CHAPTER 7

ANALYSIS OF PROPOSED FRAMEWORK AND ITS APPLICATIONS AND CONTRIBUTIONS

7.1. ANALYSIS OF PROPOSED FRAMEWORK

The performance level of the proposed novel cloud data storage mechanism to enhance communication and transaction security for concurrent users are analyzed using the CloudSim simulator to work under the simulation environment. The experiment for security level is processed with the help of Java language on the transactions between different cloud environments. The CloudSim simulator toolkit has been used as a simulation platform with 8 GB of RAM and 1 TB of storage space. The Amazon Access Samples dataset information is used on the transaction processing between cloud users and cloud servers. The cloud server side process is implemented on CloudSim software with larger instance type, 7.5 GB memory, and 850 GB instance storage. The randomly generated test data is of 1 GB size. The information included in the Amazon Access Samples dataset comprises of dense dataset where less than 5% of the attributes were used for evaluating the data consistency state on the transactions. The Amazon Access Samples dataset includes four categories of attributes including Person_Attribute, Resource_ID, Group_ID and System_Support_ID.

The ICCKO model is constructed to reduce the leakage of data in cloud. It supports the security and data confidentiality in an efficient manner. The data security of the model is based on client and server and its performance and computational complexity are considered. Here, the proposed ICCKO model provides end-to-end security in a highly distributed fashion. One of the modern features of the ICCKO model is its ability to maintain lightweight and powerful security. It combines the aspects of access control for data sharing, usage control for accessing the data and authentication for maintaining the security. By means of the ICCKO model, the data vendors follow not only the service-level agreements, but also impose access and usage control rules as needed. The ICCKO model are
evaluated based on the factors such as communication overhead, data transfer rate, data leakage detection rate, data security level, channel disturbance level and log creation time. Since the ICCKO scheme uses an instant communication channel for transferring the data to the clients, it is found that it offers reduced communication overhead of about 11 - 20 %, increased data transfer rate of about 10 - 16 %, improved data leakage detection rate of about 8 - 15 %, improved security level of data transaction of about 13 - 17 %, reduced channel disturbance level of about 12 - 15 % and minimized log creation time of about 36 - 52 % when compared to the existing CIA and DLD schemes respectively.

The rapid growth of transaction processing in cloud server improves the risk of providing security of data in cloud storage. The transactions of cloud data is performed effectively using the CSTAE-PSTO framework on cloud data storage system by different users through different access levels. The PSTO technique optimizes the best result of transaction from the entire population of information in cloud. The concept used in CSTAE-PSTO framework increases the stochastic nature of the particle and attains maximum result with good solution. The performance level of the proposed CSTAE-PSTO framework is measured based on the factors which includes throughput level on transaction, security rate on data layer, mapping efficiency, transaction completion time, and optimization time. The CSTAE-PSTO scheme makes good response with improved throughput level on transaction processing of about 9 - 15 %, increased security rate for different client requests of about 14 - 25 %, improved mapping efficiency of about 12 - 15 %, reduced transaction completion time of about 30 - 58 % and minimized optimization time of about 28 - 45% when compared to RDA and Shield schemes respectively.

The design of LE-PED framework bears numerous failures in distributed storage environment. The Linear Erasure Correction model ensures the increased storage capacity of cloud data. Moreover, the Poisson Exponential Distribution based Multi-threaded State Transition model is used in which the cloud user relies on the data from the cloud server in order to obtain improved cyclic progression ratio thus maintaining data consistency. The Poisson exponential distribution model stops the iterative process on the basis of the multi-threaded state transition mechanism. Finally, the cyclic progression for the storage states and the threads (i.e. the cloud
user that has to be assigned with the cloud storage) are assigned in an on-demand transaction request of the user. The performance of the LE-PED framework is measured based on the parameters such as cloud data storage capacity, transaction duration, cyclic progression ratio and data consistency level. The analysis of the results shows improvement of cloud data storage capacity of about 10 - 17 %, reduced transaction duration with respect to data storage of about 31 – 38 %, improved cyclic progression ratio of about 18 – 38 % and increased data consistency level of about 8 to 12% when compared to the existing DAS-HT and ADS-OC schemes respectively.

7.2. APPLICATIONS OF PROPOSED FRAMEWORK IN CLOUD ENVIRONMENT

The security for dynamic data transactions can be provided in cloud servers to ensure the users with flexible data access including addition, update and removal of data. This storage distribution scheme achieves secure processing of data and detection of the malicious users in cloud environment. This novel cloud data storage mechanism can be applied for several Android applications. The users can access their files in the cloud at any time through any devices from various locations. A number of applications are free to use, whereas the others provides additional options for payment. Another application is a Google drive which is a combination of cloud storage and processing services. With the use of Google drive, users can access photos, documents, videos and other significant files. This novel cloud data storage application services are also sufficient to support the applications that require guarantees on consistency especially in the presence of data updates.

7.3. CONTRIBUTIONS OF THE RESEARCH WORK

The research contribution of the proposed work combines the aspects of providing communication and transaction security for concurrent usage of cloud applications. The contribution of the research work are listed as follows.

- To provide security for sharing of data between cloud servers and users, the Instant Communication Channel Key Organizer model is presented.
The Belief Inspector presented in the ICCKO model is used to prevent the malicious users from accessing the sensitive data from the cloud server.

The leakage of data during data transfer can be reduced in the cloud environment by means of Belief Inspector, who checks for authorized users requesting for data access. The Belief Inspector sends the data only to the authorized users and prevents the unauthorized users from usage of cloud data.

To ensure transactional security of data in cloud servers, Conditional Source Trust Attribute Encryption with Particle Swarm based Transaction Optimization technique is proposed.

The security level of data transactions on cloud storage is increased by using the conditional source trust attribute based encryption and decryption methods based on unique cipher specific identity number.

To support efficient handling of multiple delegated tasks in cloud domain, the bilinear mapping process is explored.

To minimize the transaction completion time on cloud applications, Particle Swarm based Transaction Optimization technique can be used. This optimization technique provides the best result of data transaction to cloud users.

To improve the data storage capacity in cloud and consistency of data during concurrent transactions, Linear Erasure Correction model is presented. Multiple threads are assigned for processing the transaction of data with increased throughput level.

To provide increased cyclic progression ratio, Poisson Exponential Distribution based Multi-threaded State Transition model is developed. The Poisson Exponential Distribution model stops the iterative process on the basis of the Multi-threaded State Transition mechanism by considering the arrival rate and an interval time of cloud users.