

MOBILE WARE

By

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Certificate

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Dedication

This project is dedicated to my **Family** for their everlasting love, trust and support.

What I am today is just because of their prayers and love for me. With this dedication I want to thank them for all the things they have done for me and I want to tell them that I love all of them very much.

Acknowledgments

First of all I am extremely thankful to Almighty Allah for giving me the will power, courage and sprit to complete my final year project. I am also grateful to my family, especially my parents who have encouraged me through their devotion towards me and my studies and their prayers were always there with me.

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In the end I would like to thank all of my committee members, faculty members and my friends who helped me through their support and guidance.

Abstract

There is a very few amount of work done in order to make a ware house for mobile users which include digital content uploading through mobile device using GPRS and MMS, account management and features like sharing pictures with friends. Most of the online communities focus on web applications, where user can only using internet (HTTP). Mobile device are advancing so does there connecting technology. There should be a community through which mobile users can find other mobile users and can communicate with them through SMS, MMS or WAP over GPRS. They can also upload there pictures taken through mobile and share on the community.

Basic aim of an online community is to provide information about community member to other members. One can share its profile and picture through this platform. But there is no such community that provides fully featured access on mobile. For example “orkut” is one of the most popular web based online community. But they also do not provide mobile access to its user.

So the project “Mobile Ware” aims to provide a platform on which digital contents are uploaded.

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Chapter 1

INTRODUCTION

This section includes overall overview of the project. It briefly explains the background, motivation, problem statement, domain, proposed solution, scope and deliverables and timeline

1.1 BACKGROUND

Introduction of GPRS, MMS and Internet technologies have pushed development of application for GPRS/MMS as well as Internet users.

Our website will provide online community for both the internet as well as mobile (GPRS) users. It will provide facility to the user to create there profile online with facility to upload there picture from internet as well as through MMS. There will be an MMS center that will accept all request made to upload picture through MMS message to the member profile. Similarly all the other digital content will be handled. There would be another section for “Favorite SMS uploading”. This section will be containing all the text messages that a user has uploaded to his/her profile. So this will also facilitate those users who do not have the facility of using GPRS and MMS on their handsets.

1.2 MOTIVATION

Now a days mobile phones and mobile devices are becoming somewhat a necessity of every person including a common man. This is because the reason that the mobile technology is becoming cheaper and almost every one can afford its cost. People can afford to purchase it and operate it at a very low and reasonable cost. Because of such hype of mobile technologies these days people are demanding more and more value added services. Similarly the usage of internet applications is also becoming a need of every person and there has been a tremendous boom in internet industry within a very short span of time. Keeping in view the extreme progress of these two industries we decided to provide such an application or a platform which can benefit both internet as well as mobile users. We can provide services to a common mobile phone and internet user that attracts them in many aspects. That is the main motivation behind this project.

1.3 PROBLEM STATEMENT

There is unfortunately very few amount of work done in order to provide such a facility to mobile as well as internet users through which they can share their digital contents including pictures, videos, audios and messages with their friends, family and other internet and mobile users in a convenient manner. There should be a platform for mobile users through which they can communicate by sharing there digital contents through SMS and MMS over GPRS.

Every mobile phone user sends SMS and MMS to other mobile users which cost them according to the number of messages they are sending. For example, if a person wants

to send a single mms or he wants to share his picture or video with all his friends he will send that mms to each and every person individually which will cause him time as well as cost overhead. Mainly following problems are faced by the mobile users while sending MMS to other users.

- **Content Adaptation**

Multimedia content created by sender's mobile device might not be compatible with the receiver's mobile phone in that case the receiver will not be able to interpret the contents sent by the sender.

- **Distribution List**

Current MMS specification does not allow recipient list which means that a Person cannot address to many users at one time.

- **Bulk Messaging**

Using bulk messaging creates cost and time overheads. Moreover it also creates network congestion.

In order to cope up with these problems we have devised a mechanism which caters for the mobile users as well as mobile services providers.

1.4 PROPOSED SOLUTION

The proposed system will provide a website to the mobile user communities. Through the website, the mobile user will be able to view as well as upload the messages. User is allowed to upload both MMS and SMS messages. Users will be provided with the facility to create their accounts on the website, they will be able to add friends and keep their digital contents in the private or the public section of their profile depending

upon the nature of privacy of their contents. Moreover the user will also be able to upload his digital contents to their profiles through email.

The system will provide content based services to the mobile and internet users through the SMS gateway named Kannel, MMS gateway named MBuni and an Email server using Postfix. For SMS, the gateway Kannel will be connected to SMS Center, which will be SIM based mobile phone. The services provided regarding SMS will be configured in the configuration file of Kannel. Kannel gateway will get the request in SMS Center specific protocol (WAP Push) and convert it into an HTTP request. The HTTP request will contain the POST data along with all its headers including senders MSISDN (phone number) and pass it to the JSP page of the website. Kannel gateway also converts HTTP request into SMS Center specific protocol to send an acknowledgment back to the SMS Center. The contents will be stored on the web server.

In case of MMS, the Postfix email server will receive the incoming message which would be sent by the mobile device using MM3 protocol of MMS technology. The email server will be configured to receive the MMS emails destined to a particular email ID. Email server will then forward the message to the MMS gateway Mbuni, which will adapt its contents according to the contents actually received i.e. in Base64 format mostly in case of a picture. The parsing of MMS message will be carried out on the server side and the resulting contents, including the sent data and sender's identification will be provided to the web server hosting the website. The digital content will be displayed according to the headers specified in the message.

1.5 SCOPE

The project is mainly divided into three modules

- **JSP website**
- **SMS content uploading service**
- **MMS content uploading service**

1.5.1 JSP Website

The system will allow the mobile users to create their profiles online on the website. This website will contain the information about the user. The user profile will be created on different attributes of the user including name, age, gender, education, email address and phone number. The user will be able to view his/her profile after logging into the site. The user will also be able to search other members of the community and add them as his/her friends. The member search will be based on different attributes like name, age group and phone numbers. The result will be shown to the user and he/she can view the profile of that member. The members which a user adds as his/her friends will be able to view his/her digital contents marked as private by the user. The other members will only be able to view his/her public part of the profile. The user will also be provided the facility to rate others pictures and on the basis of that rating a contest will be held at the end of each month. The winner picture will be displayed on home page of the website for the next month.

1.5.2 SMS Content Provider Service

This module will provide sms content uploading services to the users. Mobile users will be able to upload their favorite sms to the website in their accounts using this service. The service mainly consists of an SMS gateway named Kannel. Kannel will be responsible for getting SMS with its headers and Post it in an HTTP request to the JSP website. Kannel is also responsible for sending back the acknowledgment to the user in SMS format.

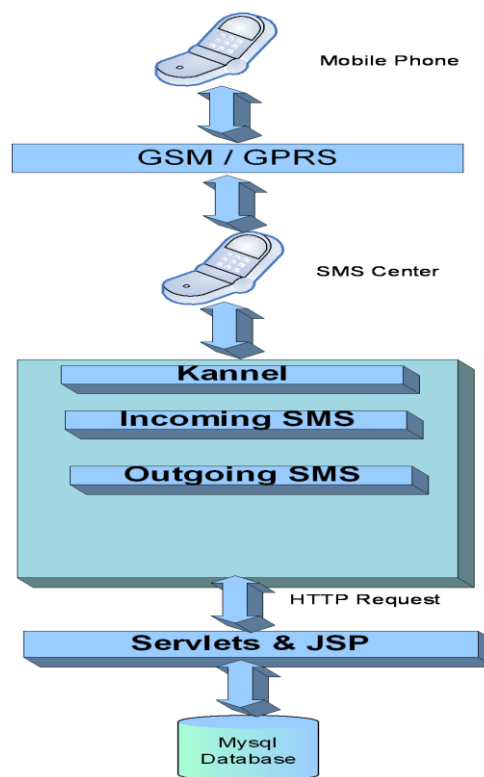


Figure 1: SMS content provider service

1.5.3 MMS Content Provider Service

This module will provide the digital content uploading to the users including pictures, videos and audio. This module will act as a middleware between mobile user and the website. This module consists of two parts

- **Postfix e-mail server**
- **MMS gateway (Mbuni)**

1.5.3.1 POSTFIX email server

The postfix email server will listen on port 25 for email requests. MMS is received through SMTP by the Postfix email server. After receiving MMS as email, it will relay the MMS to the port on which MMS gateway is listening. After altering the MMS contents and making it compatible with a normal email, the MMS gateway will again forward the message to the Postfix email server.

Postfix will perform the command specified for that email (MMS message) and concatenate the output to a text file.

1.5.3.2 MMS gateway (MBUNI)

MMS gateway acts as a message switching and adaptation device in the MMS architecture. MMS gateway receives MMS as an email from the Postfix mail server. MMS gateway receives messages by Postfix email server using MM4 protocol which define the delivery of messages from an email server to the MMS gateway and vice versa. The gateway recodes the message as standard MIME and passes it to the SMTP server for delivery through MM4 protocol. Email messages received are similarly re-

coded as MMS and forwarded to the relevant MMS client. The MMSC or the gateway also interfaces with the subscriber database, which controls the message delivery but in my case the gateway only interfaces with the EMAIL server using MM4 protocol.

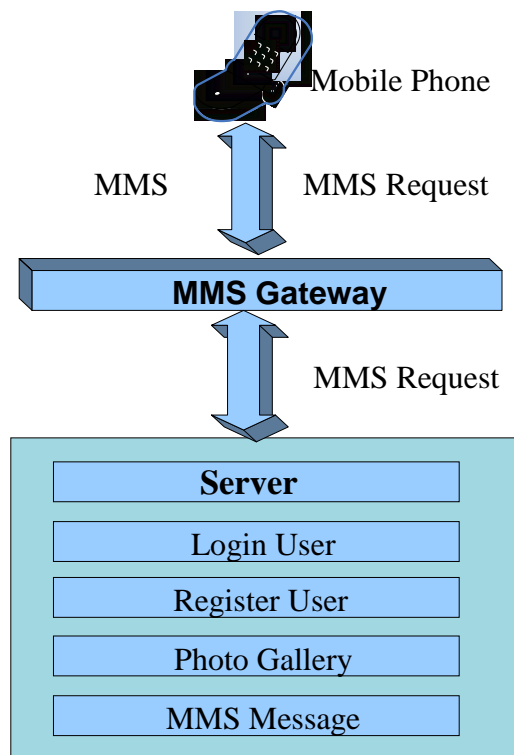


Figure 2: MMS Gateway

1.6 DELIVERABLES

1.6.1 JSP Website

- Login functionality
- Register functionality
- Editing profile
- Uploading MMS through mobile phone
- Maintaining User profile

1.6.2 SMS Content Based Service

- Configuration of SMS Gateway (Kannel)
- General services like receiving SMS
- Authenticate user against his/her phone number
- Uploading SMS

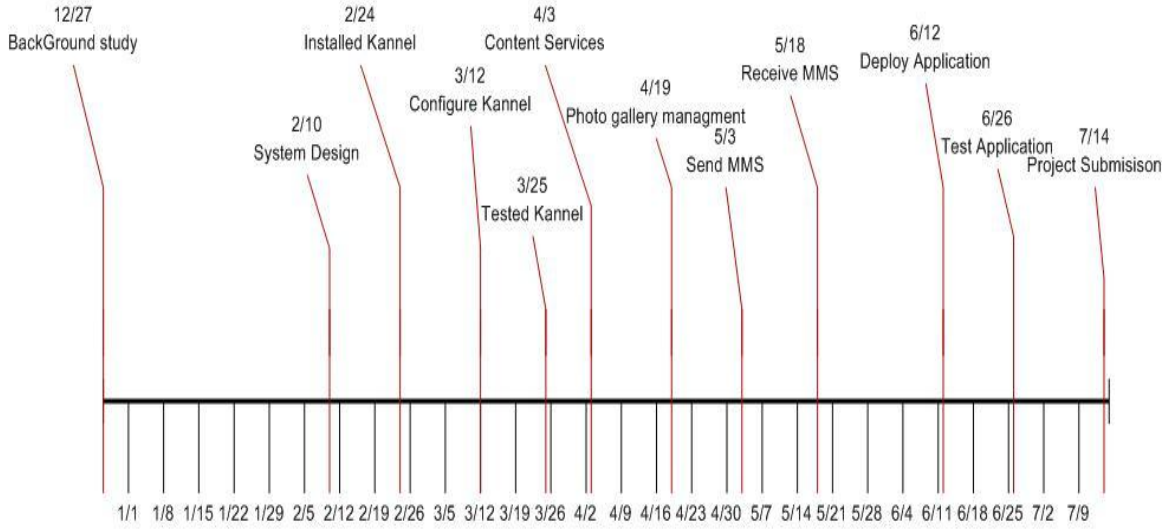
1.6.3 MMS Content Based Service

- Configuration of MMS gateway (Mbuni)
- Configuration of MMSC
- Configuration of POSTFIX email server
- Receiving email through Postfix
- Content adaptation through MMS Gateway
- Content uploading

1.7 TIME LINE

Task Name	Start Date	End Date
1: Background study + Requirement Analysis	Feb 13 th , 07	Mar 11 th , 07
2: SYSTEM DESIGN	Mar 12 th , 07	April 20 th , 07
3: IMPLEMENTATION	Mar 21 st , 07	June 20 th , 07
3.1: Install Linux	Mar 22 nd , 07	Mar 23 rd , 07
3.2: Install Kannel	Mar 24 th , 07	Mar 29 th , 07
3.3: Configure Kannel	Mar 30 th , 07	April 5 th , 07
3.4: Configure MySql	April 10 th , 07	April 10 th , 07
3.5: Testing Kannel	April 11 th , 07	April 20 th , 07
3.6: Content Based Services	April 20 th , 07	May 10 th , 07
3.6.1: Content Services News etc.	April 20 th , 07	April 24 th , 07
3.6.2: Configuring postfix	April 25 th , 07	April 31 st , 07
3.6.3: Configuring Mbuni	May 1 st , 07	May 7 th , 07
3.7: Receiving MMS as email	May 11 th , 07	June 14 th , 07
3.7.3: Develop Website pages	May 24 th , 07	May 30 th , 07
4: REAL APPLICATION	June 20 th , 07	June 25 th , 07
5: TESTING AND BUGS ANALYSIS	June 25 th , 07	June 30 th , 07

1.7.1 Graphical Timeline



LITERATURE REVIEW

This chapter will discuss the background study done for this project.

2.1 KANNEL GATEWAY

Kannel, the SMS gateway is an open source SMS and WAP gateway used in this project. Kannel is used for relaying and routing purposes of SMS and WAP traffic. The most common and mostly used technology for mobile services is WAP, short for Wireless Application Protocol. It also has the capability to allow a mobile phone to act as a simple web browser, but optimizes the markup language, scripting language, and the transmission protocols for wireless use. The gateway is used to switch and relay messages within the GSM network. Every mobile phone used nowadays provides the functionality of SMS so it targets a large number of users.

2.1.1 Kannel as SMS Gateway

Kannel is an open source SMS Gateway that is used to send SMS messages from one GSM phone to other. When a mobile phone user sends an SMS to other mobile user or to a gateway or HTTP server, the receiver doesn't receive message directly from the sender. Receiver receives SMS from SMSC (SMS Center) rather than receiving it directly from the sender. First the SMS goes to SMSC from the sender mobile phone where it is stored until the receiver receives the SMS. SMSC which uses store and forward mechanism then forwards SMS to the receiver. This SMSC uses some SMS

specific protocol to send the message to the receiver. Different SMSC use different SMS protocols to send messages. Almost all SMSC specific protocols are supported by Kannel and it can be used with any SMSC. Kannel acts as a middleware in the communication using SMSC specific protocols to famous HTTP protocols. Kannel makes an HTTP request to fetch the content requested or uploaded by the sender through SMS. Kannel gets the response or acknowledgment (in my case) back from the HTTP Servers using HTTP request and will send the content to the SMSC using the same SMSC specific protocol in which the content was requested.

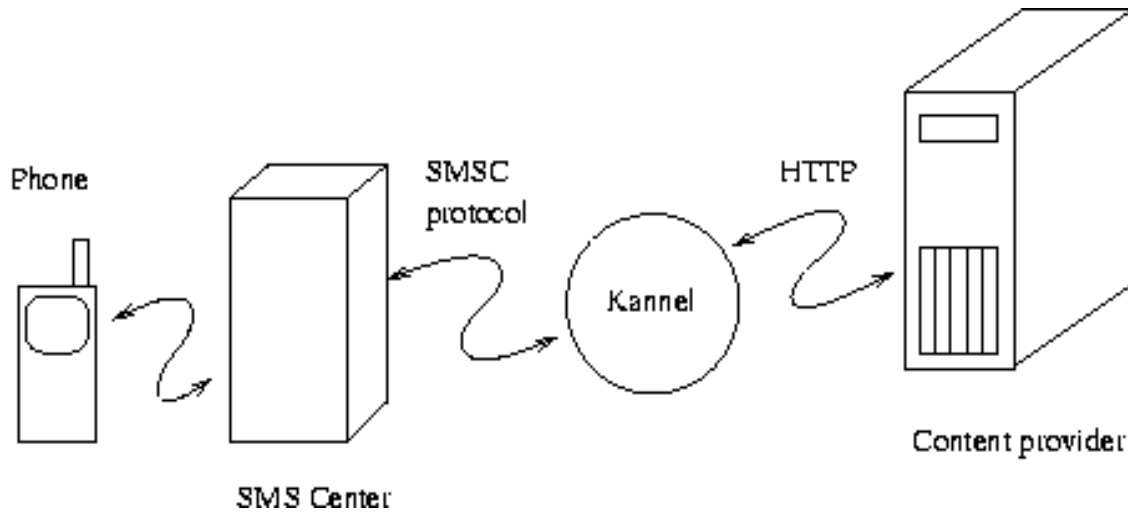


Figure 3: SMS Gateway

2.2 GENERAL PACKET RADIO SERVICE (GPRS)

GPRS is a wireless technology, which allows the data to transfer in the form of packets. The basic technology used by GPRS is the GSM technology. GPRS allows the data to transfer at speed 115 kb/sec and the data is sent in the form of packets. The most attracting feature of GPRS is that the mobile user is charged for the amount of data actually transferred. As the technology is used by the mobile users simultaneously, so we can say that the GPRS wireless technology is highly efficient and durable and cheaper. GPRS technology is used to transfer mobile phone content on the Internet such as SMS and MMS.

2.3 SHORT MESSAGING SERVICE (SMS)

Short Message Service also known as SMS is a service, which is available in GSM networks. SMS based services are the most commonly used services. This service supports sending of very small amount of data i.e. only 160 characters. The cost of sending SMS is also very cheap and affordable. Because of its lower costs, mobile users prefer to send SMS rather than making a phone call. All the messages are stored in SMS Center, as it follows store and forward mechanism, before the receiver receives the messages. An SMS gateway is required if the mobile user wants to send the message from/to the Internet.

2.4 MULTIMEDIA MESSAGE SERVICE (MMS)

Multimedia Messaging Service also known as MMS provides a huge set of digital contents to subscribers. The digital contents supported by MMS include pictures, video, audio and games etc. MMS incorporates both sending and receiving of digital content through the MMS enabled client devices (Mobile phones). Just like SMS or email, MMS provides non-real-time delivery of digital contents. MMS uses store and forward mechanism.

MMS is implemented such that it is transported over IP. MMS also supports other services like email and WAP. MMS are encoded using WAP MIME formats and are therefore transported through WAP.

2.5 MBUNI (MMS GATEWAY)

Mbuni is an open source MMS gateway. It performs both the functionalities of core network MMS switching and also the messaging gateway. Mbuni is used by most of the telecom operator companies as a full fledged MMSC. It is also suitable to work for Value Added Service Providers.

Mbuni implements all the major MMS interfaces and protocols. Mbuni basically provides seven interfaces i.e. MM1 to MM7. These interfaces work in different manner according to the content being transferred from one side to the other. The major of these interfaces include Phone-to-phone (MM1 interface), phone-to-email (MM3), **inter-MMSC (MM4)**, and MMS VAS (MM7). The rest of the interfaces are used for billing and other purposes.

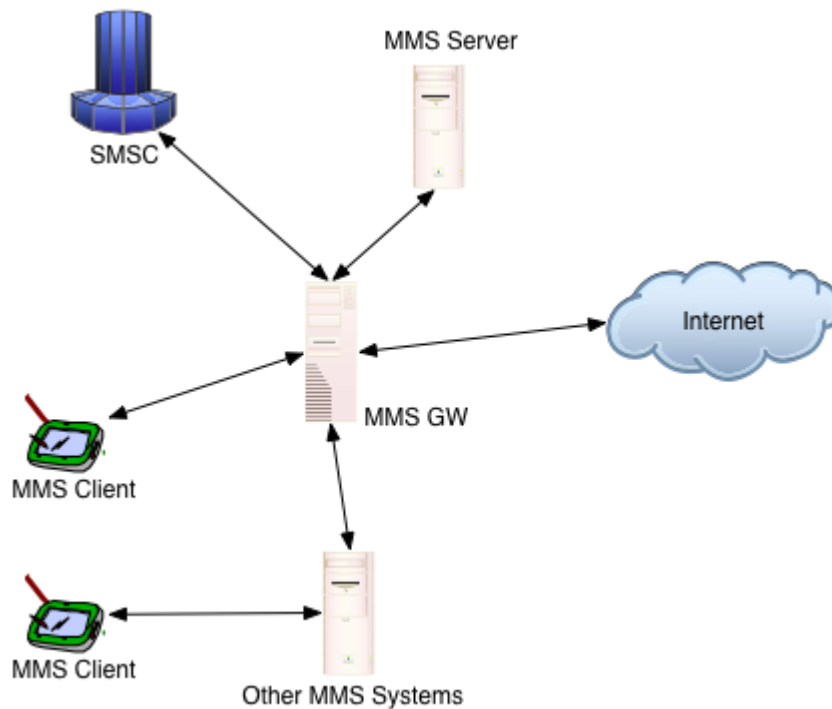


Figure 4: Working of MMS

The above picture contains the following components:

- **MMS Client:** The device used by the user to send and receive MMS messages.
- **MMS Gateway:** MMS gateway is used to switch messages between different MMS clients (mobile users) and between MMS and Email.
- **MMS Server:** Messages are stored on MMS server. It is used in store and forward technique.
- **Other MMS Systems:** Other systems, such as Third Party MMS systems.

2.5.1 Modes of Operation

There are mainly two modes of operation of MMS gateway (Mbuni):

- As MMSC

- **As VAS Gateway**

2.5.1.1 As MMSC

While operating as MMSC, Mbuni provides several facilities including Phone-to-phone Messaging, content adaptation, transferring MMS to Email and Email to MMS, persistent store of MMS messages for store and forward mechanism.

2.5.1.2 As VAS GATEWAY

While operating as VAS gateway, Mbuni provides features like: More than one connections to different MMSC of different types, Multimedia content can be uploaded either from a file or from a URL or from output of a computer program.

2.6 POSTFIX

Postfix is an open source Mail Transfer Agent (MTA). Postfix is a computer program that is responsible of routing and delivery of email messages. It is considered to be fast, easy to operate and secure Mail transfer agent as compared to the one widely used i.e. Sendmail MTA.

Postfix also comes as a default Mail transfer agent with a lot of operating system distributions like UNIX.

Postfix is capable of handling a large amount of email. Postfix is basically a combination of various daemons. Each daemon performs a unique task. So if a daemon is corrupted, the effect only remains limited to that daemon and cannot spread throughout the entire system.

Chapter 3**REQUIREMENTS**

All the functional and non-functional requirements of the system are described in this chapter for the ease of implementation. The chapter contains all the requirements as well as analysis of the system. This document will help in developing the system because all the requirements of the system are known.

3.1 FUNCTIONAL REQUIREMENTS

Functional requirements of the system are described in this section.

Use Case Name	Upload SMS
Actors	Mobile User
Description	This process will allow users to upload sms.
Normal Course	<ol style="list-style-type: none"> 1. Write SMS according to specified format. 2. Send SMS. 3. Get acknowledgment.
Alternate Course	None
Pre Conditions	User must have a mobile phone capable of sending and receiving SMS.
Post Conditions	User will upload the sms and receive acknowledgment.
Use Case Name	Send MMS
Actors	Mobile User
Description	This process will allow users to send MMS from a mobile phone.
Normal Course	<ol style="list-style-type: none"> 1. Create an MMS. 2. Send MMS. 3. Get Confirmation.
Alternate Course	None
Pre Conditions	User must have a mobile phone capable of sending and receiving MMS.
Post Conditions	The MMS is uploaded to user profile

Use Case Name	Register to website
Actors	Mobile/Internet User
Description	This process will allow users to register and create profile on the website.
Normal Course	<ol style="list-style-type: none"> 1. Open the registration page. 2. Provide information to make user profile. 3. Save Profile
Alternate Course	None
Pre Conditions	User must have an internet connection
Post Conditions	The user profile is created.

Use Case Name	User Profile
Actors	Mobile User
Description	This process will allow users to build their profile.
Normal Course	<ol style="list-style-type: none"> 4. Open the profile application. 5. Provide information to make user profile. 6. Save Profile.
Alternate Course	None
Pre Conditions	User must have a Java enabled mobile phone so that java application should be installed on it.
Post Condition	The users profile is made and data is saved in a database.

Use Case Name	Search Users
Actors	Mobile/Internet User
Description	This process will allow users to search for other members.
Normal Course	<ol style="list-style-type: none"> 1. Provide search attributes. 2. Send search request. 3. Get results.
Alternate Course	None
Pre Conditions	User must provide search attributes.

Use Case Name	Show Gallery
Actors	Mobile/Internet User
Description	This process will allow users to check their picture gallery.
Normal Course	<ol style="list-style-type: none">1. View Profile2. Check Picture Gallery
Alternate Course	None
Pre Conditions	User must be logged on to view his/her Gallery for pictures.
Post Conditions	The user views his/her Inbox and can read messages.
Use Case Name	View Favorite Messages
Actors	Mobile/Internet User
Description	This process will allow users to the sms section of their profile.
Normal Course	<ol style="list-style-type: none">1. Login to profile2. Check messages section.
Alternate Course	None
Pre Conditions	User must be registered to the website.
Post Conditions	The users can read messages from his/her sms section.

3.1.1 Use Case Diagram

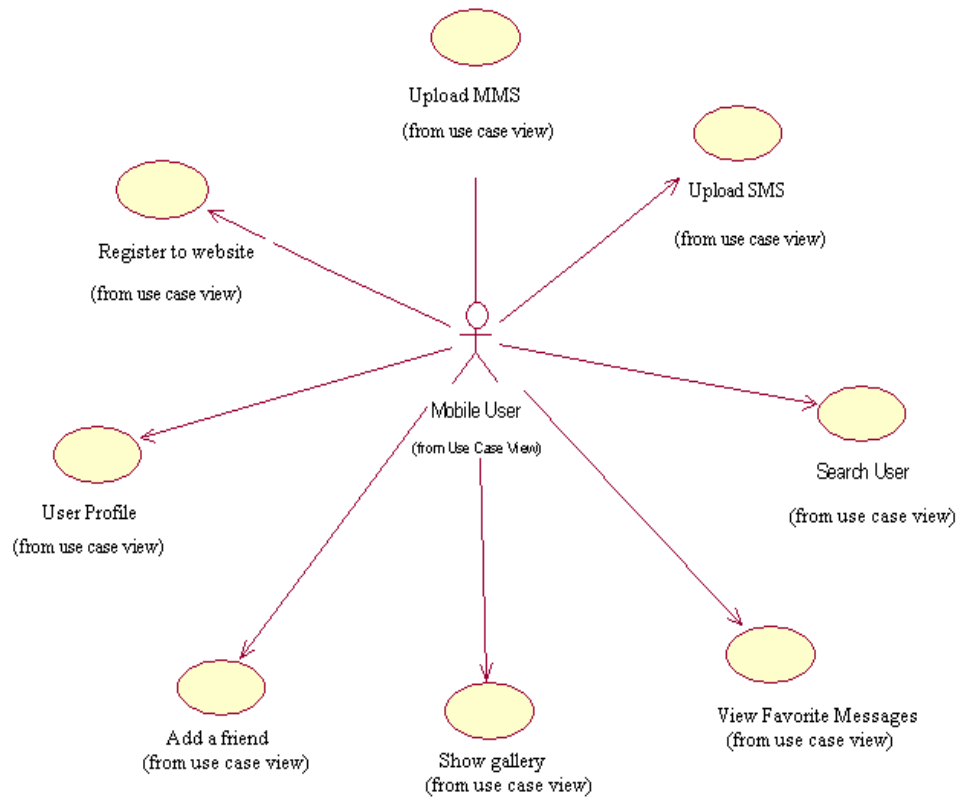


Figure 5: Use Case Diagram

3.2 NON-FUNCTIONAL REQUIREMENTS

3.2.1 Software Quality Attributes

- **Availability:** The system is available to the users on anytime anywhere basis. User can send MMS and SMS to the system anytime from all over the world and it will be uploaded in his/her profile.
- **Reliability:** Messages including MMS and SMS should be correctly sent, received and uploaded. The content is not corrupted while uploading. User data is stored in the database correctly.
- **Usability:** The system is easy to use and to understand by the users. System has different users with different skill sets and most of them will not be technical people. The interface of website is also very simple and easy to interact.
- **Maintainability:** For other users and developers, the system is maintainable so that they can understand the system. The system is well documented and all configuration files are given along with the system which will help in configuring and updating the system.

3.2.2 Security Requirements:

All necessary security measures are taken in the configuration file of the SMS Gateway (kannel) as well as MMS Gateway (Mbuni). We can set a limit to the access to the gateways and just like that we can grant access to the gateway in the configuration file of the kannel as well as Mbuni.

3.2.3 Extensibility

The proposed system is extensible in order to meet the future needs and demands. More SMS and MMS based services are easily incorporated with the current applications without any change in the basic underline architecture for example the user can be given option to receive the information uploaded by him/her back to his mobile phone.

3.2.4 Reusability

There does not need of devising the whole system from the scratch.

3.3 INTERFACE REQUIREMENTS

3.3.1 Hardware Interfaces:

- Handset having the capability of sending and receiving messages. These messages include both SMS and MMS.
- Handset (mobile phone) should support GPRS and MMS which is necessary for MMS Content based services module.
- A P4 computer machine that will be used as a server.

3.3.2 Software Requirements:

- SMS gateway Kannel, with its bearer box program which makes a direct connection to the SMSC and overlays all the complexity of communication through Http request.
- Database will be created in MySQL.

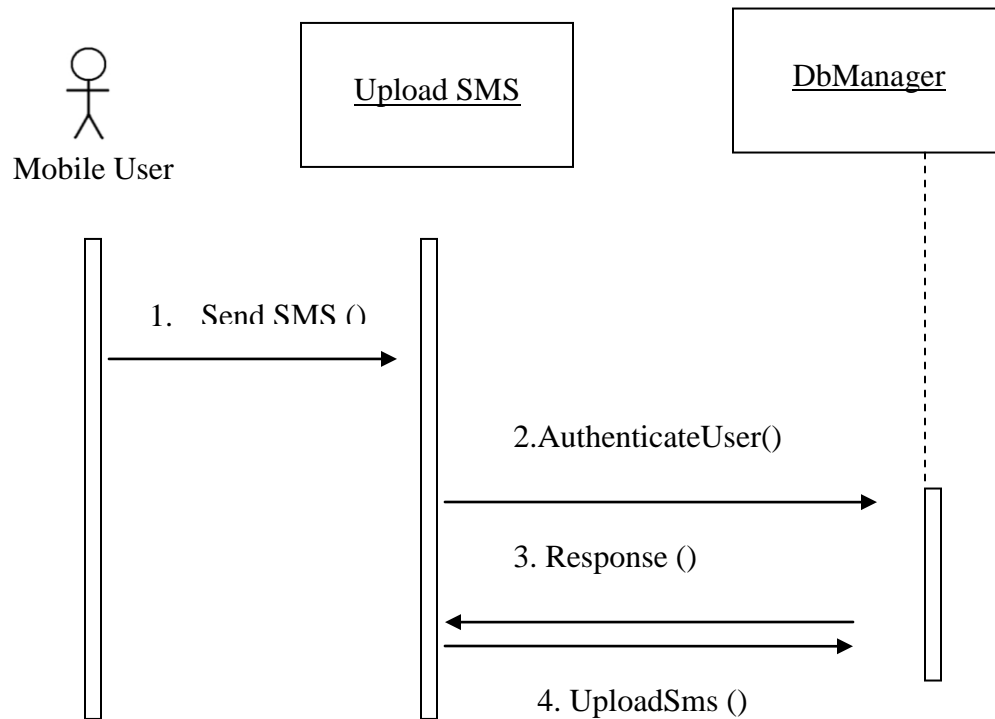
- JSP will be used to create a dynamic website incorporating the features of SMS and MMS uploading and also to store the data in database.
- MMS Gateway Mbuni, with its program like MMSRELAY, MMSPROXY, and MMSBOX will be used. Which is used for content adaptation purposes.
- POSTFIX mail transfer agent will be used in order to receive MMS in the form of email and relaying it to Mbuni for content transformation.

SYSTEM DESIGN

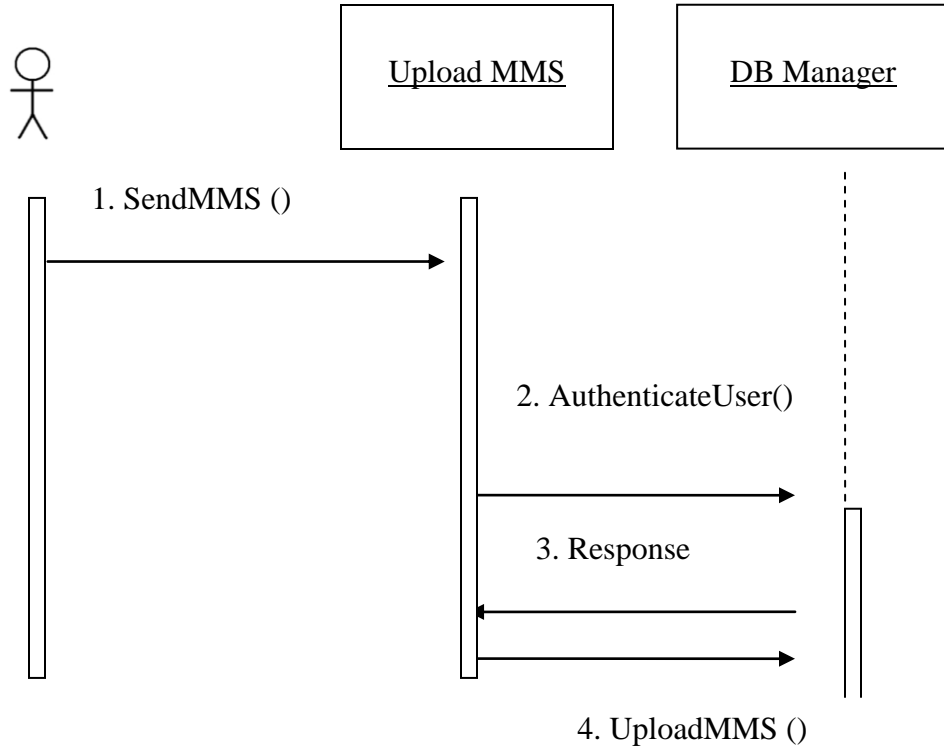
The basic design of the system is explained in this section. This will help in understanding the technical details of the project and in the implementation of the project.

4.1 SEQUENCE DIAGRAMS

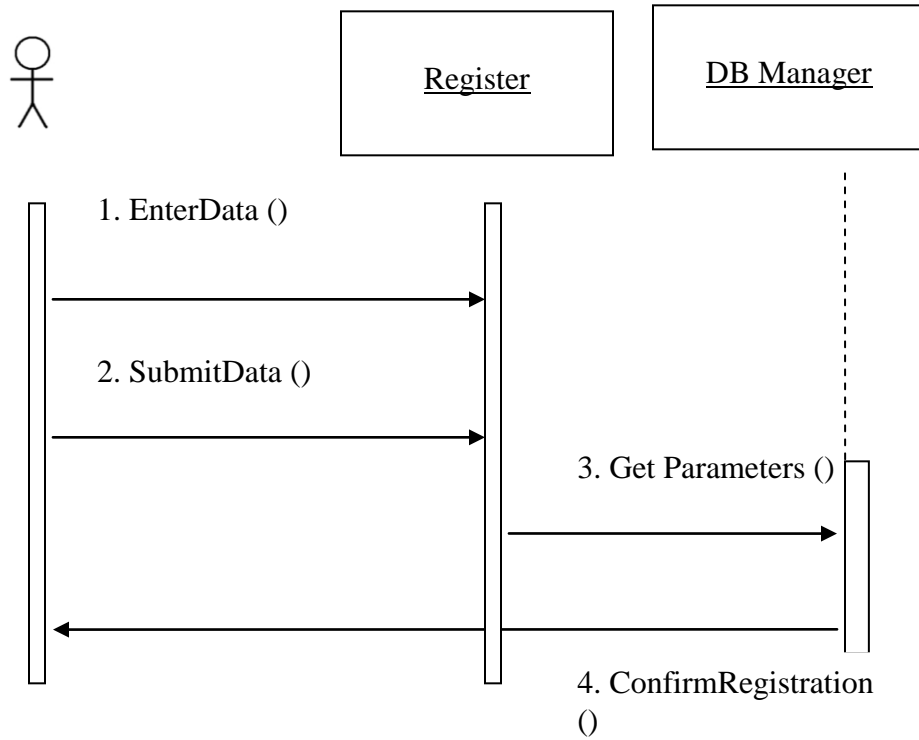
4.1.1 Upload SMS



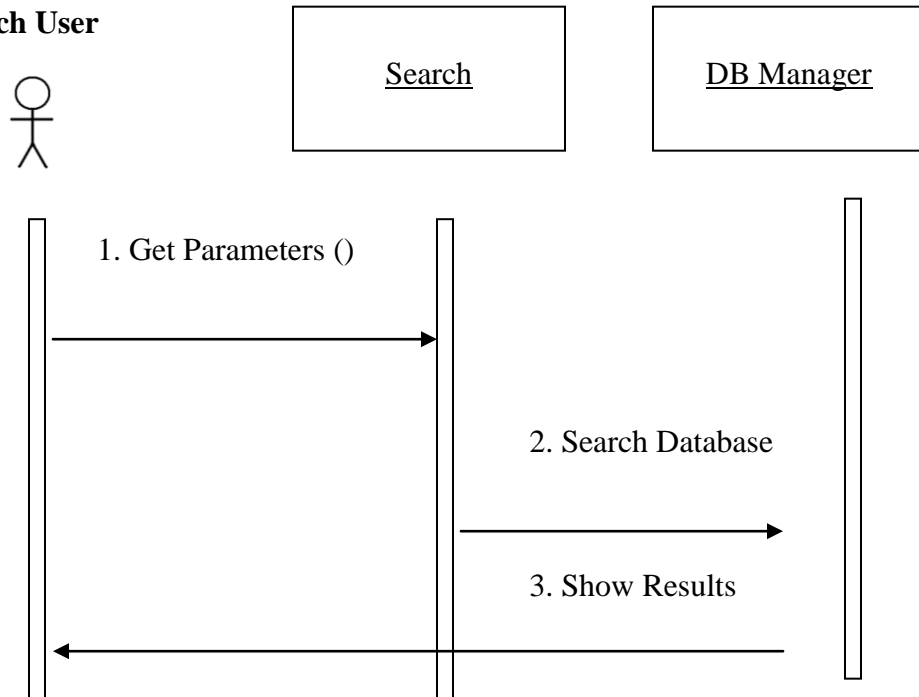
4.1.2 Upload MMS



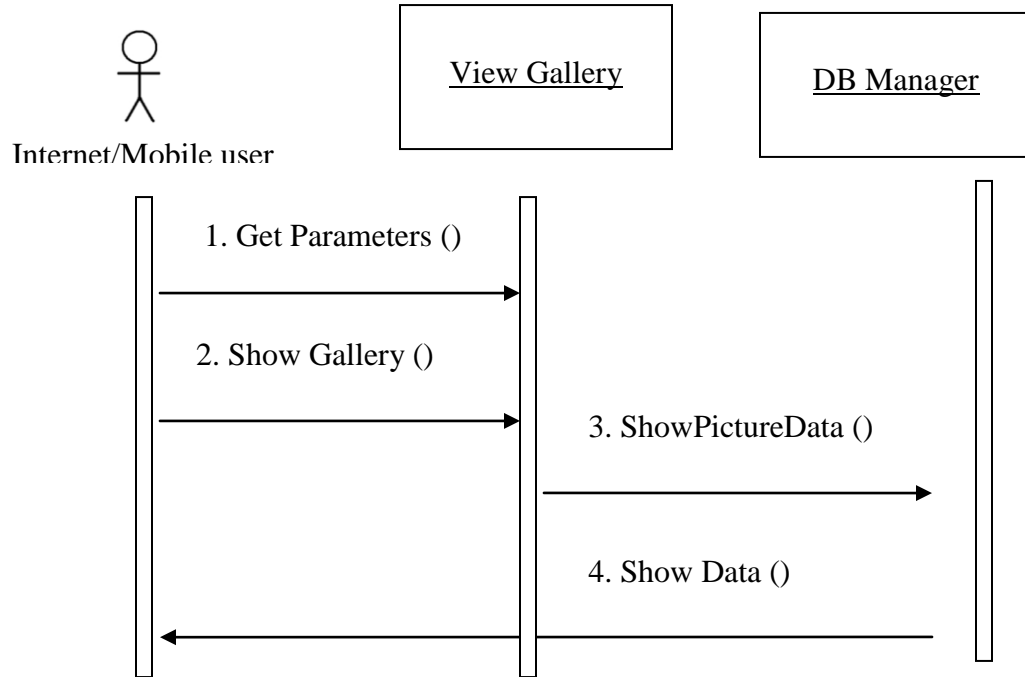
4.1.3 Register to Website



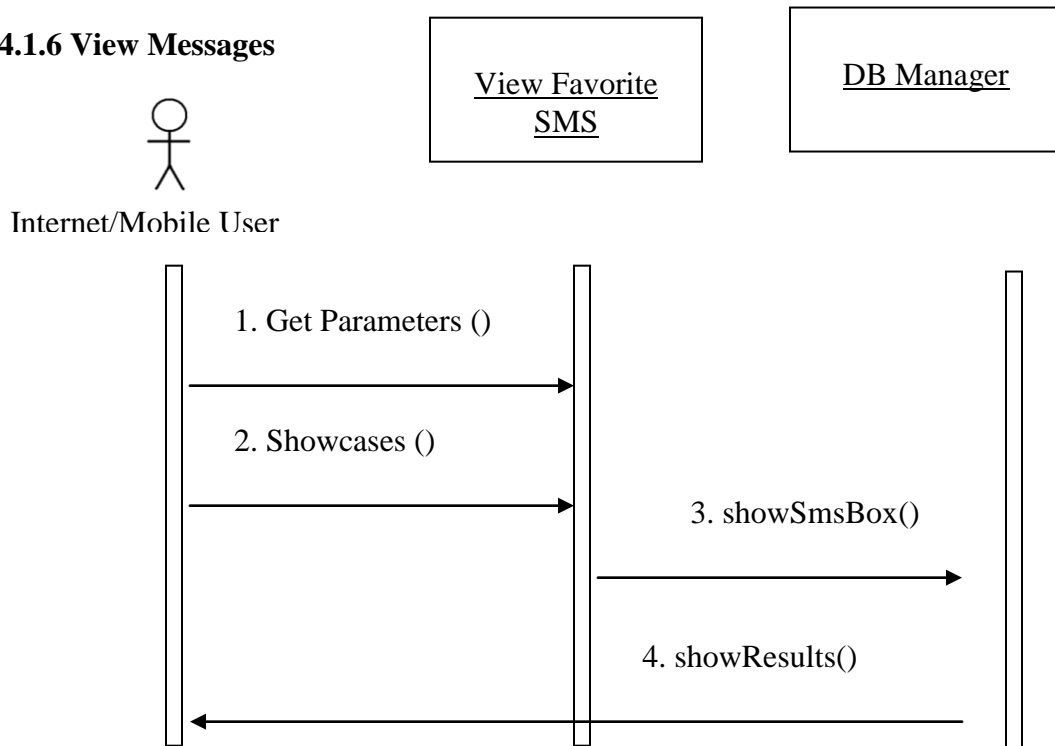
4.1.4 Search User



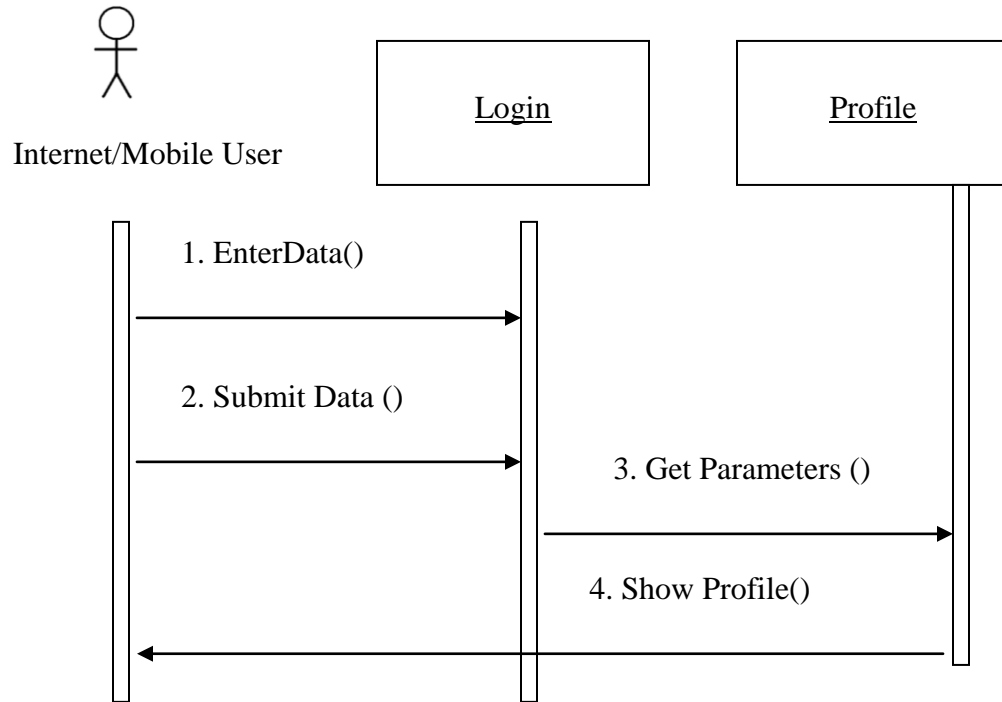
4.1.5 View Gallery



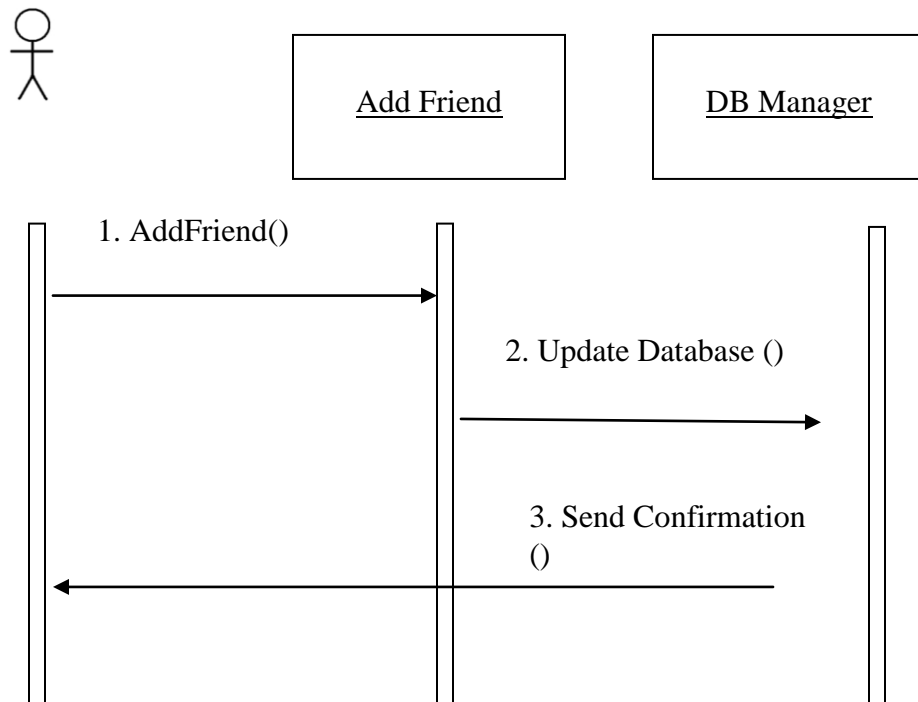
4.1.6 View Messages



4.1.7 User Profile



4.1.8 Add a Friend



ARCHITECTURE

The overall architecture and major components of the project are discussed here.

5.1 SYSTEM ARCHITECTURE

5.1.1 Architecture Diagram of the System

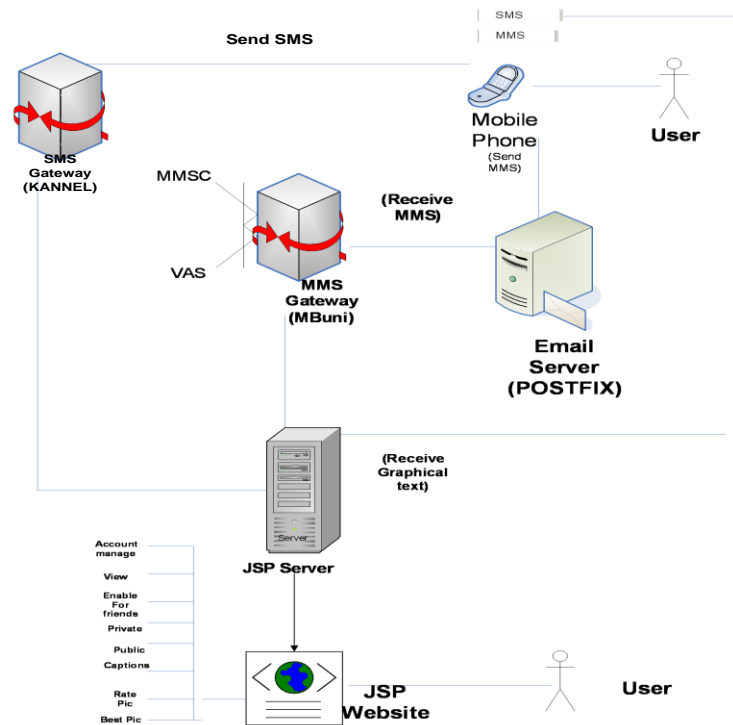


Figure 6: System Architecture

The figure shows a complete architecture of the system and major parts of the system.

There are four major parts of the system i.e.

1. MMS Gateway (Mbuni)
2. SMS Gateway (Kannel)
3. Postfix Server
4. HTTP Server serving JSP website

5.2 MODULE DEFINITIONS

5.2.1 MMS Gateway

MMS Gateway (Mbuni) is a full fledged MMSC (Multimedia Switching Center). The MMS gateway is used as a middleware to for message switching between Phone-to-phone, phone-to-email, email-to-phone and inter MMSC. MMS gateway receives MMS as an email from the Postfix mail server. MMS gateway receives messages by Postfix email server using MM4 protocol which define the delivery of messages from an email server to the MMS gateway and vice versa. The gateway recodes the message as standard MIME and passes it to the SMTP server for delivery through MM4 protocol. Email messages received are similarly re-coded as MMS and forwarded to the relevant MMS client. The MMSC or the gateway also interfaces with the subscriber database, which controls the message delivery but in my case the gateway only interfaces with the EMAIL server using MM4 protocol. There are two main services that Mbuni includes:

- **MMS Relay**

The function of MMS Relay is to route all the messages (to phone or to email).

MMS Relay watches the MMS Global queue for incoming MMS messages. The service makes an attempt to send the message to its destination as soon as it is received. In case of failure it uses exponential back-off method to try again. It is also responsible for sending notifications to clients (mobile users).

- **MMS Proxy**

MMS Proxy performs the main task of connecting the gateway and the MMS clients. Provides user the facility to send MMS messages by giving them an HTTP interface. It provides the user with the interfaces of **Sending Request** through which they can send MMS to the gateway, **Forward Request** through which a user requests a multimedia request to forward a multimedia message pending in the global queue, Notify Response is send by the client to send the notification of receipt of MMS i.e. whether the client has received MMS correctly or not.

5.2.2 SMS Gateway (Kannel)

The gateway used for sending, receiving and uploading of SMS is Kannel. Like the MMS gateway Kannel is also used for switching SMS between sender device, SMSC and the receiver device or an HTTP server.

Kannel is used for relaying and routing purposes of SMS and WAP traffic. The most common and mostly used technology for mobile services is WAP, short for Wireless Application Protocol. It also has the capability to allow a mobile phone to act as a simple web browser, but optimizes the markup language, scripting language, and the transmission protocols for wireless use. Kannel translates the optimized protocols to

plain old HTTP. Kannel and also works as an SMS gateway for GSM networks. Almost all GSM phones can send and receive SMS messages, so this is a way to serve many more clients than just those using a new WAP phone. There are three main services provided by Kannel.

- **Bearer Box**

The function of Bearer Box is to receive SMS messages sent by the user from SMS Center. Bearer Box keeps the text messages in a stack. Bearerbox makes TCP connection with both Smsbox and Wapbox.

- **SMS Box**

Request from Bearer Box comes into SMS Box, It then creates an HTTP connection to the Server to retrieve the contents of the message. After receiving the message from HTTP server, SMS Box forwards the information to bearer box which in turn forwards it to the SMSC.

- **WAP Box**

WAP Box is used for fetching the contents requested by the client from HTTP servers. It will then send the result back to Bearer Box through the HTTP connection.

5.2.3 POSTFIX Server

The postfix email server will listen on port 25 for email requests. MMS (as email) is received through SMTP by the Postfix email server. After receiving MMS as email, it will relay the MMS to the port on which MMS gateway is listening. After altering the

MMS contents and making it compatible with a normal email, the MMS gateway will again forward the message in Base 64 format to the Postfix email server.

Postfix will perform the command specified for that email (MMS message) and concatenate the output to a text file. Following picture shows POSTFIX server in running condition.

5.2.4 HTTP Server

HTTP Servers are required to store the information related to the mobiles users. HTTP server is responsible for storing all the data and information sent by mobile users into a database, this information is then retrieved by Java Server Pages. Both the gateways (Kannel and Mbuni) will request Java Server Pages for uploading their contents, they will establish an HTTP connection to the server and upload the respective data. For Example favorite SMS uploaded and MMS (pictures, video and audios) are stored on the HTTP server.

IMPLEMENTATION AND TESTING

The implementation and testing of various modules of the system are described in this chapter. There are mainly three modules of the system:

- **JSP Website**
- **SMS content based service**
- **MMS content based service**

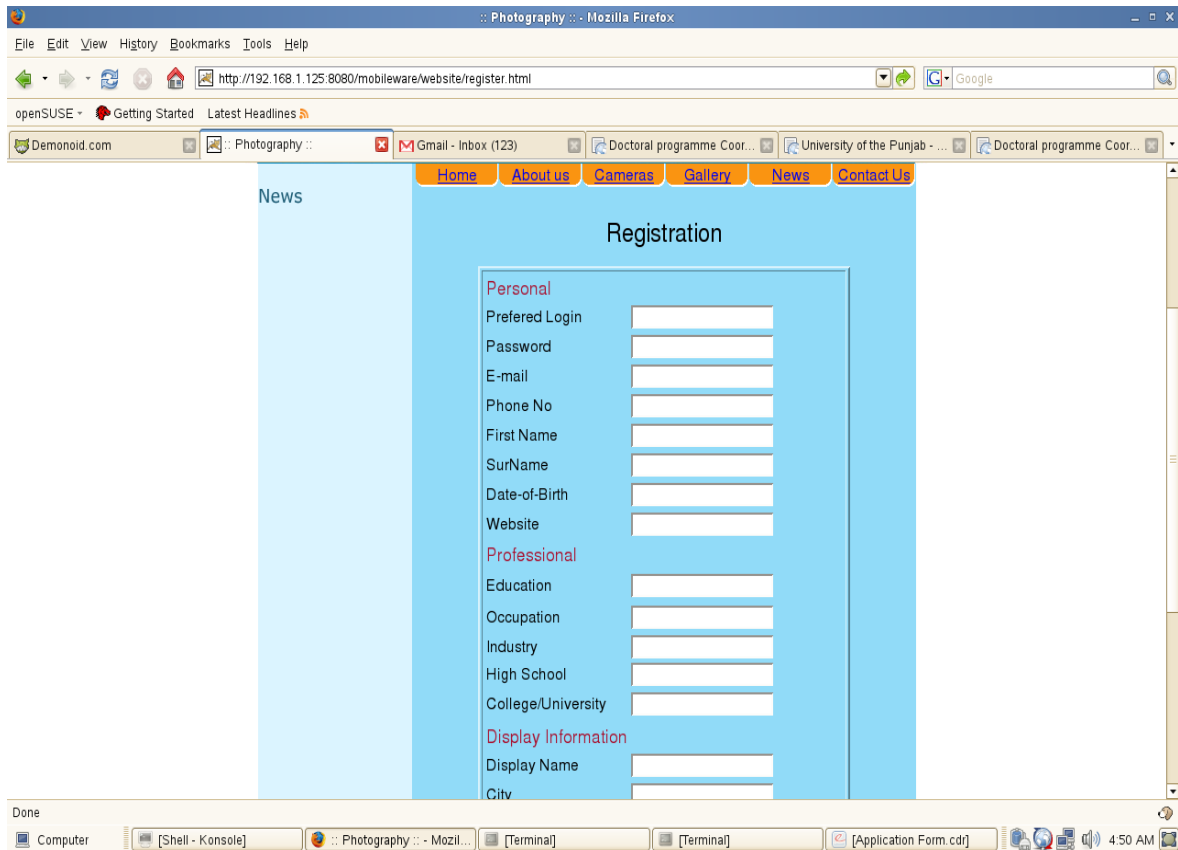
6.1 JSP WEBSITE

JSP website is the main module of the system. It provides user the facility to register and make profile. The profile will be created on different attributes such as name, age, education, email address and phone number.

The user will be able to view his/her profile after logging into the site. The user will also be able to search other members of the community and add them as his/her friends. The member search will be based on different attributes like name, age group and phone numbers. The result will be shown to the user and he/she can view the profile of that member. The members which a user adds as his/her friends will be able to view his/her digital contents marked as private by the user. The other members will only be able to view his/her public part of the profile. The main constituents/modules of JSP website are as follows:

6.1.1 Register to website

Registration Module allows user to register on the website and have a profile of their own. The user has to provide login name, password, email, phone number and some of his/her personal information in order to register to the website. On submitting this information, the user will be able to log in to his/her profile. A view of Registration module is given below.



The screenshot shows a Mozilla Firefox browser window displaying a registration page. The page has a light blue background and a navigation menu at the top with links for Home, About us, Camerag, Gallery, News, and ContactUs. The main content area is titled 'Registration' and contains a form with the following fields:

- Personal**
 - Preferred Login
 - Password
 - E-mail
 - Phone No
 - First Name
 - SurName
 - Date-of-Birth
 - Website
- Professional**
 - Education
 - Occupation
 - Industry
 - High School
 - College/University
- Display Information**
 - Display Name
 - City

The browser's address bar shows the URL <http://192.168.1.125:8080/mobileware/website/register.html>. The taskbar at the bottom shows several open applications, including a terminal and a file named 'Application Form.cdf'.

Figure 7: Register page

6.1.2 User Profile

After logging in to the web site, the user will be able to view his/her profile. User profile will display the information user has provided at the time of registration. This module will also have links to favorite SMS, Picture gallery video gallery etc. A view of user's profile is given below.

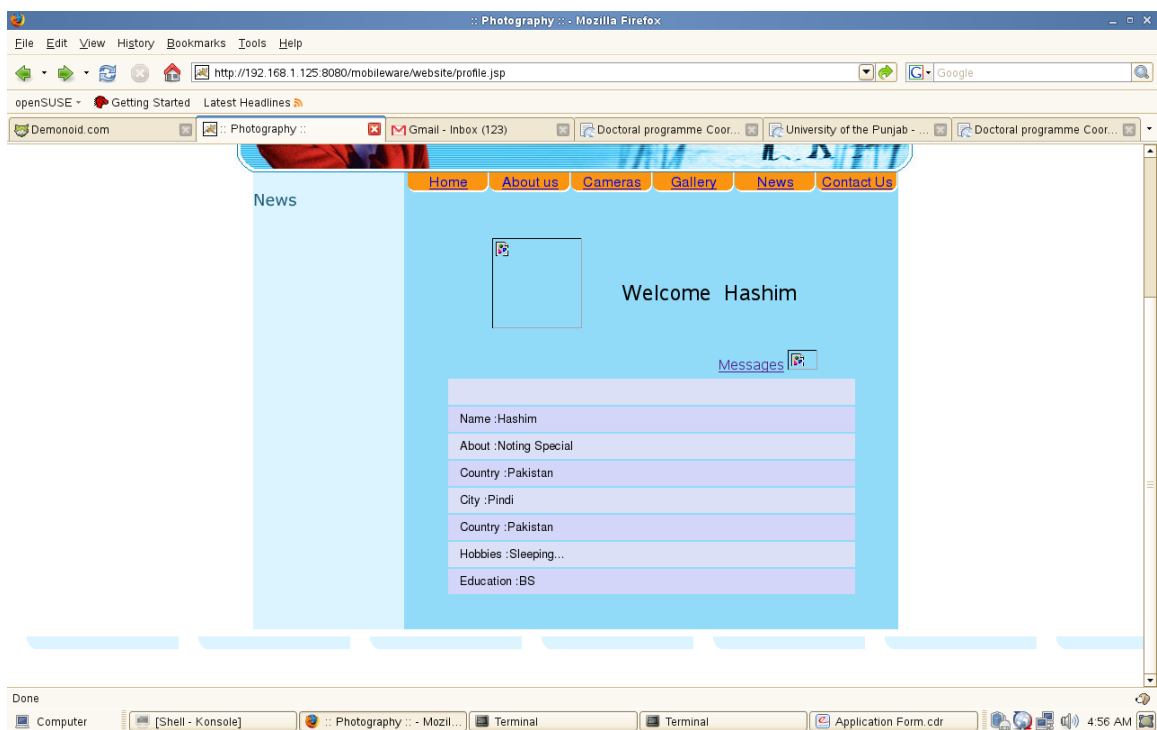


Figure 8: User Profile

6.1.3 View Favorite Messages

Every registered user of the web site will have section of Favorite messages that contains all the messages that are kept online by the user himself. Sender name, Message Date and Message itself will be shown for every message sent to the user.

User can reply to the person who sent the message by clicking on the sender's name. A view of message gallery is given below.

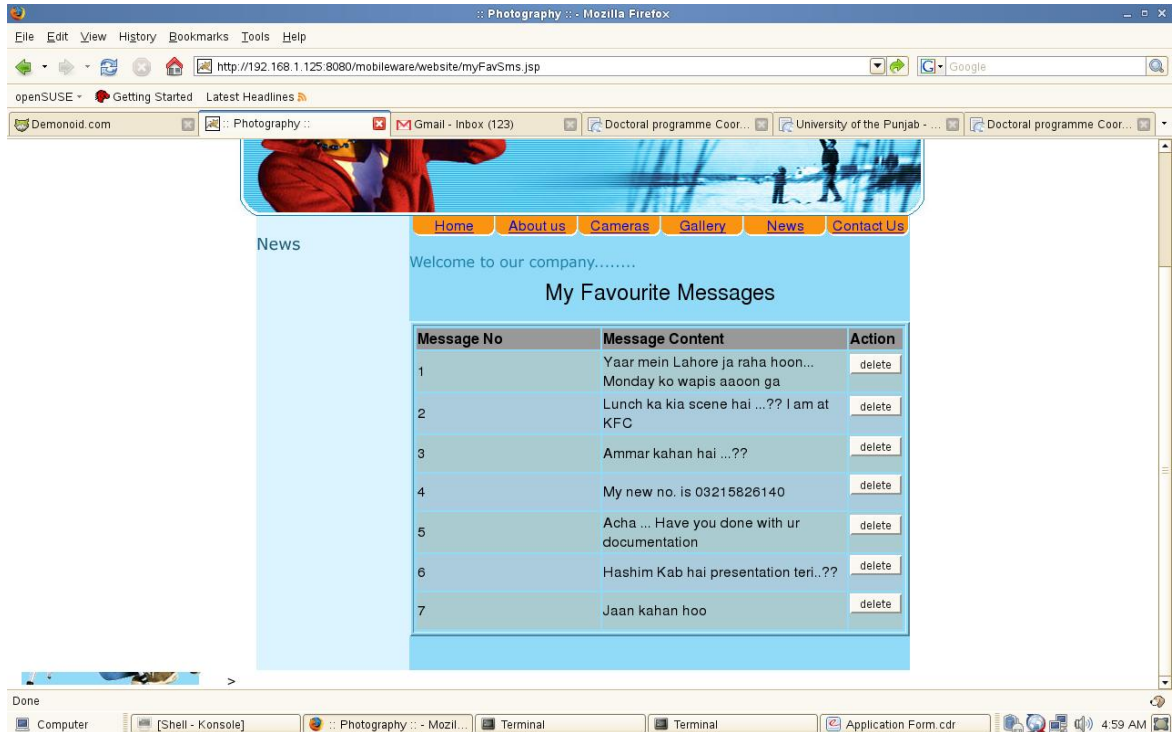


Figure 9: SMS Section

6.1.4 View Gallery

All registered users will have a gallery section where the users will be able to view their uploaded pictures. Sender name, Message Date and Message itself will be shown for every MMS sent to the user. User can change captions or rate the pictures on simply clicking on them.

6.2 MMS CONTENT BASED SERVICES

This module will provide the digital content uploading to the users including pictures, videos and audio. This module will act as a middleware between mobile user and the website. This module consists of two parts

6.2.1 Postfix Email server

After receiving MMS as email, POSTFIX will relay the MMS to the port on which MMS gateway is listening. After altering the MMS contents and making it compatible with a normal email, the MMS gateway will again forward the message in Base 64 format to the Postfix email server.

Postfix will perform the command specified for that email (MMS message) and concatenate the output to a text file. Following picture shows POSTFIX in running condition.

```

Terminal
File Edit View Terminal Tabs Help
Terminal Terminal Terminal Terminal Terminal
Jul  8 09:28:58 linux-xnje postfix/qmgr[3622]: C36DE3C399: removed
Jul  8 09:28:58 linux-xnje postfix/smtp[3652]: B2B6E3C393: to=<923215355130@mms.warid.net>, relay=none, delay=452423, delays=452403/0.35/20/0, dsn=4.4.3, status=deferred (Host or domain name not found. Name service error for name=mms.warid.net type=MX: Host not found, try again)
Jul  8 09:28:58 linux-xnje postfix/qmgr[3622]: B2B6E3C393: from=<>, status=expired, returned to sender
Jul  8 09:28:58 linux-xnje postfix/qmgr[3622]: B2B6E3C393: removed
Jul  8 09:29:14 linux-xnje postfix/master[3511]: terminating on signal 15
Jul 16 02:28:03 linux-xnje postfix/postfix-script: starting the Postfix mail system
Jul 16 02:28:03 linux-xnje postfix/master[3559]: daemon started -- version 2.3.2, configuration /etc/postfix

Jul 16 05:05:30 linux-xnje postfix/master[3559]: terminating on signal 15
Jul 16 05:05:30 linux-xnje postfix/postfix-script: starting the Postfix mail system
Jul 16 05:05:30 linux-xnje postfix/master[5319]: daemon started -- version 2.3.2, configuration /etc/postfix
  
```

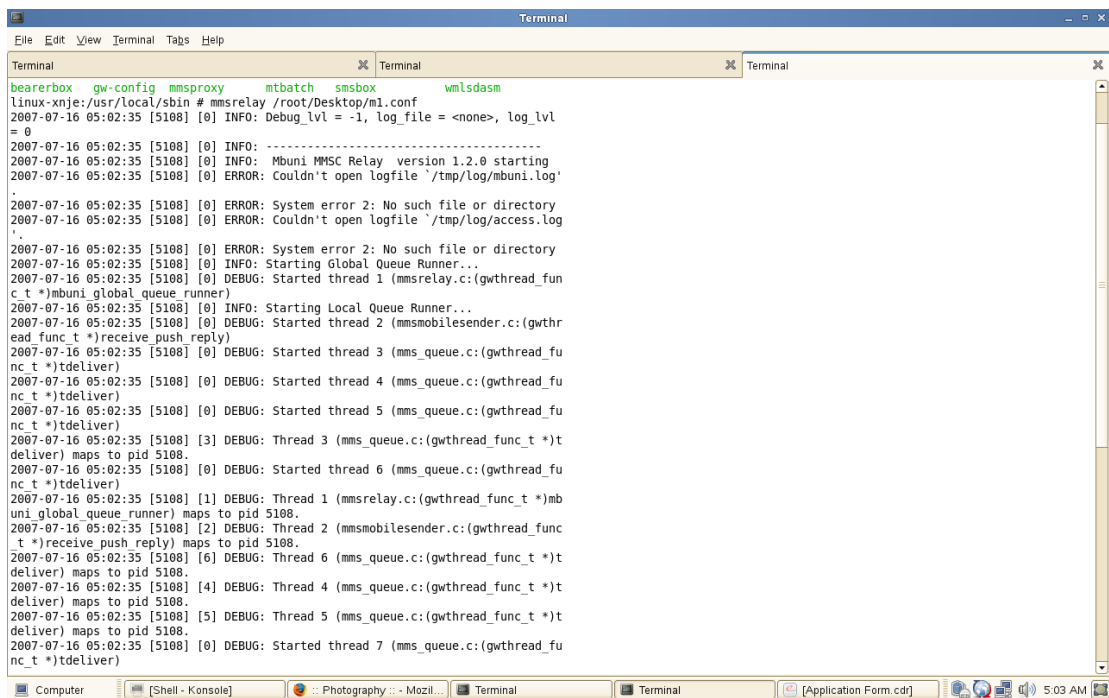
Figure 10: POSTFIX Running

6.2.2 MMS Gateway (Mbuni)

After the installation and correct configuration you have to run two main programs of Mbuni:

6.2.2.1 MMS Relay

Output of running the MMS Relay program gives us the following screen.



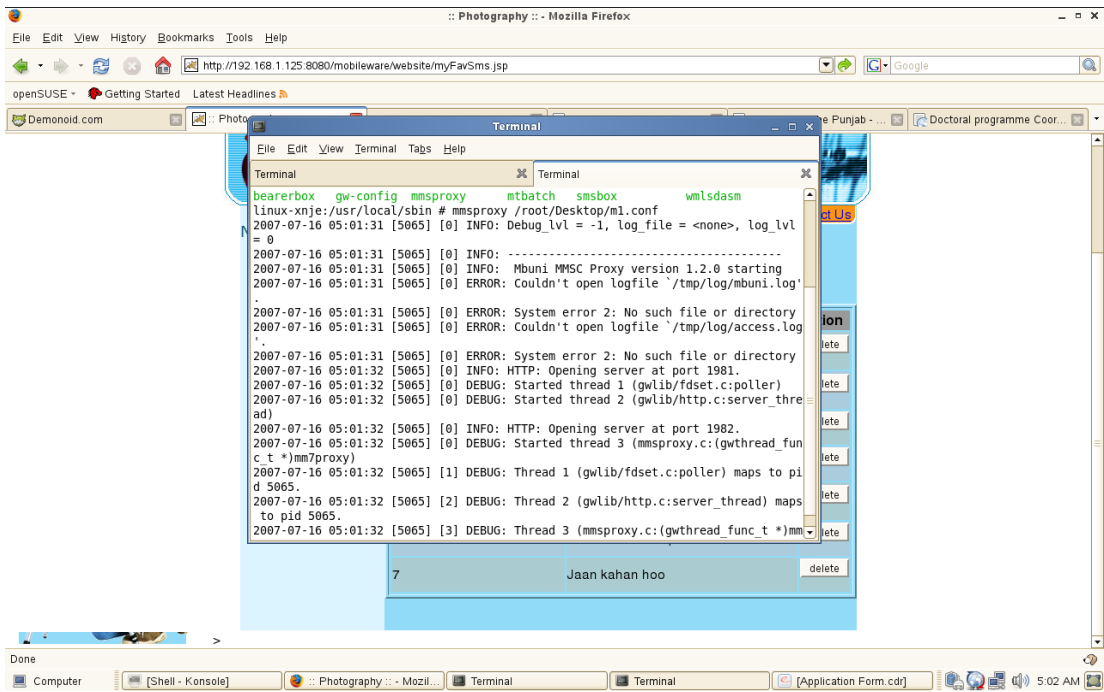
```

Terminal
File Edit View Terminal Tags Help
Terminal Terminal Terminal
bearerbox gw-config mmsproxy mtbatch smsbox wmlsdasm
linux-xnje:/usr/local/sbin # mmsrelay /root/Desktop/m1.conf
2007-07-16 05:02:35 [5108] [0] INFO: Debug_lvl = -1, log_file = <none>, log_lvl
= 0
2007-07-16 05:02:35 [5108] [0] INFO: -----
2007-07-16 05:02:35 [5108] [0] INFO: Mbuni MMSC Relay version 1.2.0 starting
2007-07-16 05:02:35 [5108] [0] ERROR: Couldn't open logfile '/tmp/log/mbuni.log'
.
2007-07-16 05:02:35 [5108] [0] ERROR: System error 2: No such file or directory
2007-07-16 05:02:35 [5108] [0] ERROR: Couldn't open logfile '/tmp/log/access.log'
.
2007-07-16 05:02:35 [5108] [0] ERROR: System error 2: No such file or directory
2007-07-16 05:02:35 [5108] [0] INFO: Starting Global Queue Runner...
2007-07-16 05:02:35 [5108] [0] DEBUG: Started thread 1 (mmsrelay.c:(gwt
hread_func_t *)mbuni_global_queue_runner)
2007-07-16 05:02:35 [5108] [0] INFO: Starting Local Queue Runner...
2007-07-16 05:02:35 [5108] [0] DEBUG: Started thread 2 (mmsmobilesender.c:(gwt
hread_func_t *)receive_push_reply)
2007-07-16 05:02:35 [5108] [0] DEBUG: Started thread 3 (mms_queue.c:(gwt
hread_func_t *)tdeliver)
2007-07-16 05:02:35 [5108] [0] DEBUG: Started thread 4 (mms_queue.c:(gwt
hread_func_t *)tdeliver)
2007-07-16 05:02:35 [5108] [0] DEBUG: Started thread 5 (mms_queue.c:(gwt
hread_func_t *)tdeliver)
2007-07-16 05:02:35 [5108] [3] DEBUG: Thread 3 (mms_queue.c:(gwt
hread_func_t *)tdeliver) maps to pid 5108.
2007-07-16 05:02:35 [5108] [0] DEBUG: Started thread 6 (mms_queue.c:(gwt
hread_func_t *)tdeliver)
2007-07-16 05:02:35 [5108] [1] DEBUG: Thread 1 (mmsrelay.c:(gwt
hread_func_t *)mbuni_global_queue_runner) maps to pid 5108.
2007-07-16 05:02:35 [5108] [2] DEBUG: Thread 2 (mmsmobilesender.c:(gwt
hread_func_t *)receive_push_reply) maps to pid 5108.
2007-07-16 05:02:35 [5108] [6] DEBUG: Thread 6 (mms_queue.c:(gwt
hread_func_t *)tdeliver) maps to pid 5108.
2007-07-16 05:02:35 [5108] [4] DEBUG: Thread 4 (mms_queue.c:(gwt
hread_func_t *)tdeliver) maps to pid 5108.
2007-07-16 05:02:35 [5108] [5] DEBUG: Thread 5 (mms_queue.c:(gwt
hread_func_t *)tdeliver) maps to pid 5108.
2007-07-16 05:02:35 [5108] [0] DEBUG: Started thread 7 (mms_queue.c:(gwt
hread_func_t *)tdeliver)

```

Figure 11: MMS Relay

6.2.2.2 MMS Proxy



```
Terminal
File Edit View Terminal Tabs Help
bearerbox gw-config mmsproxy mtbatch smsbox wmlsdasm
linux-xnje:/usr/local/sbin # mmsproxy /root/Desktop/ml.conf
2007-07-16 05:01:31 [5065] [0] INFO: Debug_lvl = -1, log_file = <none>, log_lvl
= 0
2007-07-16 05:01:31 [5065] [0] INFO: -----
2007-07-16 05:01:31 [5065] [0] INFO: Mbuni MMS Proxy version 1.2.0 starting
2007-07-16 05:01:31 [5065] [0] ERROR: Couldn't open logfile `/tmp/log/mbuni.log'
.
2007-07-16 05:01:31 [5065] [0] ERROR: System error 2: No such file or directory
2007-07-16 05:01:31 [5065] [0] ERROR: Couldn't open logfile `/tmp/log/access.log'
.
2007-07-16 05:01:31 [5065] [0] ERROR: System error 2: No such file or directory
2007-07-16 05:01:32 [5065] [0] INFO: HTTP: Opening server at port 1981.
2007-07-16 05:01:32 [5065] [0] DEBUG: Started thread 1 (gwlif/fdset.c:poller)
2007-07-16 05:01:32 [5065] [0] DEBUG: Started thread 2 (gwlif/http.c:server_thre
ad)
2007-07-16 05:01:32 [5065] [0] INFO: HTTP: Opening server at port 1982.
2007-07-16 05:01:32 [5065] [0] DEBUG: Started thread 3 (mmsproxy.c:(gwtread_func
t *)mm7proxy)
2007-07-16 05:01:32 [5065] [1] DEBUG: Thread 1 (gwlif/fdset.c:poller) maps to pi
d 5065.
2007-07-16 05:01:32 [5065] [2] DEBUG: Thread 2 (gwlif/http.c:server_thread) maps
to pid 5065.
2007-07-16 05:01:32 [5065] [3] DEBUG: Thread 3 (mmsproxy.c:(gwtread_func_t *)mm
7proxy) maps to pid 5065.
7 Jaan kahan hoo delete
```

Figure 12: MMS Proxy

APPENDIX A: GLOSSARY

- MMS – Multimedia Messaging Service
- SMS- Short Messaging Service
- GPRS- General Packet Radio Service
- WAP- Wireless Access Protocol
- HTTP- Hyper Text Transfer Protocol
- MSISDN- Mobile Station International Subscriber Directory Number
- MM1- Multi Media 1- MMS service
- MM3- Multi Media 3- MMS service
- MM4- Multi Media 4- MMS service
- MM7- Multi Media 7- MMS service
- SMTP- Simple Mail Transfer Protocol
- MMSC- Multi Media Switching Center
- GSM- Global System for Mobiles

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