Software Requirements Specification

Revision History

| **Date** | **Revision** | **Description** | **Author** |
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| 02/25/2024 | 1.1 | Revised some requirements. | Derion, Gia, Anya |
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# Purpose

This document outlines the requirements for the Communication System.

## Scope

This document will catalog the user, system, and hardware requirements for the Communication System. It will not, however, document how these requirements will be implemented.

## Definitions, Acronyms, Abbreviations

* Normal user: In this document, a normal user refers to employees of the organization who are not IT staff. In other words, a normal user does not have the IT admin privileges in this Communication System.
* IT user: IT user refers to IT staff, which not only has all the features of a normal user, but also has privileges like checking server logs.
* User: In this document, “User” refers to all users in this Communication System, including both Normal users and IT users.
* Synchronous: In this Communication System, the word “synchronous” refers to the situation where two or more users are online and any messages among them are sent or received synchronously.
* Asynchronous: The word “asynchronous” refers to the case when the sender is online and the recipient of the message is offline. In this case, any messages between them are sent or received asynchronously.
* Group owner: Group owner is the owner and administrator of a group chat. Group owner can accept new people to the group, remove people from the group, and delete the group completely. The person who creates the group is automatically the group owner. Group owner can appoint another person in the same group to be the group owner. There will be only one group owner for each group chat.
* Event: In this document, event refers to all the traffic in and out of the server, including messages, login/logout requests, etc.
* Server application: server application refers to the Java application running on the server, which is responsible for distributing messages, responding to all users, and logging events.
* Client application: client application refers to the Java application with GUI that users use. Client application is mainly responsible for user login/logout and send/receive messages.
* Online status: online status refers to whether a user is online (logged in the system and has stable connection with the server) or offline (logged out of the system or loses connection with the server).
* Availability status: availability status is a status that the user can set as he wants to indicate his availability at the moment. Availability status could either be “idle” or “busy”.
* User status: User status refers to both online status and availability status.

## References

Use Case Specification Document – Step 2 in assignment description

UML Use Case Diagrams Document – Step 3 in assignment description

Class Diagrams – Step 5 in assignment description

Sequence Diagrams – Step 6 in assignment description

## Overview

This is a communications system for a very large organization, which has one server application and supports many users online at the same time. This system should allow employees to communicate over chat both synchronously and asynchronously. All users will be able to chat in direct messages and in groups. Only Text messages will be allowed in this system. All conversations will be logged and viewable by the IT users.

# Overall Description

## Product Perspective

## Product Architecture

The system will be organized into 3 major modules: Message module, Server module, and Admin module.

## Product Functionality/Features

The high-level features of the system are as follows (see section 3 of this document for more detailed requirements that address these features):

2.3.1 The Communication system allows all users to send/receive direct messages and group chats over the network both synchronously and asynchronously.

2.3.2 The server application is able to log all events in the system.

2.3.3 IT users have more permissions than normal users, including viewing all logged events in the server, create/delete users.

2.3.4 The client application has a GUI interface supporting basic communication functionalities.

2.3.5 The server and client application should be able to pass Message objects over the network with timestamps.

## Constraints

2.4.1 The server application has logging capabilities to allow IT users to view all conversations.

2.4.2 Both client and server applications are Java applications which are able to run on Java Virtual Machine with JRE 20 or above.

2.4.3 All users cannot log into the same account from different IP addresses at the same time.

2.4.4 The system must support message delivery both synchronously and asynchronously.

2.4.5 All communications among server and clients are over TCP/IP network and the traffic is not encrypted.

2.4.6 The client GUI interface should have basic functionalities of login/logout, send and receive direct messages and group chats.

2.4.7 All chat messages are only text messages. No image, video, file are supported.

## Assumptions and Dependencies

2.5.1 The server has enough space, memory, computational power, and network bandwidth to allow many users to chat online at the same time.

2.5.2 It is assumed that all users as well as the server have synced time before the client/server application starts.

2.5.3 It is assumed that the server application is able to store all log events for at least 60 days.

2.5.4 It is assumed that the server application is up and has good network connection most of the time.

2.5.6 It is assumed that all users can learn how to use the client application by themselves without further assistance.

2.5.7 It is assumed that all text messages only contain ASCII characters.

# Specific Requirements

## Functional Requirements

### Common Requirements:

3.1.1.1 All messages received in client applications will be cleared after the user logs out.

3.1.1.2 Users should be able to delete messages locally, including direct messages and group chats, such that deleted messages will not show up in the client application but the messages logged in the server will not be deleted.

3.1.1.3 Users should be able to mute direct message conversations and group chats, in a way that they will receive the messages but not get notifications.

3.1.1.4 Users should be able to unmute direct message conversations and group chats if they muted them before, and start getting message notifications whenever they receive a new message from those conversations.

3.1.1.5 Users should be able to view the directory of all users in the system.

3.1.1.6 Users should be able to view other users’ online statuses (online or offline) and availability status (idle or busy).

3.1.1.7 Users should be able to change their availability statuses (idle or busy) whenever they want.

3.1.1.8 Users’ online statuses are only based on whether they are logged in the system or not and cannot be changed by users.

### Message Module Requirements:

3.1.2.1 Users should be able to receive messages that are sent synchronously.

3.1.2.2 Users should be able to receive messages that are sent asynchronously.

3.1.2.3 Users should be able to send messages to other users regardless of whether other users are online or offline.

Users should be able to initiate a new conversation with any users in the system.

3.1.2.4 Users should be able to accept invitations to join group chats.

3.1.2.5 Users who are members of the groups should be able to send requests to invite other people to join group chats.

3.1.2.6 Users should be able to create new group chats and they will automatically become the Group Administrators of the new group chats.

3.1.2.7 Every group chat will only have one Group Administrator, who is also the person created the group.

3.1.2.8 Only users who are Group Administrators of the group chat can decide whether to let certain users join.

3.1.2.9 Only users who are Group Administrators of the group chat can remove members from the group chat.

3.1.2.10 Users should be able to leave any group chats if they want.

3.1.2.11 Every Group Administrators of the group chats can appoint one team member to be the new Group Administrator, and there will be only one Group Administrator at a time.

### Server Module Requirements:

* + - 1. All events (both inbound and outbound traffic through the server) will be logged in the server with timestamp, including all messages (including direct messages and group chats), login/logout requests and other bad requests.
      2. Before the server shuts down, all logged events should be stored in a txt file in local and can be restored after restarting the server.
      3. The server application is multi-threaded, allowing many users to connect it at the same time.

### Admin Module Requirements:

3.1.4.1 IT users should be able to view all the logged events stored in the server.

3.1.4.2 Only IT users can create new users.

3.1.4.3 IT users should be able to delete existing users and automatically remove them from all the group chats they belong to. Any attempts to send new messages to these deleted users will be rejected and those users will receive an error message.

## External Interface Requirements

3.2.1 The system must provide a GUI interface for all users.

3.2.2 The GUI supports basic functionalities, including login/logout, send/receive messages, with no animations.

3.2.3 The GUI for an IT user is the same with a normal user, except that there are a few more features like view server logs, create and delete users.

## Internal Interface Requirements

3.3.1 The server application should be able to communicate with the client application over TCP/IP.

3.3.2 The communication between server and client is by sending Message objects over the network. Different functionalities (including login, direct message, group message, directory, online status, etc) correspond to different Message types.

3.3.3 Each Message object has a GMT (Greenwich Mean Time) timestamp associated with it.

# Non-Functional Requirements

## Security and Privacy Requirements.

4.1.1 The system only allows one account to log in from one device at a time. Any requests to log in the same account from different devices will be rejected.

4.1.2 The system uses username and password for user authentication.

4.1.3 The system must maintain comprehensive logs for inbound and outbound network traffic through the server, ensuring traceability for security and auditing purposes.

4.1.4 Only IT users can access the system logs.

## Environmental Requirements

4.2.1 Both server and user applications should run on a computer with Windows, MacOS, or Linux, with at least 4GB of RAM and enough hard drive space to store messages locally.

4.2.2 Both server and user applications require JRE 20 or above.

4.2.3 Both server and user applications are required to connect to the Internet with minimum an average of 1Mbps (Down/Up).

## Performance Requirements

4.3.1 The system must respond to user requests within 1 second for real-time chat interactions.

4.3.2 The system should not have unnecessary limits for the number of concurrent users online.