Software Engineering

Experiment No. 2

Batch : C22

Team Members :

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Aim: To develop Software Requirement Specification (SRS) document in IEEE format for the project.

Theory:

SRS Software Requirements Specification

A document that specifies most of the requirements as required by the customer and as understood by the software engineer.

A well formatted document that includes scope, purpose, product perspective, software and hardware requirements, functional and non-functional requirements for the product.

Performance:

1. Identify a suitable case study with the scope for software engineering process.
2. Explain the abstract in one page clearly explaining the project with their functionalities.
3. Each project should have atleast 4 functional requirements clearly explaining each functionality by referring to the given SRS template.
4. Prepare a well-formatted document

Conclusion:

In this experiment we were able to make an SRS for our case study and clearly understood the process and requirements for an SRS.

Software Requirements Specification

for

Virtual Connect

Version 3.10

Prepared by

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Course: Software Engineering

Lab Section:

Teaching Assistant:

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Contents

Revisions

Version	Primary Author(s)	Description of Version	Date Completed
Draft Type and Number	Full Name	Information about the revision. This table does not need to be filled in whenever a document is touched, only when the version is being upgraded.	00/00/00

<In this template you will find text bounded by the "<>" symbols. This text appears in italics and is intended to guide you through the template and provide explanations regarding the different sections in this document. There are two types of comments in this document. These comments that are in black are intended specifically for that course. These comments that are in blue are more general and apply to any SRS. Please, make sure to delete all of the comments before submitting the document.

The explanations provided below, do not cover all of the material, but merely, the general nature of the information you would usually find in SRS documents. It is based on the IEEE requirements and was adapted specifically for the needs of Software Engineering 3K04/3M04 courses. Most of the sections in this template are required sections, i.e. you must include them in your version of the document. Failure to do so will result in marks deductions. Optional sections will be explicitly marked as optional.

1 Introduction

VirtualConnect stands as the epitome of sophistication in the realm of online virtual meeting solutions, embodying an unparalleled fusion of cutting-edge technology and seamless functionality. Elevating remote collaboration to new heights, it boasts features such as real-time video conferencing, astutely efficient messaging, and a flawlessly integrated scheduling system. This platform not only caters to the diverse needs of professionals, educators, and remote teams but also redefines the very essence of global connectivity. With an unwavering commitment to the highest standards of security through end-to-end encryption, VirtualConnect provides a fortified environment for dynamic and secure interactions. Its user-friendly interface further enhances the overall experience, positioning VirtualConnect as an indispensable tool for businesses, educators, and teams navigating the intricacies of the digital landscape. In fostering this synergy of innovation and practicality, VirtualConnect emerges as a transformative force, ushering in a new era of sophisticated and efficient online collaboration.

1.1 Document Purpose

The purpose of this Software Requirement Specifications document is to provide a comprehensive overview of the technical aspects of Virtual Connect - Version 3.10. This document aims to articulate how the software will interact with users, hardware, software components, and other interconnected applications. It serves as a guide to understand the requirements, technical specifications, and limitations of the project. The information outlined herein will assist the development team in ensuring optimal utilization of resources, meeting all product requirements, and delivering a robust and user-friendly online virtual meeting software.

1.2 Product Scope

Virtual Connect software is a specialized application designed to facilitate virtual collaboration and communication among users. Its scope encompasses a range of features tailored to enhance remote interactions. This may include functionalities such as user profiles, real-time video conferencing, chat capabilities, scheduling tools, screen sharing, and secure authentication. Users can create personalized profiles, allowing them to customize their virtual meeting experiences based on preferences and roles. The core functionality involves real-time video conferencing, enabling users to conduct face-to-face meetings from different locations.Other key features may include chat functionality for instant communication, scheduling tools to plan and organize meetings, and screen sharing for collaborative presentations. Security measures, such as secure authentication and end-to-end encryption, are integral components to ensure the confidentiality of virtual interactions. Additionally, the software may provide analytics to track usage patterns and performance metrics,

contributing to a better understanding of user engagement. Monetization strategies can involve subscription models, licensing, or additional features available through in-app purchases, providing a sustainable revenue stream for the continued improvement and support of the online meeting software.

1.3 Intended Audience and Document Overview

Intended Audience : This Software Requirements Specification (SRS) for the online virtual meeting software, VirtualConnect, caters to a diverse audience encompassing developers, project managers, marketing staff, end-users (business professionals, educators, remote teams), testers, documentation writers, and any stakeholders involved in the project, including the client and the evaluating professor. Developers will rely on the technical details for implementation, project managers for oversight, marketing staff for promotional insights, end-users for understanding the software's capabilities, testers for validation, and documentation writers for creating user manuals and instructional materials.

Document Overview : The SRS is meticulously structured to provide a comprehensive understanding of VirtualConnect. Commencing with a brief abstract, the document sets the thematic tone, introducing the project's purpose and goals. This document has got four sections:

1. **Section 1 (this section)** provides an overview of the entire SRS document.

2. **Section 2** gives a overall description of the general factors that affect the product that will be produced based on this SRS. It includes product perspective and General capabilities, Product Functionality, User characteristics, operating Enviorment, Design and Implementation Constraints, Assumptions and dependencies of the product.

3. **Section 3** gives a specific requirements about the specific equipments which is divided into Use Case Diagram, Functional Requirements and UI, Software, Hardware, External Interface Requirements.

4. **Section 4** gives a list of all Non functional requirements and Constraint Requirements and they are described along with attributes like interoperability, accuracy, suitability, functional compliance, data flow diagrams etc.

5. **Section 5** tells about the other requirements

1.4 Definitions, Acronyms and Abbreviations

- **API**: Application Programming Interface
- **CPU**: Central Processing Unit

- **GPU**: Graphics Processing Unit
- **HTTPS**: Hypertext Transfer Protocol Secure
- **OS**: Operating System
- **RAM**: Random Access Memory
- **RTC**: Real-Time Communication
- **SRS**: Software Requirements Specification
- **SSO**: Single Sign-On
- **UI**: User Interface
- **URL**: Uniform Resource Locator
- **WebRTC**: Web Real-Time Communication

1.5 Document Conventions

The following conventions were followed while creating the document:

• We have used the IEEE standards for document formatting.

• The font used is Arial, font size for title is 14 and font size for text is 12.

• Italics have been used for comments.

• 1” margin has been maintained throughout the document.

• The text is single spaced.

1.6 References and Acknowledgments

These are some of the references:

https://support.zoom.com/hc/en/category?id=kb_category&kb_category=42927a128720391089a37408dabb3572
https://www.makeuseof.com/how-to-use-the-7-best-features-in-zoom/
https://www.zoom.com/en/blog/10-benefits-of-zoom-for-small-businesses-according-to-this-
https://support.zoom.com/hc/en/article?id=zm_kb&sysparm_article=KB0060469
https://dribbble.com/shots/9914282/attachments/1948337?mode=media
https://www.researchgate.net/figure/Use-case-diagram-of-the-virtual-meeting_fig1_220883354

2 Overall Description

2.1 Product Perspective

Virtual Connect is positioned as an autonomous virtual meeting solution, is crafted with the intent to enhance rather than replace existing systems. Its primary objective is to elevate the virtual meeting experience, addressing contemporary communication demands with a suite of advanced features. This comprehensive solution spans across a web-based platform, desktop applications for both Windows and macOS, and mobile apps compatible with iOS and Android devices. The entire system is fortified by a resilient cloud infrastructure, ensuring scalability and reliability in meeting the evolving needs of users. Software provides scheduling, initiation, and execution, integrating real-time video, audio, screen sharing, and collaboration tools for a dynamic environment. Collaboration is fostered through integrated tools for document sharing, whiteboarding, and chat.

2.2 Product Functionality-

User Interface (UI): Enable seamless meeting participation. Provide an intuitive platform for tool accessibility. Facilitate efficient settings management.

Meeting Management: Schedule virtual meetings. Initiate meetings seamlessly. Orchestrate the execution of virtual meetings.

Real-time Communication: Facilitate real-time video and audio capabilities during meetings.

Collaboration Tools: Enable document sharing among meeting participants. Provide interactive whiteboarding features for collaborative sessions. Implement a chat interface for real-time text-based communication during meetings.

Security and Privacy: Employ end-to-end encryption for secure communication. Ensure secure user authentication. Guard against unauthorized access to maintain a safe and secure virtual meeting environment.

Multi-platform Accessibility: Offer a web-based platform for accessibility through browsers. Develop desktop applications for both Windows and macOS. Create mobile applications for iOS and Android devices.

Cloud Infrastructure: Leverage a robust cloud infrastructure for data storage and processing. Ensure scalability and reliability of the system.

Integration: Interface with external systems, such as calendar applications, for seamless scheduling integration. Integrate with third-party productivity tools and file-sharing platforms to enhance collaboration.

2.3 Operating Environment

Web browsers: Chrome, Firefox, Safari, Edge, Brave, Microsoft Edge.

Recommended Operating systems: Windows, MacOS, IpadOS, iOS , Android and Linux.

2.4 Design and Implementation Constraints

The quality of real-time audio and video during virtual meetings may be impacted by bandwidth limitations. Users with slow network connections may experience reduced functionality. Additionally, the software must adhere to industry-specific security standards and data protection regulations, influencing encryption protocols, user authentication methods, and data storage practices for compliance. Integration with external applications, such as calendar systems and productivity tools, depends on the availability and compatibility of APIs, and changes to these external applications may necessitate adjustments. Ensuring a consistent user experience across various devices and platforms poses a design challenge, requiring responsive design practices. Maintenance of the software may be the responsibility of the customer's organization, emphasizing the need for user-friendly interfaces and clear documentation. The scalability is constrained by hardware limitations, particularly in the underlying cloud infrastructure. Efficient scaling to accommodate increased user demand is crucial and requires careful consideration in both design and implementation phases.

2.5 User Documentation

This documentation will include a detailed user manual providing step-by-step instructions on accessing, scheduling, and participating in virtual meetings. Additionally, online help resources will be integrated directly into the software interface, offering context-sensitive assistance to users as they navigate through different functionalities. A series of tutorials will be developed to guide users through specific tasks, such as document sharing, interactive whiteboarding, and security settings. The documentation will be available in various formats, including digital manuals in PDF format, online help accessible within the application, and video tutorials for visual learners.

2.6 Assumptions and Dependencies

User Technology Proficiency: Users are assumed to possess basic technological understanding, encompassing web browsers, desktop applications, and mobile devices.This assumption impacts the software's user interface design and onboarding strategies, relying on users' technological proficiency.

Internet Connectivity: Assuming users have reliable internet connectivity is fundamental for a seamless virtual meeting experience. The software heavily depends on a stable internet connection for real-time communication, collaboration, and data transfer during virtual meetings.

Device Compatibility: It is assumed that users will access the platform from devices meeting minimum system requirements, ensuring optimal performance. The software's functionality and user interface design are dependent on device capabilities, influencing the overall user experience across various platforms.

Security Awareness: An assumption is made that users possess a basic awareness of security practices, emphasizing the importance of confidentiality during virtual meetings. The software's security features, including encryption and authentication protocols, rely on user awareness and cooperation to maintain a secure meeting environment.

Organizational Policies: It is assumed that organizations using the platform have established policies regarding virtual meeting etiquette, data sharing, and security. This assumption influences user behavior and adherence to organizational guidelines during virtual meetings.

Integration with External Platforms: The assumption is that external platforms, like calendar applications and productivity tools, maintain consistent APIs for seamless integration. Any changes or disruptions in external platform APIs may impact the software's integration, requiring adjustments to maintain functionality.

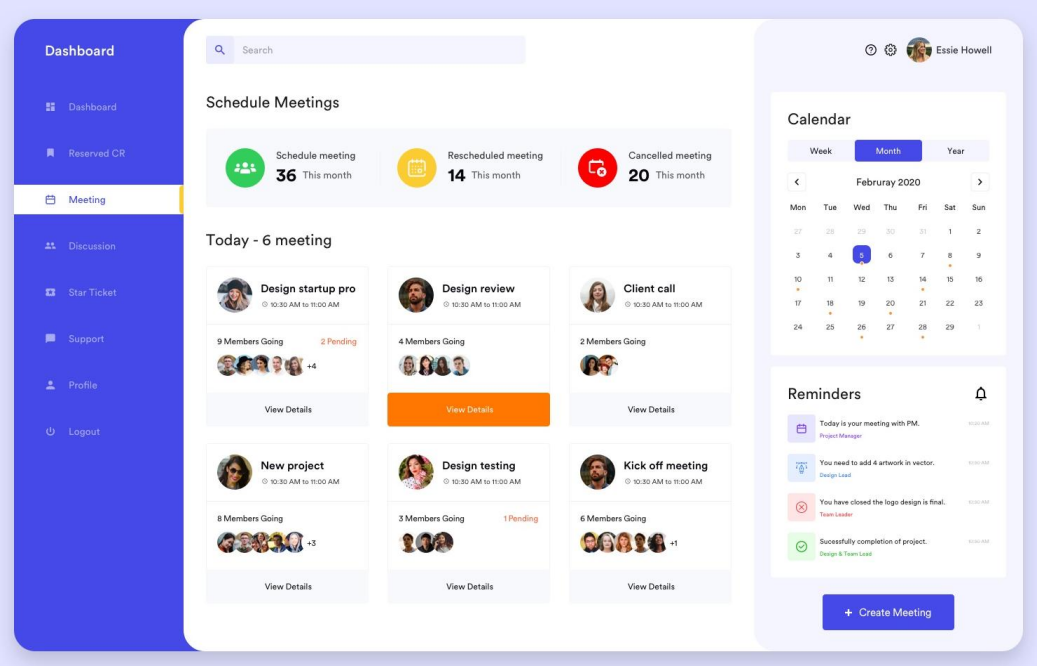
Regulatory Compliance: It is that assumed that alignment with current data protection and privacy regulations applicable to virtual meeting solutions. Dependencies arise if there are changes in regulatory requirements, necessitating updates to ensure continued compliance, affecting both functionality and user data handling.

3 Specific Requirements

3.1 External Interface Requirements

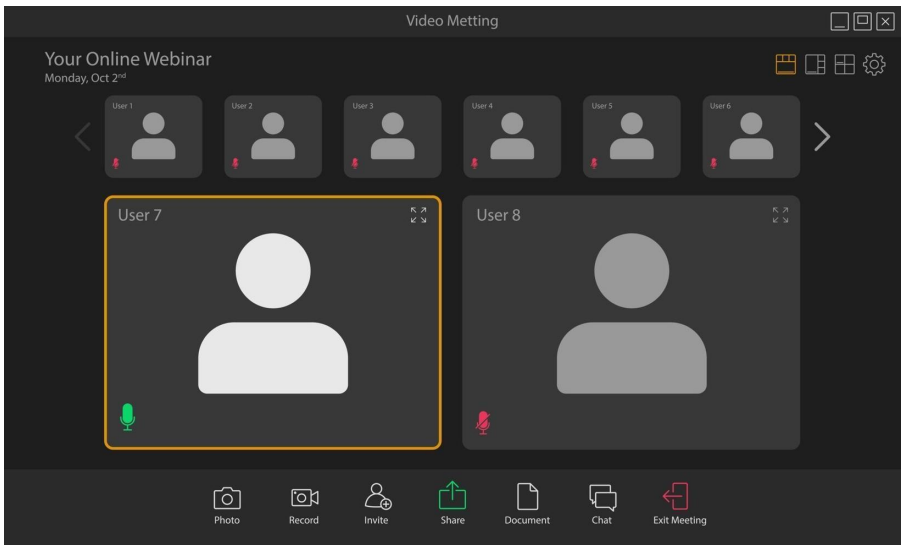
3.1.1 User Interfaces

Dashboard ui (light theme) :



This shows the dashbaord or initial screen of software where in it provides an overview of upcoming meetings, remainders, and quick access to essential features(like profile, settings, logout, help&support).

Basic UI during meeting :



The above image shows the ui of meeting where in the person is highlighted who is speaking and you get various options at the bottom of screen such as screenshot, record the meet, invite a person, share screen, share a document, chat with other memebers in meeting and lastly option to leave the meeting. Besides this green mic indicates the user is unmute and user's can talk to everyone where as red mic tells that the user is mute and its audio cant be heared.

3.1.2 Hardware Interfaces

Audio and Video Devices: Interfaces with microphones, speakers, and cameras for real-time audio and video communication. Supports USB peripherals like microphones and web cameras.

Display Devices: Interfaces with monitors, laptops, and projectors to present the virtual meeting interface. Transmits graphical user interface elements and meeting content to display devices.

Network Interfaces: Connects through wired (Ethernet) or wireless (Wi-Fi) networks for data transmission. Manages data transfer for real-time communication during virtual meetings.

Input Devices: Interfaces with keyboards and pointing devices for user interaction within the virtual meeting environment. Captures user inputs for messaging, participant management, and content sharing.

Storage Devices: Interfaces with local storage solutions for data storage. Manages storage for meeting recordings, chat logs, and temporary data.

System Resources: Interacts with CPU, RAM, and GPU resources to optimize performance. Manages resource usage for video encoding, decoding, and overall software performance.

For Computers:

CPU: Intel Core i5 or equivalent AMD processor.

RAM: Minimum 8GB for optimal performance.

GPU: Integrated graphics or dedicated GPU for video processing.

For Mobile Devices:

CPU: Quad-core processor (e.g., Snapdragon 600 series or equivalent).

RAM: Minimum 4GB for smooth operation.

GPU: Adreno 500 series or equivalent for handling graphics.

3.1.3 Software Interfaces

Browsers: Chrome, Firefox, Safari, Edge and Brave.

Operating systems: Windows, MacOS, IpadOS, iOS, wear OS, watchOS, Android and Linux.

Third party software apis for calendars(for scheduling), whiteboarding, google docs api for document sharing.

3.1.4 Communications Interfaces

Real-Time Communication Protocol (RTC): Ensures low-latency audio and video transmission for seamless interaction.

WebRTC (Web Real-Time Communication): Enables direct browser-to-browser meetings without additional installations, ensuring user convenience and security.

HTTPS (Hypertext Transfer Protocol Secure): Secures web-based interactions, including authentication and data exchange, through encrypted communication.

End-to-End Encryption: Prioritizes data security by implementing encryption for audio, video, and text communications, safeguarding user privacy.

Optimized Data Transfer Rates: Adapts to varying network conditions for smooth communication, addressing bandwidth limitations.

To ensure a smooth and uninterrupted virtual meeting experience, users are recommended to have a reliable internet connection with a minimum data speed of 1 Mbps for a satisfactory experience and 2Mbps for smooth video conferencing.

3.2 Functional Requirements

Functional requirements cover a comprehensive range of features to deliver a robust and user-friendly online virtual meeting experience :

User Authentication and Authorization: Users must be able to create accounts, log in securely, and have appropriate roles and permissions. Secure user authentication through email/password or Single Sign-On (SSO) methods. Role-based access control for meeting moderation.

Meeting Creation and Scheduling: Users should be able to create, schedule, and manage virtual meetings. Intuitive meeting setup with options for scheduling, recurring meetings, and calendar integration.

Audio and Video Conferencing: Provide high-quality audio and video conferencing capabilities. Real-time communication with features like mute/unmute, video on/off, and adaptive bandwidth usage.

Screen Sharing and Content Collaboration: Allow users to share screens and collaborate on documents. Screen sharing with multiple participants, collaborative document editing, and virtual whiteboard functionality.

Chat and Messaging Features: Enable text-based communication during virtual meetings. In-meeting chat, private messaging, and file sharing capabilities.

Participant Management: Facilitate the management of meeting participants. Add/remove participants, control participant permissions, and view participant status.

Recording and Playback: Allow users to record meetings for later playback. Secure meeting recording, storage, and playback functionality.

Virtual Backgrounds and Filters: Enhance user experience with virtual backgrounds and filters. Provide options for background customization and video filters.

Integration with Calendar and Productivity Tools: Integrate with external applications for seamless workflow. Calendar synchronization, integration with productivity tools like document editors.

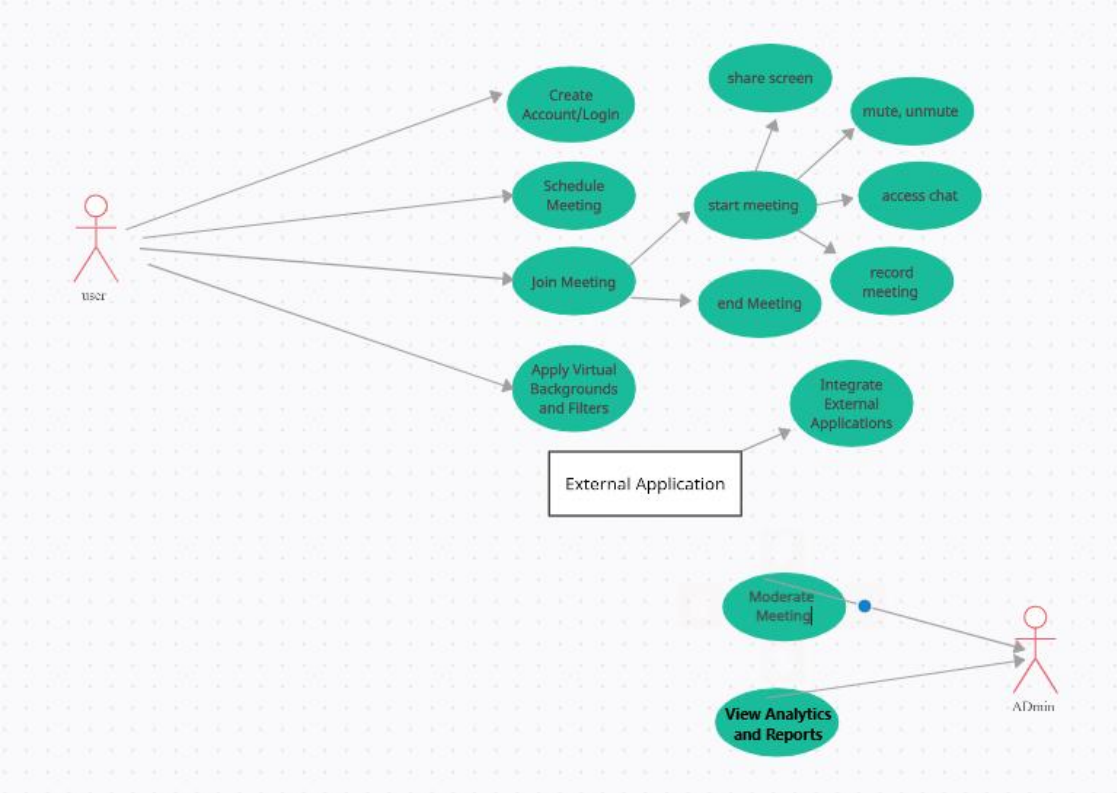
Security Features: Ensure a secure virtual meeting environment. End-to-end encryption, meeting password protection, and secure participant verification.

User Analytics and Reporting: Provide insights into user engagement and meeting performance. Analytics dashboard, attendance reports, and user behavior tracking.

Accessibility Features: Ensure accessibility for users with diverse needs. Support for screen readers, closed captioning, and other accessibility features.

3.3 Behaviour Requirements

3.3.1 Use Case View



Use Case Diagram:

Description:

The Use Case Diagram encapsulates the entire system, illustrating the goal-oriented interactions between external actors and the ConnectXperience system.

Actors:

- User: Represents individuals accessing the virtual meeting software.
- Administrator: Manages and moderates virtual meetings, ensuring smooth operation.
- External Application: Represents third-party tools or applications integrated.

Use Cases:

Create Account/Login:

- Actor: User
- Description: Allows users to create accounts or log in securely to access the platform.

Schedule Meeting:

- Actor: User
- Description: Enables users to schedule virtual meetings with various options like date, time, and recurrence.

Join Meeting:

- Actor: User
- Description: Allows users to enter scheduled meetings and engage in virtual collaboration.

Moderate Meeting:

- Actor: Administrator
- Description: Empowers administrators to manage and moderate virtual meetings, ensuring order and security.

Integrate External Applications:

- Actor: External Application

- Description: Facilitates seamless integration with external tools like calendar applications and productivity software.

Share Screen and Collaborate:

- Actor: User
- Description: Enables users to share screens and collaborate on documents during meetings.

Access Chat and Messaging:

- Actor: User
- Description: Provides in-meeting chat and messaging features for communication.

Record Meeting:

- Actor: User
- Description: Allows users to record virtual meetings for later playback and reference.

Apply Virtual Backgrounds and Filters:

- Actor: User
- Description: Enhances user experience with options for virtual backgrounds and video filters.

View Analytics and Reports:

- Actor: Administrator
- Description: Provides administrators with insights into user engagement and meeting performance.

4 Other Non-functional Requirements

4.1 Performance Requirements

1. Real-time Audio and Video Quality: The software must ensure a minimum frame rate of 30 frames per second (fps) for video and a latency of less than 500 milliseconds for real-time audio to provide a smooth and immersive meeting experience. This requirement ensures that participants experience high-quality, real-time audio and video interactions, fostering effective communication during virtual meetings.

2. Meeting Join Time: The system should allow users to join a virtual meeting within 5 seconds of initiating the join process. Also user which are invited to meeting are allowed in by host.Swift meeting access enhances user experience, particularly for participants joining time-sensitive discussions or presentations.

3. Screen Sharing Responsiveness: The software should achieve a screen sharing response time of less than 5 seconds, ensuring quick initiation and smooth collaboration during presentations. Prompt screen sharing enhances the collaborative aspect of virtual meetings, especially when sharing documents, presentations, or software demonstrations.

4. Meeting Recording Efficiency: The system must efficiently record and save meetings with a processing time not exceeding 10 seconds per minute of recorded content. Quick processing of meeting recordings ensures that users can access recorded content promptly for review or sharing without significant delays.

5. Scalability for Large Meetings: The software should support virtual meetings with up to 100 participants without significant degradation in performance. Scalability is crucial to accommodate large-scale virtual events or company-wide meetings, ensuring a seamless experience for all participants.

4.2 Safety and Security Requirements

1. Authentication and Authorization: Implement a strong authentication system that requires users to create unique login credentials, including usernames and passwords. Also, ensure that users can only access the information that is authorized for their account.

2. Secure APIs: Implement secure APIs to ensure that third-party applications do not have unauthorized access to user data. APIs should require authentication and should only allow authorized applications to access specific data.

3. Regular Updates: Keep the application updated with the latest security patches and upgrades to address any potential security vulnerabilities.

4. Security Testing: Perform regular security testing and assessments to identify and address any security vulnerabilities before they can be exploited by attackers.

4.3 Software Quality Attributes

1. **Reliability**: The software must achieve a 99.9% uptime, ensuring a reliable virtual meeting experience. In case of unexpected disruptions, the system should have automatic recovery mechanisms to minimize downtime. Reliability is critical to providing a consistent and dependable virtual meeting platform, ensuring users can access and participate in meetings without service interruptions.

2. **Usability**: The user interface must follow established usability principles, allowing participants to navigate the platform intuitively. A user satisfaction survey will be conducted regularly, and the software should maintain a satisfaction rate above 85%. Usability is essential for user adoption and satisfaction. A user-friendly interface enhances the overall virtual meeting experience, promoting effective collaboration.

3. **Maintainability**: The software architecture should be modular, allowing for easy updates and maintenance. The development team must follow coding standards, and the codebase should have comprehensive documentation.Maintainability ensures that the software can adapt to changes efficiently. Modular architecture and well-documented code simplify updates and bug fixes, contributing to the long-term viability of the virtual meeting platform.

4. **Security Robustness**:The software should undergo regular security audits and vulnerability assessments. Any identified vulnerabilities must be addressed promptly, with a commitment to continuous improvement in security measures.Security robustness is paramount for safeguarding user data and maintaining trust. Regular assessments and prompt resolution of vulnerabilities enhance the overall security posture of the virtual meeting software.

5. **Interoperability**:The software must support integration with commonly used calendar applications (e.g., Google Calendar, Microsoft Outlook) and third-party productivity tools. API documentation should be comprehensive and accessible. Interoperability ensures seamless integration with external applications, enhancing the overall productivity of users who rely on various tools in their workflow. Comprehensive API documentation facilitates smooth integration processes for developers.

Appendix A – Data Dictionary

Variable	Description	Operations and Requirements
User Credentials	Information for user authentication (username, password)	- Users can create accounts with unique usernames and secure passwords. - Secure login process with authentication checks.
Meeting Details	Information related to scheduled meetings	- Users can create and manage meetings with details like date and time. - Options for scheduling, recurring meetings, and calendar integration.
Audio and Video Devices	Interfaces with microphones, speakers, and cameras	- Support for USB peripherals like microphones and web cameras. - Real-time communication features (mute/unmute, video on/off).
Display Devices	Interfaces with monitors, laptops, and projectors	- Transmit graphical user interface elements and meeting content. - Ensure compatibility with various display devices.
Network Interfaces	Connects through wired (Ethernet) or wireless (Wi-Fi)	- Ensure data transmission for real-time communication. - Adapt to varying network conditions for smooth communication.
Input Devices	Interfaces with keyboards and pointing devices	- Capture user inputs for messaging, participant management. - Support for various input devices for user interaction.
Storage Devices	Interfaces with local storage solutions	- Manage storage for meeting recordings, chat logs, and data. - Ensure efficient storage management for recorded content.

System Resources	Interacts with CPU, RAM, and GPU resources	- Optimize performance for video encoding, decoding, and processing. - Ensure efficient utilization of system resources.
RTC Protocol	Real-Time Communication Protocol	- Ensure low-latency audio and video transmission.
WebRTC	Web Real-Time Communication	- Enable browser-to-browser meetings without additional installations.
HTTPS	Hypertext Transfer Protocol Secure	- Secure web-based interactions including authentication and data exchange.
End-to-End Encryption	Data encryption for audio, video, and text communications	- Prioritize data security for confidential virtual interactions.
Meeting Analytics	Insights into user engagement and meeting performance	- Analytics dashboard for tracking usage patterns and performance metrics.
Accessibility Features	Support for users with diverse needs	- Implementation of features like screen readers and closed captioning.
Uptime	System availability percentage	- Achieve 99.9% uptime for a reliable virtual meeting experience.
Usability Rate	User satisfaction rate	- Regular user satisfaction surveys with a target rate above 85%.

Modular Architecture	Design allowing for easy updates and maintenance	- Codebase adheres to coding standards with comprehensive documentation.
Security Audits	Regular security assessments and audits	- Identify and address security vulnerabilities promptly.
API Documentation	Comprehensive documentation for third-party integration	- Ensure accessible and well-documented APIs for interoperability.

Appendix B - Group Log

Date	Actors	Work Done
31/01/2024	**Riddhi, Dhruvin**	**Analysed Requirements**
7/02/2024	**Riddhi, Dhruvin**	**Prepared SRS**