

Flash (Connect App) - Collaboration Platform Design Document

1 Overview

This platform enables real-time communication and collaboration between students, corporate teams, and organizations. It supports chat, video conferencing, content sharing, and task coordination.

2 Core Features

- User authentication (Login, Logout, Account Creation)
- Group and private messaging (chat interface)
- Video conferencing
- Post creation and interaction (comments)
- Channel creation for content sharing

3 System Requirements

3.1 Functional (User-Facing)

Must-Have Features:

- ✓ User Accounts (Login, Sign-up, Email verification)
- ✓ Organization Management (Create/join orgs)
- ✓ Group & Private Messaging
- ✓ Posts & Comments
- ✓ File Sharing (Docs, PDFs, etc.)
- ✓ Video Uploading & Playback
- ✓ Voice & Video Calling (WebRTC-based)

- ✓ Polls & Surveys
- ✓ Notifications (push + in-app)
- ✓ Search (Users, posts, files)
- ✓ User Roles & Permissions (e.g., admin, member)
- ✓ Dark Mode / Light Mode

Nice-to-Have Features:

- ✓ AI Assistant (e.g., summarizing discussions or posts)
- ✓ Calendar Integration (for events)
- ✓ Task Management
- ✓ Emoji/GIF Support in Chat
- ✓ Analytics Dashboard for Organizations

3.2 Non-Functional (System-Facing)

System Requirements:

- Authentication & Authorization
 - OAuth2 / JWT for secure access
 - Role-based access control
- Scalability
 - Microservices (modular design)
 - Load balancers
 - Kubernetes or Docker-based deployment
- Real-Time Support
 - WebSockets / Socket.IO
 - Optional: Firebase Cloud Messaging (FCM)
- Security
 - Input sanitization
 - HTTPS (SSL/TLS)
 - Rate limiting
 - Secure file uploads
 - GDPR/CCPA compliance

- Performance
 - Redis caching
 - CDN for static files
 - Lazy loading
- Monitoring & Logging
 - Prometheus + Grafana
 - Sentry
 - ELK Stack (Elasticsearch, Logstash, Kibana)
- Testing
 - Unit, Integration, and E2E testing (Jest, Cypress, Postman)

4 User Roles

Role	Permissions
Admin	Full access, user/org management, analytics
Moderator	Manage posts, reports
Member	Standard access (chat, post, call, share)
Guest	Limited access, invited or trial accounts

5 Integrations and Services

- Video Calls: WebRTC + Mediasoup / Twilio
- File Storage: AWS S3 / Firebase Storage
- Auth: Firebase Auth / Auth0 / Custom
- Notifications: FCM (Firebase Cloud Messaging)
- Email: SendGrid / Amazon SES
- Payments (optional): Stripe / PayPal
- DevOps: GitHub Actions / Docker / Kubernetes

6 Suggested MVP Features

1. ✓ User Authentication (Sign-up/login + JWT)
2. ✓ Organization creation and team invite
3. ✓ Basic group/private chat

4. ✓ File upload and download
5. ✓ Posts and comments (forum-style)
6. ✓ Poll creation and voting
7. ✓ Video uploading and playback
8. ✓ Basic voice/video calling
9. ✓ Notifications (email + push)
10. ✓ Simple admin dashboard

7 Future Features

- AI-based chat summarization
- Auto-transcription of video calls
- Voice-to-text notes
- Workspace themes & customization
- Slack / Teams integration
- LMS (Learning Management System) plugins

8 Tech Stack

Languages & Frameworks

- Frontend: React.js, Tailwind CSS, React Native, Flutter
- Backend: Node.js (Express / NestJS), Python (FastAPI), Go, Java (Spring Boot)
- Android Native: Java
- C (for integrations if needed)

Real-Time Communication with Node.js + Socket.IO

Why Use It?

- ✓ Instant messaging
- ✓ Typing indicators
- ✓ Live polls

- ✓ Real-time notifications
- ✓ Online/offline presence
- ✓ Video/voice call signaling

Socket.IO Summary:

- Enables bidirectional, event-driven communication over WebSockets
- Server-side: Node.js
- Client-side: React / React Native using Socket.IO client

9 Why This Stack Works Well

Feature	Node.js + Socket.IO
Real-Time Communication	WebSocket support for two-way data flow
Full JavaScript Stack	Unified language across front and back end
Event-Based Model	Ideal for chat, calls, notifications
Performance	Handles concurrent users efficiently
Cross-Platform	Works on web and mobile easily

10 Use Cases

- Group / Private Messaging: Real-time message exchange
- Typing Indicators: Emit typing status
- Read Receipts: Acknowledge message view
- Live Polls: Push updates instantly
- Notifications: Instant alerts
- Call Signaling: Setup audio/video sessions