A MUTUALLY VERIFIABLE BILLING SYSTEM FOR THE CLOUD COMPUTING ENVIRONMENT

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ABSTRACT

Cloud Computing Is an Important Transition That Makes Change In Service Oriented Computing Technology. With The Widespread Adoption Of Cloud Computing, The Ability To Record And Account For The Usage Of Cloud Resources In A Credible And Verifiable Way Has Become Critical For Cloud Service Providers And Users Alike. The Success of Such A Billing System Depends On Several Factors: The Billing Transactions Must Have Integrity and No Repudiation Capabilities the Billing Transactions Must Be No Obstructive and Have A Minimal Computation Cost; And the Service Level Agreement (SLA) Monitoring Should Be Provided In A Trusted Manner. Existing Billing Systems Are Limited In Terms Of Security Capabilities or Computational Overhead. This Project Proposes A Secure And Non Obstructive Billing System Called THEMIS As A Remedy For These Limitations. The System Uses A Novel Concept Of A Cloud Notary Authority For The Supervision Of Billing. The Cloud Notary Authority Generates Mutually Verifiable Binding Information That Can Be Used To Resolve Future Disputes Between A User And A Cloud Service Provider In A Computationally Efficient Way. Even Administrator of A Cloud System Cannot Modify or Falsify the Data. The research proposes an Accounting Layer tasked with the job of collecting and managing data that is to be fed to the Business Layer. Data collected through the Accounting Layer is measured against Service Level Agreement metrics. The Accounting Layer obtains real-time performance metrics relating to CPU and memory usage, as well as key performance indicator measures using custom software probes or software agents designed to collect operating health of software running in a given virtual machine being monitored.

Keyword *Service level agreement (SLA), THEMIS, CSPS, CAN, SMon Module Cloud Service Provider*

1. INTRODUCTION

Cloud computing is an important transition that makes change in service oriented computing technology. Cloud service provider follows pay-as-you-go pricing approach which means consumer uses as many resources as he need and billed by the provider based on the resource consumed. CSP give a quality of service in the form of a service level agreement. For transparent billing, each billing transaction should be protected against forgery and false modifications. Although CSPs provide service billing records, they cannot provide trustworthiness. It is due to user or CSP can modify the billing records. In this case even a third party cannot confirm that the user's record is correct or CSPs record is correct. To overcome these limitations we introduced a secure billing system called THEMIS. For secure billing system THEMIS introduces a concept of cloud notary authority (CNA). CNA generates mutually verifiable binding information that can be used to resolve future disputes between user and CSP. This project will produce the secure billing through monitoring the service level agreement (SLA) by using the SMon module. CNA can get a service logs from S-Mon and stored it in a local repository for further reference. Even administrator of a cloud system cannot modify or falsify the data. Central Nodal Authority (CNA) generates the bill with binding information. The process, which involves a generation of mutually verifiable binding information among all the involved entities on the basis of a one-way hash chain, is computationally efficient for a thin client and the CSP. So even administrator of a cloud system cannot modify or falsify the data.

2. LITERATURE SURVEY

Tribikram Pradhan, Santosh S Patil suggested in " A Mutually Verifiable Billing System For the Usage of Cloud Resources in Cloud Computing Environment ", International Research Journal of Engineering and Technology (IJGDC), Volume:08, Issue :01 June -2015;

Analysis: This system provides to user a pay-as-you-go service which means consumer uses as many resources as he need and billed by the provider based on the resource consumed.

For this we use secure billing system THEMIS introduces a concept of cloud notary authority (CNA). CNA generates mutually verifiable binding information that can be used to resolve future disputes between user and CSP. It consist of a UI where user can login to the service provider website here a user will be validated if he is a authorized user or not so we are preventing from unauthorized user entering into the service provider website. After login user can check his resources available to him perform any billing transactions every user interaction will be recorded and logs will be generated for any future disputes. After accessing the service, user want billing transaction.
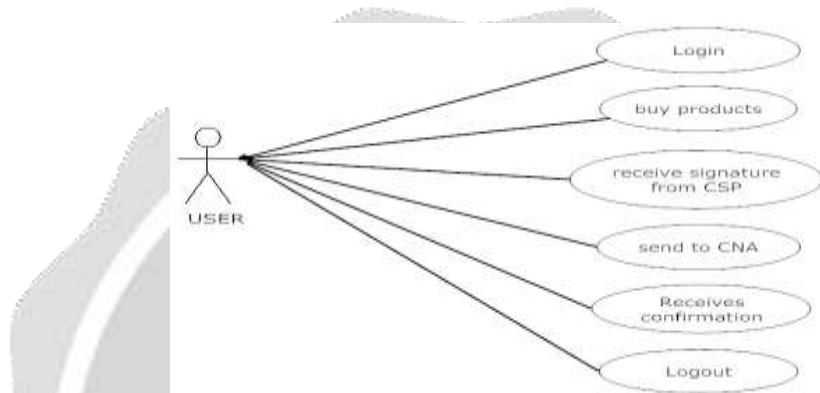
Chart -1: Use Case Diagram

If he\she wants the bill means it should send the contract of the CSP with contract of the user to the CNA. If both the details checked by the CNA are identical then user can receive the bill binding information along with confirmation message. It also facilitates us to explore more applications such as ePN Mobile iPhone VOSS Fulfillment Solution Absolute Performance SLA Monitoring.

2.1 Literature Review

Saurabh Amrutkar, Swati Daundkar recommended in "A Secured and Controlled Billing System by Agent for Cloud Computing Environment" International Journal Of Engineering And Computer Science Vol:3, No:11,2014, This study provides a very secure way for generation of bill previously there were inflexible communication between CSP and client. This is system uses concept of CTA for confirmation of billing. CTA store information that will solve problem between client and CSP efficient way the mediator will be responsible to check if the services are provided according to the contract. It proposed this work for three platforms IaaS, PaaS and SaaS where it provides the transactions to be more reliable and scalable with Computing efficiency and Trusted Third Party monitoring. It's basic workflow of the proposed system is to provide a mutual authentication for client then both the CSP and user send their keys to CTA through user. Authentication is provided by Cloud Transaction Administrative. After authentication user can access the files services and final stage is the billing transaction user sends log-in request to Cloud transaction administrator. CTA checks user validation and contract between billing agent and user CTA will send the data in consistent form to user. When a user requests to log out it will send log out request to CTA.

2.2 Market Review

For the billing transaction existing system used public key infrastructure (PKI)-based digital signature into each billing transaction to prevent corruption. Several studies have addressed this issue by deploying a PKI-based digital signature mechanism in an underlying security layer; however, they were handicapped by computational overhead due to the extreme complexity of the PKI operations. In spite of the consensus that PKI-based billing systems offer a high level of security through two security functions (excluding trustworthy SLA monitoring), the security comes at the price of extremely complex PKI operations. Consequently, when a PKI-based billing system is used in a cloud computing environment, the high computational complexity causes high deployment costs and a high operational

overhead because the PKI operations must be performed by the user and the CSP. The CSP may deliberately or unintentionally generate incorrect monitoring records, resulting in incorrect bills. To provide an SLA monitoring mechanism, several studies have made great efforts to design solutions that meet various requirements, including scalability with distributed resource monitoring, dataflow monitoring, and predictions of SLA violations, rather than addressing security concerns such as the integrity and trustworthiness of the monitoring mechanism. Thus, they are not fully supportive of the security issues.

System	Transaction Integrity	Non-Repudiation	Trusted SLA Monitoring	Billing Latency
Billing System with limited Security	No	No	No	Avg. 4.06ms
Micropayment-based Billing System	Yes	No	No	Avg. 4.70 ms
PKI-based Billing System	Yes	Yes	No	Avg. 82.51ms
THEMIS	Yes	Yes	Yes	Avg. 4.89 ms

- Experiment Environment:
  Server-Side: (CPU: X5650, RAM: 24GB), User-Side: (CPU: Z530, RAM: 1GB)

3. PROPOSED SYSTEM

The focus of our project a Proposed system is mainly taking in consideration for reliability, scalability and robust performance. We are working towards the system for more fault tolerance against scalable billing system. Main remarkable feature of the billing system is security; we can increase the security by applying different type of encryption and decryption algorithm. Different type of billing system format can be used to avoid lagging between user and cloud service provider. We introduce a new concept of a CNA to ensure undeniable verification of any transaction between a cloud service user and a CSP. By increasing more security in CNA verification we can achieve better performance of the system. By doing this, we made the transactions for billing more objective and acceptable to users and Cloud Service Providers. Data security is another important part for our proposed system, our system does provide all data in confidential manner so that user get his own data in consistent form, we can apply different data encryption algorithm to keep user data Confidential. A cloud billing system needs to take into its stride all forms of cloud products and services provided by the cloud service provider. It needs to be scalable and responsive to demands. It needs to furnish data to users in real-time and should be able to display up to date changes in cloud computing services enjoyed by a consumer. Last but not the least, a cloud billing system has to be transparent and customer-facing such that consumers are always kept informed on the resources being used or have been used, and the billed and/or payable amounts in respect thereof. The authors also touch upon the subject of different modes of billing such as "pay-as-you-go" and the "pay-for-resources".
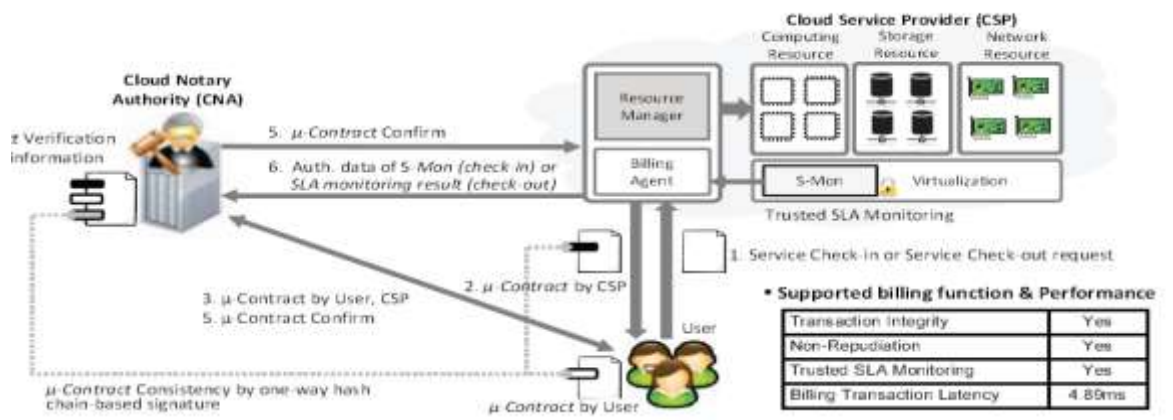

Chart -2: Proposed System

3.1 Methodology

- The user generates a service check-in or check-out request message and sends it to the CSP.
- The CSP uses an element from the CSP's hash chain to send the user a μ-contract-CSP as a digital signature.
- The user uses an element from the user's hash chain to generate a μ-contract-User as a digital signature. The user then combines the μ-contract-User with μ-contract-CSP and sends the combined μ-contract to the CNA.
- The CNA verifies the μ-contract from the user, and generates mutually verifiable binding information of the user and the CSP to ensure the consistency of the μ-contract.
- The process is completed when the user and the CSP receive confirmation from the CNA.
- Finally, in the case of a service check-in, the S-Mon of the user's cloud resource transmits authentication data of the S-Mon to the CNA.
- For the system we are introducing a CNA cloud notary authority which would authorize all the transactions and maintain integrity in the system CNA generates mutually verifiable binding information. Even administrator of a cloud system cannot modify or falsify the data. Lastly, the important feature which we have introduced in the THEMIS is monitoring user through the service level agreement (SLA) by using the S Mon module as in our main aim is to provide mutually verifiable billing transactions. Cloud Notary Authority (CNA) generates the bill with binding information. It acts as forgery-resistive SLA measuring and logging mechanism.   So even administrator of a cloud system cannot modify or falsify the data.

4. CONCLUSIONS

Since the inception of our project THEMIS a mutually verifiable billing system we have carried out different phases of the Software Development Lifecycle. We have clearly defined the purpose of the project and also the scope determining the goals and milestones in project lifecycle. The benefits and limitations of the project are well listed in this synopsis. The aims and objectives are achievable within the next phases of lifecycle. From the extensive research on various internationally published papers we have analyzed their drawbacks and found areas to improve in our own project. The papers have served as a good base for our research and we have developed new ideas for THEMIS through carefully analyzing their aspects. We have referred even publications for supporting knowledge and gained insight from them. The project plan and methodologies are apt for the successful completion of the project. The existing system is studied properly and so the proposed system will surely eliminate existing problems. The diagrams in the synopsis are made after intense discussions and are easy to understand. Each diagram serves its purpose and is made in such a way that there will be no confusions during coding and testing of project. Thus we conclude that the designing was carried out with utmost care and took maximum time.

5. REFERENCES

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