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Design of Traffic Redundancy and Elimination Approach for Reducing Cloud Bandwidth and Costs

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ABSTRACT: In last couple of years there huge increase in the usage cloud computing because cloud computing is emerging style of IT-delivery in which applications, data and resources are rapidly provisioned provided as standardized offerings to users with a flexible price. But it is important to provide the convenient pricing model for the users of cloud. Hence we design a new traffic redundancy and elimination scheme for reducing the cloud bandwidth and costs.

Keywords: cloud computing, novel-TRE, pay-as-you-go.

I. INTRODUCTION

The cloud computing paradigm has achieved widespread adoption in recent years. Its success is due largely to customers' ability to use services on demand with a pay-as-you go [2] pricing model, which has proved convenient in many respects. Low costs and high flexibility make migrating to the cloud compelling. Cloud computing is the long dreamed vision of computing as a utility, where users can remotely store their data into the cloud so as to enjoy the on-demand high quality applications and services from a shared pool of configurable computing resources. By data outsourcing, users can be relieved from the burden of local data storage and maintenance. Traffic redundancy and elimination approach is used for minimizing the cost.

Our new traffic redundancy elimination approach also called as novel-TRE or receiver based TRE, which detects redundancy at the client side and there is no need of server to continuously. However for server specific TRE approach it is difficult to handle the traffic efficiently and it doesn't suites for the cloud environment because of high processing costs. Novel-TRE matches incoming chunks with a previously received chunk chain or local file and sending to the server for predicting the future data.

Packet level redundant content elimination [3] as a universal primitive on all internet routers, such a universal deployment would immediately reduce link loads everywhere. However, we argue that far more significant network-wide benefits can be derived by redesigning network routing protocols to leverage the universal deployment. The "redundancy-aware" intra- and inter-domain routing algorithms show that they enable better traffic engineering, reduce link usage costs, and enhance ISPs' responsiveness to traffic variations. Disadvantage Of course, deploying redundancy elimination mechanisms on multiple network routers is likely to be expensive to start with. However, we believe that the significant long term benefits of our approaches offer great incentives for networks to adopt them.

End-system redundancy elimination [4] provides fast, adaptive and parsimonious in memory usage in order to opportunistically leverage resources on end hosts. EndRE is based on two modules server and the client. The server-side module is responsible for identifying redundancy in network data by comparing against a cache of prior data and encoding the redundant data with shorter meta-data. The client-side module consists of a fixed-size circular FIFO log of packets and simple logic to decode the meta-data by "de-referencing" the offsets sent by the server. Thus, most of the complexity in EndRE is mainly on the server side. Therefore it is server specific not able to maintain the full synchronization between client and the server. EndRE uses SampleByte fingerprinting scheme which is quicker than Rabin fingerprinting. EndRE limited for small redundant chunks of the order of 32-64 bytes. Only unique chunks are transmitted between file servers and clients, resulting in lower bandwidth consumption. The basic idea underlying EndRE is that of *content-based naming* where an object is divided into chunks and indexed by computing hashes over chunks. A limitation of this technique chunk size is small and it is server specific.

The Method and apparatus for reducing network traffic over low bandwidth links [5] describes how to get aside with three-way handshake between the sender and the receiver if a full state synchronization is maintained. A method is disclosed for reducing network traffic. At a sender, a data chunk is identified for transmission to a receiver, which is

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connected to the sender over a communication link. The sender computes a signature of the data chunk and determines whether the date chunk has been previously transmitted by looking up the signature in a sender index table. The sender index table associates the signatures of previously transmitted data chunks with unique index values. A message is transmitted to the receiver, where if the data chunk has previously been transmitted then the message includes an index value from the sender index table that is associated with the signature of the data chunk. At the receiver, the data chunk is located in a receiver cache that stores the previously transmitted data chunks by looking up the index value included in the message in a receiver index table. The receiver index table associates the unique index values with the locations in the receiver cache of the previously transmitted data chunks.

To prevent chunks from being too large or too small, minimum and maximum chunk sizes can be specified as well. Since Rabin fingerprinting determines chunk boundaries by content, rather than offset, localized changes in the data stream only affect chunks that are near the changes. Once a stream has been chunked, the WAN accelerator can cache the chunks and pass references to previously cached chunks, regardless of their origin. Wanax approach [6] is based on three-way-handshake technique uses a sender middle-box and receiver middle-box for transmitting data between the sender and the receiver. Limitations of this approach are(1) End-to- end encrypted traffic do not cope well middle-boxes.(2) It creates latency for non cached data and middle-boxes will not improve the performance.

II. SYSTEM ARCHITECTURE

System architecture of traffic redundancy and elimination approach is shown in figure-1.

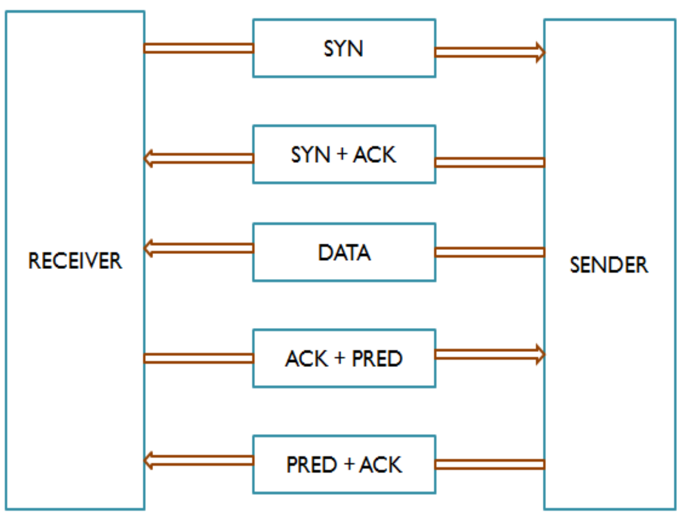

Fig.1 System Architecture

The above figure [1] shows the architecture of a novel-TRE. In order to conform to existing firewalls and minimize overheads, we use the TCP Options field to carry the PACK wire protocol. It is clear that novel-TRE can also be implemented above the TCP level while using similar message types and control fields. The Figure 1 illustrates way the novel-TRE operates under the assumption that the data is redundant. First, both sides enable the PACK option during the initial TCP handshake by adding a *PACK* permitted flag to the TCP Options field. Then, the sender sends the (redundant) data in one or more TCP segments, and the receiver identifies that a currently received chunk is identical to a chunk in its chunk store. The receiver, in turn, triggers a TCP ACK message and includes the prediction in the packet's Options field. Last, the sender sends a confirmation message PRED-ACK replacing the actual data.

A. Modules

Traffic redundancy and elimination approach for reducing cost of cloud computing consists three modules namely:

- Data owner module.
- Cloud server module.

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- Receiver module.

1) Data owner: In this module we will be concentrating on the selecting the infrastructure of cloud and creating an account. Uploading the file into cloud server and then getting the details of the cloud cost.

2) Cloud server module: In this module we are storing the received file into the server, maintaining the account details of the data owner and computing the mathematical modelling of the cost.

3) Receiver module: In this module we are entering all the valid details such as file name, secret key, and infrastructure selection and sending predictions for the server for the future data.

III. DESSIGN LAYOUT

A. Data Flow Diagram :

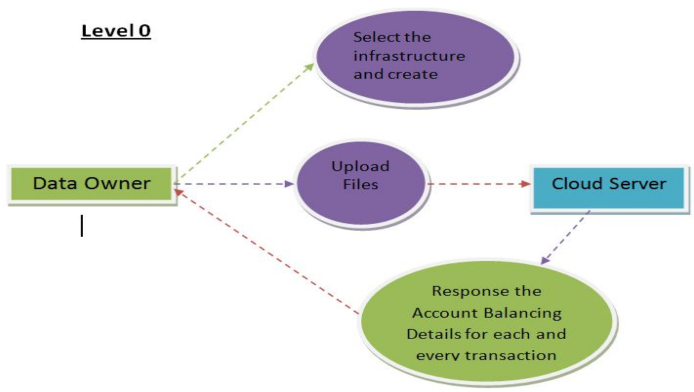

Fig. 2 Data Flow Diagram of Level 0

The Fig. 2 shows Level 0 dataflow diagram the interaction between the data owner and cloud server. First data owner will creates account in cloud choosing infrastructure such as the IaaS, SaaS, PaaS. Depending on the payment cloud server will allot some cloud bandwidth to the user after that data owner can upload the file into the server and server sends details of usage for each and every transaction.

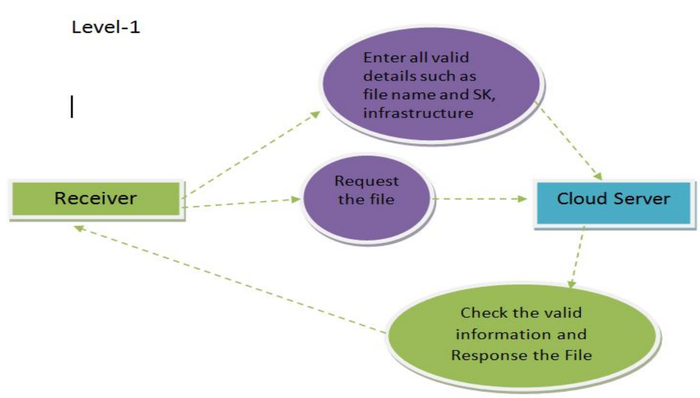

Fig. 3 Data Flow Diagram of Level 1

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The Level 1 Data Flow Diagram Fig. 3 gives more information about the receiver. Here the receiver enters the valid details such as secret key, infrastructure selection and the file name he wants to access after entering all the details requests for the file. Cloud server checks all information of the receiver and sends the requested data. Based on received data receiver sends acknowledgement and prediction for the future data to the clod server.

B. Use Case Diagram:

Usecase diagram is a graphical overview of the functionality provided by a system in terms of actors or user, their goals or usecases any dependencies between those usecases. Usecase diagram for our approach is as shown in Fig4.

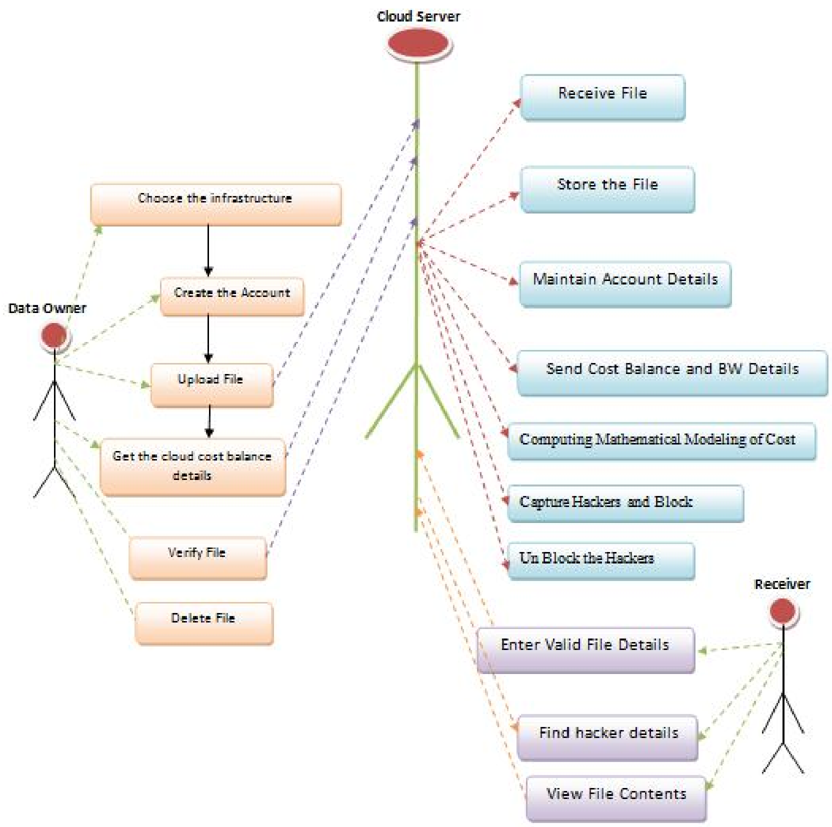

Fig. 4 Usecase Diagram

Above Usecase diagram shows the actions performed by sender as well as receiver. As shown in figure sender performs actions like choosing the infrastructure, creating the account, uploading the file, deleting the file. Cloud server receives the file, stores that files in the cloud server and maintains account details and identifying hackers and blocking finally receiver enters valid details for access and views the contents of the file.

C. Sequence Diagram:

A sequence diagram in Unified Modelling Language (UML) is a kind of interaction diagram that shows how processes operate with one another and in what order. Sequence diagrams of proposed system are as shown in Fig. 5.

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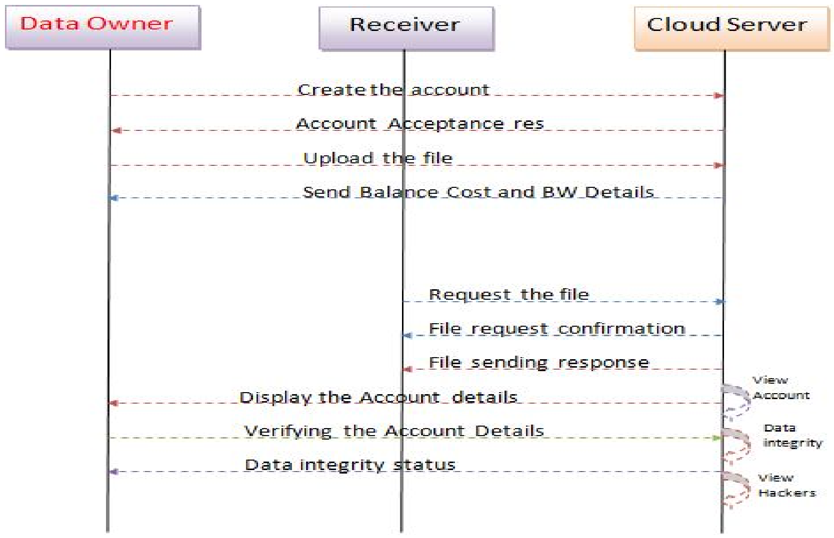

Fig. 5 Sequence Diagram

D. Class Diagram

A class diagram is a static structure diagram that describes the structure of a system by showing system's classes, their attributes and relationships between the classes. The class diagram for our approach is as shown in Fig (6).

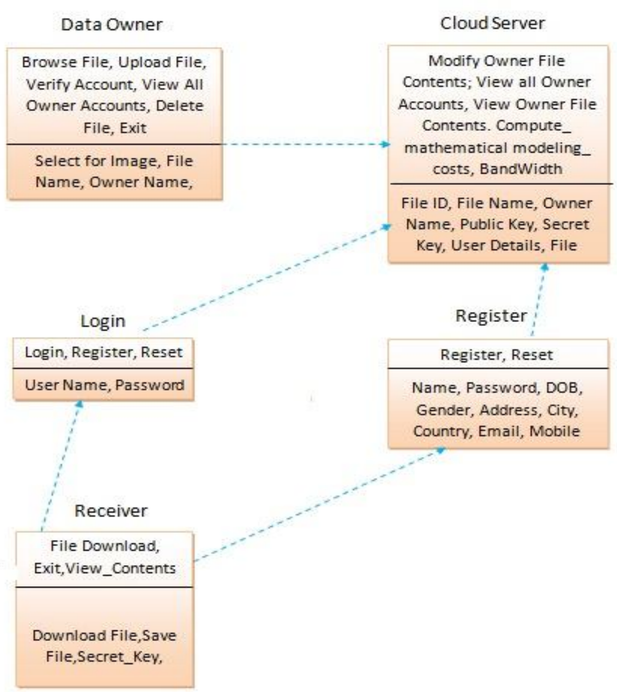

Fig. 6 Class Diagram

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IV. CONCLUSION

In this paper we have given overview of the design techniques that we use for our new scheme. With these techniques our approach helps in reducing the cost of the cloud computing by making the predictions.

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