ABSTRACT

Cloud Computing refers to accessing Services through Internet based on pay per usage model. The current cloud infrastructure provides Software as a Service (SaaS), Infrastructure as a Service (IaaS) and Platform as a Service (PaaS). The advantage of migrating towards a cloud based application is that they have the capability to eliminate the need to install and manage client rich applications completely.

This research work emphasizes achieving Enhanced Secure Cloud Computing Services using Policy Monitoring and Virtualization Techniques. The initial contribution deals with creating a virtual platform for enabling cloud based services. Further, it also deals with analyzing the Stax platform, and process of deploying an application in the cloud using the Stax platform.

The next research contribution of the thesis deals with detailed analysis of the challenges and security issues in the cloud computing platform and describes Virtualization as a solution for most of these issues. The key points to maintain security of the cloud are listed, which are considered as policies enforced to enhance cloud security.

The proposed architecture “Cloud Security Model” has two major modules: Policy Manager module (PM) and Security Auditor module (SA). CSM’s PM module generates digital signature using HMerkleDigest generator module, generates the signature which has to be appended with the data, which assures protection policy for all the service in the cloud using message protection mechanism and in turn assures integrity of the data stored in CSP. Policy Checker verifies whether any of the data has been modified.
since from last access by generating HMD again and compares it with the previously generated hash which was sent along with the data.

CSM’s SA module, continuously monitors the resources (e.g. CPU, memory, network, and port) based on the defined policy can identify the intruded virtual machines and isolate them in order to perform the necessary measures. Vulnerability analysis is represented in a ring topology format. Threats can also be identified by monitoring specific port as well as services.

CSM’s PM module is based on risk assessment, which is in turn based on the policies provided. CSM takes steps, to prevent a fault machine from running. The VM is either destroyed or reconstructed using the virtual machine images from the snapshots taken periodically using hypervisor. So Enhanced Security of the cloud service is assured. Digital signature is generated using HMD generator module and is appended with the data, which assures protection policy for all the service in the cloud using message protection mechanism. Policy Checker verifies whether any of the data has been modified since last access by generating HMD again and by comparing it with the previously generated hash that was sent along with the data.

An enhancement in the cloud security through policy monitoring techniques is proposed. It details the problems prevailing in the cloud environment and presents policy monitoring techniques that can be used as effective solutions for these problems.

The next research contribution deals with enhancing the security aspect of cloud by combining Virtualization and Policy monitoring techniques. The challenges discussed in the earlier contributions are addressed and the security aspects that are handled by each of these techniques are
discussed in detail. Additional benefits of this hybridized approach are also discussed in detail.

This research work emphasizes achieving Enhanced Secure Cloud Computing Services using Policy Monitoring Techniques. Policy Monitoring is a continuous process based on regulatory compliance, information risk, service requirements and cloud business requirement.

The final contribution provides an extension to the previous contribution by using service policy monitoring techniques for providing improved security.

Proposed Cloud Security Model (CSM) provides efficient enhancements to the Security in Cloud Applications. The proposed architecture was implemented and as a case study it has been tested in our University Data Center. Results show that it assures the user to identify all the threats and unknown services running in the machines. Results reveal significant improvement in Security besides offering two fold securities to the cloud services with CSM. Our Proposed Policy Monitoring Techniques assures Enhanced Secure Cloud Computing Services.