phase we have drawn the E-R diagrams for our project CUTS. All UML diagram are also drawn for authentication, resource managing and bill analysis. The Data Flow diagrams of Level0 and Level1. In this way we have completed the Planning, Design and Analysis Phase successfully.

References


