# Smart Medical Reports Explainer - AWS Architecture

Overview 🔗

The **Smart Medical Reports Explainer** is an AI-powered tool designed to simplify complex medical documents for patients and caregivers. By leveraging AI-driven text extraction, natural language processing (NLP), and trusted medical sources, the system transforms medical jargon into plain language, improving health literacy and decision-making.

Architecture Overview 🔗

This document provides an overview of the AWS-based cloud architecture used for the **Med-AI Project**. The system is designed to securely process and store medical reports, extract information using AI, and deliver simplified explanations to users.
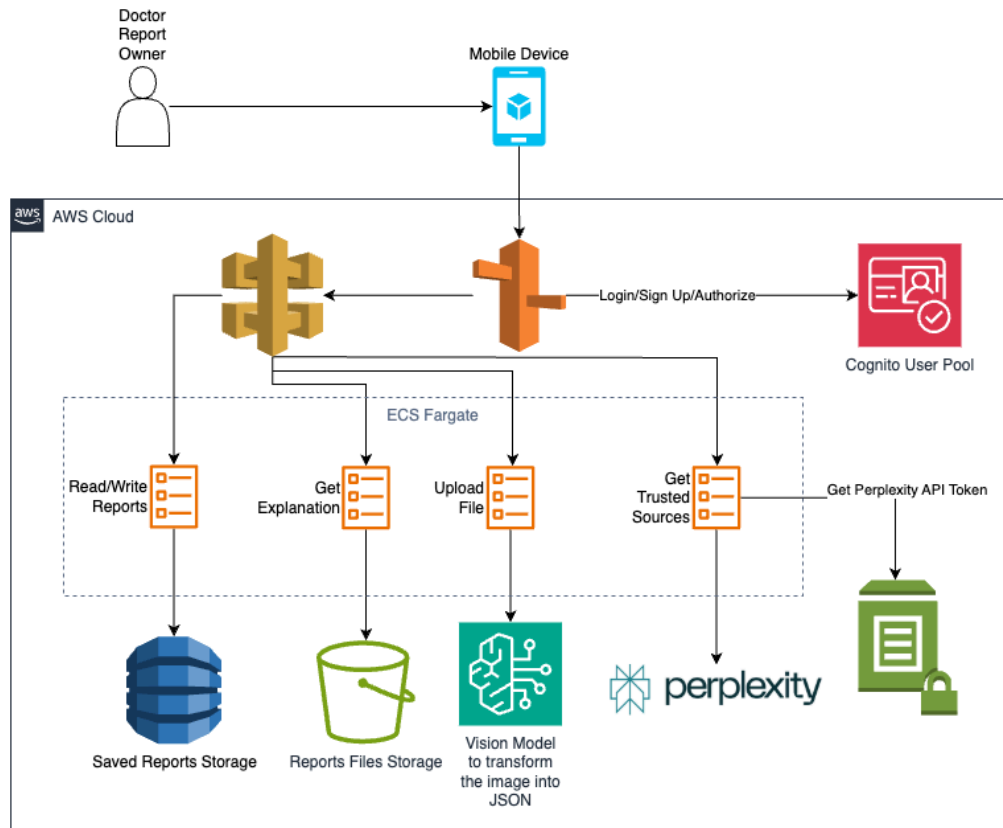
Components & Flow 🔗

1. User Interaction 🔗

- **Actors:**
  - **Doctor Report Owner**: Uploads medical reports.
  - **Mobile Device**: Mobile iOS or Android Interface through which users interact with the system.
- **Actions:**
  - Users log in via AWS Cognito.
  - Users upload medical reports for AI processing.

- Users retrieve simplified explanations of medical data.

2. Authentication & Authorization 🔗

- **AWS Cognito User Pool**
  - Manages user authentication (login, sign-up, and authorization).
  - Secures access to system functionalities based on user roles.

3. AWS API Gateway & ECS Fargate 🔗

- **API Gateway**:
  - Routes user requests securely to backend services.
  - Manages authentication and request validation.
- **ECS Fargate**:
  - Hosts containerized services responsible for:
    - Processing uploaded files.
    - Extracting and simplifying medical text.
    - Interfacing with trusted data sources.

4. Data Processing & Storage 🔗

- **Saved Reports Storage (Amazon DynamoDB):**
  - Stores processed medical reports in a structured format.
- **Reports Files Storage (Amazon S3):**
  - Stores original uploaded files for reference.
- **Vision Model Processing (AWS Bedrock powered by Titan Multimodal LLM):**
  - Extracts text from uploaded medical reports.
  - Converts image-based documents into structured JSON format.
  - Generates the explanation for common people to understand.

5. AI-Powered Processing 🔗

- **AI Explanation Service:**
  - Utilizes AWS Bedrock models to translate complex medical jargon into plain language.
- **Trusted Medical Sources Validation:**
  - Retrieves trusted data from Perplexity AI.
  - Ensures explanations are cross-referenced with CDC, WHO, and Mayo Clinic sources.
- **Perplexity API Integration:**
  - Retrieves API tokens for accessing AI-powered medical knowledge.

Technical Workflow 🔗

1. **User Login & Authentication:**
   - Users log in via **Cognito User Pool**.
   - API Gateway authorizes requests.
2. **File Upload & Processing:**
   - Users upload medical reports via the mobile app.
   - Reports are stored in **Amazon S3**.
   - ECS Fargate processes files, extracting text and converting them to JSON.
3. **AI-Powered Explanation:**
   - LLM models simplify understanding medical terminology and generating common people understanding.
   - AI cross-references explanations with trusted sources.

4. **User Access to Reports:**
    - Users retrieve processed reports and explanations via API Gateway.
    - The mobile app displays simplified information.

Key Benefits 🔗

- **Improved Patient Understanding:** Simplifies complex medical information.
- **AI-Driven Insights:** Uses AI for accurate, accessible explanations.
- **Secure & Scalable Infrastructure:** AWS serverless architecture ensures efficiency and compliance.
- **Integration with Trusted Medical Sources:** Provides verified, reliable health information