PERSONAL CLOUD BACKUP IN MOBILE SUBSCRIPTION SERVICES

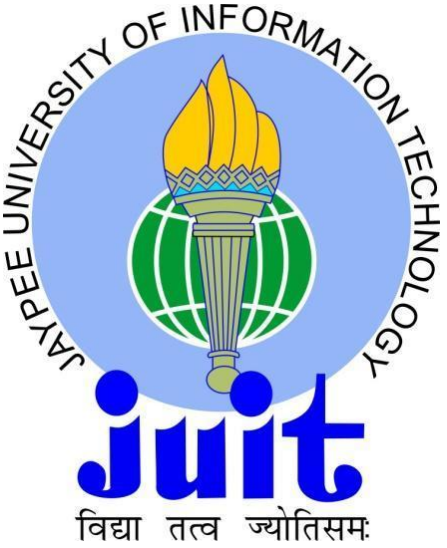
Industrial Project Report submitted in fulfilment of requirement of the Degree

BACHELORS OF TECHNOLOGY

By

SHUBHAM UPADHYAY

(131270)



Department of Computer Science and Engineering (CSE)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY

WAKNAGHAT, SOLAN, INDIA

May, 2017

DECLARATION

I hereby declare that this project report titled '**PERSONAL CLOUD BACKUP IN MOBILE SUBSCRIPTION SERVICES**' submitted at **Jaypee University of Information Technology, Waknaghat, India** is an authentic record of my work carried out under supervision of **Mr. Abhishek Agarwal.** I am fully responsible for the contents of my Bachelors of Technology internship project at GEMALTO.

Shubham Upadhyay

131270

Department Of Computer Science and Engineering

Jaypee University of Information Technology

May, 2017

SUPERVISOR'S CERTIFICATE

This is to certify that the work reported in Bachelors of Technology Industrial Training entitled "**PERSONAL CLOUD BACKUP IN MOBILE SUBSCRIPTION SERVICES**" submitted by **Shubham Upadhyay** at **Jaypee University of Information Technology, Waknaghat, India** is a bonafide record of his original work carried under my supervision.

Mr. Abhishek Agarwal

(Reporting Manager)

12-A,Pride Tower,

Sector 125, Noida,

Uttar Pradesh, 201313

TABLE OF CONTENT

ACKNOWLEDGEMENT

The internship opportunity at 'Gemalto' was a great learning experience. I would like to express my gratitude to my college for allowing me to do internship in the last semester of my Bachelors of Technology degree. I would like to express my deepest gratitude to myfunctional manager **Mrs. Awanti Singh** and reporting manager**Mr. Abhishek Agarwal** who stood beside me on every step and inspite of their busy schedule made themselves available whenever I needed them.

It is my radiant sentiment to place on record my best regards, deepest sense of gratitude to my mentors, **Mr. Mohit Garg** and **Mr. Sandeep Kumar** and the entire team of **MSS** for making it easy for me to survive and making learning so enjoyable and not to forget their careful and precious guidance which was extremely valuable for my study both theoretically and practically.

I would like to acknowledge guidance of my college mentor, Dr.Yashwant Singh who constantly guided me during my internship and suggested me to improve on every aspect.

ABOUT THE COMPANY (Gemalto)

Gemalto is a world leader in digital security. It is also the largest manufacturer of sim cards in the world. It generated a revenue of 3.1 billion euros in 2016. Employee strength is 15,000 of 119 nationalities. Its expertises in authentication and data protection. The areas are digital banking, e – Government, manufacturing of sim cards, software licensing, software monetization, vehicle telematics, mobile connectivity and data encryption.

Clients of this company come from 180 countries. They comprise of well-known enterprises, mobile operators, banks and financial institutions, national administration, software publishers and a large number of other industries looking for simplicity, security and efficiency.

Companies such as Verizon, Amazon Web Services, Barclays, Alibaba, Banco Santander and governments of Peru, U.K., Algeria and about 27 other countries have trust in Gemalto. It provides technology like e-Passports, e-Driving licence, e-ID citizen cards, e-Healthcare cards, e-Government ID and transportation.The fundamental in our relationship with the clients is trust. Ultimately, everything that is done is founded on the trust earned from the clients over the years.

ABSTRACT

I was initially asked to deliver a presentation on Blockchain technology and Bitcoins. Following the presentation I got training of the technologies used in the PCB i.e. Personal Cloud Backup project. I was trained in Spring MVC framework, use of Eclipse Integration Development Environment, Junit, Mockito, SOAP UI, Mercurial, Jenkins, JIRA.

I was assigned many tasks which enhanced my knowledge and experience. I then had a chance to work on the live project and fixed a cosmetic bug on web interface of the customer care console.

I was also given an exercise to calculate the 'Mobile Network Bankwidth'. Initially, I did this exercise and calculated the data manually which took about 20-25 minutes for 10 transactions approximately and later automated the process using Pattern and Regex matching libraries in Java and it reduced the data calculation time to a few seconds.

I created a Java project and implemented the concept of 'Pagination' with my own business logic. After doing this I had a better understanding of the backend working of JSP, Servlet pages, database connectivity, hosting a server and I also learnt how to troubleshoot the connectivity problems between these using console and logging techniques.

Another project was of 'URL rewriting'. It helped me understand the use of url rewriting and I hosted an Apache Web Server on local machine and wrote rewriting rules to do tasks like, preventing the image hotlinking, display custom web pages on HTTP status, forbid a page from being displayed.

LIST OF ACRONYMS AND ABBREVIATIONS

1.	PCB	Personal Cloud Backup
2.	OTACS	Over the Air Configuration Server
3.	OTA	Over the Air
4.	FC	Flow Control
5.	DD	Device Detection
6.	SMSC	Short Message Service Center
7.	SMSE	Short Message Service Engine
8.	AHC	Auto Handset Configuration
9.	JSP	Java Server Pages
10.	JS	Java Script
11.	PBGUI	Phonebook Graphic User Interface
12.	PBE	Phonebook Engine
13.	DDE	Device Detection Engine
14.	HTTP	Hyper Text Transfer Protocol
15.	SIM	Subscriber Identification Module
16.	USIM	Universal Subscriber Identification Module
17.	DBMS	Database Management System
18.	POJO	Plain Old Java Object
19.	PIM	Personal Information Manager
20.	MO	Mobile Originated
21.	MT	Mobile Terminated
22.	gWAF	Gemalto Web Application Firewall

LIST OF FIGURES

INTRODUCTION TO PROJECT

PCB – Personal Cloud Backup

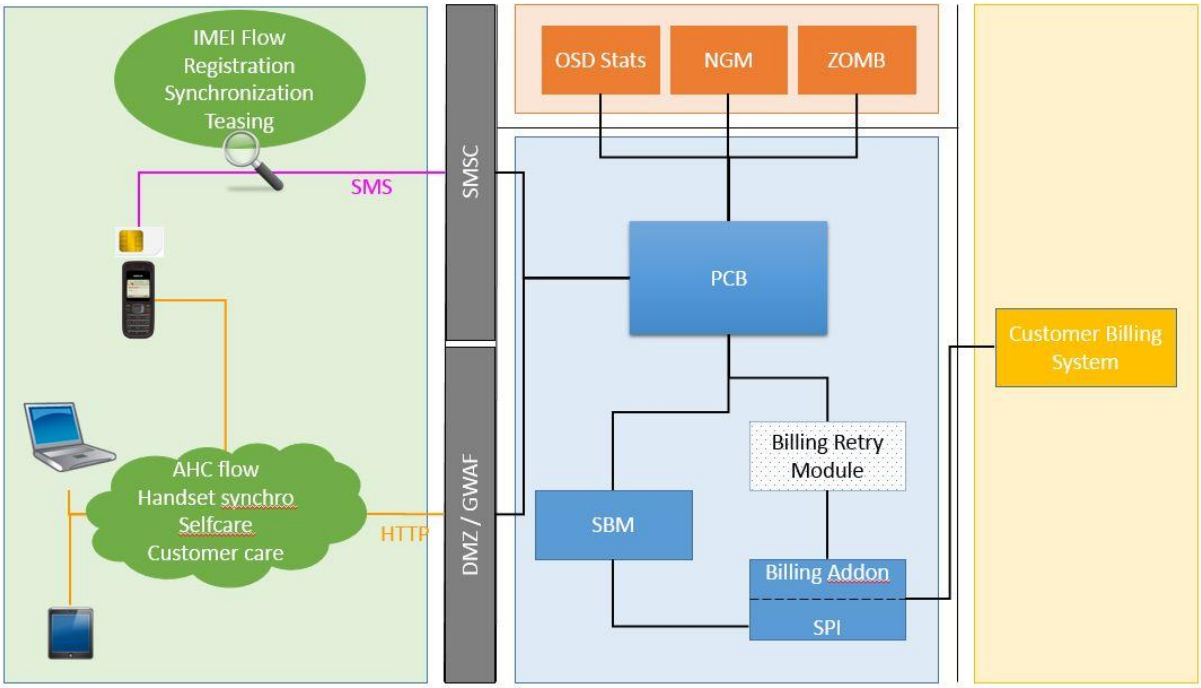


Fig 1

PIM

- Personal Information Manager.
- Its goal is to store, manage, and synchronize personal data. It is deployed on Weblogics server.
- Its prime aim is to backup or restore the contacts(with and without avatar), calendar events and notes of the handset

SIM - GATEWAY

- It is an application software which permits to communicate with the SIM Card. It is deployed on JBOSS server.
- It is designed to manage the synchronization of data on the SIM card.

The different ways to access the PCB:

- The first way is through the SMS for mobiles that are not compatible with any kind of internet services.
    - Using an MO a request is sent to the SMSC where it is redirected to the OTACS through the GWAF where is checked for any malformated MO.
    - Then it is passed on to the OTA where it is authenticated and redirected to the PCB module.
    - Here, in the PCB module it is checked if the data is of the handset or the SIM card and is directed respectively.

- The second way is through the mobile app
    - In this the MO or the http request is sent through the app. There is app for both android and iOS.
    - This request is sent to the OTACS through the same GWAF where is is checked for any malformated MO.
    - It is then passed on to OTA for authentication and then redirected to the PCB module.
    - Here, it is further directed to the PIM or SIM-gateway where the request would be processed.

- The third way is through the http request on the web browser
    - Its flow is same as the above for mobile app.
    - The difference is that the http request is generated through the web browser rather than the app hitting any web service.

METHODOLOGY USED

AGILE METHODOLOGY (SCRUM)

It is not a development process. It is an alternative method to the conventional project management. In it the requirement and solution evolve through the team labour of self-organizing cross-functional teams. It includes learning adaptively, delivery well before time, continuous delivery, evolutionary development and encourages rapid and flexibility to change i.e. when the requirements of a project change the team changes with it.

Scrum Methodology:

It is a part of Agile movement. As the Agile Movement doesn't provide concrete steps so in it the inspection and feedback taking process is carried on hand in hand so as to deal with the complexity and risk. Time is divided into short durations usually of 2-3 weeks known as sprints. At the end of sprint stakeholders, team members meet to see a demonstrated potentially shippable product increment. The work done is then evaluated and is kept in shippable state at all times.

SELFCARE PORTAL

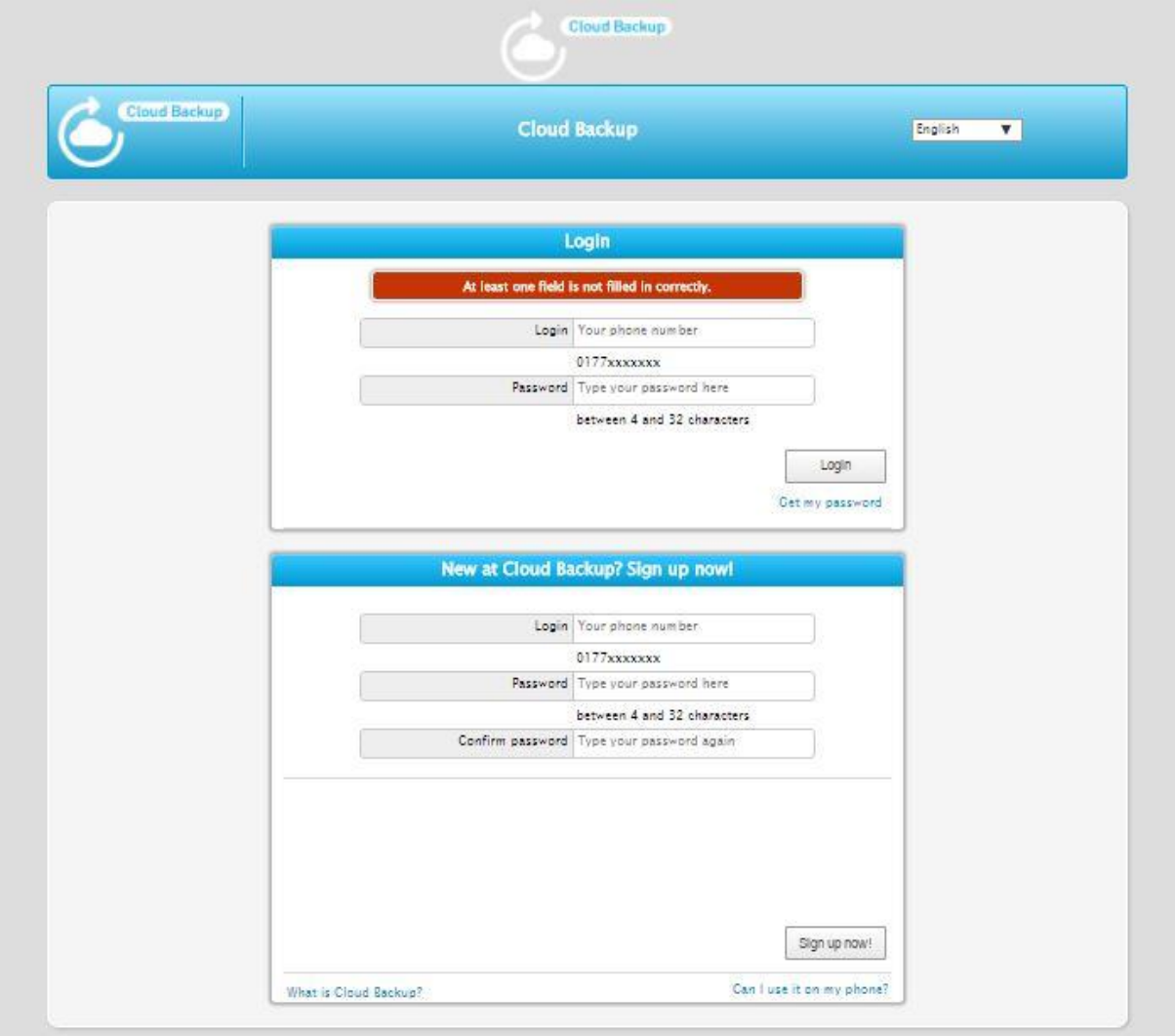


Fig. 2

Here this is the login page of selfcare login web portal. It is here that a user can login to his account or signup to create a new one.

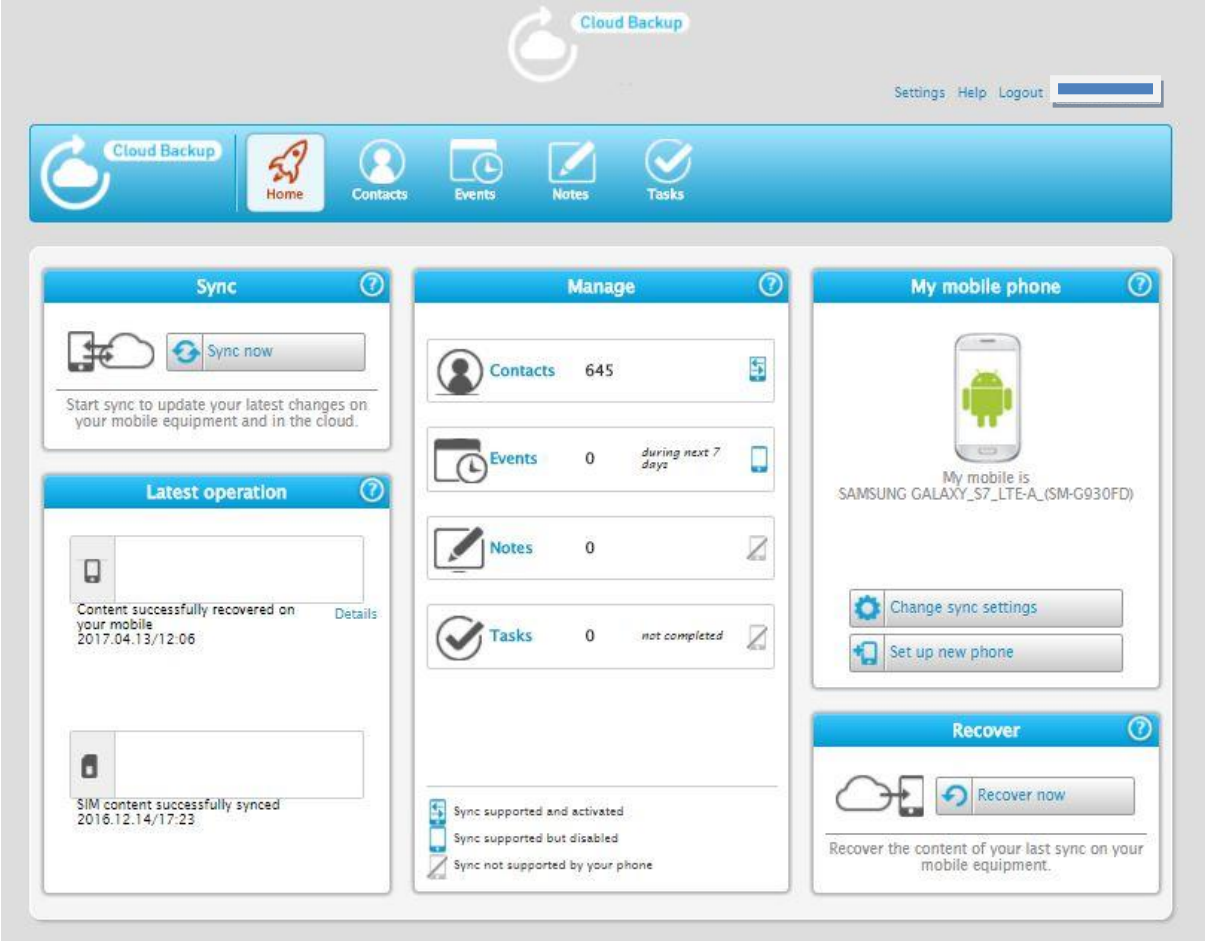


Fig 3

This is the page that is displayed after logging in the selfcare portal. Here you can manage these:

- Contacts
- Calender
- Notes
- Task
- Setup new phone
- Synchronize your handset to the cloud

CUSTOMER CARE PORTAL

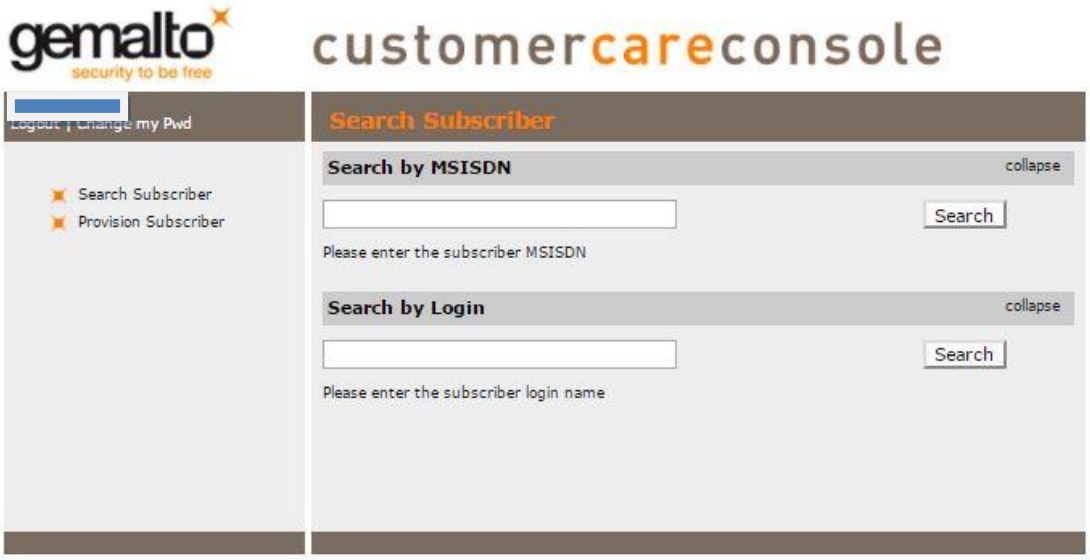


Fig 4

Here is the customer care web console. It is through this console that the MNO customer care looks in when any complaint or problem occurs to any of its customers. One can look for the details of the customer using the MSISDN i.e. our 10 digit phone number or through his/her login name.

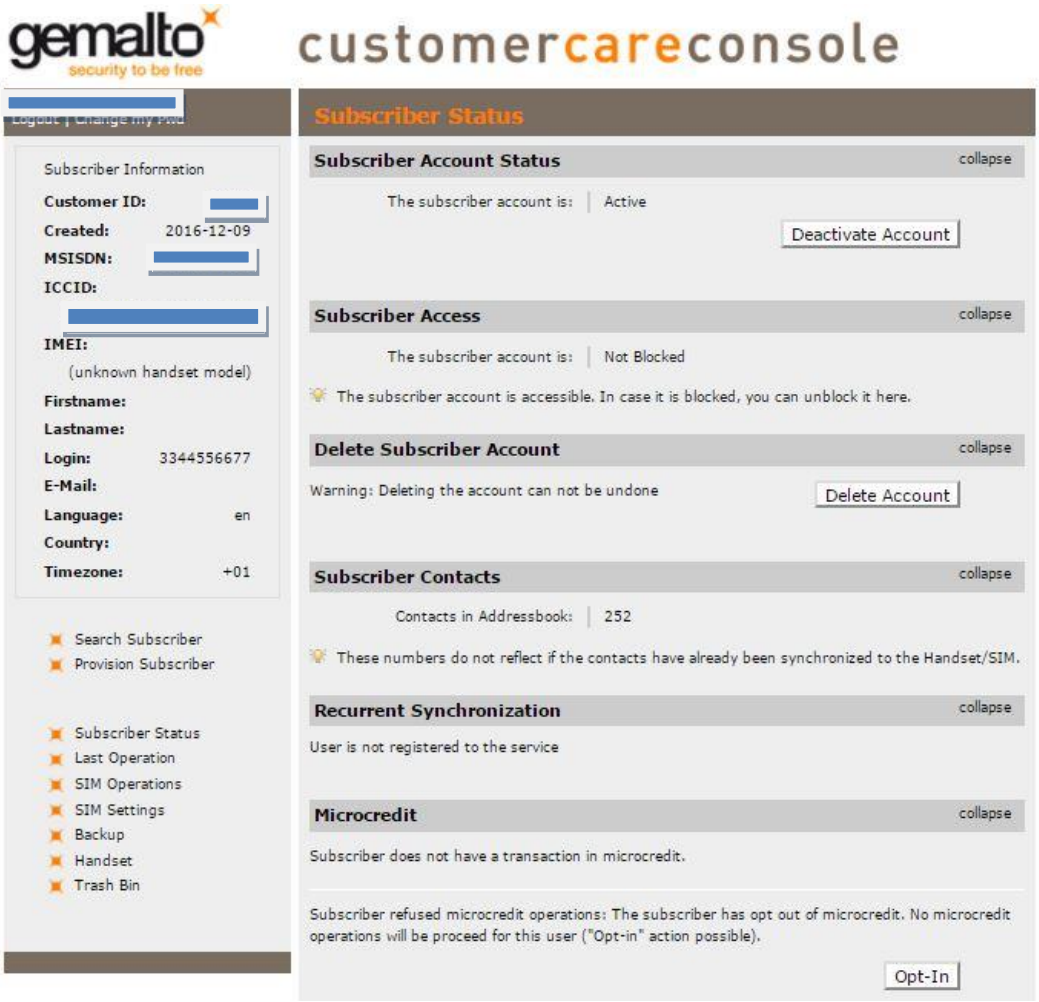

gemalto
security to be free
customercareconsole
Subscriber Information
Customer ID:
Created: 2016-12-09
MSISDN:
ICCID:
IMEI:
(unknown handset model)
Firstname:
Lastname:
Login: 3344556677
E-Mail:
Language: en
Country:
Timezone: +01
Search Subscriber
Provision Subscriber
Subscriber Status
Last Operation
SIM Operations
SIM Settings
Backup
Handset
Trash Bin
Subscriber Status
Subscriber Account Status
collapse
The subscriber account is: Active
Deactivate Account
Subscriber Access
collapse
The subscriber account is: Not Blocked
The subscriber account is accessible. In case it is blocked, you can unblock it here.
Delete Subscriber Account
collapse
Warning: Deleting the account can not be undone
Delete Account
Subscriber Contacts
collapse
Contacts in Addressbook: 252
These numbers do not reflect if the contacts have already been synchronized to the Handset/SIM.
Recurrent Synchronization
collapse
User is not registered to the service
Microcredit
collapse
Subscriber does not have a transaction in microcredit.
Subscriber refused microcredit operations: The subscriber has opt out of microcredit. No microcredit operations will be proceed for this user ("Opt-in" action possible).
Opt-In

Fig 5

TOOLS USED

JIRA

It is the most famous software among Agile development teams. It helps view the status of all the projects that are going on. It helps maintain flexible scrums. It helps to bring the team together. It helps create sprints, tasks and sprints. This assists in planning track and release report.

It also helps in sorting, filtering and colour coding. All the changes on production issue can be viewed by the entire team. Code changes builds and deploys can be seen by all.

Targets all the issues for release and hence confirms that all the issues are covered. It can also helps us view the data in form of burndown chart, sprint chart, velocity chart, cumulative chart, version chart, epic chart, control burndown, release burndown etc.

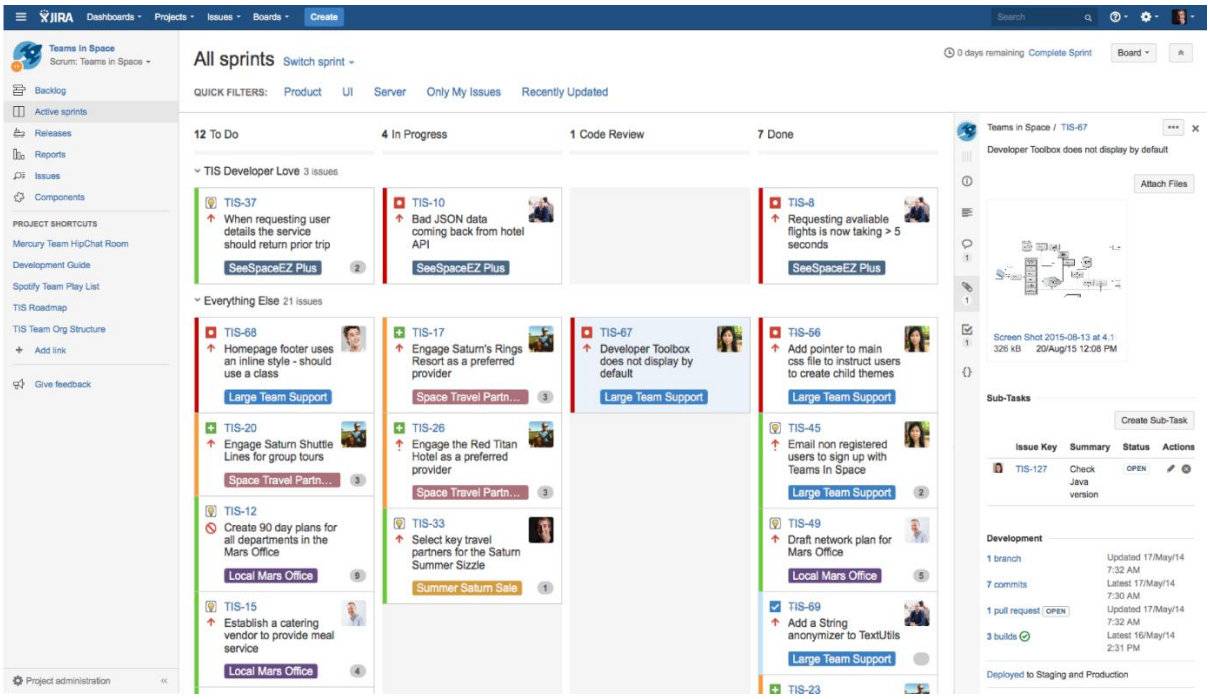


Fig 6

JENKINS

Jenkins is used to automate the tasks like building, deployment and testing. It requires a Java Runtime Environment installed. It can work as a sland alone application on any machine with at least Java 7 installed in it. It can be called as self-contained, open source automation server.
It works in 3 steps:

1. The software developers check their source code.
2. Jenkins picks up the changes in the code and trigger a build and run any regression or system tests if required.
3. The build output is available in the Dashboard. Also an automatic notification can be sent to the developer.

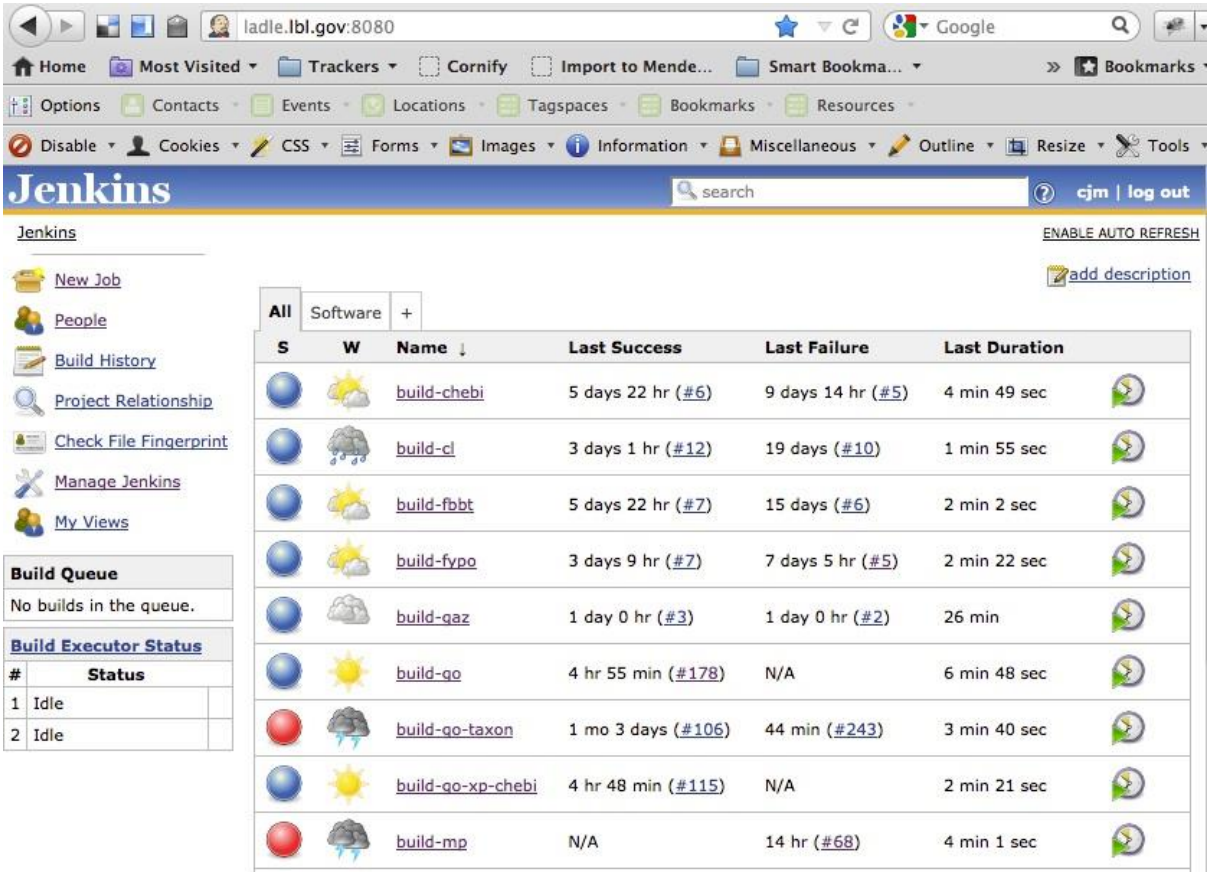


Fig 7

MERCURIAL

TortoiseHg is the front end of Mercurial that runs on Windows platform. Its written in PyQt and underlying client can be used on the command line.

Mercurial is a Version Control System that helps the management of the code just like the most popular one as GIT HUB. Infact both of these use the GIT commands in the background but just the frontend part is different in both the cases.

It has some terminology like:

- **Pull the code:** It means to make a copy of the latest existing version of code in your local system so as to make some changes or build it.
- **Commit the changes:** After making the required changes you must commit your changes to the common repository which will be shown as a separate branch merging into the main one from which you have pulled the code.
- **Merge code:** The code is then verified and merged to the main-branch and the latest version to make your commit permanent.

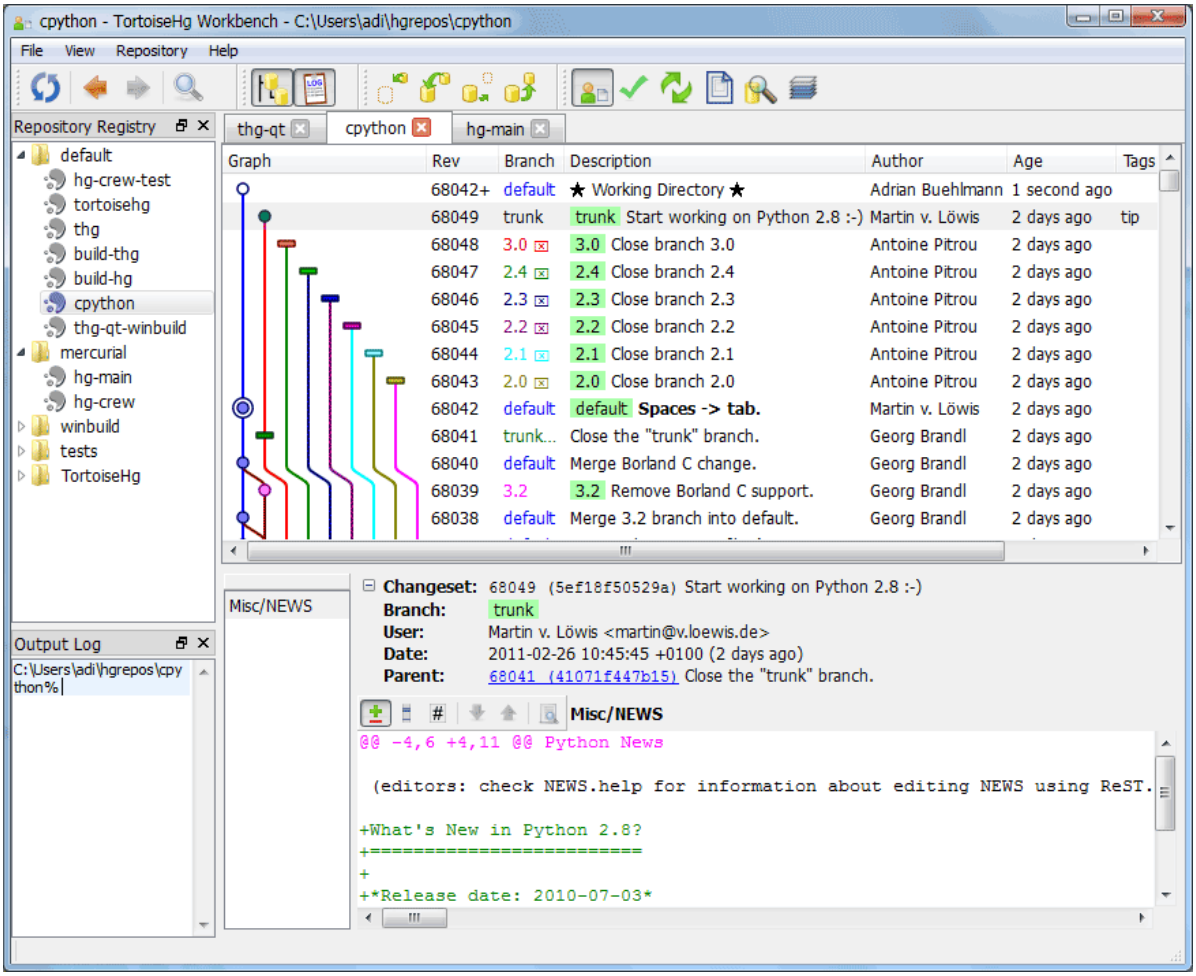

cpython - TortoiseHg Workbench - C:\Users\adi\hgrepos\cpython
File View Repository Help
Repository Registry
default
hg-crew-test
tortoisehg
thg
build-thg
build-hg
cpython
thg-qt-winbuild
mercurial
hg-main
hg-crew
winbuild
tests
TortoiseHg
Output Log
C:\Users\adi\hgrepos\cpython%
thg-qt
cpython
hg-main
Graph Rev Branch Description Author Age Tags
68042+ default ★ Working Directory ★ Adrian Buehlmann 1 second ago
68049 trunk trunk Start working on Python 2.8 :-) Martin v. Löwis 2 days ago tip
68048 3.0 3.0 Close branch 3.0 Antoine Pitrou 2 days ago
68047 2.4 2.4 Close branch 2.4 Antoine Pitrou 2 days ago
68046 2.3 2.3 Close branch 2.3 Antoine Pitrou 2 days ago
68045 2.2 2.2 Close branch 2.2 Antoine Pitrou 2 days ago
68044 2.1 2.1 Close branch 2.1 Antoine Pitrou 2 days ago
68043 2.0 2.0 Close branch 2.0 Antoine Pitrou 2 days ago
68042 default default Spaces -> tab. Martin v. Löwis 2 days ago
68041 trunk... Close the "trunk" branch. Georg Brandl 2 days ago
68040 default Merge Borland C change. Georg Brandl 2 days ago
68039 3.2 3.2 Remove Borland C support. Georg Brandl 2 days ago
68038 default Merge 3.2 branch into default. Georg Brandl 2 days ago
Misc/NEWS
Changeset: 68049 (5ef18f50529a) Start working on Python 2.8 :-)
Branch: trunk
User: Martin v. Löwis <martin@v.loewis.de>
Date: 2011-02-26 10:45:45 +0100 (2 days ago)
Parent: 68041 (41071f447b15) Close the "trunk" branch.
Misc/NEWS
@@ -4,6 +4,11 @@ Python News
(editors: check NEWS.help for information about editing NEWS using ReST.
+What's New in Python 2.8?
+==========
+
+*Release date: 2010-07-03*

Fig 8

TASKS DONE

1. MOBILE NETWORK BANDWIDTH CALCULATION

The steps I followed to do this exercise were:

- The first step was to generate an (.apk) file by giving the parameters to the build server. After this an acknowledgement mail would be sent to you telling you if your configuration is correct or not. Then after 15 minutes an email would be sent to you with the attachment of the (.apk) file.

- The second step would be to install the app on the handset, which in my case was Samsung Galaxy S8. At this step it required to create a folder with particular file inside the handset. It was done so as to record the logs of the activity going on in the app.

- After adding the contacts from the selfcare portal of the app (i.e. the web page from where we can handle our account. The selfcare portal's server end is accessed through Putty and then the contacts are added in one go.

- The app is then started on the app and operations are performed using the specific use-cases i.e. 100, 105, 200, 205 contacts backup and restore.

- The data then logged is viewed in the log file created in the handset.

- The data sent and received is then calculated using a manual calculator which is a time consuming process because in one restore or backup operation there are many small modules in which the data is sent or received.

- To summarize the above So the exercise would be to calculate, in a realistic use-case (addressBook with 100 contacts (First Name/Last Name + 2 phone numbers), included 10% of contacts with avatar)

    - The size of a Slow synchronization (contact on server – restore on Mobile) = Nb of kB sent from PCB Server to Mobile App
    - The size of a subsequent sync with 5 contacts without avatar updated.

AUTOMATION :

In order to save the time consumed in the last process I wrote a Java program which would do the following:

- It would fetch the data from the log file
- Using the Regular Expression I parsed the data for the particular values that are needed to calculate the data.
- Then using the Pattern and Matcher libraries in Java I parsed the data calculated to further match the data more specifically and segregate the data in each block.
- It calculated the logged data within seconds which would take about 20-25 minutes earlier when done manually.
- So it redued the human effort to a great extent and it is currently being used to work further on the live project to add the new feature.
- The Java program that I wrote was error free and handled the following cases :
    - If the log file is not found at the specified location.
    - If the data is corrupted.
    - If the blocks are not separated correctly i.e. any anomaly in the writing of log file.
    - If the log file is empty.
    - If the data sent/received is not in numeric format.

```
12/04/2017 12:23:29 START_OF_SYNC
12/04/2017 12:23:29 AMOUNT_OF_DATA_SENT 0 bytes
12/04/2017 12:23:29 AMOUNT_OF_DATA_RECEIVED 174 bytes
12/04/2017 12:23:29 AMOUNT_OF_DATA_SENT 945 bytes
12/04/2017 12:23:30 AMOUNT_OF_DATA_RECEIVED 549 bytes
12/04/2017 12:23:34 AMOUNT_OF_DATA_SENT 442 bytes
12/04/2017 12:23:34 AMOUNT_OF_DATA_RECEIVED 538 bytes
12/04/2017 12:23:34 AMOUNT_OF_DATA_SENT 408 bytes
12/04/2017 12:23:35 AMOUNT_OF_DATA_RECEIVED 417 bytes
12/04/2017 12:23:35 END_OF_SYNC
12/04/2017 12:23:35 SUMMARY  cli_images:0cli_video:0cli_audio:0null:0cli_tasks:0clibookmarks:0cli_appointments:0cli_contacts:0
12/04/2017 12:23:43 START_OF_SYNC
12/04/2017 12:23:43 AMOUNT_OF_DATA_SENT 945 bytes
12/04/2017 12:23:44 AMOUNT_OF_DATA_RECEIVED 549 bytes
12/04/2017 12:23:47 AMOUNT_OF_DATA_SENT 409 bytes
12/04/2017 12:23:48 AMOUNT_OF_DATA_RECEIVED 3741 bytes
12/04/2017 12:23:49 AMOUNT_OF_DATA_SENT 488 bytes
12/04/2017 12:23:49 AMOUNT_OF_DATA_RECEIVED 417 bytes
12/04/2017 12:23:49 END_OF_SYNC
12/04/2017 12:23:50 SUMMARY  cli_images:0cli_video:0cli_audio:0null:0cli_tasks:0clibookmarks:0cli_appointments:0cli_contacts:2
```

Fig. 9

Log file generated in the handset

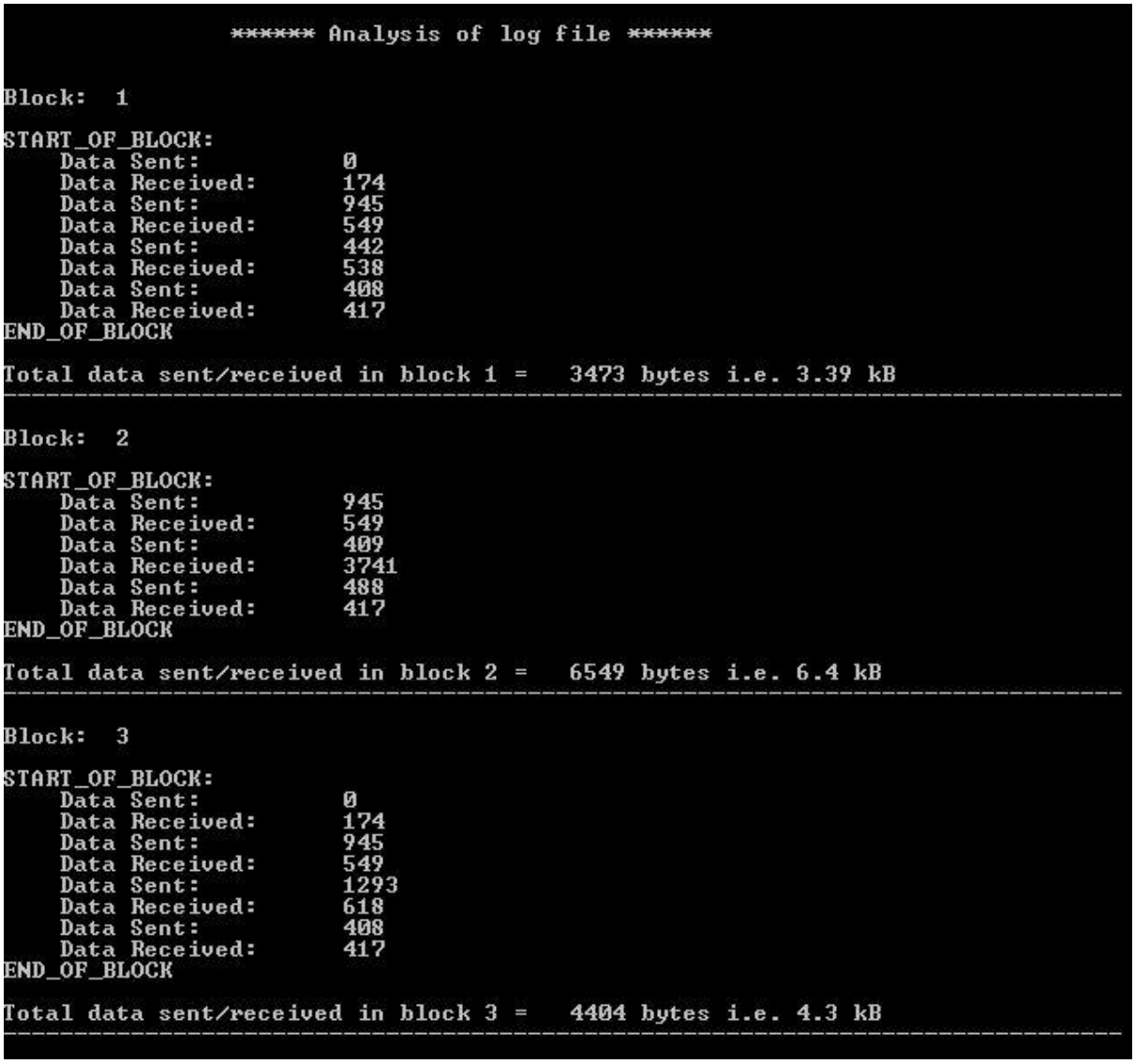


Fig. 10

Output of automation Java program

2. COSMETIC BUG FIX ON THE WEB PORTAL OF CUSTOMER CARE CONSOLE

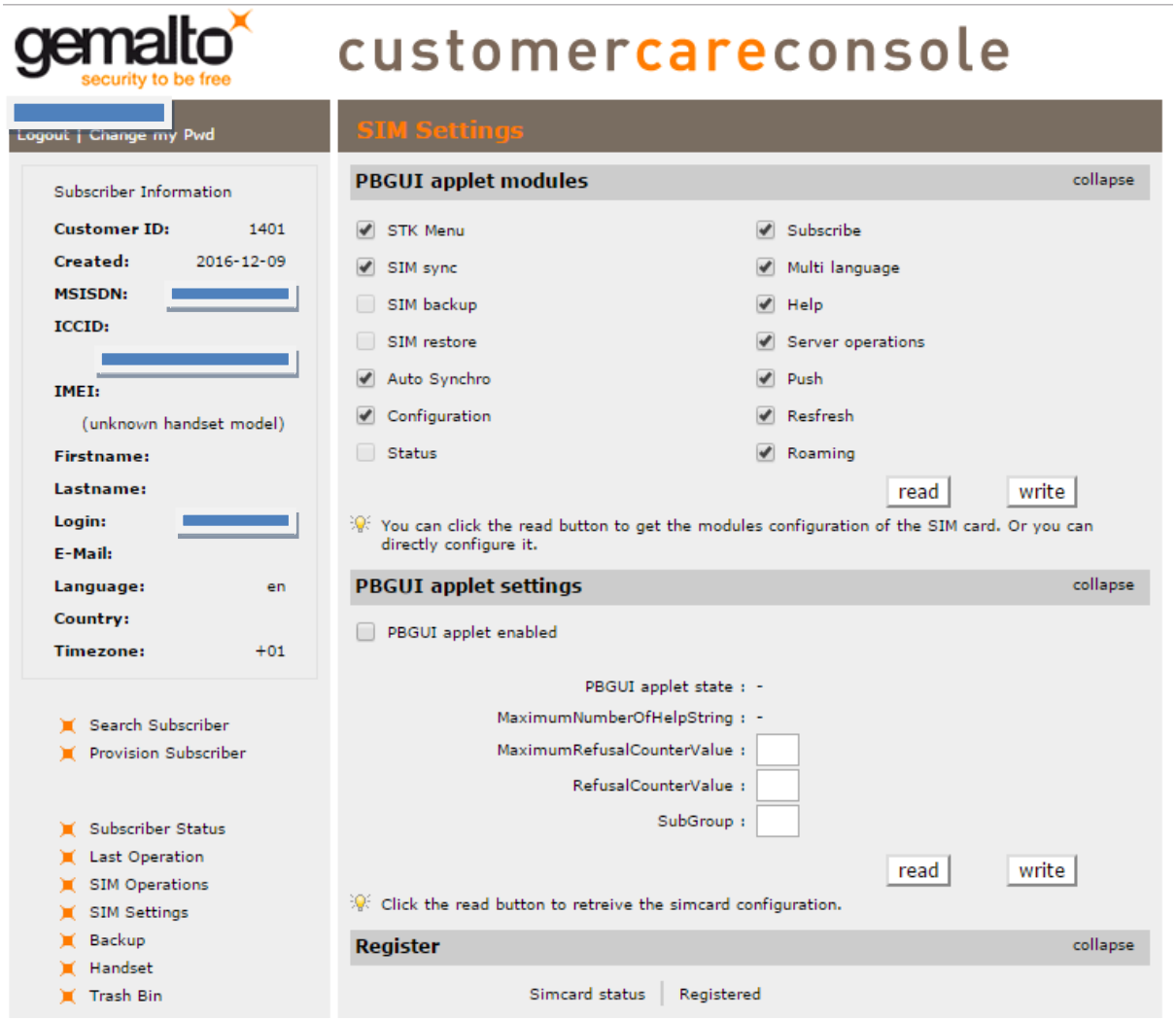


Fig. 11

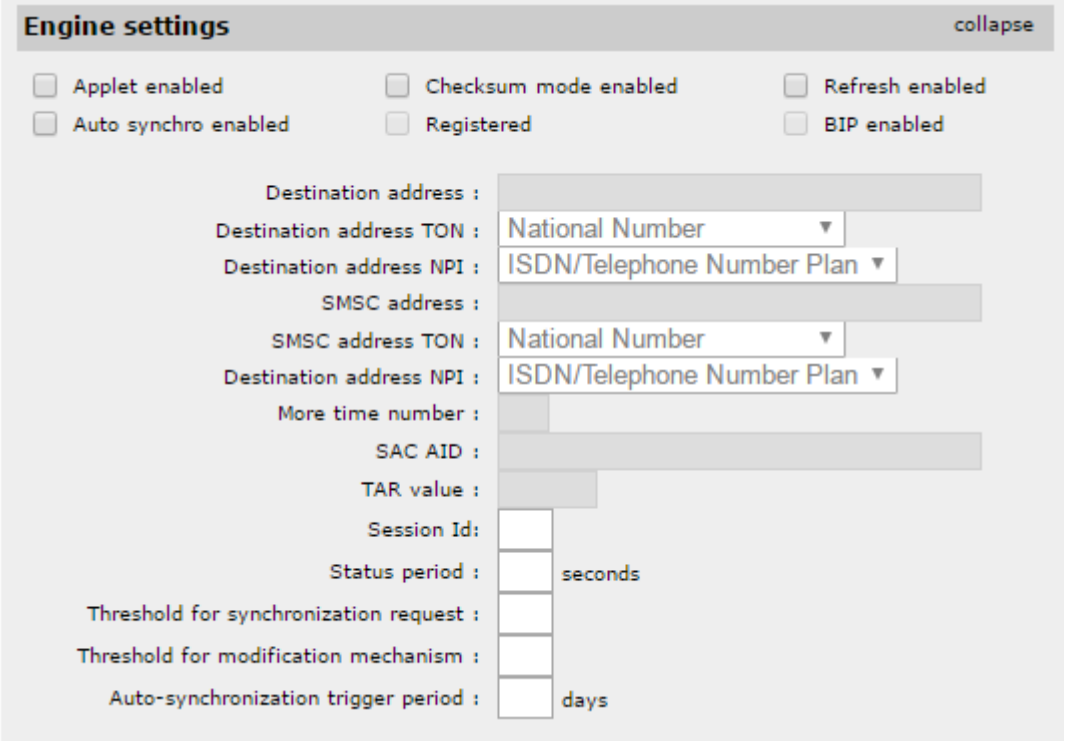


Fig. 12

BUG:

This was a cosmetic bug as “Session Id: “. It should have been with a space after Id i.e. “Session Id :” .

BUG FIX:

This bug was fixed by changing the properties file in which the string was hardcoded. It had to be changed there. The bug removal was stable and did not unstabalize the system.

3. PAGINATION

Displaying many records in a single page may take time, so it is better to break the page into parts. To do so, wecreate pagination application.

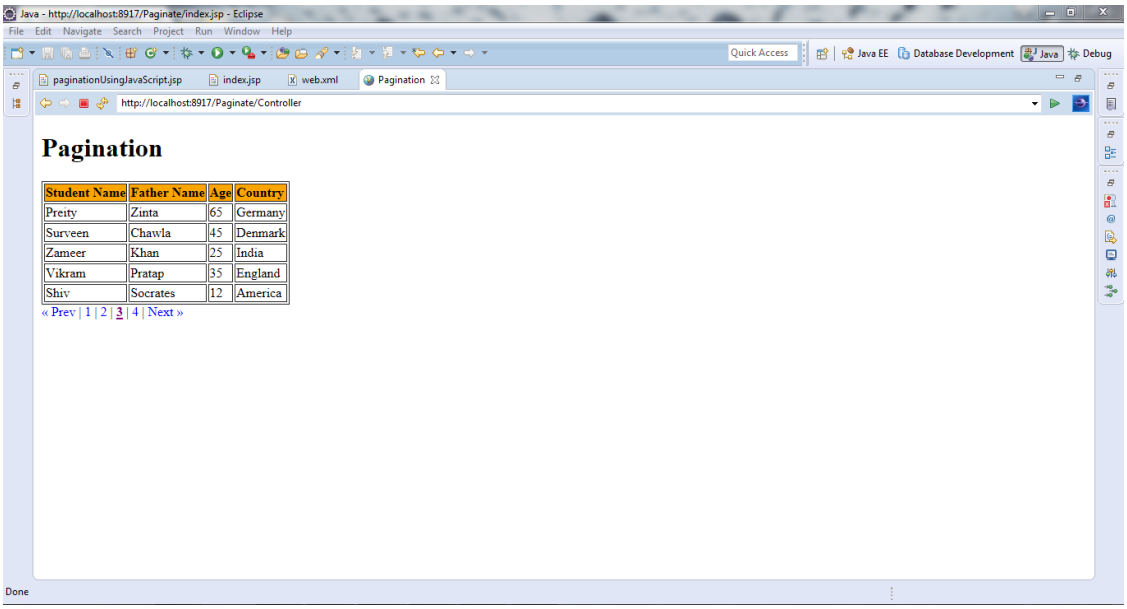


Fig. 13

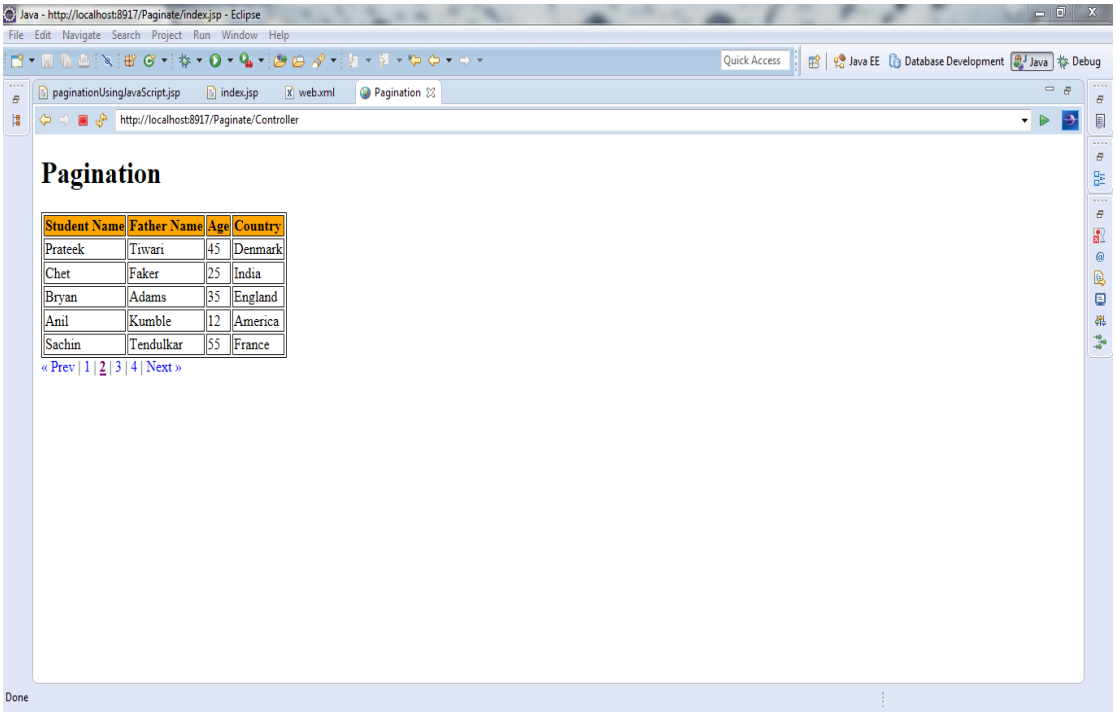


Fig. 14

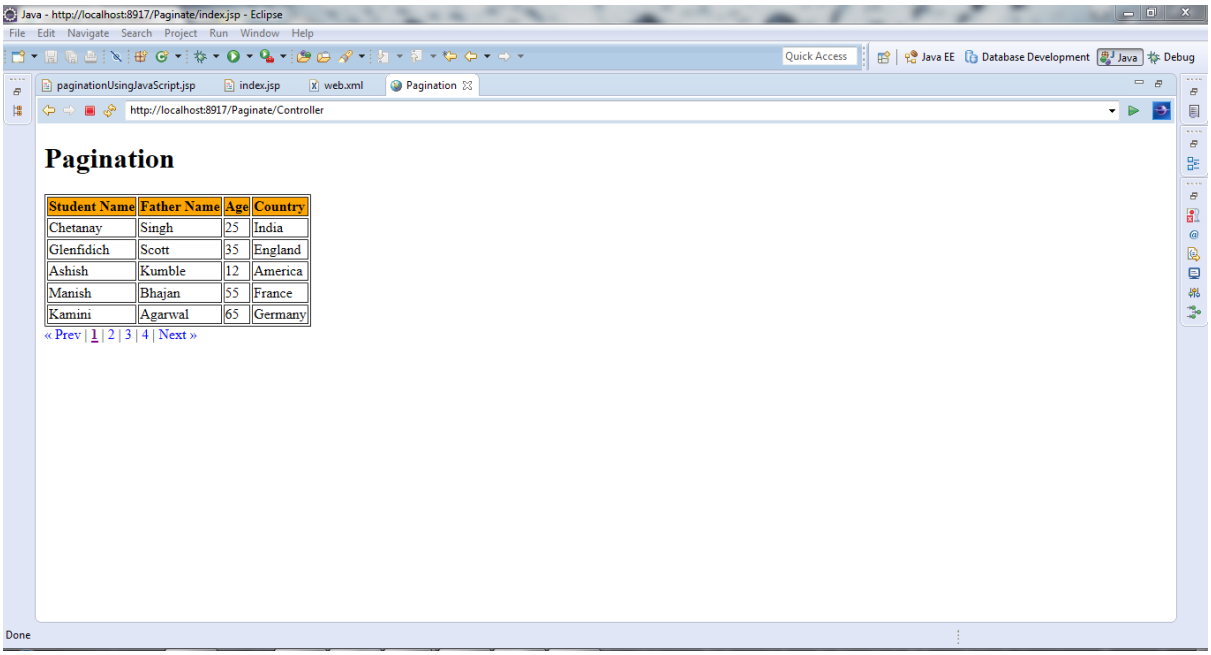

Java - http://localhost:8917/Paginate/index.jsp - Eclipse
File Edit Navigate Search Project Run Window Help
Quick Access
Java EE
Database Development
Java
Debug
paginationUsingJavaScript.jsp
index.jsp
web.xml
Pagination
http://localhost:8917/Paginate/Controller
Pagination
Student Name
Father Name
Age
Country
Chetanay
Singh
25
India
Glenfidich
Scott
35
England
Ashish
Kumble
12
America
Manish
Bhajan
55
France
Kamini
Agarwal
65
Germany
« Prev | 1 | 2 | 3 | 4 | Next »
Done

Fig. 15

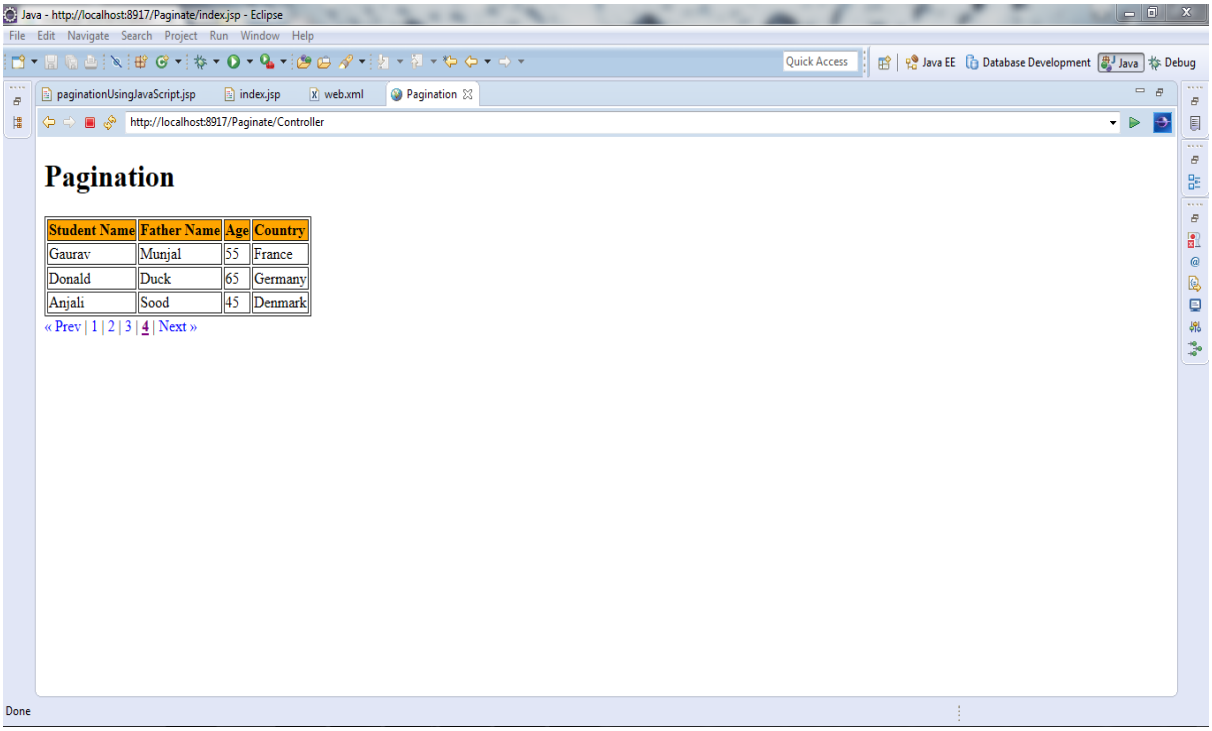

Java - http://localhost:8917/Paginate/index.jsp - Eclipse
File Edit Navigate Search Project Run Window Help
Quick Access
Java EE
Database Development
Java
Debug
paginationUsingJavaScript.jsp
index.jsp
web.xml
Pagination
http://localhost:8917/Paginate/Controller
Pagination
Student Name
Father Name
Age
Country
Gaurav
Munjal
55
France
Donald
Duck
65
Germany
Anjali
Sood
45
Denmark
« Prev | 1 | 2 | 3 | 4 | Next »
Done

Fig. 16

4. URL REWRITING ON APACHE WEB SERVER

URL rewriting is the process of rewriting or hiding the real page names so as to protect the website from getting hacked or intruded by hackers.

The OWASP ModSecurity Core Rule Set (CRS) is a set of generic attack detection rules for use with ModSecurity or compatible web application firewalls. The CRS aims to protect web applications from a wide range of attacks

It uses some flags such as:

- Last (L)
- Nocase (NC)
- Redirect (R)
- Forbidden (F)
- Ornext (OR)
- Next (N)

NOTE: You must write all your rewriting rules in **httpd.conf** file in your Apache Web Server.

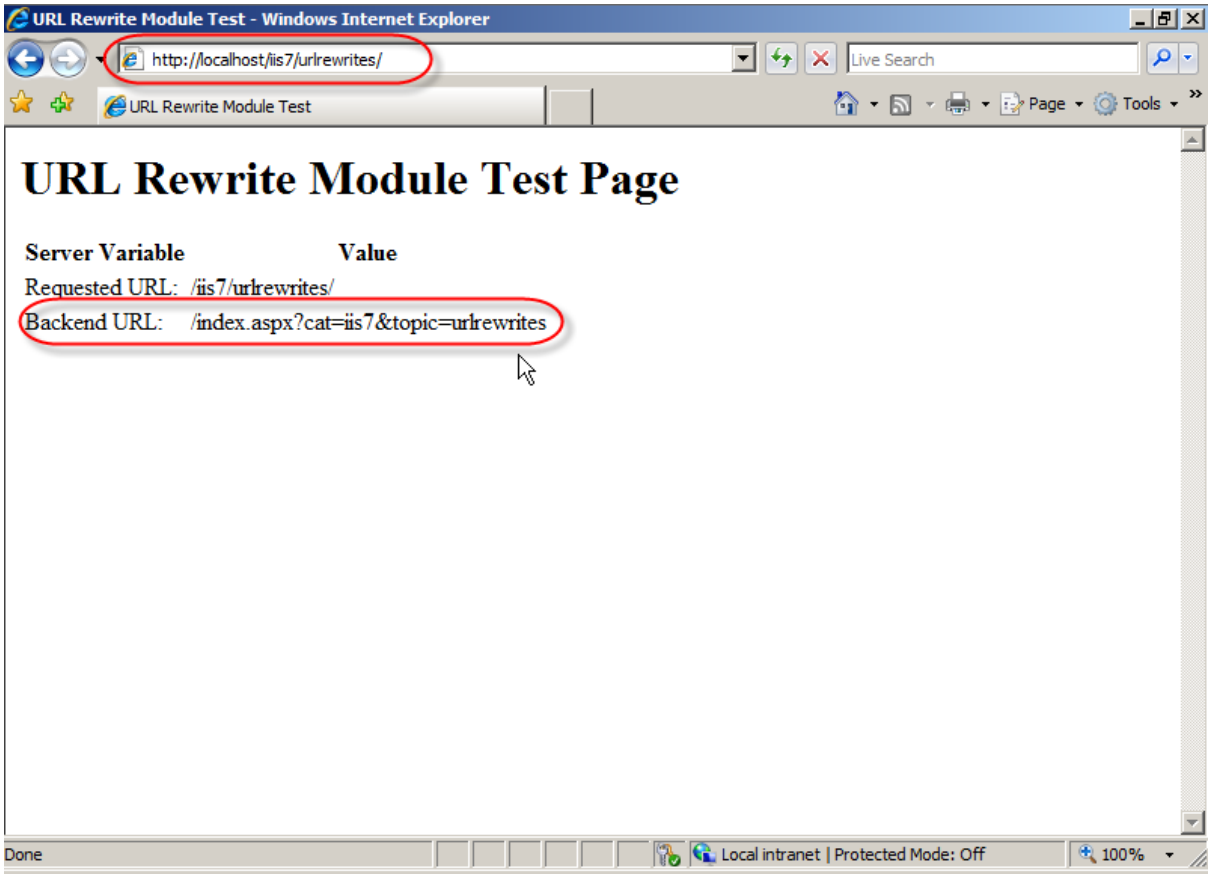


Fig. 17

- **Eliminating www from a domain**

Rewrite Engine on

RewriteCond %{HTTP HOST}!^juit.com$ [NC]

RewriteRule .? http://juit.com%{REQUEST_URI} [R=301,L]

Rewrite Engine off

- **Prevent image hotlinking**

Rewrite Engine on

RewriteCond %{HTTP_REFERER} !^$

RewriteCond %{HTTP_REFERER} !^http://(www.)?juit.com/ [NC]

RewriteRule .(gif|jpg|png)$ - [F]

Rewrite Engine off

- Prevent image hot-linking and redirecting to a specific image
- Displaying a custom web page for HTTP error codes

5. TRASH BIN BUG

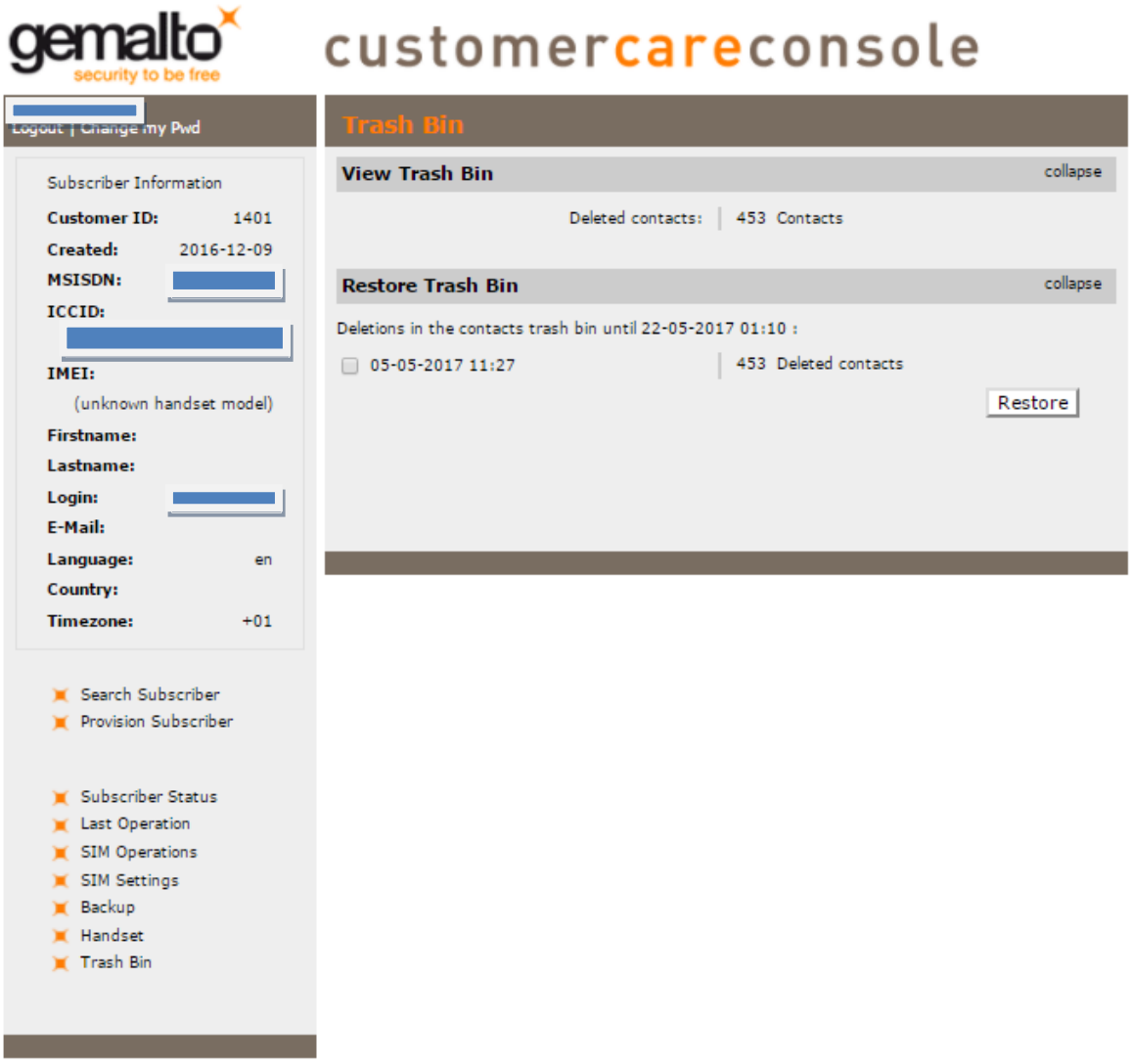


Fig. 18

BUG: When we selected 1 or more than 1 restore contact and click on Restore button then the entire list is being restored but only the selected ones should get restored.

BUG FIX: The list that is being formed at the time of selection of items to be restored is different from the one that is being used to finally execute the Restore functionality. So, the

6. BLOCKCHAIN AND BITCOIN PRESENTATION

CREATION OF BITCOINS

- It can be done using ‘mining’. Mining is the process of spending computing power to process transactions, secure the network, and keep everyone in the system synchronized together.

- Second method is by exchanging fiat currency for bitcoins.

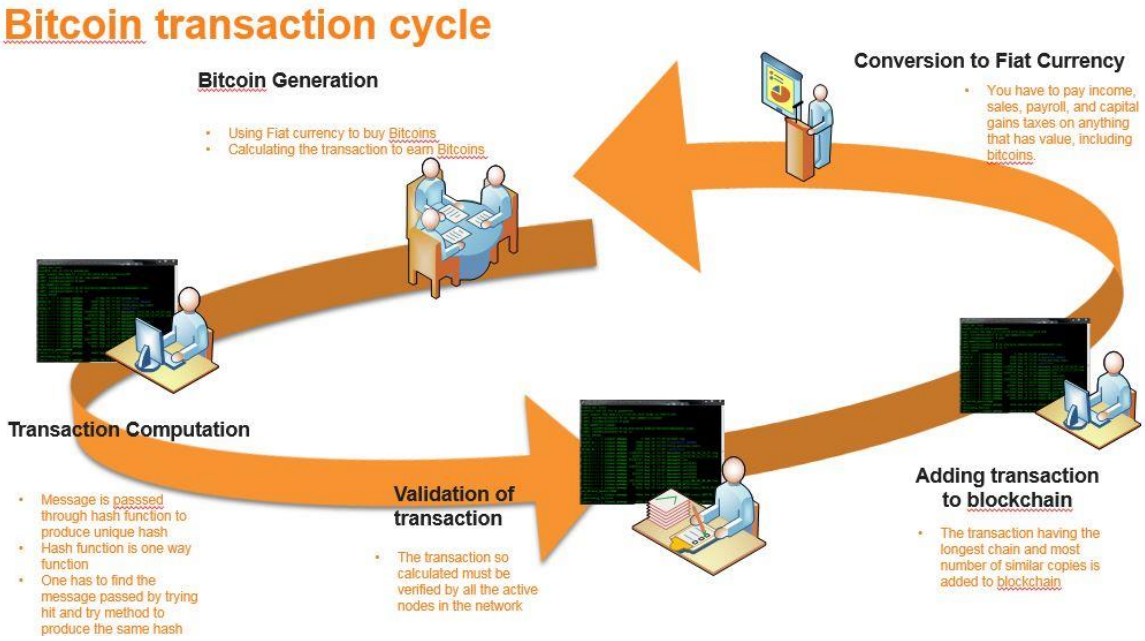


Fig. 19

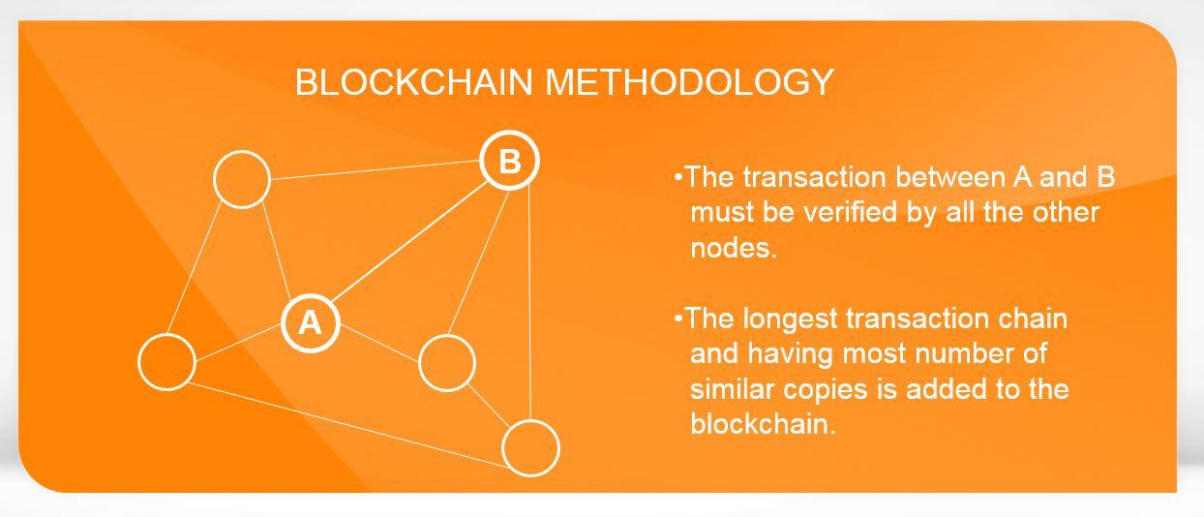


Fig. 20

- The transaction between A and B must be verified by all the other nodes.
- The longest transaction chain and having most number of similar copies is added to the blockchain.

CONCLUSION

The learning experience in the industry exposes you to much more technologies and methodologies of development when compared to the theoretical knowledge. There were many technologies like Spring MVC framework which gave me a good understanding of object injection, annotation etc. It helped me understand how the code was written so that it can be reused later on and also modified easily. Another interesting aspect was using the Mockito framework and Junit framework to write the test cases and test our written code very efficiently. I also got a chance to understand the stack of hardware and software used so as to work together to achieve a common goal. The use of virtual machine to deploy the web servers like Weblogics and JBOSS, databases like Oracle 11g and logging tool like log4j.

The product i.e. PCB on which I am working on is being used in many countries like latin America and Europe. It has a very less latency and is highly efficient. According to a study done by Gemalto about 80 percent of people are willing to pay extra to avail these services of backup and restore their data. These days data is money hence everyone wants to safeguard their data so the demand of this product is high.

I would conclude the report by saying that project work assigned to me has been completed to my satisfaction and I have gained significant knowledge.

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