

**Core architecture & functionality** to be scalable:

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## 1. Frontend (User Interface Layer)

**Technology Stack:**

- **Next.js (React + TypeScript)** → SEO-friendly, SSR + CSR hybrid rendering.
- **TailwindCSS** or **MUI** → Clean, fast UI.
- **PWA (Progressive Web App)** → Works offline, can be installed like an app.
- **WebRTC / Web Speech API** → For voice-based interaction.

**Core Frontend Features:**

- Multi-device responsive dashboard (mobile-first).
  - Secure Firebase Auth login (Google, email/password, possibly OAuth with hospitals).
  - User profile & medical history viewer.
  - Document upload (PDF, image) → sent to OCR.
  - Chat-style AI assistant powered by Gemini.
  - Health timeline visualization (charts from vitals & lab results).
  - Notifications for medication and appointments (Firebase Cloud Messaging).
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## 2. Backend & AI (Business Logic Layer)

**Core Services:**

- **Gemini API Integration**

- Summarize medical reports.
    - Answer patient queries.
    - Translate medical jargon to simple language.
    - Generate care reminders based on input data.
  - **Document AI (OCR)**
    - Extract text from uploaded prescriptions, lab reports, handwritten notes.
  - **Cloud Functions (Serverless)**
    - Trigger AI processing when new documents are uploaded to Firebase Storage.
    - Handle API requests from frontend to Gemini and healthcare APIs.
    - Automate notifications when new data indicates risk.
  - **API Integrations**
    - Healthcare APIs (FHIR/HL7) for pulling medical records.
    - Wearable device APIs (Fitbit, Apple Health, Google Fit).
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### 3. Database & Storage (Data Layer)

#### Firestore Services:

- **Firestore** → Store structured medical data, AI summaries, chat history.
  - **Cloud Storage** → Store unstructured files like PDFs, images, and voice notes.
  - **Firebase Auth** → Secure authentication & role-based access control.
  - **Firestore Rules** → Enforce HIPAA/GDPR-level access restrictions.
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## 4. Monitoring, Logging, and Security

- **Firebase Analytics** → Track user engagement, retention, and feature usage.
  - **Cloud Logging** → Monitor API calls, AI model performance, and error rates.
  - **Firebase App Check** → Prevent unauthorized backend access.
  - **End-to-End Encryption** → For sensitive data transfer and storage.
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## 5. Scalability Principles

- Use **Cloud Functions** for auto-scaling compute.
  - Keep Gemini calls **stateless** to scale horizontally.
  - Store **processed summaries & embeddings** in Firestore to reduce repeated AI calls.
  - Leverage **Firebase CDN hosting** for blazing-fast static content delivery.
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✅ This setup would give you:

- **Fast frontend** with modern tech stack.
- **Serverless backend** that scales automatically.
- **AI-powered features** directly integrated with Gemini.
- **Fully managed database** (Firebase) with built-in auth & security.