

Cloud Computing Implementation Architecture : Data Processing Mechanism for Telecom Medium

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Abstract

In this paper, we propose a cloud-based architecture to store and retrieve on need a user's important mobile data like contact details, mobile log file, call history, etc through internet. In this cloud architecture, we have established a robust relation between a mobile manufacturer and a mobile service provider. Through huge cloud block storage, a mobile manufacturer and a mobile network service provider can store their user/clients' data in the cloud. Through this relationship, if a users' mobile or SIM gets accidentally damaged or lost, with the help of this cloud architecture, all of his/her 'lost' data can be retrieved into the replaced devices or SIM without any copy and paste process.

Keywords: Mobile Computing, Cloud Computing, Data Storage, Cloud Architecture

1. Introduction

This Cloud Computing is a type of internet-based computing where different services (servers, storage and applications) are delivered to an organization's computers and devices through the internet. Cloud Computing has started to obtain mass appeal in corporate data centers as it enables the data center to operate like the internet through the process of enabling computing resources to be accessed and shared as virtual resources in a secure and scalable manner. Cloud Computing technology has redefined the utility of modern web-based software. It has amazingly improved data accessibility and has also effectively reduced web-based software development cost. Smart phones have attained popularity in our society and constitute an inherent part in our everyday life. These

devices are no longer used as mobile phones only, but as mobile computers for your pants pocket. IDC [6] forecasts a high demand for smart phones despite a general decline in sales of mobile phones worldwide and target audience is growing at a fast rate. One of the many reasons for this trend is that there are a lot of third-party applications for these devices. For instance Apple and Google currently offer all in all over one million applications in their respective marketplaces. [7]. Cloud Computing has immensely advanced the IT industry. Building on its predecessors, namely grid and utility computing, this new evolutionary model is witnessing a rapid expansion and proliferation. In spite of all the advantages delivered by cloud computing, several challenges are hindering the migration of customer software and data into the cloud. On top of the list is the security and privacy concerns arising from the storage and processing from the sensitive data on remote machines that are not owned, or even managed by the customers themselves. [11] Mobile cloud computing refers to both the applications delivered as services over the wireless mobile Internet and the hardware and systems software in the datacenters that provide those services. The datacenter hardware and software can be called a cloud. Mobile Cloud Computing, including three parts namely terminal (e.g, mobile phone, PDA, etc), network access (e.g., wireless mobile network) and service cloud (e.g, cloud platform), is regarded as a service model. [13].

2. Related Works

The platform collects conventional data and, in addition, allows collecting multimedia, location information, sketches, barcodes, etc. The collected data can be shared, allowing the formation of small networks for sharing of mobile data. The data is stored in a scalable cloud infrastructure. Nokia Data Gathering

is a system that allows building questionnaires which can be accessed by mobile devices with connection to the Internet. Data is gathered and stored in the mobile devices and can be transmitted to a server. However, it is a proprietary solution. [1] Cloud computing provides many benefits to users including the elimination of up front infrastructure investment plus lower overall infrastructure costs due to increased resource usage efficiency [3]. Although the cloud computing technology is emerging we think there are several challenges being faced by cloud computing technology. These are described - Regulatory Compliance: When outsourcing to a provider, customers are responsible for the security and integrity of their own data, even when it is held by a third party provider. Data Storage: Cloud computing does not allow users to physically store their data, so data storage is done by the provider. Data security and privacy protection: The security of user data is considered to be the security problem of computing platforms, security problem of computing platform is an important issue of cloud computing. Cloud computing infrastructure with a multi-tenant properties, manufacturers generally cannot guarantee that the data of two different users to achieve physical separation. In addition, considering the massive expansion (scalability) requirements, the physical location of the data may not be guaranteed. [4]. Before the first data collection, the mobile application user must authenticate at the server; this guarantees that the user has permission to collect data for that form. This process is done using the OAuth framework [2] over HTTPS protocol. Figure 1 illustrates the authentication steps: (i) First, the user makes a request for authorization to the server, thereby the server redirects the user to a login screen, (ii) If the user is successfully authenticated, it generates a code, this step is called "confirmation" of authorization, (iii) With this code, the user can generate a token, which must be renewed after

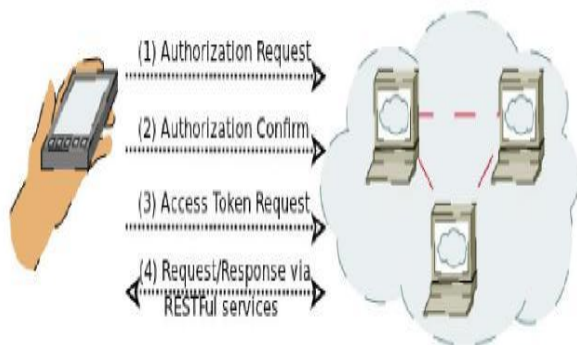


Fig 1: Authentication [1]

a certain period of validity; (iv) Finally, with a valid token, the user can collect, save and visualize data. All data transfer is implemented using RESTFUL services, using JSON or XML message formats. [1] The advent of the internet poses great challenges to the design of public submission systems as it eliminates traditional barriers, such as geographical location and costs associated with physical media and mailing, helped keeping the number of submissions at bay. With open global access, it is very hard to estimate storage space and processing power required by this class of applications. [9] Cloud computing provides functionality for managing information data in a distributed, ubiquitous and pervasive manner supporting several platforms, systems and application. [10] Finally, the back-end level that is built on AWS cloud platform provides services such as Apache Web server on Amazon Elastic Computing Cloud (EC2), MySQL database server on Amazon Relational Database Service (RDS), and a cloud storage that uses Amazon Simple Storage Service (S3), giving flexible, auto scalable, and secure servers to provide required services. The application is also caching images on the local storage and storing some data in SQLite database on the mobile device itself to provide some offline activities, and also decrease the number of sending requests to the servers, in order to save some data traffic. [12] To ensure the correctness of users' data in the cloud, we propose an effective and flexible distributed scheme with two salient features, opposing to its predecessors. By utilizing the homomorphism token With distributed verification of erasure-coded data, our scheme achieves the integration of storage correctness insurance and data error localization, i.e., the identification of misbehaving server(s). [14] 4th generation mobile communication service is high quality seamless broadband multimedia service, which can be used at low cost and high convenience. This service should be possible with Anything, Anytime, Anywhere, Any Device, Anyone (AAAAA). Competition has already begun. We have enough know-how about 2G and 3G mobile communication systems. With these strengths, if we keep producing and providing highly advanced services using 4th generation mobile communication technologies.[16]

3. Major Findings

In the telecom medium (mobile equipment manufacture and mobile service provider) data exchange is possible through mobile (mobile, PDA, Tab etc) internet. Cloud service is too efficient to increase the usage of various applications and it can handle large data. In cloud, there is no limitation of

memory (Elastic block storage). It also reduces the infrastructure cost as well as the operation cost in comparison with web services. For enhancing the security after managing the request it requires authorization then authentication. For this process CSP dynamically generates code and token for temporary period for validity. With global APN access it has to estimate storage space. For each of its customers, a mobile service provider stores call log data in its database. But after a considerable period of time (about a year), this data is found to be no longer available. Thus, if such mobile data is stored in a cloud database, then there will be no possibility of data loss at all. This is because in the cloud, such data will be stored permanently and will be efficiently maintained and easily retrieved due to the fact that cloud offers infinite storage capacity (Elastic Block Storage).

4. Scope of Work

The last few years have witnessed a phenomenal growth in the wireless industry, both in terms of mobile technology and its subscribers. There has been a clear shift from fixed to mobile cellular telephony, especially since the turn of the century. By the end of 2010, there were over four times more mobile cellular subscriptions than fixed telephone lines. Both the mobile network operators' vendors have felt the importance of efficient network with equally efficient design. This resulted in Network planning and optimization related services coming in to sharp focus. [15]. Through in-depth study and analysis, what we have concluded is that any mobile manufacturer stores and maintains IEMI NO, MACID, MOBILE MODEL NO etc for a specific mobile into their database. In the same way, mobile service provider also store and maintains the various sets of information for a specific mobile number into their database. So, we have aimed to establish a robust relation between two such databases for a specific mobile of a specific customer by maintaining them in the same cloud. The cloud or the internet is simply the 'necessity' for the creation of such relation due to its unlimited memory (Elastic Block Storage) to store enormous amount of mobile data. Also, for the creation of such relation, it is necessary for the mobile manufacturer and the mobile service provider to display each mobile data along with their respective names for any specific customer. If such a relation between the corresponding databases of mobile manufacturer and mobile service provider is successfully established, then it will be easy to determine which mobile is currently used by which customer, which SIM corresponds to which mobile no, which IEMI no corresponds to which mobile no, which

MACID corresponds to which IEMI no, etc. If a customer accidentally loses his/her mobile and SIM or his/her mobile and SIM get accidentally damaged of any cause, then if he/she can provide his/her Customer Identification Code, all of his/her mobile data can be easily accessed from the databases maintained in the cloud. Using the IEMI NO, it will also be possible to find out the name of the mobile's owner and the particular person who is using this customer's SIM with a different hand set. If the customer applies for a SIM replacement to the specific mobile service provider, then such replacement will also be easy and fast. Suppose a customer stays in India and using the service of a specific mobile service provider and is using a mobile of a specific mobile manufacturer. For some purpose, he/she goes to USA and accordingly starts using a new SIM for communication and other utilities. Then, for getting all the data of the previous SIM (mobile log, contact details, call history) in his/her new SIM, he/she does not need to start the 'tedious copy & paste activity'. Instead of that, all the required data can be simply downloaded from the cloud into the new SIM by using the customer's Identification number. This project, if implemented will appear as an outstanding facility for customers in the near future.

5. Proposed Model

The model proposed here aims to bring the various Mobile Manufacturers and various Mobile Service Providers inside the same Cloud. To identify each mobile manufacturer and service provider uniquely, a database will be constructed and maintained in the cloud. Each mobile manufacturer and each mobile service provider will get a unique ID after registration. When a mobile manufacturer (say X) produces and releases a new mobile model, then immediately the mobile model no, manufacturer's serial no, the model's IEMI ID no and MAC ID will get displayed in a specific table in the cloud. This system will be the same for several other mobile manufacturers. By using this system, a mobile service provider (say Y) can update its services for each new mobile model of each mobile manufacturer. This system will ensure data sharing between all the mobiles displayed in this table and it can be located from anywhere and anytime. This model aims to establish the practicality that using any of the mobiles enlisted in the table, the same cloud data can be accessed from anywhere and anytime. Suppose, person A (a user) has lost his/her mobile accidentally. Consequently, he/she has lost the SIM card of the mobile. This means that he/she has lost all types of highly important data stored in the mobile which is, at this stage, available only at the mobile service

provider's end. After this incident, if A purchases or uses a different mobile model no, a different SIM card, none of the data of his/her previous mobile is lost, all of them already will be securely stored in the cloud from where he/she will be able to easily download them into the new mobile using his unique user identification number. For this purpose, we have designed a table named CUSTOMER_DETAILS for this model. In this table all the essential details of each and every customer will be stored and displayed. In this table, for each customer, a unique Customer Identification Code will be generated. Using this code, it will be possible to locate any customer anytime and anywhere in the

world. We have designed another table named CUSTOMER REGISTRATION DETAILS in this model in which we have sophisticatedly merged a specific Customer Identification Code with the corresponding Mobile No and the Mobile Service Provider. From this table, it will be possible to determine which Customer is using which Mobile No and using the Service of which Mobile Service Provider. We have designed another table named SIM ACTIVE DETAILS. This is a very important table for the proposed model's architecture and functionality. This table will display which Customer is using which Mobile No and the corresponding unique SIM No. The Customer Code is the primary key in this table. Here, we have merged the SIM No's with their corresponding Mobile Nos. Suppose, a customer (say E) has accidentally lost his/her mobile, then from the tables CUSTOMER REGISTRATION DETAILS and SIM ACTIVE DETAILS, using the columns CUSTOMER CODE and MOBILE NO, it will be possible to determine the SIM NO of the lost mobile and each and every data which the specific customer has lost. Suppose a customer is using a mobile of mobile no XYZ and IEMI ID no 1211(approx). He/she stays in India and he/she uses a SIM of a specific mobile service provider. For any reason, he/she goes to USA. There, he/she uses a different SIM of a different mobile service provider without International Roaming (although International Roaming is cost-effective). Consequently, all the data of the previous SIM is not available in his mobile now. In order to access or use those data, he/she needs to load all those data into the mobile from the previous SIM. In order to simplify this task, the unique MAC ID of the customer will be used to download all the needed data of his/her previous SIM from the cloud and all those data will then be transferred into his/her mobile. If both the mobile and the SIM of a customer get accidentally destroyed, then here again, the customer does not have to worry. On getting the unique Customer Identification Code, the Mobile No, the SIM No and the Mobile Service

Provider for the particular customer can be easily determined. If the Mobile Service Provider receives an application for a new SIM from the particular customer, then the customer will be provided with a new SIM soon. Consequently, the tables CUSTOMER REGISTRATION DETAILS and SIM ACTIVE DETAILS will be updated in the cloud for the particular customer.

CUSTOMER DETAILS

Customer No	Customer Name	Address	Location	Country	Mobile ID	IMEI Number	Mobile Service Provider	Customer Data
2	gh	U	x	i	@			/

CUSTOMER REGISTRATION DETAILS

Customer No	C_Code	Status	Registration No	Mobile No	Date of Issue
1	12	1	343	89999	2009-04-10

SIM ACTION DETAILS

Code		SIM No		Mobile No		Action	
12		111		961231 5		0 (off SIM, deactivated)	
005		276		961231 5		1 (new SIM activated)	
Cust omer Code	M odel Num ber	Co mpan y	Serial Number	I MEI NO	M AC_ id		
111							

Manufacture

Serial number	Manufacturer	Active
001 162 389	Xyz Mnp abc	

Mobile_Service_User

Customer Code	SI	Active	Input Details
	From Customer registration details		

Contact_Details

I	ser	C	C	E	C	I	I	S	R
Id	id	ontact name	ontact no	mail id	ontact Status	ndate	ntime	tatus	etrieval Flag
1	2							1	

Log_Details

I	S	U	Cal	C	C	C	Call
ser	Id	l	all	all	all	Call	Category
Id	Id	numbe	Statu	Fre	Dat	local/ISD/ST	D
1	2						

Mobile Service provider

S2	Service provider	Active
1001	Mm12	1
1002	X2m	1
1003	Y2m	1

In the above table, the first column SI no lists all the customer entries, the column Customer Code shows the unique code of each customer, the column Customer Name shows the names of each customer. The columns Address Location, State, Country, e-mail ID shows the respective address location, state, and country and e-mail IDs of the respective customers. The columns Picture, Thumb Impression, Eyerish, Status and e-mail shows the picture, Thumb Impression, Eyerish, Status and e-mail of a particular customer. The column Customer Code is the primary key in table Customer Details.

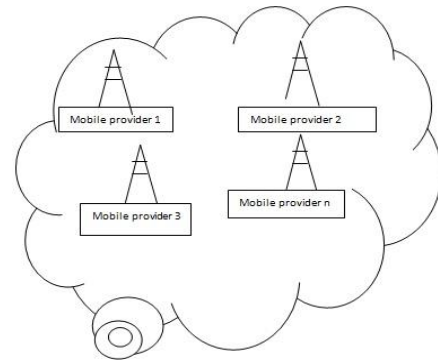


Fig 2: Mobile Manufacturer Cloud

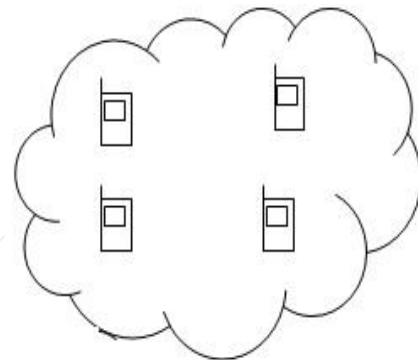


Fig 3: Mobile Service Providers Cloud

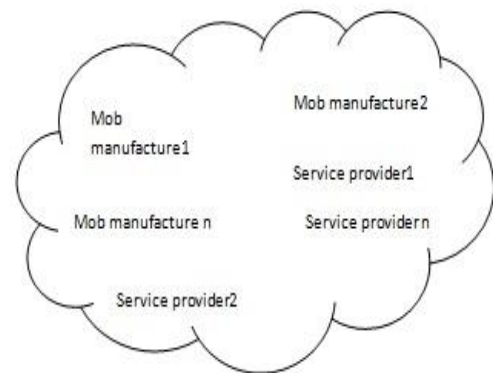


Fig 4: Proposed Model

In table Customer Registration Details, the columns Si No, C_Code, Status, Reg No, Mobile No and date of issue shows each customer entry, each unique customer code, status of each customer, registration no of each

customer, mobile no of each customer and the particular date on which a particular mobile no is issued. In the above table, the column code shows each customer code (same as 'customer code' column in table customer details and C-CODE column in table CUSTOMER REGISTRATION DETAILS), the column SIM NO shows all the SIM NOs of the respective customer and the column MOBILE NO shows the specific mobile no's of the respective customers. The remaining column is ACTION. Let's understand its contents. Suppose a customer has lost his/her mobile. His/her mobile no is 9612315. Consequently the corresponding SIM No 111 is deactivated. On deactivation, the ACTION column shows 0. This specific mobile is provided a new SIM No 276, keeping the mobile no same. On activation of the new SIM No of the mobile, the ACTION column shows 1.

Algorithm

```
mob_manufacturer()
{
if(New Model)
{
insert new model_number;
generate imei_number;
company_id will added from manufacture table;
generate Mac_Id;
put the details in the mobile_details table;
}
else
if(new set)
{
take the model_number;
generate mac_id;
company_id will be added from manufacturer table;
generate imei_number;
put the details into the mobile_details_ table;
}
```

```
mobile_service_provider ()
{
if(new registration)
{
take the customer_details & put the details into the
customer_details table;
insert mobile_number along with
registration_number and customer_id and insert the
data into customer_registration_details;
}
if(activate)
{
update the sim_activate_details along with
sim_number and mobile_number and
activate the active field with digit 1;
}
else
if(deactivate)
{
take the sim_number;
update sim_activate_details and modify the active
field with 0;
}
}
```

```
Cloud_Operation ( )
{
If (request with imei_id)
{
take the customer code from mobile_datas against
imei_number;
take serial number from mobile_service_user;
take the customer code from
customer_registration_details;
take the unique identification for retrieving the
contact details from contact_details
}
else
if(request with customer_id)
{
take the contact details from contact_details table
against user_id
}
else
if ( request with mobile_no)
```

```

{
retrieve the customer code data from
customer_registration_details table against
mobile_number where mobile_number= request
mobile number;
retrieve the data from contact_details.
}
}

```

6. Conclusion

Nowadays, as compared to ordinary mobile phones, smart phones and PDAs are lot more used by people since such phones offer greater varieties of utilities. The log file and history of calls are maintained at mobile service provider's side and in mobile device. There is one kind of data redundancy. Through this architecture, we can overcome this problem. The cloud or the internet has unlimited or infinite memory for huge amount of data storage (Elastic Block Storage). This cloud architecture aims to bring the Mobile Manufacturers and the Mobile Service Providers in the same cloud which will reduce the infrastructure cost and introduce the time consuming process for storage and retrieval of appropriate user data. This architecture can be characterized to apply and augment useful features from existing approaches and to add functionalities for missing features.

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