Video Conferencing Web App

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Document Version Control

Date Issued	Version	Description	Author
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Contents

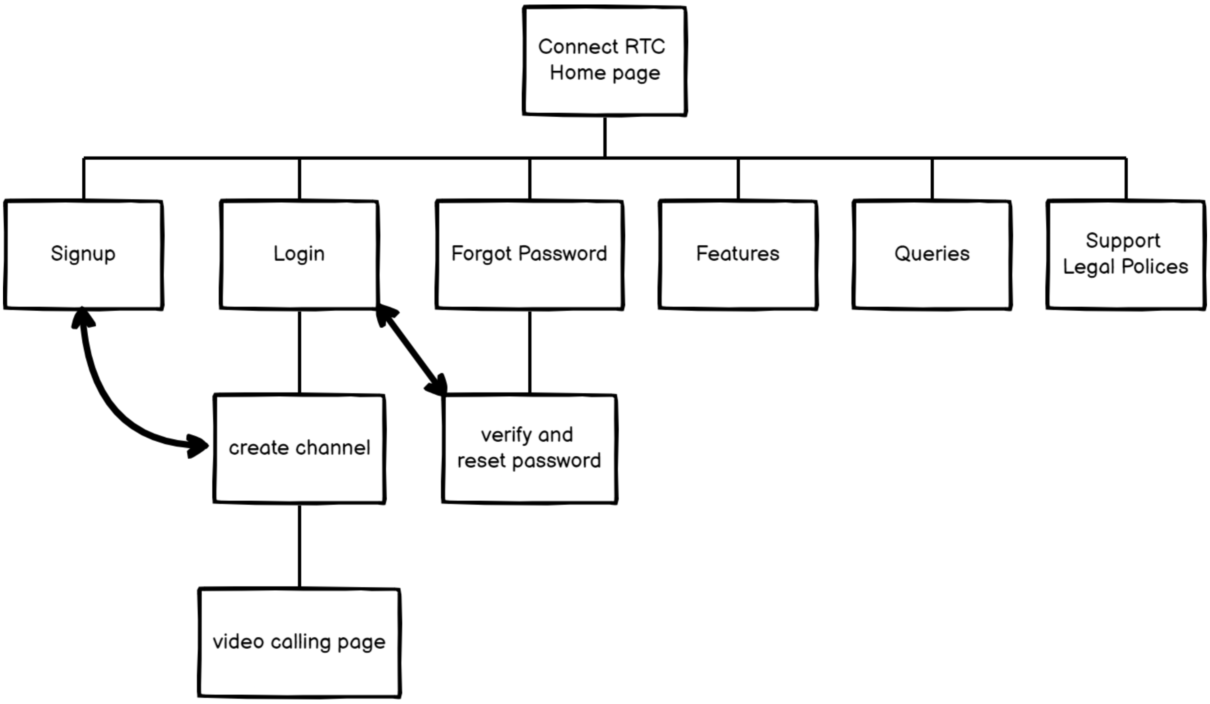
Abstract:

In an increasingly interconnected world, the need for seamless and efficient communication has driven the evolution of digital platforms. This High-Level Design (HLD) document outlines the architecture and functionality of a cutting-edge website designed to facilitate video conferencing through WebRTC (Web Real-Time Communication) technology. As remote interactions become the norm, this website aims to empower users with a powerful and intuitive platform for virtual meetings. By harnessing the capabilities of WebRTC, the website provides real-time audio and video communication, transcending geographical boundaries and enabling face-to-face interactions in a virtual environment and screen sharing. This document will delve into the system's architecture, component interactions, data flow, security considerations, scalability, and more, offering a comprehensive overview of how this innovative platform redefines modern communication through its seamless video conferencing capabilities.

Site Map:

Site Map Explanation for Video Conferencing Website:

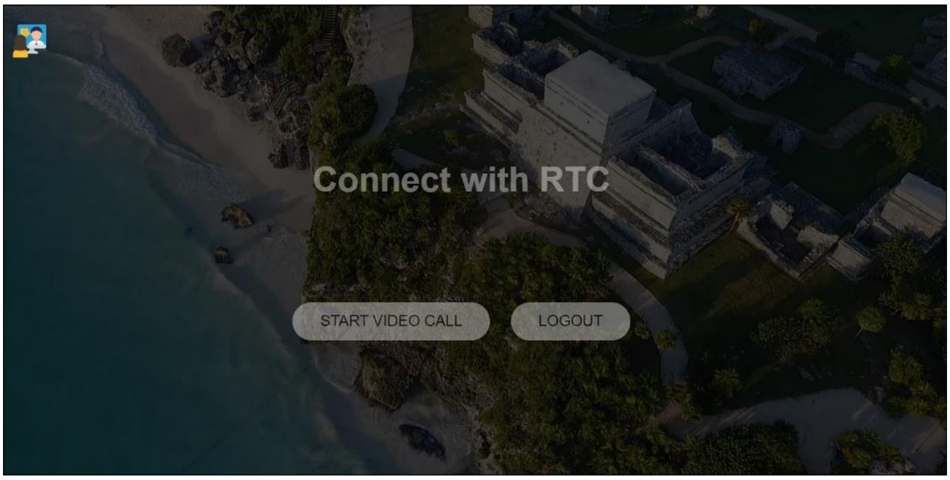
The site map for the video conferencing website is a visual representation of its structure and hierarchy. It outlines the main sections, pages, and navigation paths that users can take to access various features and functionalities. The site map ensures that users can easily navigate through the website, initiate video conferences, and engage in real-time communication.

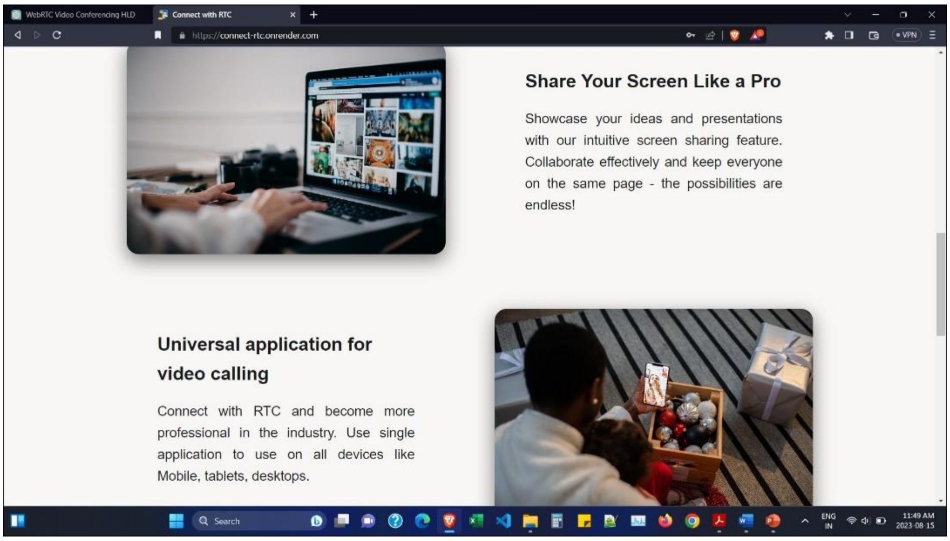


1. Home Page:

- Welcome users to the website.
- Provide an overview of the platform's features and benefits.
- Include a "Get Started" button that leads to the registration/login page.
- Include asked queries form uses.
- Footer with policy’s and copyright.

High Level Design





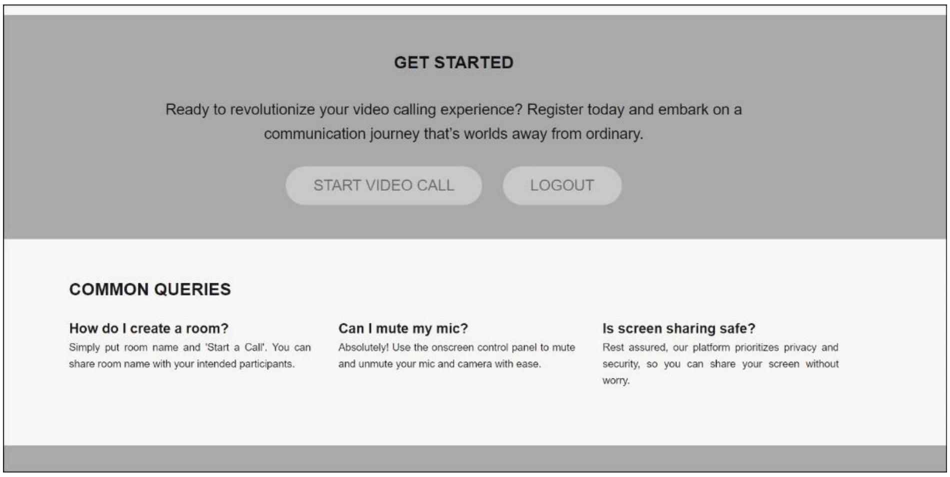
WebRTC Video Conferencing HLD
Connect with RTC
https://connect-rtc.onrender.com

Share Your Screen Like a Pro

Showcase your ideas and presentations with our intuitive screen sharing feature. Collaborate effectively and keep everyone on the same page - the possibilities are endless!

Universal application for video calling

Connect with RTC and become more professional in the industry. Use single application to use on all devices like Mobile, tablets, desktops.



GET STARTED

Ready to revolutionize your video calling experience? Register today and embark on a communication journey that's worlds away from ordinary.

COMMON QUERIES

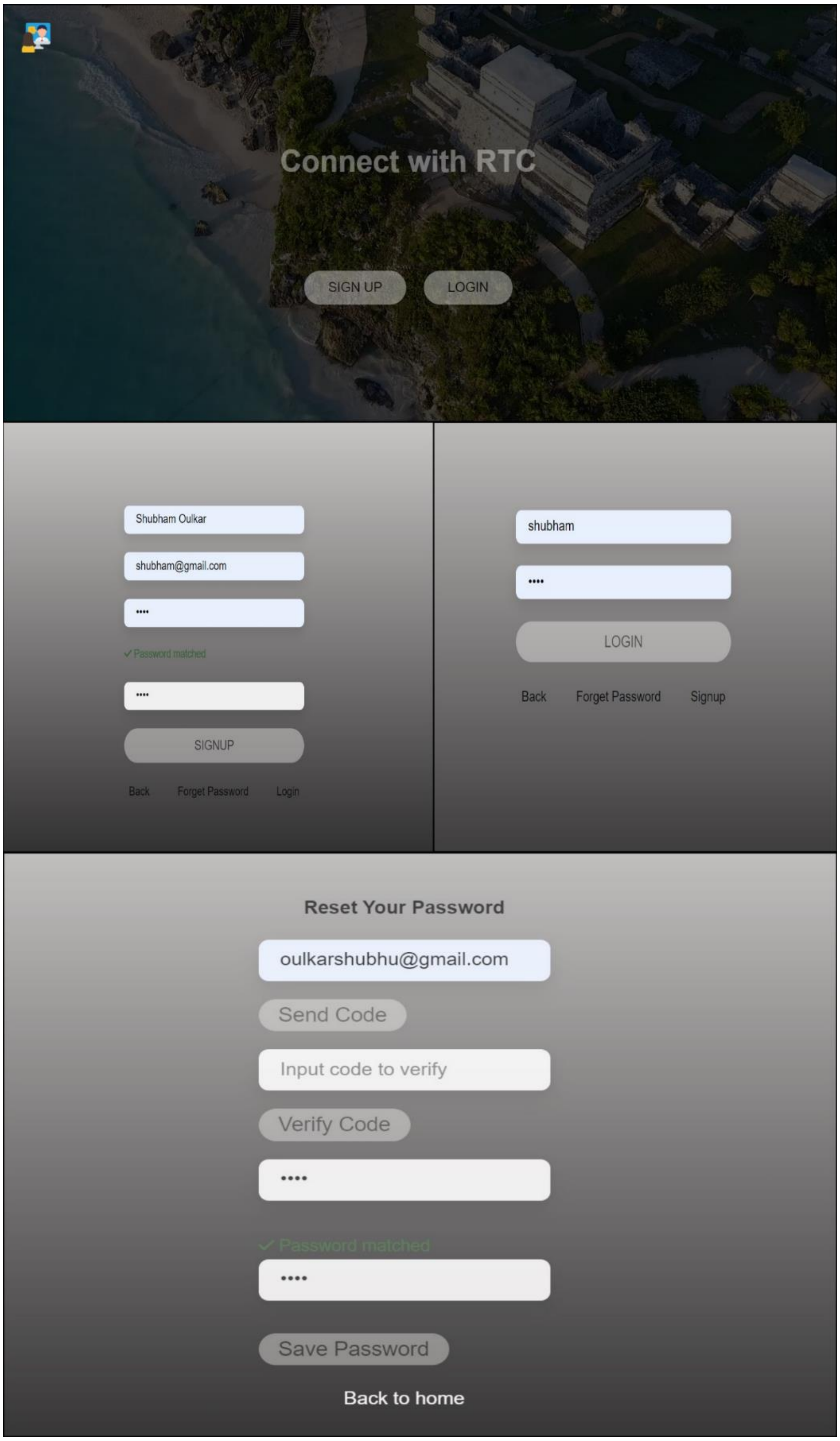
How do I create a room?
Simply put room name and 'Start a Call'. You can share room name with your intended participants.

Can I mute my mic?
Absolutely! Use the onscreen control panel to mute and unmute your mic and camera with ease.

Is screen sharing safe?
Rest assured, our platform prioritizes privacy and security, so you can share your screen without worry.

2. Authentication:

- Login: Allow registered users to log in using their credentials.
- Registration: New users can create an account.
- Forgot Password: Provide a password recovery option.



Shubham Oulkar

shubham@gmail.com

••••

✓ Password matched

••••

shubham

••••

oulkarshubhu@gmail.com

Input code to verify

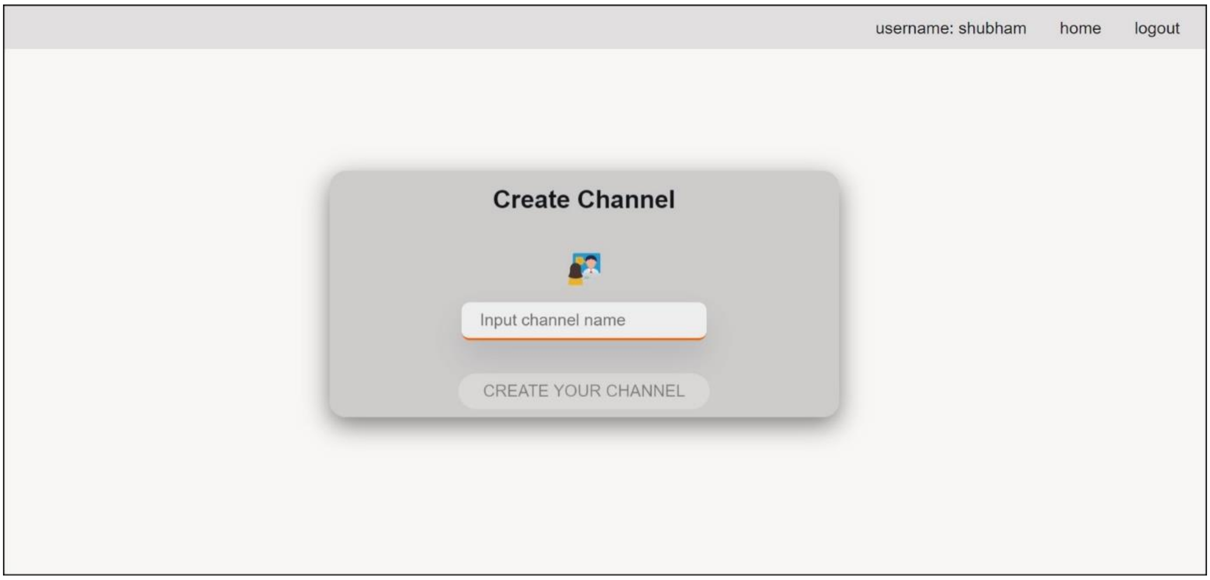
••••

✓ Password matched

••••

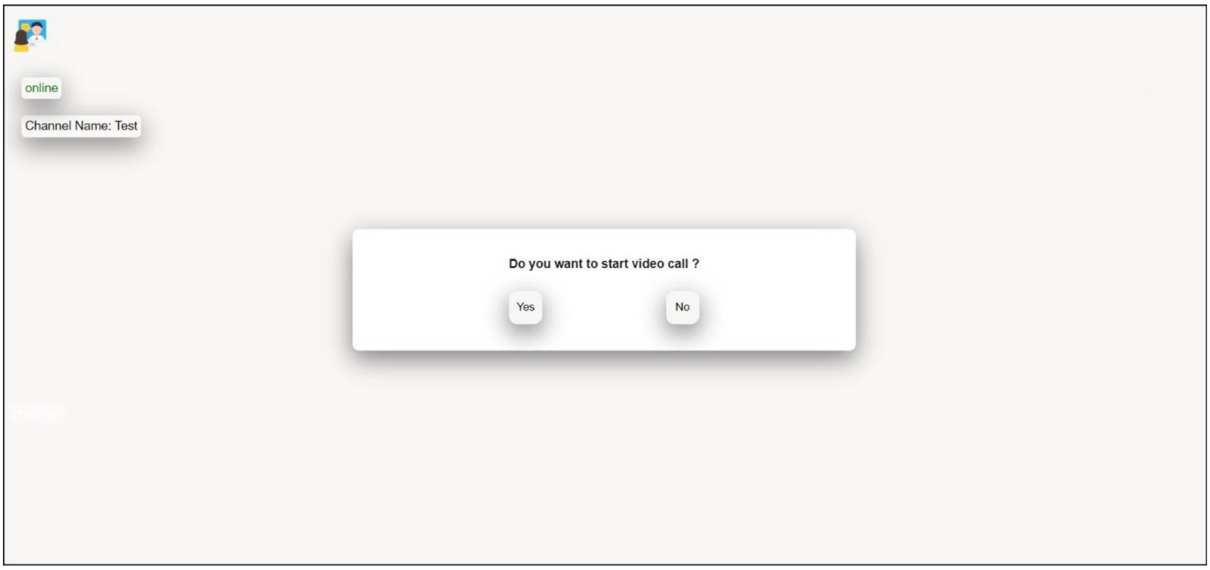
3. Create Channel:

- Form for setting up a new channel.
- "create channel" button to initiate the video call.


username: shubham

4. Start Conference:

- Option to enable/disable video and audio before joining.

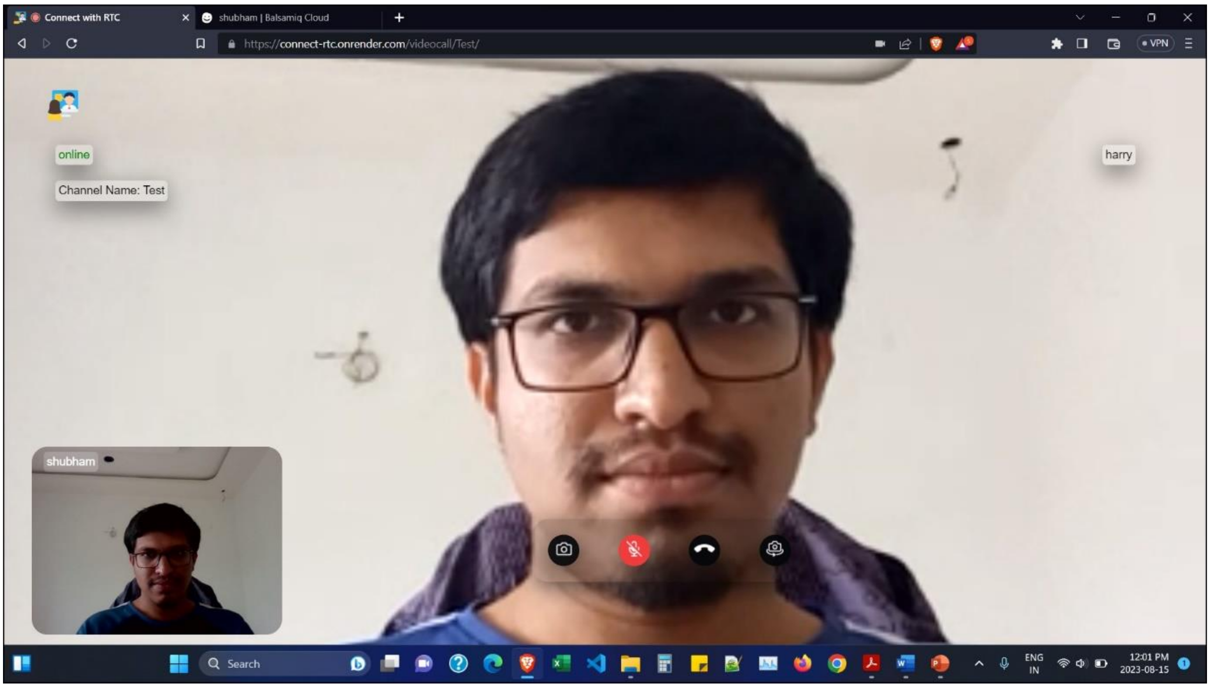

online

Channel Name: Test

Do you want to start video call ?

5. Video calling Room:

- Main interface for active conferences.
- Display user video streams and controls for muting/unmuting.
- Screen sharing option.
- Show channel name, internet connection status.
- Remote peer username.



8. Help and Support:

- FAQs: Frequently asked questions about using the platform.
- Contact: Information on how to get in touch with customer support.

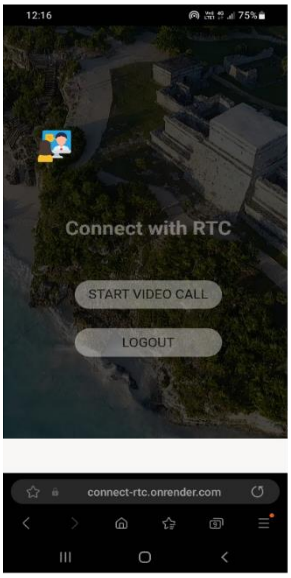
9. Privacy and Security:

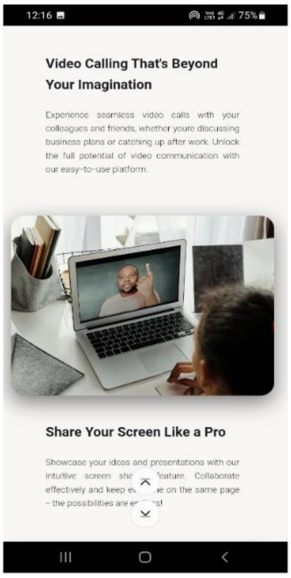
- Information on the platform's security measures and data protection policies.
- Terms of Service and Privacy Policy.

10. Logout:

- Log out the user from the platform.

UI for mobile devices:



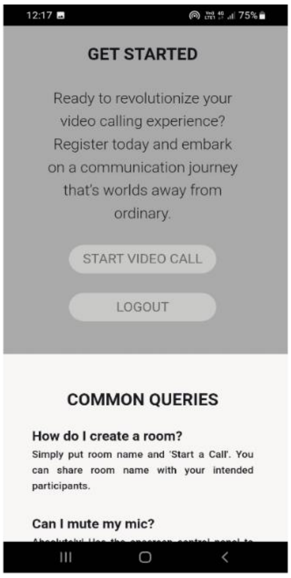


Video Calling That's Beyond Your Imagination

Experience seamless video calls with your colleagues and friends, whether youre discussing business plans or catching up after work. Unlock the full potential of video communication with our easy-to-use platform.

Share Your Screen Like a Pro

Showcase your ideas and presentations with our intuitive screen sha feature. Collaborate effectively and keep ev e on the same page – the possibilities are e s!



Ready to revolutionize your video calling experience? Register today and embark on a communication journey that's worlds away from ordinary.

COMMON QUERIES

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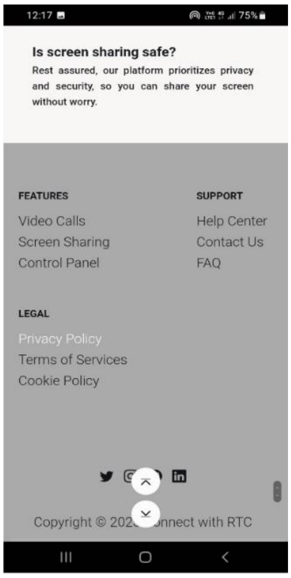
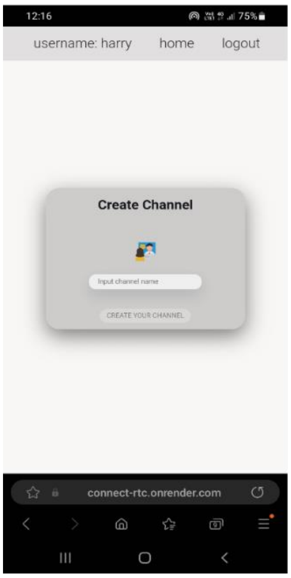
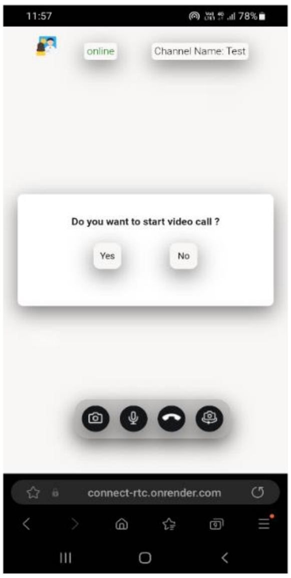


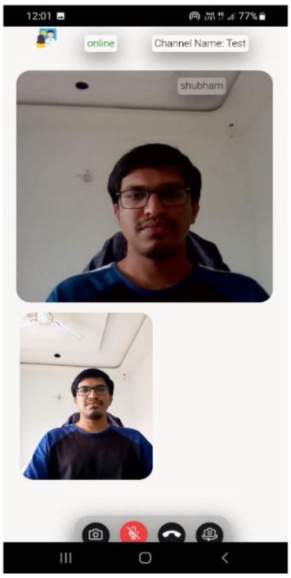
Is screen sharing safe?

Rest assured, our platform prioritizes privacy and security, so you can share your screen without worry.





Do you want to start video call ?



Navigation Paths:

1. User Registration and Channel Creation:

Home > Registration > Dashboard > Create Channel

2. User Login and Create Channel:

Home > Login > Dashboard > Create Channel

4. Accessing Help and Support:

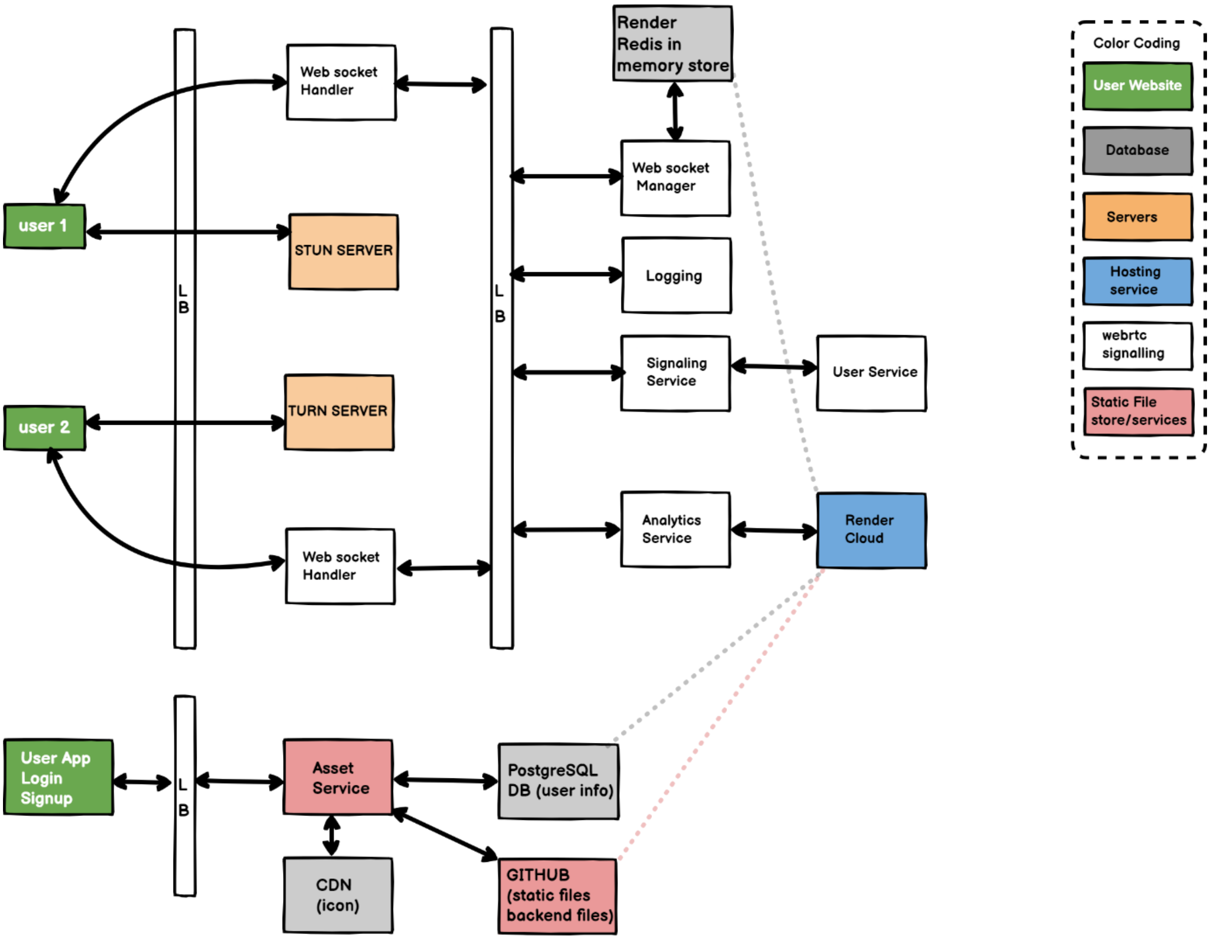
Dashboard > Help and Support > FAQs

5. Initiating a Channel and Interacting in Video calling Room:

Dashboard > Create Channel>Start video call

The site map provides an intuitive guide for users, helping them navigate through the website effortlessly and access the essential features for video conferencing using WebRTC technology. It ensures a smooth user experience, efficient communication, and seamless interactions within the virtual conferencing environment.

Architecture



1. User Authentication and Management:

- This component handles user registration, authentication, and profile management.
- It interfaces with the User Interface (UI) module to facilitate user login and registration processes.
- User authentication tokens are generated and managed to ensure secure access to the system.

2. WebRTC Integration with STUN/TURN Servers:

- At the core of the architecture, the WebRTC integration component harnesses the power of WebRTC library and APIs.

- STUN (Session Traversal Utilities for NAT) and TURN (Traversal Using Relays around NAT) servers are integrated to address network traversal challenges.
- STUN servers help discover public IP addresses and ports to establish peer-to-peer connections, while TURN servers act as relays when direct connections are not feasible.

3. **Real-time Communication Handling with Redis & Django-channels:**

- This component manages the real-time communication layer between users participating in conferences.
- It handles the signalling process (Web socket), enabling participants to negotiate connection parameters, exchange information, and synchronize their interactions.
- As users join or leave conferences, this component updates the conference state and informs participants.
- Harnessing the prowess of Django Channels and internal Redis service, it crafts a robust WebSocket-based signalling infrastructure.

4. **User Interface (UI):**

- Users are empowered to effortlessly initiate, join, or oversee conferences through this interface.
- Within the UI, video streams are elegantly displayed, participants can mute/unmute, share screens seamlessly, and participate in text-based conversations.

5. **Data Storage Using PostgreSQL for Django:**

- The Data Storage component is anchored by an internal PostgreSQL environment, meticulously chosen to underpin the Django framework.
- User profiles, authentication data, and conference history are securely stored within this environment, ensuring the sanctity of data.

- Conference history retrieval and user-related features are adeptly facilitated by this robust integration.

6. **GitHub Integration for Storing Static Files and Assets:**

- A key aspect of this architecture is the seamless integration of GitHub for storing static files and various assets.
- GitHub serves as a reliable repository for static content, enhancing the website's performance and facilitating efficient asset management.

7. **To understand behaviour of the application and to debug unexpected issues or tracking Events logging file is used. So this this is source of information to debug errors.**

Render Deployment for Hosting:

- Elevating this architecture is the deployment on Render, a strategic choice that ushers the platform into the realm of high-performance hosting.
- Render's infrastructure ensures scalability, reliability, and rapid deployment, fortifying the architecture's prowess.

Security Considerations:

- The architecture is fortified by Django's advanced security measures tailored for production environments.
- Protection against common vulnerabilities, session management, and robust user authorization mechanisms are meticulously employed to secure the platform.

Scalability:

- Integration with Redis for WebSocket-based signalling enhances scalability by efficiently handling real-time interactions among a growing number of users.
- The UI design is responsive, allowing users to access the platform from various devices, supporting scalability across different platforms.
- PostgreSQL's robust architecture supports vertical and horizontal scaling, enabling the system to handle increased data loads.
- GitHub's scalable infrastructure ensures efficient distribution of static assets, enabling the system to handle increased traffic.
- Render's auto-scaling capabilities ensure the platform can handle varying levels of user traffic without compromising performance.

In **conclusion**, this High-Level Design (HLD) envisions a video conferencing website architecture that is not only feature-rich but also prioritizes scalability and performance. The seamless integration of various components, technologies, and services ensures that the platform can grow and perform seamlessly while offering a secure, user-friendly, and immersive video conferencing experience.