DESIGN & DEVELOPMENT OF ADVANCED DIGITAL COMMUNICATION SYSTEM USING LATEST TOOLS & TECHNOLOGIES

Dr. Piyush Choudhary1, Nupur Kanungo 2, Khushi Shrivastava 3, Noorvi Patankar 4, Prachi Rai 5, Pawan Mahajan 6

1 Professor & Head, Department of Computer Science and Engineering, Prestige Institute of Engineering, Management & Research, Indore(M.P)
piyushchoudhary2210@gmail.com
2,3,4,5,6 Student B.Tech. Department of Computer Science and Engineering, Prestige Institute of Engineering, Management & Research, Indore (M.P)

Abstract

"We are Stronger when we listen and Smarter when we share"

In today's fast developing world, the human connection is the key to personnel and career success. The single biggest problem in the communication is the illusion that has taken place. Communication is the solvent of all problems and can be considered as the lifeline of any relationship. Digital communication plays a vital role during the situations like pandemics. As per the whatsapp user statistics 2022, more than 90% youths are using digital chat messengers for their daily use, while 50% users are using file sharing applications. The proposed project prepared a Chat Application with File Sharing Function. This project created a web application for users to instantly communicate with each other. And the most important part of building a good chat application is focus on the data flow on web. This project spends a good amount of research to find the most appropriate technology for deliver the data flow, which is REST api for account management, WebSocket for text chat and WebRTC for video and audio and find the pleasant result.

Keywords: Chat, Messenger, Chatbot, File Sharing Software, Internet.

I. INTRODUCTION

Communication through internet is becoming vital these days. An online communication allows the users to communicate with other people in a fast and convenient way. Considering this, the online communication application must be able to share the texts or images or any other files in a faster way with minimum delay or with no delay. People can connect with their family living far from them and can easily communicate with them.

II. KEY OBJECTIVES:

The key objective of the study along with its implementation is given below as:-
2.1 Instant communication functionality between users.

2.2 The users have the capability to do one to one communication, group communications and video/audio chat.

2.3 The users can receive messages instantly while online and still be able to see the messages sent while they are offline

2.4 The client-side application can be hosted on any machine with JVM

2.5 Communicate with server side with socket.

III. ANALYSIS
3.1. Function Analysis

The following are the functional requirements of the system:

3.1.1 The system shall provide the user the ability to create a new account.

3.1.2 The system shall provide the user the ability to login with the username and password chosen at the time the account was created.

3.1.3 The system shall deliver sender's message to receiver instantly if the receiver is online.

3.1.4 The system shall deliver sender's message to receiver once the receiver is back online if the message was sent when receiver's offline

3.2. Non Functional Analysis
The following are the non-functional requirements of the system:

3.2.1 The system shall be a web-based application that can provide all the functions over the internet.

3.2.2 The system shall deliver messages in the same order it gets sent out.

3.2.3 The system shall guarantee the delivery. And shall notice sender if message is not delivered successfully.

3.2.4 The system shall be cost efficiently. It shall not cost a lot if there is not many users.
3.2.5 The system shall deliver the message relatively quickly.

IV. LITERATURE REVIEW & PROBLEM SOLVING
4.1 Literature Review
Technology trends in both hardware and software have driven the hardware industry towards smaller, faster and more capable devices that can support a wider-range of functionality and open source operating systems. Internet communication is getting more and more popular among the public. The application developed should be easy to operate and use for everyone. There are many chat applications used by millions of people nowadays. The various researches have been done and are going on location based project and in the same ratio various applications have been developed on location-based and message sharing system. As the amount of user deal to exchange the information with other people to store the large amount of data the existing system cannot support the centralized

database. Sensitive data may also be leaked accidentally due to improper disposal or resale of storage media. A lot of portals are available which provide messengers free of charge. Since they are free of charge, they are the preferred services by millions of people around the world.

Some of the Messaging Applications those are generally used are:

4.1.1 Hike Messenger

Hike Messenger, also called Hike Sticker Chat, was an Indian freeware, cross-platform instant messaging (IM), Voice over IP (VoIP) application which was launched on 12 December 2012 by Kavin Bharti Mittal and is now owned by Hike Private Limited.[3] Hike can work offline through SMS and has multi-platform support.[4] The app registration uses standard one time password (OTP) based authentication process.[5] With abundance of low-cost data, Hike decided to go from a single super app strategy to multiple app approach, so that it can focus more on the core messaging capabilities.[6] It has numerous Hikemoji Stickers which can be customized accordingly. From version 6, the user-interface was revised and the app no longer supports features like news, mobile payment, games or jokes.[7] As per CB Insights, $1.4 billion is the valuation of Hike[8] with more than 100 million registered users till August 2016 and 350 employees working from Bengaluru and Delhi.[9][10]

4.1.2 ChatON

ChatON was a global mobile communication service introduced by Samsung Electronics in September 2011.[15] ChatON served more than 120 countries in 62 languages.[15] ChatON was available on Android,[16] iOS,[17] BlackBerry, Windows Phone (Samsung Zone),[18] Windows Mobile (Korea), and Bada smartphones.[11] Additionally, a web client was offered for access to the service via web browsers.[12] Users could invite and register buddies via Facebook and Twitter as well as share ChatON content on Facebook. Among ChatON's unique features were allowing users to create Animation messages, Broadcast to send personal notices in a group chat room, and the Trunk which stores media files shared in chats[11] When a user logs in ChatON, the user's buddy list is available on any connected device.[13][14]

4.1.3 WhatsApp

WhatsApp Messenger, or simply WhatsApp, is an internationally available American freeware, cross-platform centralized instant messaging (IM) and voice-over-IP (VoIP) service owned by Meta Platforms.[19] It allows users to send text messages and voice messages,[20] make voice and video calls, and share images, documents, user locations, and other content.[21][22] WhatsApp's client application runs on mobile devices but is also accessible from desktop computers, as long as the user's mobile device remains connected to the Internet while they use the desktop app.[23] The service requires a cellular mobile telephone number to sign up.[24] In January 2018, WhatsApp released a standalone business app targeted at small business owners, called WhatsApp Business, to allow companies to communicate with customers who use the standard WhatsApp client.[25][26]

The client application was created by WhatsApp Inc. of Mountain View, California, which was acquired by Facebook in February 2014 for approximately US$19.3 billion.[16][17] It became the world's most popular messaging application by 2015,[18][19] and had more than 2 billion users worldwide by February 2020.[20] By 2016 it had become the primary means of Internet communication in regions including Latin America, the Indian subcontinent, and large parts of Europe and Africa.[18]

4.1.4 Facebook Messenger

Facebook Messenger is an American messaging app and platform developed by Meta, Inc. It was originally developed as Facebook Chat in 2008. The company revamped its messaging service in 2010. It released standalone iOS and Android apps in August 2011 and standalone Facebook Portal hardware for Messenger-based calling in the fourth quarter of 2018. Later on, Facebook launched a dedicated website interface (Messenger.com), and separated the messaging functionality from the main Facebook app. This allows users to use the web interface or download one of the standalone apps.

In April 2020, Facebook officially released Messenger for Desktop. It is supported on Windows 10 and macOS and distributed on Microsoft Store and App Store respectively.

4.2 Problem Solving

Following the pandemic that swept the globe in recent years, many people found confined to homes, unable to meet there family and relatives. In such trying times it becomes imperative to find a reliable and secure way to remain connected.

The chat application lets the user log in to the system and stay connected with their loved ones without having to use their phone number. All the user needs to have is a smart device and a connection to the internet. Moreover, this application doesn't allow the users to delete their chats thereby maintaining an accurate record of all the conversations. This messenger application keeps the personal details of its users safe and makes sure that they aren't compromised.

In this application people can text and share file while chatting with other people. The size of the file would be in a limit so there will be more security.

The proposed solution approach will be as:

4.2.1 To create a chat application with a server and users to enable the users to chat with each other's.

4.2.2 To develop an instant messaging solution to enable users to seamlessly communicate with each other.

4.2.3 To make it user enabling even a novice person to use it.

4.2.4 To provide multi chatting functionality through network.

4.3 Solution Approach and Methodology

The best messaging apps provide a cohesive experience so simple and intuitive that end users don't necessarily notice individual features. Where other types of apps use multiple pages and navigation menus, great chat apps usually just open a keyboard below a message window, so each feature feels like an intrinsic part of the whole.
Regardless of the intended use case, the following chat features will be necessary to support any basic messaging experience.

4.3.1 App registration page and user authentication mechanism

4.3.2 Message text editing field with keyboard

4.3.3 Conversation window with sent and received messages clearly distinguished from each other and ordered chronologically

4.3.4 Ability to package and send a message

4.3.5 Ability to receive, interpret, and display a message

V. TECHNICAL LIBRARIES AND MODULES
In Virtual Assistant following libraries and Modules are use:

5.1. Python
Python is a high-level, interpreted, interactive and object-oriented scripting language. Python is designed to be highly readable. It uses English keywords frequently where as other languages use punctuation, and it has fewer syntactical constructions than other languages.

5.2. Django
Django is an advanced Web framework written in Python that makes use of the model view controller (MVC) architectural pattern. Django was created in a fast-moving newsroom environment, and its key objective is to ease the development of complicated, database-driven websites.

5.3. Bootstrap
Bootstrap is a free and open-source CSS framework directed at responsive, mobile-first front-end web development. It contains CSS- and JavaScript-based design templates for typography, forms, buttons, navigation, and other interface components.

5.4 JavaScript
An object-oriented computer programming language commonly used to create interactive effects within web browsers.

5.5 HTML
Hypertext Markup Language, a standardized system for tagging text files to achieve font, colour, graphic, and hyperlink effects on World Wide Web pages.

5.6. CSS
CSS is the language we use to style a Web page. CSS stands for Cascading Style Sheets. CSS describes how HTML elements are to be displayed on screen, paper, or in other media. CSS saves a lot of work. It can control the layout of multiple web pages all at once. External stylesheets are stored in CSS files
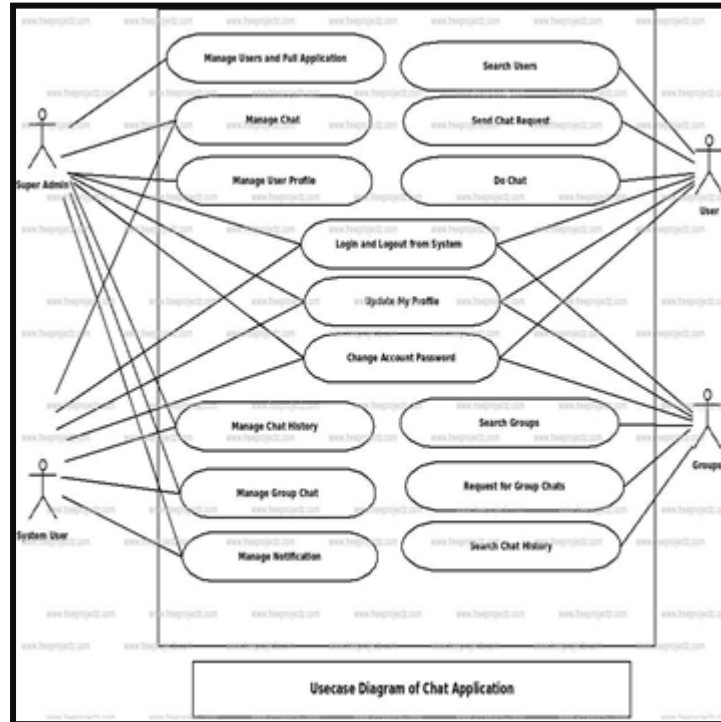
VI. UML Modelling

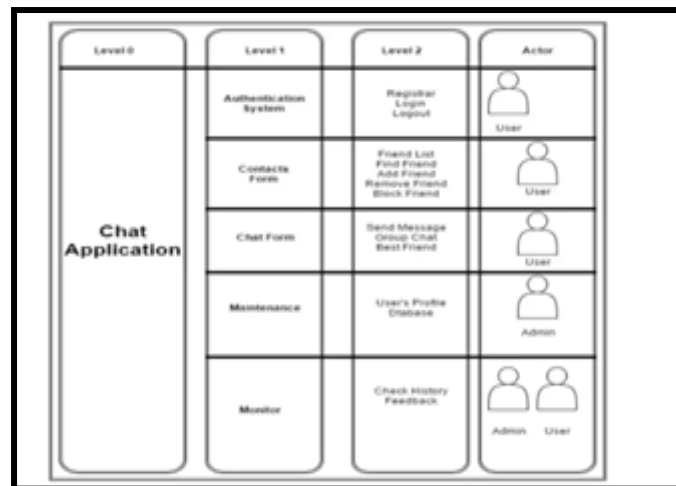6.1.1 Use Case Diagram

Fig 6.1(a): USE CASE MODEL OF SYSTEM

Fig 6.1 (b): USE CASE MODEL OF SYSTEM
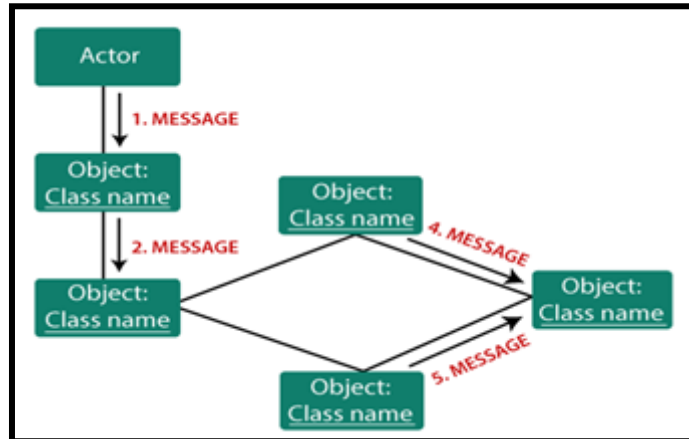
6.1.2 Collaboration Diagram

Fig: 6.2 COLLABORATION DIAGRAM OF SYSTEM
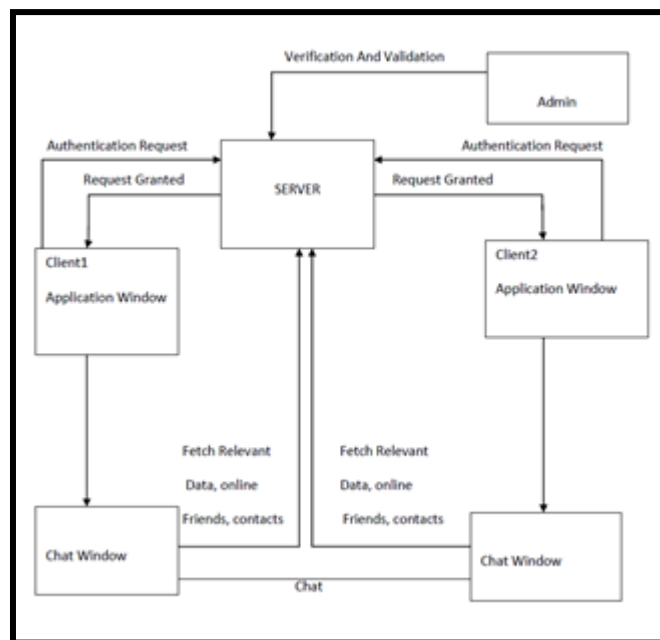
6.1.3 Module Diagram

Fig: 6.3 MODULE DIAGRAM
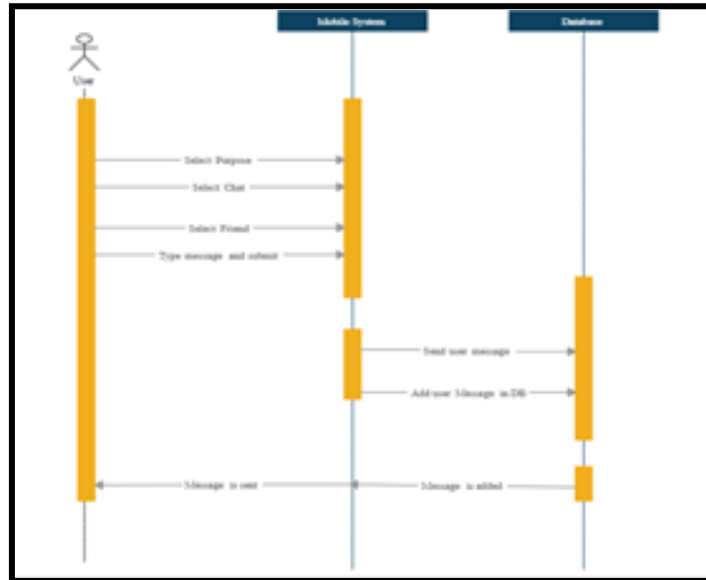
6.1.4 Sequence Diagram
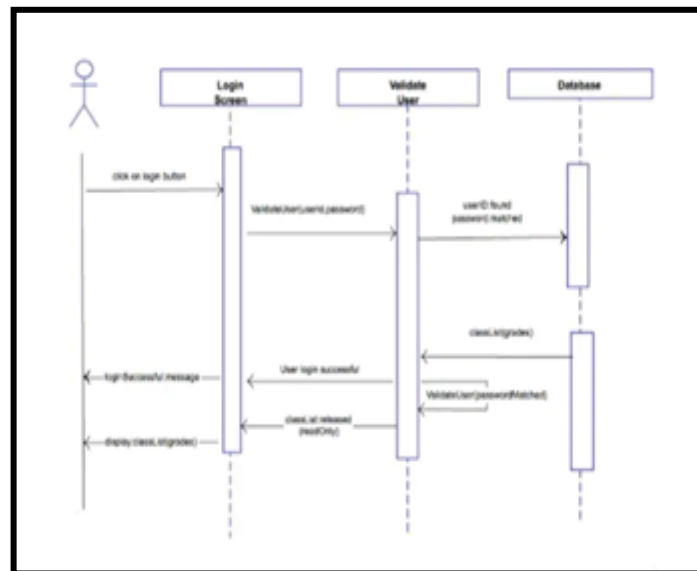

Fig: 6.4(a) SEQUENCE FLOW OF SYSTEM

Fig: 6.4(b) SEQUENCE FLOW OF SYSTEM
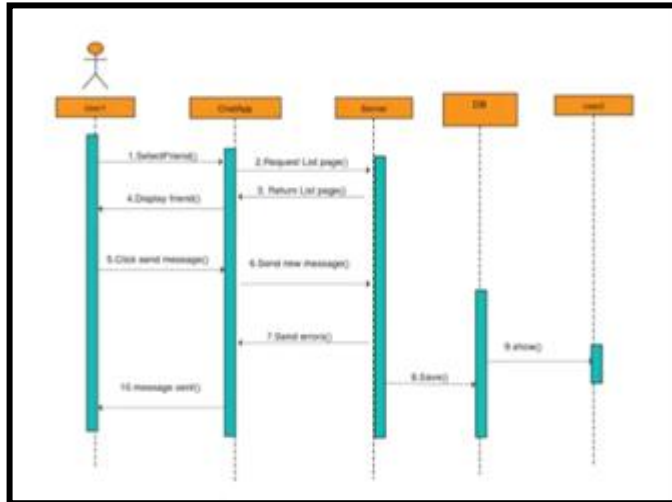
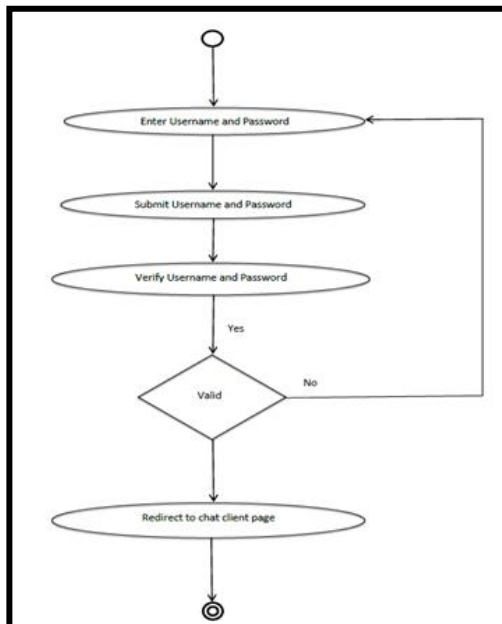**Fig: 6.4(c) SEQUENCE FLOW OF SYSTEM**

6.1.5 Activity Diagram

Fig: 6.5 (a) ACTIVITY FLOW OF SYSTEM
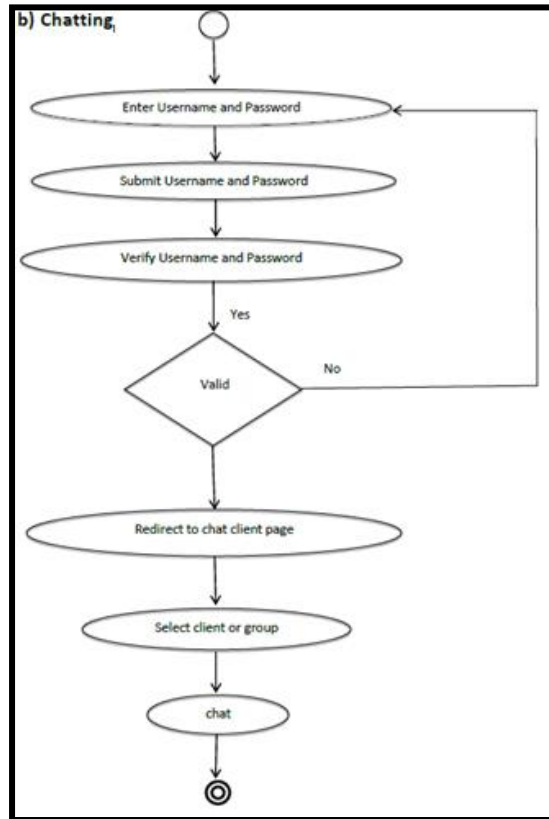
Fig: 6.5 (b) ACTIVITY FLOW OF SYSTEM
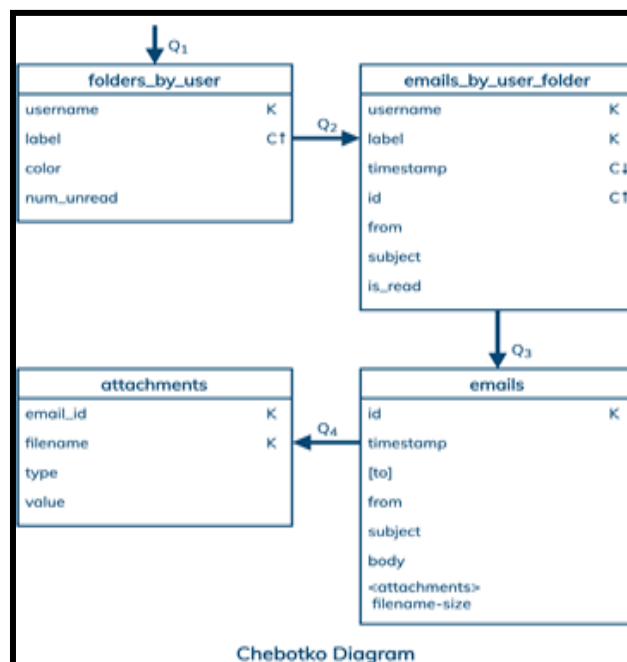
6.2 Data Modeling
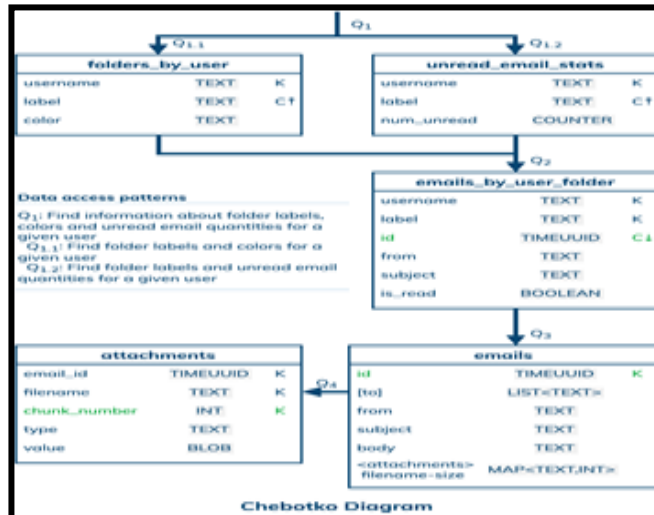

Fig: 6.6 PHYSICAL DATA MODEL

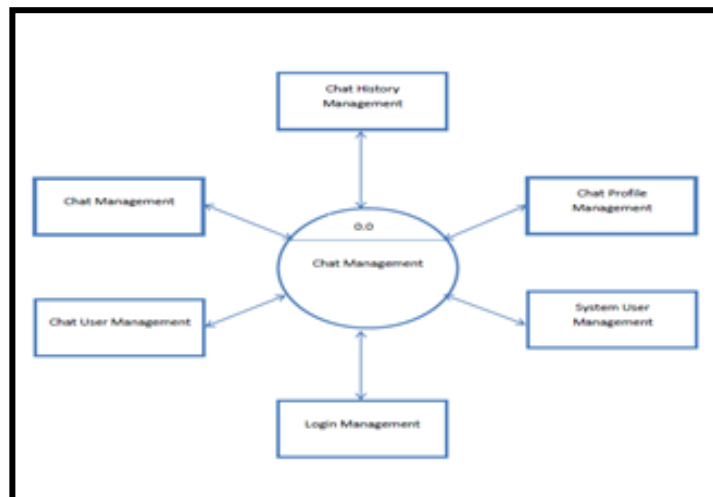**Fig: 6.6 (b) LOGICAL DATA MODEL**

6.2.1 Data Flow
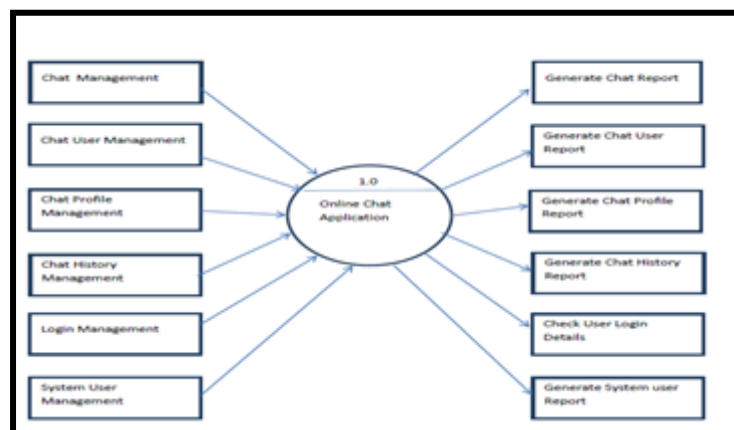

Fig: 6.7(a) DATA FLOW DIAGRAM: Module I
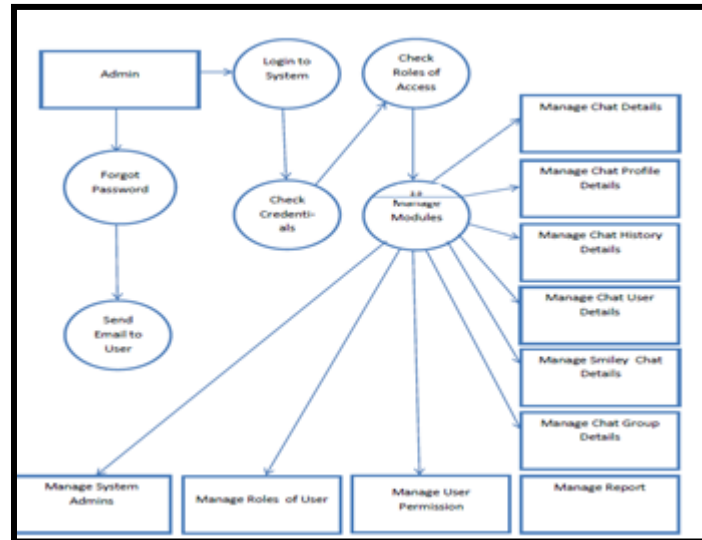

Fig: 6.7(b) DATA FLOW DIAGRAM: Module II

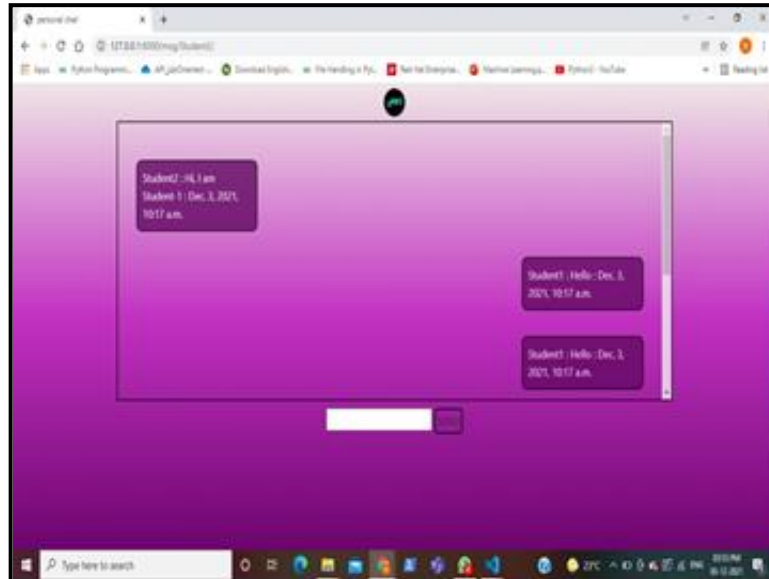*Fig: 6.7(a) DATA FLOW DIAGRAM: ENTIRE SYSTEM*

VII. IMPLEMENTATION

Fig: 6.8(a) TESTING IMAGE MODULE I
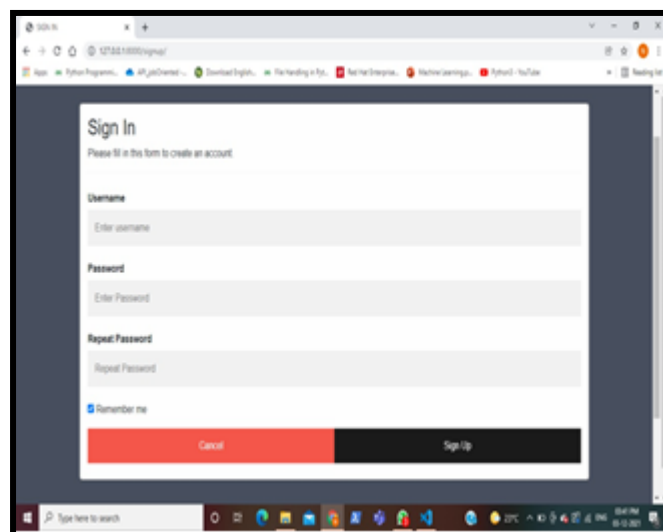
Fig: 6.8(b) TESTING IMAGE MODULE II

Fig: 6.8(c) TESTING IMAGE MODULE III

VIII. CONCLUSION AND FUTURE SCOPE

Chatting application based on WI-FI technology allows users to communicate with each other through WIFI, simply Turing on WI-FI option from mobile phone instead of using internet data connectivity. Thus it saves the costs where users are can send and receive messages within WI-FI range. However, there is no need of any external connection. Within WI-FI range users can transfers large amount of data as well as download the data.

8.1 Broadcasting Chat Server Application is going to be a text communication software, it will be able to communicate between two computers using point to point communication.

8.2 The limitation of Live Chat is it does not support audio conversations. To overcome this limitation, we are concurrently working on developing better technologies.

8.3   Companies would like to have a communication software wherein they can communicate instantly within their organization.

8.4 The fact that the software uses an internal network setup within the organization makes it very secure from outside attacks.

Some features like live capture, video calling, voice calling, group chatting etc. can also be added in the application.

9. **FUTURE SCOPE**

   The following are the future things added with the application.

   9.1 Extending this application by providing Authorization service.

   9.2 Creating Database and maintaining users.

   9.3 Increasing the effectiveness of the application by providing Voice Chat.

   9.4 Extending it to Web Support.

   9.5 Chat and connect with people near to you without any data usage or external connection

   9.6 Transfer large files including audio, video, pdf files in seconds for free. No data usage. No Internet needed.

   9.7 Allows to share other applications in device used.

   9.8 In future voice message, live capture, video call, audio call etc. can be added according to the users demand.

   The summarization with above points can be given as;

   1. File Transfer

   2. Voice Message

   3. Video Message

   4. Audio Call

   5. Video Call

   6. Group Call

REFERENCES

[1] "hike messenger". Play Store. Retrieved 2020-01-14.

[2] "Hike Sticker Chat". App Store. Retrieved 2020-01-14.

[3] "Hike Launches Globally". Bharti SoftBank. December 12, 2012. Retrieved August 12, 2014.

[4] "How to Send Free SMS". NDTV Gadgets 360. Retrieved 2019-10-14.

[5] "Hike Sticker Chat Gets Auto Backup Feature, Web Client". NDTV Gadgets 360. Retrieved 2019-10-14.

[6] www.ETTelecom.com. "Kavin Mittal's Hike eyes mergers and acquisitions for its 'unbundle' strategy - ET Telecom". ETTelecom.com. Retrieved 2019-10-16.

[7] James, Thomas K. Thomas & Nandana. "Kavin Mittal redraws game plan, to unbundle Hike". @businessline. Retrieved 2019-02-12.

[8] "The Complete List of Unicorn Countries". Meet all of the world's startups valued at $1B+ in our ongoing list of all unicorn companies in the U.S. and abroad. Retrieved 2019-10-15.

[9] "Hike Messenger launches Hike ID, a unique identity that lets users chat without sharing their mobile number". in.news.yahoo.com. Retrieved 2020-02-24.

[10] Choudhury, Saheli Roy (2017-07-26). "The 29-year-old CEO of Whatsapp rival Hike on pitfalls founders should avoid". CNBC. Retrieved 2019-10-15.

[11] "ChatON". Samsung. Archived from the original on 2012-05-05. Retrieved 2012-06-27.

[12] "Samsung ChatON now available as web-based messaging client". Engadget. Retrieved 2012-08-07.

[13] "Samsung unveils ChatON 2.0 with multiple device syncing, new social features and more | NDTV Gadgets". Gadgets.ndtv.com. 2012-12-27. Retrieved 2013-10-28.

[14] "Samsung introduces ChatON mobile communication service". Samsung.com. 2011-08-29. Retrieved 2014-01-07.

[15] "ChatON - Android-apps on Google Play". Retrieved 2012-08-07.

[16] "ChatON". Apple App Store. 2013-04-08. Retrieved 2012-08-07.

[17] "Samsung releases ChatON messaging app for Windows Phone users". wpcentral. 6 June 2012. Retrieved 2012-08-07.

[18] Motorola il iDEN (2012-12-30). "Samsung ChatON 2.0 now available across mobile devices and on the web". Intomobile.com. Archived from the original on 2013-10-29. Retrieved 2013-10-28.

[19] Metz, Cade (April 5, 2016). "Forget Apple vs. the FBI: WhatsApp Just Switched on Encryption for a Billion People". Wired. ISSN 1059-1028. Archived from the original on April 9, 2017. Retrieved May 13, 2016.

[20] "Features". WhatsApp.com. Archived from the original on May 28, 2019. Retrieved May 31, 2019.

[21] Voice calling, March 12, 2015, archived from the original on March 17, 2015, retrieved March 16, 2015

[22] "WhatsApp Voice Calling". Forbes. April 4, 2015. Archived from the original on October 19, 2017. Retrieved September 18, 2017.

[23] "WhatsApp Desktop Client for Windows & Mac Is Only Second Best". MakeUseOf. February 20, 2018. Archived from the original on February 27, 2019. Retrieved June 18, 2019.

[24] "WhatsApp FAQ – Using one WhatsApp account on multiple phones, or with multiple phone numbers". WhatsApp.com. Archived from the original on May 10, 2018. Retrieved May 9, 2018.

[25] "There's a new version of WhatsApp". The Independent. January 19, 2018. Archived from the original on August 5, 2019. Retrieved June 18, 2019.

[26] Armstrong, Paul. "How To Know If Your Business Should Use The New WhatsApp Business App". Forbes. Archived from the original on April 8, 2019. Retrieved June 18, 2019.