Coimbatore Institute of Technology

Department of AI and DS

Multiple Chat User System
Software Requirements Specification

Version: ***1.0d***

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Modification History

Date	Modifications	Reason	Version
22.10.2023	Initial draft	-	0.6d
22.10.2023	Added system architecture	To approach systematically	0.7d
22.10.2023	Updated user registration requirement	Enhanced security	0.8d
22.10.2023	Added file sharing feature	User request	0.9d
22.10.2023	Major update to user roles	Improve perks of the users	1.0d

Table 1.0 Modification History

Contents

1. Introduction

1.1 Document Purpose

This document presents the software requirements, as determined during initial analysis by creating multiple chat user system (MCS) which is more helpful for discussion and forums. Specifically, the document details the functional requirements and constraints for the computer software to be developed by CIT AI firm for the Client.

This document will be subject to formal/informal review by the CIT AI firm development team and the Client, and will form the basis for ongoing development of software, by CIT AI firm, to meet the requirements of the Client.

This document is the main deliverable output from the Requirements Elicitation Activity. It is intended to be a baseline, to supply sufficient requirements information to the Client to provide a foundation for subsequent software assessment and approval. Further, it also provides the development team with a basis for on-going software design.

1.2 About the Project

The aim of this project is to perform the 'Requirements Elicitation and Specification' activity. All tasks associated with this activity shall be performed based on the theoretical support provided as part of 'Software Engineering/Introduction to Software Engineering' course. It is assumed that other related/required activities involved in the development of the system shall be completed under different project(s).

1.3 Document Scope

The Multiple Chat System aims to provide a platform for real-time text-based communication between multiple users. It includes features for private and group chats, user authentication, message storage, and real-time updates. It allows users to exchange text messages, multimedia content, and supports basic chat management functions.

Terminology Used

Term/Acronym	Definition/Description
Developers	The team responsible for the complete development of the software system.
Process	The term "process" is used to describe the systematic and structured actions that occur within the MCS, contributing to its overall functionality and user experience.
Requirement	A condition or capability needed by a user to solve a problem or achieve an objective.
Specification	A document that prescribes, in a complete, precise, verifiable manner, the requirements, design, behaviours or other characteristic of a system or system components.
User	The person operating and/or using the software system.
GUI (Graphical User Interface)	The visual interface that allows users to interact with software through graphical elements like buttons and menus.
Encryption	The process of converting data into a code to secure it from unauthorized access.
Multi-Factor Authentication (MFA)	A security method that requires users to provide multiple forms of identification before granting access to the system.

Table 2.0 Definitions, acronyms and abbreviations

1.4 Related Documents

https://drive.google.com/file/d/1qmD-hwdZ8ac9jvIAqe5bQbLxZHLV9_gA/view?usp=drivesdk

1.5 Document Overview

This document, the Software Requirements Specification (SRS), identifies the software requirements for the project Multiple Chat User System.

This document has 7 major sections and 7 appendices:

- **Introduction** (Section 1) provides an overview of the entire SRS document, the project and the product being specified.
- **Product Overview** (Section 2) describes the product in overview, addressing the hardware and software requirements, user characteristics, constraints, assumptions and dependencies, expressed in natural language.
- **Functional Requirements** (Section 3) will detail the functional requirements that specify the specific actions and behaviours the system exhibits.
- **User Interface Requirements** (Section 4) provides a high-level summary of the user interface related aspects of the software system.
- **Non-Functional Requirements** (Section 5) outlines the non-functional requirements that are crucial for the successful development and operation of the system and also describes the qualities and characteristics that the system exhibits.

- **Operating Environment** (Section 6) provides a brief description of the environmental conditions and infrastructure where the system is intented to operate
- **Acceptance Criteria** (Section 7) provides high level summary of the conditions that the system must meet to be considered acceptable.

2. Product Overview

2.1 Introduction

This section provides a high-level description of the requirements that have been identified to be essential to the software system to be developed. All the characteristics and limitations of the proposed software system have been provided below. Some examples of use of this system are business meeting, research collabration, professional webinars, online community building, etc.

2.2 Business Services Supported

The system shall provide software support for the following operations:

- Registration
- Login
- Chat Room
- Real-Time Messaging
- User Managemet
- Voice Chat
- Video Chat
- Status Information

2.3 Product Characteristics

Multiple chat system is a real-time chat application designed to facilitate seamless text-based communication between multiple users. It allows for both private one-on-one conversations and group chats. The system ensures user authentication and message storage with real-time updates, promoting efficient and engaging communication among its users

2.3.1 User Interface

The system shall provide Graphical User Interfaces.

2.3.2 Operating Environment

The deployment platform requirements are a PC equipped with a Pentium-200Mhz (equivalent or above) CPU with 128Mb of RAM and 5 Mb of free disk space, running Windows 2000 Operating System. However, the system specified in this document shall also run efficiently on any operating environment (including the hardware and operating system) that supports the Java Virtual Machine.

2.3.3 Hardware Interfaces

For effective operation the software system will need:

- Network Interface: To connect to the internet and enable data transmission for real-time communication.
- Input Devices: Interfaces for keyboard and mouse inputs for users to send messages and interact with the application.
- Storage Devices: Interfaces for accessing storage, which may include databases for message storage and retrieval.

- Display Devices: Interfaces for rendering the user interface on screens, including monitors or mobile device displays.
- Server Hardware: If the software is hosted on a server, it would require server hardware interfaces for data processing and storage.
- Audio/Video Devices: If the system supports audio or video chats, it would need interfaces for microphones, speakers, and cameras.
- Mobile Device Interfaces: For mobile applications, interfaces for touchscreens, sensors, and mobile-specific features.

2.4 User Characteristics

This section shall describe the various types of users that are expected to use this system and what the minimum requirements are in terms of their knowledge and skills.

The users of this system shall be:

- General Users
- Multimedia Group Employee
- Sales and Marketing Team
- Business User
- Project Teams
- Customers and Clients

2.4.1 General User Characteristics

All users can be assumed to have the following characteristics:

- Ability to read and understand English.
- Access to a reliable internet connection to use the system effectively.
- Proficiency in typing to send text messages in the chat system.
- An understanding of privacy and data security concerns when engaging in online communication.

2.4.2 Multimedia group Admin Characteristics

- Proficiency in using the chat system and its multimedia features for managing group communication.
- Ability to curate and share multimedia content effectively within the group.
- Capability to organize and structure multimedia content, discussions, and group activities.
- Awareness of data security and privacy concerns, particularly when sharing multimedia content.
- Readiness to adapt to changes and updates in the chat system and its multimedia features.
- A willingness and ability to assist group members with technical issues or usage questions.
- The capability to plan and execute strategies for achieving the group's multimedia communication goals.

2.4.3 Sales and Marketing Team Characteristics

- Prioritizing the needs and preferences of customers to provide personalized interactions and solutions.
- Proficient written communication to convey product/service information and persuade potential customers.
- Ensuring prompt responses to engage leads and customers, enhancing the likelihood of successful conversions.
- Leveraging the MCS to proactively identify and engage potential leads for the sales pipeline.

- Utilizing chat data analytics to measure and improve the effectiveness of marketing campaigns and sales efforts.

2.4.4 Business User Characteristics:

- Business users employ the MCS for professional, work-related communication, ensuring clarity and relevance in their messages.
- They use the MCS for effective team collaboration, sharing information, coordinating tasks, and working on projects.
- Maintaining awareness of data security and privacy to safeguard sensitive business information shared through the MCS.
- Leveraging the MCS's ability to integrate with other business tools to enhance productivity and streamline workflows.
- Adhering to compliance regulations and retaining chat records for auditing, legal, and accountability purposes.

2.4.5 Project Team Characteristics:

- Dedicated chat spaces for project teams to discuss tasks, progress, and goals in real time.
- The ability to share project-related files, documents, and resources within chats for seamless information exchange.
- Functionality for assigning, tracking, and discussing tasks and responsibilities within the chat to ensure clarity and accountability.
- Immediate notifications and real-time updates on project developments and changes to keep the team informed and aligned.
- Message search and chat archives to easily find and reference project-related information, ensuring efficient knowledge retrieval and management.

2.4.6 Customers and Clients Characteristics:

- The primary need is efficient, real-time communication with businesses, ensuring prompt and effective interactions.
- A user-friendly and intuitive chat interface is crucial for easy navigation and engagement.
- Ensuring the privacy and security of personal information and chat data is of utmost importance.
- Expectation of timely responses from customer support or sales representatives is critical for customer satisfaction.
- The ability to share and receive multimedia content, such as product images or videos, enhances the communication experience and information exchange.

2.5 General Constraints

General design/implementation constraints include:

- The software system will be developed on and run under Windows 2000.
- All code shall be developed to run on a Java Virtual Machine supporting Java 1.3.1 or above.
- Plain text files shall be used for all text-based data storage and reports.

- The documentation and code shall be in accord with relevant CIT AI firm documentation and style standards.

2.6 Priority of requirements

The following requirements are listed in the order from the most critical to the least important:

- User Registration and Authentication
- Real-Time Messaging
- Security and Privacy Controls
- Multimedia Sharing
- Notification System
- Customization and Theming
- Data Synchronization
- Message Search and History
- Group Chat Management
- Community Guidelines and Moderation

3. Functional Requirements

3.1 Registering to the chat system

The system shall support registration with all information's

Function Name: Chat_Register

3.1.1 Trigger

- A person wants to register to entering to the chat system

3.1.2 Pre-Conditions

- The person is a employee of multimedia group
- Registration need to be selected

3.1.3 Post-Conditions

Either

- Entering personal information's for creating account

or

- Use existing account information

3.1.4 Business Rules Applicable

- Registration can be made at anytime
- Multiple accounts can be created

3.1.5 Data Manipulated

Type	Name	Format	Validation Rules
Input	Start time	hh:mm	Between 08:00 & 20:00
Input	Duration	Numeric	1, 2 or 3
Input	Chat ID	Numeric	1, 2 or 3
System	Password	Alpha-numeric	Max 8 characters
System	System date	dd/mm/yyyy	
System	System time	Hh:mm	

Table 3.0 Inputs required for Chat _Register

3.1.6 Normal Processing Procedure

- User enters to chat system
- User creates account
- User enters user id and password
- System validates login information
- User establishes the connection to server
- If user is available, system displays all available users
- User selects one of the available users.
- User start chatting by sending message
- System exits while user is offline

3.1.7 Variations

- If user is idle, system displays “Sorry, user is idle for long time”.
- System prompts user to quit
- Reports Generated

No reports are generated for this function.

3.1.8 Exceptions

Exception	Error Message (Displayed/Generated/Logged)
Creating account with same name	Already name exists
Creating password with undefined symbols	Type your password correctly

Table 4.0 Exceptions during Chat_ register

3.2 Creating an Private session in chat

The system shall support establishing private session

Function Name: Chat_ Private

3.2.1 Trigger

- A user initiates the process to create a private chat session with another user.

3.2.2 Pre-Condition

- Both users must be registered and logged into the MCS.

3.2.3 Post-Condition

- A private chat session is created and maintained between the two selected participants, enabling real-time confidential messaging between them. Messages exchanged within the private chat are timestamped and tracked for read/unread status.

3.2.4 Business Rules Applicable

- Users should be able to initiate private chat sessions with any registered user.
- Private chat sessions are limited to two participants.
- Messages sent in private chats should be confidential and not accessible to other users.

3.2.5 Data Manipulated

- User IDs or usernames of both participants.
- Messages sent and received in the private chat session.
- Timestamps and read/unread status of messages.

3.2.6 Normal Processing Procedure

- The user selects an option to start a new chat or private chat within the MCS.
- The system provides a search or selection interface for choosing the user with whom to start the private chat session.

- The user selects another registered user from the list or searches for the desired user by username.
- The system verifies the selection and creates a private chat session, enabling real-time messaging between the two participants.
- Messages sent and received in the private chat are confidential and not accessible to other users.
- The chat session maintains timestamps for messages and updates the read/unread status as messages are viewed.

3.2.7 Variations

- Users can initiate private chat sessions directly from the list of their contacts or by selecting the username from their profile page.

3.2.8 Exceptions

Exception	Error Message (Displayed/Generated/Logged)
User is not registered	User Not Found
Technical issue in creation of the private chat	Session Creation Failure

Table 5.0 Exceptions during Chat_Private

3.3 Real – Time Messaging

Function Name: Real_Time_Msg

3.3.1 Trigger

- A user intends to initiate a chat session or send a message.

3.3.2 Pre-Condition

- The user is registered and logged into the MCS.

3.3.3 Post-Condition

- After successful transmission, the sent message is delivered in real-time or near real-time to the recipient(s) within the chat session. The message is displayed on the recipient's device, enabling real-time conversations and communication.

3.3.4 Business Rules Applicable

- Messages should be delivered in real-time or near real-time, typically within seconds.
- Messages must adhere to content guidelines and community rules.
- Users can engage in one-on-one or group chat sessions.

3.3.5 Data Manipulated

- User-generated message content, including text and optional multimedia attachments.
- Message timestamps for tracking message delivery and order.

3.3.6 Normal Processing Procedure

- The user logs into the MCS and selects a chat session, whether one-on-one or a group chat.
- The user initiates a new message or responds to existing messages within the selected chat session.
- The message content, including text, and optional multimedia attachments (e.g., images, videos), is composed and sent by the user.
- The MCS server processes the outgoing message and adds a timestamp indicating the time of sending.
- The message is transmitted in real-time or near real-time to the recipient(s) within the chat session.
- Recipient devices receive and display the incoming message immediately.
- Users can engage in real-time conversations, with messages delivered and displayed as they are sent.

3.3.7 Variations

- Users have the option to include emoticons, stickers, or other graphical elements in their messages to enhance communication.

3.3.8 Exceptions

Exception	Error Message (Displayed/Generated/Logged)
If a message violates content guidelines	Content Violation
Delay in delivery of message due to network or technical error	Technical Error

Table 6.0 Exceptions during Real_Time_Messaging

3.4 User Profile Management

Function Name: User_Profile

3.4.1 Trigger

- A user intends to manage or customize their user profile.

3.4.2 Pre-Condition

- The user is registered and logged into the MCS.

3.4.3 Post-Condition

- Upon successful customization or modification of the user profile, the changes made to the user profile information, including name, username, email, profile picture, and status message, are saved and displayed in the user's profile within the MCS. The updated information is visible to other users as well.

3.4.4 Business Rules Applicable

- User profile information should be accurate and up-to-date.

- Users can choose to customize their user profile with personal details, including avatars and status messages.

3.4.5 Data Manipulated

- User profile information, including name, email, username, and optional user-selected details.
- Profile picture (avatar) uploaded by the user.
- Status messages or short descriptions provided by the user.

3.4.6 Normal Processing Procedure

- The user logs into the MCS and accesses their user profile settings.
- The user selects the option to edit or customize their user profile.
- The user can update or modify user profile information, such as their name, username, and email, and can optionally upload or change their profile picture (avatar).
- The user may also set or modify a status message or short description to be displayed on their profile.
- The changes made to the user profile are saved and updated in the MCS database.
- The updated user profile information is reflected in the user's profile and displayed to other users within the MCS.

3.4.7 Variations

- Users may be allowed to link or connect their user profile to external services, such as social media accounts, for additional customization and information display.

3.4.8 Exceptions

Exception	Error Message (Displayed/Generated/Logged)
If the user provides incomplete or invalid information	Invalid Information
If a security breach is detected	Security Breach

Table 7.0 Exceptions during User_Profile_Management

3.5 File Sharing

Function Name: File_sharing

3.5.1 Trigger

- A user intends to share a file with one or more chat partici

3.5.2 Pre-Condition

- The user is registered and logged into the MCS, and an active chat session is in progress.

3.5.3 Post-Condition

- After successful sharing and scanning, the shared file is made available to the chat participants for download and viewing within the chat session.

3.5.4 Business Rules Applicable

- Supported file types and sizes should be clearly defined and communicated to users.
- Files should be scanned for viruses or malware before being shared.
- File sharing should adhere to content guidelines and community rules.

3.5.5 Data Manipulated

- User-generated file content, including documents, images, videos, and other supported file types.
- File metadata, including file name, type, size, and timestamp.

3.5.6 Normal Processing Procedure

- The user logs into the MCS and accesses an active chat session with one or more participants.
- The user selects the option to share a file within the chat session.
- The user browses their device or cloud storage to select the file they want to share.
- The selected file is uploaded and transmitted to the chat participants.
- The MCS server scans the file for viruses or malware before allowing it to be shared.
- Once the file is scanned and cleared, it is made available to the chat participants for download.
- Chat participants can download and view the shared file within the chat interface.

3.5.7 Variations

- Users may be allowed to share a variety of file types, including documents, images, videos, audio files, and more.

3.5.8 Exceptions

Exception	Error Message (Displayed/Generated/Logged)
If a shared file exceeds defined size limits or is of an unsupported type	File Size or Type Violations
If a file is detected as containing viruses	Virus or Malware Detection
If the shared file violates content guidelines	Content Violations

Table 8.0 Exceptions during File_Sharing

3.6 Edit and Delete Messages

Function Name: Edit_Delete

3.6.1 Trigger

- A user intends to edit or delete a message within a chat session.

3.6.2 Pre-Condition

- The user is registered and logged into the MCS, and the chat session with the message is active.

3.6.3 Post-Condition

- For editing a message: After successful editing, the modified message is marked as such, and the updated content is displayed to chat participants.
- For deleting a message: After deletion, the message is removed from the chat session for the user who initiated the action

3.6.4 Business Rules Applicable

- Users can edit or delete their own messages, subject to time restrictions.
- Edited messages should be marked to indicate that they have been modified.
- Deletion should be allowed for a user's own messages and should not impact the chat history of other participants.

3.6.5 Data Manipulated

- User-generated message content, including text.
- Message metadata, including timestamps.

3.6.6 Normal Processing Procedure

Editing a Message:

- The user logs into the MCS and accesses the chat session containing the message they want to edit.
- The user selects the specific message they want to modify.
- The user clicks on an "Edit" or "Modify" option associated with the message.
- The message content becomes editable, allowing the user to make changes.
- After editing, the user saves the modified message.
- The edited message is marked to indicate that it has been modified, and the updated content is displayed to chat participants.

Deleting a Message:

- The user logs into the MCS and accesses the chat session containing the message they want to delete.
- The user selects the specific message they want to remove.
- The user clicks on a "Delete" or "Remove" option associated with the message.
- The message is removed from the chat session for the user who initiated the deletion.

3.6.7 Variations

- Users may be allowed to edit or delete their messages within a specified time frame after sending, with the exact time limits defined in the system's rules.

3.6.8 Exceptions

Exception	Error Message (Displayed/Generated/Logged)
If a user edits a message beyond time limit,	Time Limit Exceeded
Users deleting messages sent by others	Unauthorized Deletion
If a message violates content guidelines or community rules	Content Violations

Table 9.0 Exceptions during Edit_Delete_Message

3.7 Video and Voice Chat

Function Name: V_Chat

3.7.1 Trigger

- A user intends to initiate a video or voice chat session within an existing chat or directly with another user.

3.7.2 Pre-Condition

- The user is registered and logged into the MCS, and an active chat session is in progress.

3.7.3 Post-Condition

- After a video or voice chat session is initiated, audio and video streams are transmitted between users in real-time. The chat session is recorded in the system's metadata, and participants can engage in real-time conversations via video or voice chat.

3.7.4 Business Rules Applicable

- Users can initiate video or voice chat sessions with other participants.
- Participants must grant permission for camera and microphone access.
- The system should support high-quality audio and video streaming.

3.7.5 Data Manipulated

- Audio and video streams transmitted between users during the chat session.
- User permissions for camera and microphone access.
- Chat metadata, including timestamps and participants.

3.7.6 Normal Processing Procedure

- The user logs into the MCS and accesses an active chat session or selects a specific user they want to initiate a video or voice chat with.

- The user clicks on an "Initiate Video Chat" or "Initiate Voice Chat" option.
- The MCS requests camera and microphone access permissions from the user.
- Once permissions are granted, the video or voice chat session begins, with audio and video streams transmitted between participants in real-time.

- Users can engage in a video or voice chat session, with the ability to mute/unmute, turn the camera on/off, and end the session.
- The system records timestamps and chat metadata for the chat session.

3.7.7 Variations

- Users may have the option to initiate one-on-one video or voice chat sessions or include multiple participants for group video or voice chats.

3.7.8 Exceptions

Exception	Error Message (Displayed/Generated/Logged)
If a user denies camera or microphone access	Permission Denied
Technical issues or network disruptions	Technical Issues
If a user disconnects from the video or voice chat	User Disconnection

Table 10.0 Exceptions during V_Chat

3.8 Status Information

Function Name: Status

3.8.1 Trigger

- A user intends to set or update their status information in the MCS.

3.8.2 Pre-Condition

- The user is registered and logged into the MCS.

3.8.3 Post-Condition

- After setting or updating their status information, the user's status message is displayed on their profile, conveying their availability or mood. Other chat participants can view the user's status message on their profile.

3.8.4 Business Rules Applicable

- Users can set and update their status information to convey their availability or mood.
- Status information should be visible to other chat participants as an optional detail on the user's profile.

3.8.5 Data Manipulated

- User-generated status information, including mood or availability messages.

- User profile information, including status details and timestamps.

3.8.6 Normal Processing Procedure

- The user logs into the MCS and accesses their profile settings.
- The user selects the option to set or update their status information.
- The user inputs a text-based status message that conveys their availability or mood (e.g., "Available," "Busy," "Feeling great!").
- The user saves the status information.
- The updated status message is displayed on the user's profile and is visible to other chat participants when they view the user's profile.

3.8.7 Variations

- Users may have the option to choose from predefined status messages or create custom status messages.

3.8.8 Exceptions

Exception	Error Message (Displayed/Generated/Logged)
User's status message exceeds a defined character limit	Character Limit Exceeded

Table 11.0 Exceptions during Status_Information

3.9 Roles and Permission

Function Name: Roles_Permission

3.9.1 Trigger

- Admins or system administrators intend to define or modify user roles and permissions within the MCS.

3.9.2 Pre-Condition

- The user is authorized as an admin or system administrator within the MCS.

3.9.3 Post-Condition

- After defining or modifying user roles and permissions, the specified roles and permissions are stored and become effective within the MCS. Users with assigned roles have access to actions or features based on their role's associated permissions.

3.9.4 Business Rules Applicable

- Admins or system administrators have the authority to define and manage user roles and permissions.
- User roles and permissions should be clearly defined and communicated.

- Permissions should be granular, allowing specific actions to be granted or restricted.

3.9.5 Data Manipulated

- User roles and permissions, including the definition of roles, their associated permissions, and the assignment of roles to users.

3.9.6 Normal Processing Procedure

- An admin or system administrator logs into the MCS and accesses the administrative panel.
- The admin selects the option to define, modify, or manage user roles and permissions.
- The admin can create new user roles, define their specific permissions, or modify existing roles and their associated permissions.
- The admin can assign user roles to registered users, granting them specific permissions based on their role.
- The MCS stores and manages user roles, permissions, and user assignments.
- Users with assigned roles can access or be restricted from specific actions or features based on their assigned permissions.

3.9.7 Variations

- The system may provide predefined roles and permission sets that can be assigned to users or allow admins to create custom roles and permissions.

3.9.8 Exceptions

Exception	Error Message (Displayed/Generated/Logged)
Unauthorized users from modifying roles and permissions	Unauthorized Changes

Table 12.0 Exceptions during Roles_Permission

4. User Interface Requirements

- Clean and User-Friendly Layout
- Intuitive Message Interface
- Responsive and Mobile-Friendly Design
- Clear Status Information
- Error Handling and Feedback

4.1 Look and Feel Requirements

- A minimalistic design with a simple color scheme.
- Clear and legible text, ensuring readability of messages.
- User's profile picture and username.
- Chat sessions displayed with usernames or profile pictures in a list format.
- Message windows that present messages in a chat-like format with a timestamp.
- Simple buttons for sending messages, attaching files, and initiating video/voice chats.
- Intuitive icons for common actions like file sharing and emoticons.
- Status information indicating user availability or mood.

4.2 Usability Requirements

- Complex and unclear navigation structures can struggle the user to find specific features leading to reduced usability.
- Inconsistencies in design elements, such as buttons and icons, can confuse users and make it difficult for them to understand.
- Users need informative feedback, such as clear error messages and message delivery indicators, to know if their actions were successful.
- A lack of mobile optimization can result in a poor user experience.

5. Non-Functional requirements

5.1 Performance requirements

- The system should respond to user actions within a maximum of 2 seconds to ensure a responsive user experience.
- The system should be able to handle a growing user base, supporting at least 10,000 concurrent users without significant performance degradation.
- The system should use system resources efficiently to minimize resource consumption.

5.2 Reliability requirements

- The system should aim for 99.9% uptime, with scheduled maintenance communicated in advance to minimize user disruption.
- All user data, including messages and profile information, must be stored securely and protected against data loss.

5.3 Security requirements

- All data transmitted within the MCS should be encrypted using industry-standard encryption protocols (e.g., SSL/TLS) to ensure data privacy.
- Robust user authentication mechanisms, including multi-factor authentication, should be in place to prevent unauthorized access.
- The system must comply with data privacy regulations (e.g., GDPR) and protect user data from unauthorized access or breaches.

5.4 Maintainability requirements

- The system's architecture should be modular, making it easy to add new features or components without causing disruptions to existing functionality.
- All code must be thoroughly documented to facilitate maintenance and updates by future developers.
- The system should use version control systems (e.g., Git) to track code changes and enable collaborative development and issue tracking.

5.5 Usability requirements

- The GUI should comply with accessibility standards (e.g., WCAG) to ensure usability for individuals with disabilities.
- Provide user training resources and documentation to help users become proficient in using the MCS.
- Implement clear and user-friendly error messages to guide users in resolving issues and reduce user frustration.

5.6 Data Backup and Recovery requirements

- Schedule regular data backups to prevent data loss due to unexpected events like hardware failures or accidental deletions.
- Develop a data recovery plan and procedures to restore the system to normal operation in case of data loss or disruptions.

6. Operating Environment

The system specified shall operate on the hardware, software requirements outlined in this section.

6.1 Hardware

The system is expected to have the following minimum configuration:

- Pentium-200MHz (equivalent or above).
- 128 MB RAM.
- 20MB free hard disk space.
- VGA Monitor.

6.2 Software

The basic software required for effective operation shall be:

- Windows 2000 operating system.
- Java Virtual Machine capable of running Java v1.3.1 applications or above.

6.3 Printer

The printer must be compatible with the computer system and must be capable of printing text files.

6.4 External Data Storage

All data that needs to be stored on external storage devices for security and protection reasons shall be clearly identified. Descriptions of all data files and methods of access to archive these data items shall be provided as part of the User Manual. It is expected that the technical operator of this system shall have the required expertise to transfer all relevant data files on to an external archive (e.g. Floppy Disk, DAT, CD and/or ZIP disk).

7. Acceptance Criteria

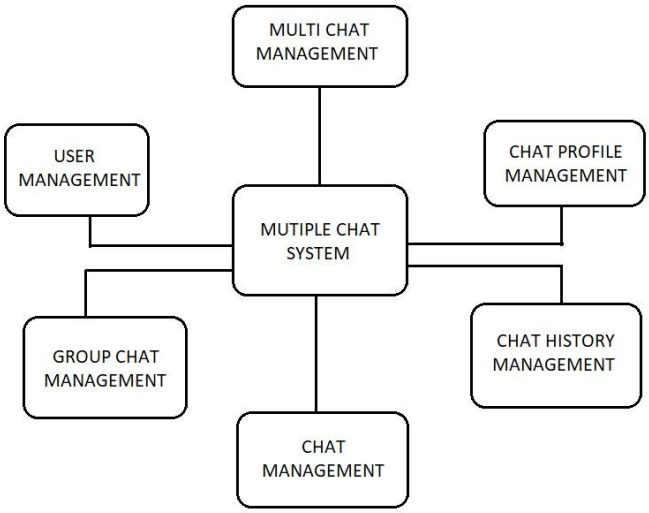
The system must be able to, at least

- Support a minimum number of concurrent users.
- Provide real-time messaging with a latency of no more than 1 second.
- Allow users to send text messages and images.
- Ensure secure user authentication and authorization.
- Support the creation of public and private chat rooms.
- Provide message history and the ability to retrieve past messages.
- Offer user notifications for new messages.
- Support cross-platform compatibility.
- Have robust error handling and logging for system maintenance.
- Ensure scalability and performance under load.

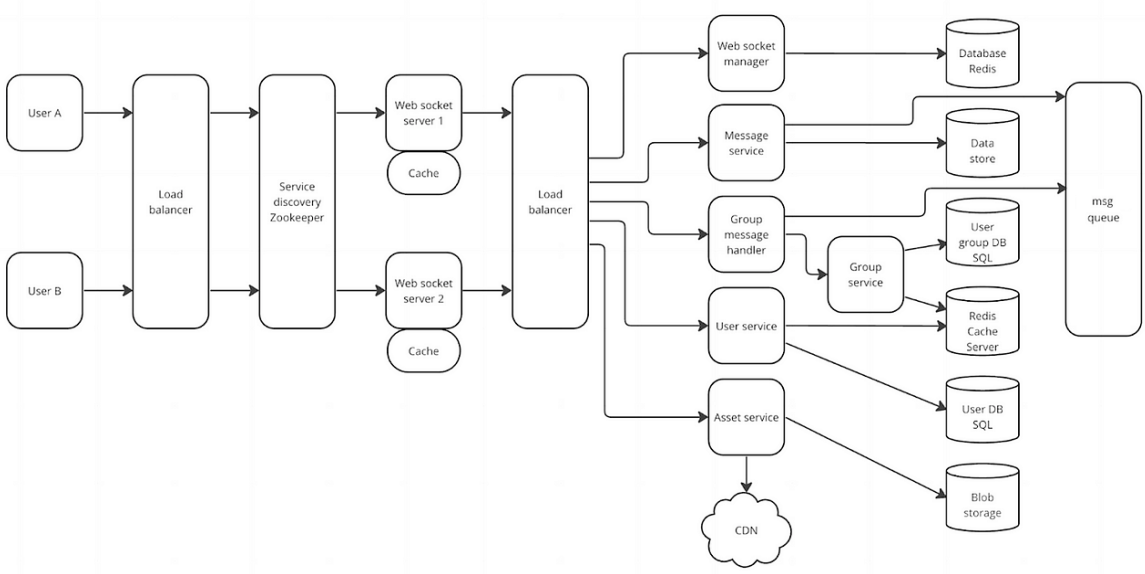
Glossary

Term	Definition
GUI (Graphical User Interface)	The visual interface that allows users to interact with software through graphical elements like buttons and menus.
MCS (Multiple Chat System)	The chat software that enables users to engage in one-on-one and group conversations.
Encryption	The process of converting data into a code to secure it from unauthorized access.
SSL/TLS	Secure Sockets Layer (SSL) and Transport Layer Security (TLS) are cryptographic protocols used for securing data transmission over networks.
Multi-Factor Authentication (MFA)	A security method that requires users to provide multiple forms of identification before granting access to the system.
Load Testing	Evaluating system performance under high user load to ensure responsiveness and scalability.
Version Control (Git)	A system for tracking changes made to software code and facilitating collaborative development.
Data Backup	Creating copies of data to prevent data loss.
Data Recovery	Procedures for restoring lost or damaged data.
User Registration and Login	The process of creating an account and accessing the system with a username and password.
One-on-One Chat	A private conversation between two users.
Group Chat	A chat session involving multiple users in a single conversation.
Unique Identifier	A code or name that distinguishes each chat session.
Real-Time	Messages appear instantly without significant delay.
File Sharing	Sending digital documents or data to other users.
Video Chat	A live conversation with video feeds of participants.
Voice Chat	Real-time audio conversation without video.
Response Time	The time taken for the system to respond to user actions.
Scalability	The system's ability to handle an increasing number of users or data.
Availability	The system's uptime or the period it is operational and accessible to users.
Data Integrity	Ensuring data remains unaltered and undamaged.
Modular	The system's structure that allows easy addition or modification of features.
Code Documentation	Detailed explanations of the system's code to assist future developers.
Accessibility Standards (WCAG)	Guidelines for making digital content accessible to individuals with disabilities.
Error Messages	Notifications that inform users about issues or problems in a user-friendly way.

Appendix A: External Context Model



Appendix B: Internal Context Model



Appendix C: Use Case Analysis Notes

- **Real-Time Collaboration**: Field researchers can use the MCS to conduct real-time discussions, share observations, and exchange ideas, even when they are physically distant.
- **Secure Data Exchange**: Researchers can securely share data, images, and documents, ensuring that sensitive research findings remain confidential.
- **Video Conferencing**: Video chat capabilities enable researchers to hold virtual meetings, making it easier to discuss findings and plan research strategies.
- **Offline Mode**: In areas with limited connectivity, the MCS can operate in an offline mode, allowing researchers to compose messages and upload data for later transmission.
- **Custom Chat Groups:** Researchers can create specialized chat groups based on their research topics, allowing them to focus on specific aspects of their work.

Appendix D: Development Process

Tasks Undertaken

Task Name	Description	Technique(s) Used
Problem investigation	Identifying, analysing, and resolving issues, defects, or anomalies in software systems.	Issue identification, root cause analysis, documentation review, test and debugging.
Problem Analysis	Identifying issues, understanding their root causes, and finding solutions.	Identify the problem, gather info, isolate root cause, and prioritize the problem.
Use case modelling	identify, describe, and document the interactions between users (actors) and a system	Actor, use case diagram, Scenario, actor description.
Documentation	It is a reference for developers, testers, project stakeholders, and users, helping them understand the system, its design, functionality, and maintenance procedures.	Requirement documentation, design documentation, API document, test plans and reports.
Requirements review	Integral step in software development, taking place after the initial gathering of requirements	Requirement walkthrough, requirement inspection, traceability analysis, requirement validation.

Table 13.0 Tasks undertaken in the development of this document

Task Outputs

Task Name	Outputs	Section(s)
Requirement elicitation	document purpose	1.1
	About the project	1.2
	Document scope	1.3
Product operations	Characteristics	2.3
Implementation of functionalities	Functional requirement	3.1-3.9
	Non-functional requirement	5.1-5.6

Table 13.0 Sections affected by the various tasks.

Appendix E: Contributions

Contributor Name	Sections Worked On
Akshay Karthick M S	Section – 1, Section – 2, Section 3.1-3.3
Bharath Kumar R	Section -7, Appendix
Dhanush Kumar K	Section – 3.4 – Section – 3.9
Rohithraj N M	Section - 4, Section -5

Table 14.0 Document Contributions

Appendix F: Meeting Agendas/Minutes

ID	Meeting Date/Time	Apologies
1	October 22nd 2023, 10:30am – 12:30pm	None
2	October 22nd 2023, 03:00pm – 05:00pm	None
3	October 22nd 2023, 07:30pm – 11:30pm	None

Table 15.0 Meeting dates/times