

Final Year Project: Collaborative Whiteboard (MERN + WebSockets)

Phase 1: Boilerplate Setup

Tasks:

- Set up React (Vite) + Tailwind CSS + ShadCN
- Initialize Express backend with folder structure
- Connect MongoDB Atlas
- Add socket.io server setup
- Prepare .env files, Prettier, ESLint config

Technologies:

- Vite, React, Tailwind CSS, ShadCN UI
- Express.js, MongoDB Atlas
- socket.io, dotenv, Prettier, ESLint

Phase 2: Advanced Whiteboard UI

Tasks:

- Integrate react-konva for canvas rendering
- Add shape tools: rectangle, circle, arrow, line
- Add freehand pen, text tool, sticky notes
- Implement drag, resize, rotate for all elements
- Build UI: toolbar, color picker, layer controls
- Add undo/redo functionality

Technologies:

- react-konva, Konva.js
- Zustand/Redux (state management)
- Tailwind CSS, ShadCN UI

Phase 3: Real-time Collaboration

Tasks:

- Connect socket.io client to backend
- Emit and listen for drawing updates
- Sync shape/text/sticky movements in real-time
- Show user cursors and presence
- Manage rooms and board sessions

Technologies:

- socket.io, Express.js
- UUID (unique IDs), Zustand
- MongoDB (for session data)

Phase 4: Authentication & Room System

Tasks:

- Add JWT or Google OAuth login/signup
- Create public/private boards
- Assign viewer/editor/admin roles
- Build user dashboard to manage boards

Technologies:

- Auth.js / Firebase Auth / JWT
- MongoDB (users, boards, permissions)
- React Router, Cookies/Token storage

Phase 5: Communication & Replay

Tasks:

- Add WebRTC audio chat (per room)
- Add in-board chat with socket.io
- Implement board replay (action timeline)
- Enable versioning and restore capability

- Export board as PNG or PDF

Technologies:

- simple-peer / PeerJS (WebRTC)
- socket.io (chat)
- html-to-image / Konva export
- MongoDB (history log, versions)

Phase 6: Extra Features & Polish

Tasks:

- Add minimap with zoom/pan controls
- Build pre-designed board templates
- Enable PDF/doc annotation support
- Add emoji reactions and dark mode
- Implement keyboard shortcuts and settings panel
- Add AI assistant to generate flowcharts from text

Technologies:

- react-hotkeys-hook, react-colorful
- pdf.js, Gemini API / OpenAI API
- Konva layers, Zustand, Tailwind dark mode