Managing PRI Devices and Call Rates for Information Security Department

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Abstract— Now a day's usage of PRI Devices (Primary rate Interface Devices) are more in commercial organizations. The PRI is a telecommunications interface standard used on an Integrated Services Digital Network (ISDN) for carrying multiple data transmissions services between the network and a user. PRI Devices enables traditional phone lines to carry voice, data and video traffic, among others. With the help of these devices many organization manage their customers by tracking their call and other call details like caller ID, Incoming and outgoing call rates etc., In this paper the system is developed for monitoring their customer's numbers which are already registered in their server by the time of their customer's registration with their organization and are managed periodically. With this they can estimate their statistics of the customer's retail growth, duration of the call and generated revised bill amount. Processing and managing these details for large set of customers is not efficient and reliable. Proposed system plays a major role with the PRI Device and call rates are managed automatically which improves the commercial growth of the organization by reduced cost.

Index Terms— Call rates, Call session data, Call rate management, Hadoop, PRI device, PuTTY and Plan ID.

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1 INTRODUCTION

The PRI device is a standardized telecommunication service level within the Integrated Services Digital Network specification for carrying multiple DSO voice and data transmissions between a network and a user. It consists of 23 B-channels and one 64-kbits/s D- Channel using a T1 line (North America and Japanese standards) or 30 B-channels and one D-Channel using E1 line (Europe and rest of the world). There is only one line physically terminating on the customer PBX but still a PRI line can receive/send 30 calls simultaneously.

A PRI line is end to end digital circuit. It is a form of ISDN (Integrated Services Digital Network) line which is a telecommunication standard that enables traditional phone lines to carry voice, data and video traffic, among others. Service providers offer 10 channels instead of the full 30 channels. Vendor provides and charge for only 10 channels. This makes PRI lines more economical for smaller companies.

PuTTY is a secure shell and telnet client, developed by Simon Tatham for the window platform. It is open source software that is available with source code and is developed and supported by a group of volunteers. It supports many variations on the secure remote terminal and provides user control over the SSH (Secure Shell) encryption key and protocol version and public-key authentication.

The network communication layer supports IPv6, and the SSH protocol supports the delayed compression scheme. It can also be used with local serial port connections. The File Transfer Protocol (FTP) is a standard network protocol used to transfer computer files from one host to another over a TCP-based network, such as the Internet and Apache hadoop is a framework used to allow for the distributed processing of large data sets across clusters of commodity computers using a simple programming model. By using FTP one can transfer data using any of three modes:

- Stream mode - Data is sent as a continuous stream, relieving FTP from doing any processing. Rather, all processing is left up to TCP. No End-of-file indicator is needed, unless the data is divided into records.

- Block mode - It breaks the data into several blocks then passes it on to TCP.

- Compressed mode - Data is compressed using a single algorithm.

In this paper to track the PRI call session details on daily basis hadoop is used. It is designed to scale up from single servers to thousands of machines, each providing computation and storage. HDFS (storage) and MapReduce (processing) are the two core components of Apache Hadoop. The most important aspect of Hadoop is that both HDFS (Hadoop Distributed File System) and MapReduce are designed with each other in mind and each are co-deployed such that there is a single cluster and thus provides the ability to move computation to the data not the other way around. Thus, the storage system is not physically separate from a processing system.

Hadoop Distributed File System (HDFS) is a distributed file system that provides high-throughput access to data. It provides a limited interface for managing the file system to allow it to scale and provide high throughput. HDFS creates multiple replicas of each data block and distributes them on computers throughout a cluster to enable reliable and rapid access. The main components of HDFS are as described below:

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- Name Node is the master of the system. It maintains the name system (directories and files) and manages the blocks which are present on the Data Nodes.

- Data Nodes are the slaves which are deployed on each machine and provide the actual storage. They are responsible for serving read and write requests for the clients.

- Secondary Name Node is responsible for performing periodic checkpoints. In the event of Name Node failure, you can restart the Name Node using the checkpoint.

This process is applied in this paper to track the Primary Rate Interface call session details on daily basis. The purpose of session tracking is to determine the registered client and new clients. Based on number of calls the location growth and employee effort is determined and used for further process. In additional to data analyzing call charges is also calculated based on location and PRI wise. In early days systems are only used to calculate the revised call rate generated on the basis of the client developed software.

FoxPro was used in the system to retrieve the database from the predefined database. On the basis the traffic plan which is initiated and loaded in the database and each time it will read from the database. While executing the system from such procedure has a disadvantage of dynamic nature of defining the configuration and the system did not have configuration file so that the user can change the plan details when traffic plan is revised.

Using Hadoop for analytics and data processing requires loading of data into clusters and processing it in conjunction with other data that often resides in production databases across the enterprise. Huge amount of data is loaded into Hadoop from production systems is a challenging task. Users must consider details like ensuring consistency of data, the consumption of production system resources, data preparation for provisioning downstream pipeline.

Transferring data using scripts is inefficient and time consuming. Directly accessing data residing on external systems from within the map reduce applications complicates applications and exposes the production system to the risk of excessive load originating from cluster nodes.

Sqoop can provision the data from external system on to HDFS, and populate tables in Hive and HBase. Sqoop integrates with Oozie, allow to schedule and automate import and export tasks. Sqoop uses a connector based architecture which supports plugins that provide connectivity to new external systems.

The dataset being transferred is sliced up into different partitions and a map-only job is launched with individual mappers responsible for transferring a slice of this dataset. Each record of the data is handled in a type safe manner since Sqoop uses the database metadata to infer the data types. The goal of this post is to give an overview of Sqoop operation without going into much detail or advanced functionality.

2 ARCHITECTURE DESIGN

The basic architecture diagram of the entire system is

shown in Fig. 1 PRI devices and call rates for information security department is managed using the following. Initially the authentication is done with the help of User ID (For Example employee ID).
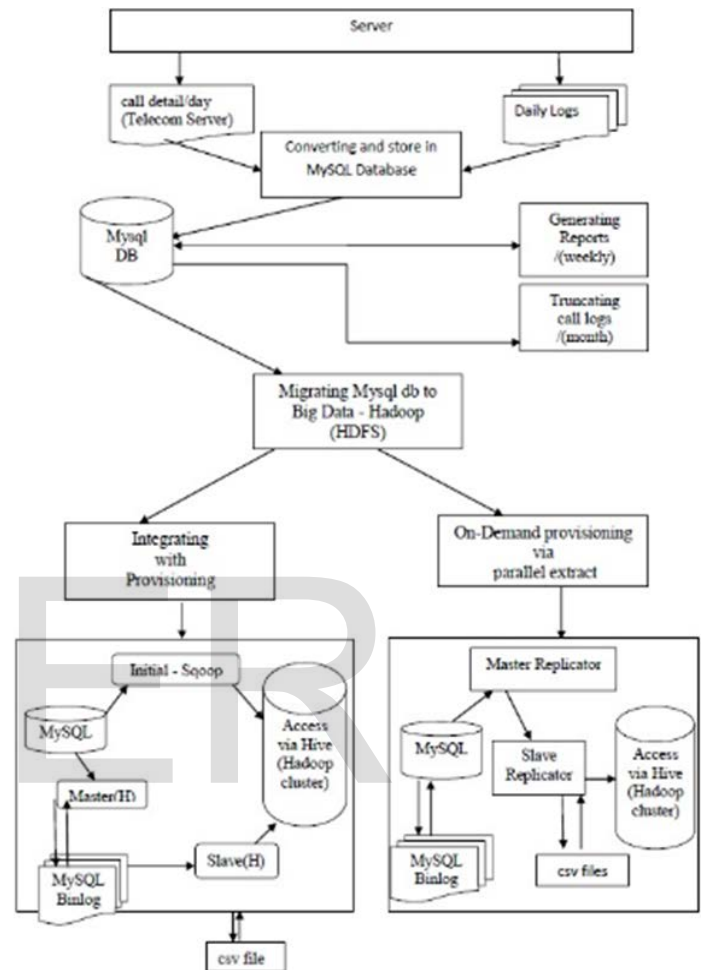

Fig1. System for Managing PRI devices and Call Rates

After obtaining access credential the raw data files generated by the vendor's about the call session are converted in to .csv file format. Then the system is configured and performs examining process to initialize plan-id. Finally for each record calculation is done to generate the report for each call and their respective data migrated from normal database to Hadoop to manage PRI device and call rates for information security department.

3 SYSTEM IMPLEMENTATION

After authentication the data provided by different vendors in different format are imported to database. Before importing, raw data is obtained from vendors in the format of test file is shown in Fig. 2. It is used to check the calling details and the call between the register PRI (inter call).
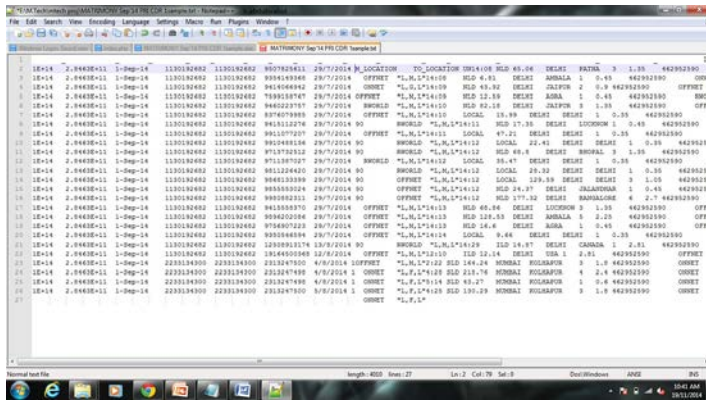
Fig2. Sample Raw Data

After that raw data is converted into .csv file format which is shown in Fig. 3. Different vendors provide the call details in individual format. In such cases the database table is defined in similar manner such that it should contain identical pattern for the entire vendor's record. Then the configuration program is developed in php in which a stack is defined which can be configured by the user as per the vendors format.
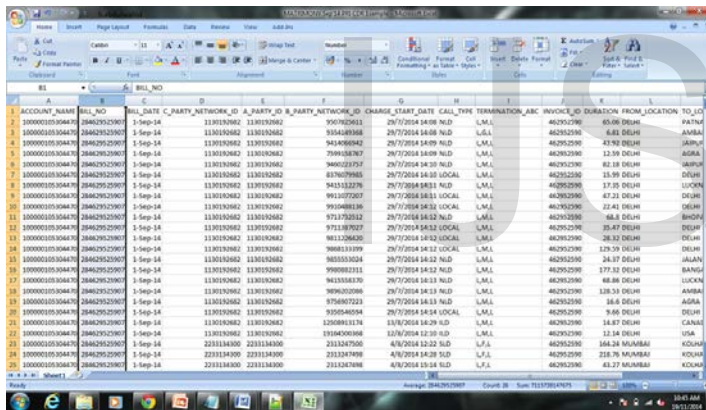

Fig3. Call Session Data in .csv Format

Then the imported data is analyzed to assign the plan id for each record stored in the database. The various constrains are used for assigning the plan-id based on termination type they are call type, differentiate region, sorting, determine config plan.

- **Determine termination type** - In order to determine, the plane termination type is integrated to similar type and modified in array. In database the termination value is modified and stores the array key instead of value.
- **Determine Call type** - The call type is determined and compared with the stored key stack value of the array from configuration table.
- **Differentiate region** - Vendor provides the generated bill which contains the entre call information. The PRI is encrypted to differentiate the call details based on different region. Starting three digits of the PRI number is checked

with configure file where the region code function is defined and declared through which the region along with the call type is determined.

- **Sorting** - Sorting the database records of caller details based on the account number in order to calculate the revised bill amount.
- **Determine config plan** - Determining the plan id for each record is mandatory in order to calculate the call charges and revised pulse unit. The parameter like termination type, call type, account is used to determine the plan id from the configuration table.

In order to initialize plan ID, the plan termination type is integrated to similar type and modified in array. In database the termination values are modified and store the array key instead of value. For each record the call charges and revised pulse unit are calculated and insert the plan ID in to database. For calculating the revised call charges, following parameters has to revised and calculated [4].

- Generate unit - Compare with the plan with primary key plain id to determine the pulse unit and calculate the revised unit.
- Calculate rate - As per the plane the call rate is retrieve from configuration table and calculate the new revised call charges where the number of units is used to get the result.
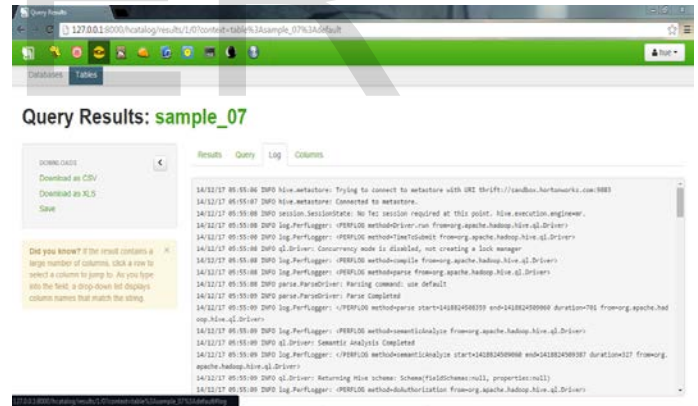- Storing result - Sorting is based on PRI account number.

Fig4. Migration of MySQL data to Big data database

Finally the data's are stored in the database. The requirements of generating interface are designed to provide a display and export the reports based on various parameters. These reports are used to analyze the growth of the region. Here handling more number of records in the database table is much difficult. It cannot able to handle more than 1 million records in the table and for calculation of billing amount for every month by inserting the data in same table is not possible.

In order to overcome the disadvantage the data are migrated to the big data database which is shone in Fig. 4. When the data is migrated then database table is truncated to handle the next month records.

4 CONCLUSION AND FUTURE WORK

PRI Devices (Primary rate Interface Devices) are more in commercial organizations. Devices enables traditional phone lines to carry voice, data and video traffic, among others. This system manage the details for large set of customers by estimating the statistics of the customer's retail growth, duration of the call details and generates new bill amount. This improves the commercial growth of the organization by automatically managing the PRI Device calls and call billing amount to the organization. It is developed for monitoring customer's numbers which are already registered in their server by the time of their customer's registration with their organization and are managed periodically. With this they can estimate their statistics of the customer's retail growth, duration of the call and generated revised bill amount. In Future this system can be improved based on new requirements made by Business development and managing Department. And tracing private calls from commercial PRI devices can be added.

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