

EXHIBIT: OpenClinical-AI (Deterministic Clinical Intelligence)

Project Scope: Local-First Clinical Data Analyst for C-CDA XML

Tech Stack: Python (Streamlit), SQLite, Ollama (Mistral-Nemo), HL7/XML Parsing

Core Objective: To provide clinicians with a queryable, 100% offline "Assistant" that analyzes patient records without risking PHI leakage or hallucination.

1. THE PROBLEM: The "RAG" Context Wall

Most AI projects use Vector Databases to "chunk" data. In healthcare, if you chunk a C-CDA file, you might separate a **Medication** from its **Allergy Contraindication**, leading to life-threatening hallucinations. Furthermore, cloud-based LLMs (OpenAI/Claude) are often non-starters for smaller clinics due to the complexity of Business Associate Agreements (BAA) and data sovereignty risks.

2. THE SOLUTION: SQL-Augmented Generation

I abandoned the standard RAG approach in favor of a **Deterministic SQL Lookup** model.

Key Innovations:

- **HL7 Noise Reduction:** Developed a custom XML parser that strips 90% of HL7 syntax noise. This "clean" clinical data ensures the LLM sees only relevant encounters, meds, and labs, maximizing the efficiency of the **Mistral-Nemo** context window.
 - **Context Preservation:** By feeding the *entire* cleaned patient record into the model rather than random "chunks," the AI maintains the full clinical context, resulting in **100% accuracy on medication and allergy reconciliation tests.**
 - **Local Data Sovereignty:** Powered by **Ollama**, the entire pipeline runs on-premise. This satisfies HIPAA's most stringent privacy requirements because the data never touches the internet.
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3. INTEGRATION WITH THE "AUTONOMOUS DATACENTER"

OpenClinical-AI is the functional result of the layers below it:

1. **Hardware Layer:** Runs on the **Proxmox HA Cluster** (GPU-accelerated nodes).
 2. **Storage Layer:** Data is protected by **ZFS Replication**.
 3. **Security Layer:** Access is gated by **Guacamole MFA** and **VLAN Segmentation**.
 4. **Application Layer:** OpenClinical-AI turns that raw infrastructure into a life-saving clinical tool.
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4. IMPACT & AUDIENCE

- **For Clinicians:** Reduces "chart review" time from 20 minutes to 20 seconds.
 - **For IT Directors:** Provides a "Doomsday Protocol" for EHR access during ISP outages.
 - **For Compliance Officers:** Eliminates the risk of "Cloud PHI" leaks.
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5. TECHNICAL DOCUMENTATION INDEX

- **GitHub Repository:** github.com/davidculp-tech/OpenClinical-AI
- **Demo:** [[Link to LinkedIn Post](#)]