

NeuroAssist AI – Detailed Software Requirements Document (SRD)

Version: 4.0 (MAX Requirements)

Version: 4.0 (MAX Requirements)

Version: 4.0 (MAX Requirements)

****Purpose**:** This is the definitive engineering specification. It includes API contracts, Failure Mode Analysis (FMEA), UI component specs, and full traceability.

Version: 4.0 (MAX Requirements)

1. System Architecture & Deployment

SRD-1.1: The system **shall** be architected as a set of Docker containers: Frontend (React/Nginx), Backend (FastAPI/Uvicorn), and Database (PostgreSQL).

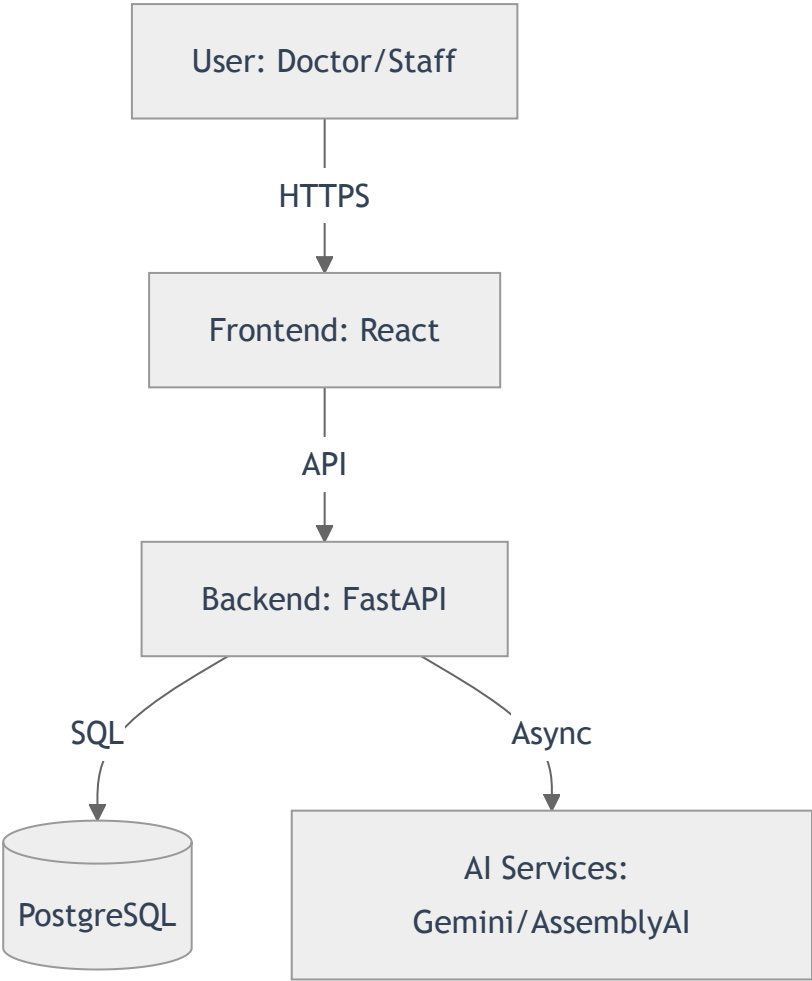
SRD-1.2: The backend service **shall** be stateless to allow horizontal scaling behind a load balancer.

SRD-1.3: The system **shall** be deployable on a local developer machine using `docker-compose`.

SRD-1.4: The system **shall** be compatible with cloud-managed PostgreSQL services (e.g., AWS RDS, GCP Cloud SQL).

SRD-1.5: All inter-service and client-server communication **shall** be encrypted using TLS 1.2 or higher (HTTPS).

1.1 Architecture Diagram



SRD-1.5: All inter-service and client-server communication **shall** be encrypted using TLS 1.2 or higher (HTTPS).

2. API Contract Requirements

SRD-1.5: All inter-service and client-server communication **shall** be encrypted using TLS 1.2 or higher (HTTPS).

2.1 Consultation Endpoints

2.2 Triage Endpoints

SRD-1.5: All inter-service and client-server communication **shall** be encrypted using TLS 1.2 or higher (HTTPS).

3. Failure Mode & Effects Analysis (FMEA)

SRD-1.5: All inter-service and client-server communication **shall** be encrypted using TLS 1.2 or higher (HTTPS).

SRD-1.5: All inter-service and client-server communication **shall** be encrypted using TLS 1.2 or higher (HTTPS).

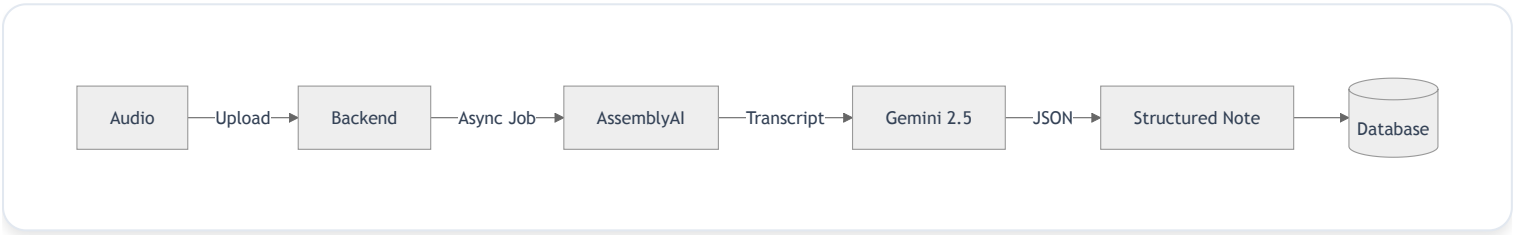
4. Audio Capture & Transcription

- SRD-4.1:** The frontend **shall** provide a single, accessible UI control to toggle recording Start/Stop.
- SRD-4.2:** The frontend **shall** render a real-time visual waveform of the audio input.
- SRD-4.3:** The system **shall** automatically stop recording if the duration exceeds 15 minutes.
- SRD-4.4:** The system **shall** utilize the AssemblyAI API for asynchronous speech-to-text processing.
- SRD-4.5:** The transcription request **shall** enable Speaker Diarization ("Doctor" vs "Patient").
- SRD-4.5:** The transcription request **shall** enable Speaker Diarization ("Doctor" vs "Patient").

5. SOAP Note Generation

- SRD-5.1:** The system **shall** use the Google Gemini 2.5 Flash model for generating clinical notes.
- SRD-5.2:** The AI prompt **shall** enforce a strict JSON output schema containing `subjective`, `objective`, `assessment`, and `plan`.
- SRD-5.3:** The system **shall** allow the Doctor to manually edit any section of the generated SOAP note.

5.1 AI Data Pipeline

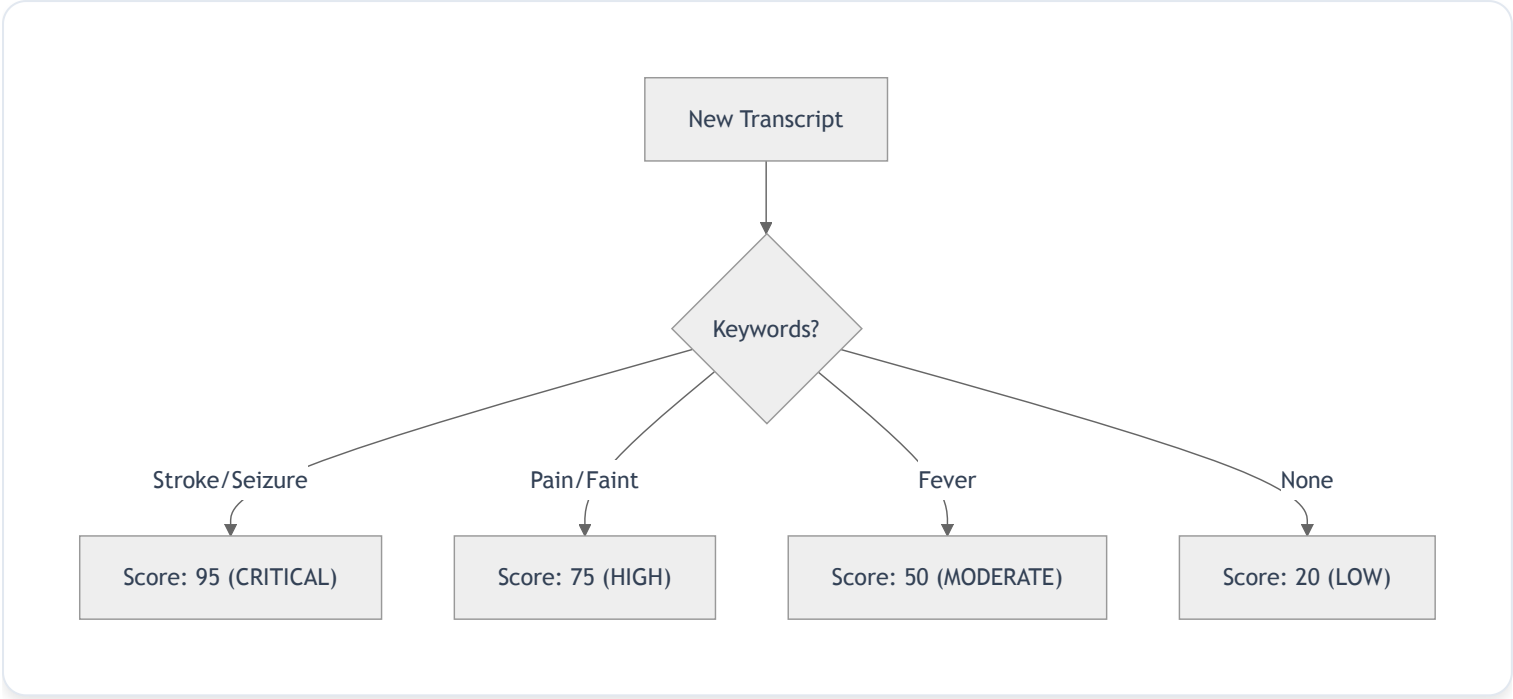


- SRD-5.3:** The system **shall** allow the Doctor to manually edit any section of the generated SOAP note.

6. Triage & Queue Management

- SRD-6.1:** The `TriageService` **shall** calculate a risk score (0-100) based on keyword checking.
- SRD-6.2:** The system **shall** categorize urgency as:
- CRITICAL (≥ 95):** "Stroke", "Suicide".
- HIGH (≥ 75):** "Fainting".
- MODERATE (≥ 50).**
- LOW (< 50).**
- SRD-6.3:** Patients with `CRITICAL` status **shall** be displayed with a visual Red Badge indicator.

6.1 Triage Logic



SRD-6.3: Patients with `CRITICAL` status **shall** be displayed with a visual Red Badge indicator.

7. UI/UX Component Specifications

SRD-6.3: Patients with `CRITICAL` status **shall** be displayed with a visual Red Badge indicator.

SRD-6.3: Patients with `CRITICAL` status **shall** be displayed with a visual Red Badge indicator.

8. Security & Compliance

SRD-8.1: API Authentication **shall** utilize stateless JSON Web Tokens (JWT).

SRD-8.2: Patient Health Information (PHI) **shall** be encrypted at rest in the database and file storage.

SRD-8.3: The system **shall** log detailed audit trails sufficient for HIPAA compliance reviews.

SRD-8.3: The system **shall** log detailed audit trails sufficient for HIPAA compliance reviews.

9. Performance Standards

SRD-9.1: Login API < 500ms (95th percentile).





SRD-9.2: SOAP Note generation < 10 seconds under load.

SRD-9.3: Triage evaluation < 1 second.

SRD-9.3: Triage evaluation < 1 second.

10. Traceability Matrix

METHOD	ENDPOINT	SRD REQUIREMENT
`POST`	`/api/v1/consultations`	**SRD-2.1.1** : Shall accept `patient_id` and create a `SCHEDULED` record.
`POST`	`/api/v1/consultations/{id}/upload`	**SRD-2.1.2** : Shall accept `multipart/form-data` audio file (< 50MB).
`GET`	`/api/v1/consultations/{id}/transcript`	**SRD-2.1.3** : Shall return 403 Forbidden for `FRONT_DESK` role.
Method	Endpoint	SRD Requirement

METHOD	ENDPOINT	SRD REQUIREMENT	
`GET`	`/api/v1/admin/triage_queue`	**SRD-2.2.1** : Shall return list sorted by `urgency_score` DESC.	
Failure Mode	Severity	Required System Response	
STT API Down	High	**SRD-3.1** : Queue the job for retry (exponential backoff x3). Notify user "Processing Delayed".	
LLM Hallucination	Med	**SRD-3.2** : Display "AI Generated - Verify Content" warning. Allow manual edit.	
Microphone Blocked	High	**SRD-3.3** : Show modal "Enable Mic Access" with link to browser settings.	
DB Connection Lost	Critical	**SRD-3.4** : Return HTTP 503. Frontend shows "System Maintenance" page.	
Component	State	Hex Color	Icon
Risk Badge	Critical	`#EF4444` (Red-500)	 Alert Triangle
Risk Badge	High	`#F59E0B` (Amber-500)	 Alert Triangle
Record Btn	Active	`#EF4444` (Red-500)	 Square (Pulse)
Record Btn	Idle	`#3B82F6` (Blue-500)	 Mic
SRD ID	PRD Feature	Tech Component	

METHOD	ENDPOINT	SRD REQUIREMENT
SRD-4.4	Transcription	`stt_service.py` (AssemblyAI)
SRD-5.1	SOAP Gen	`llm_service.py` (Gemini)
SRD-6.1	Triage Engine	`triage_service.py`
SRD-2.1.2	Audio Upload	`/api/v1/consultations.py`

SRD-9.3: Triage evaluation < 1 second.

11. Database Schema (Visual)

