GREDs AI Reference Library

Welcome to the **GREDs AI Reference Library** (COSMOLOGY) documentation.

Overview

The GREDs AI Reference Library is an enterprise-grade knowledge management system designed to ingest, index, retrieve, and verify scientific research documents with deterministic, auditable operations.

Key Features

- **Hybrid Retrieval**: Combines semantic (FAISS) and lexical (BM25) search for optimal accuracy
- **Three-Level Summarization**: Short, medium, and long summaries for each chunk
- **Citation Verification**: Automated fact-checking with cosine similarity thresholds
- **Session Management**: Stateful context preservation with checkpoint/rehydration
- **Immutable Audit Trail**: SHA256-chained JSONL logs for compliance
- **Knowledge Graphs**: Visual dependency mapping between research artifacts

Technology Stack

Component	Technology
Backend API	FastAPI + Uvicorn
Frontend	Next.js 14 (App Router)
Database	PostgreSQL 15+
Vector Store	FAISS
Lexical Search	Whoosh (BM25)
Embeddings	sentence-transformers
LLM Provider	Abacus.AI APIs
Object Storage	S3-compatible (MinIO/AWS S3)
Task Queue	Redis + RQ

Quick Start

See the Deployment Guide (deployment.md) for detailed setup instructions.

```
# Clone the repository
git clone https://github.com/nbbulk-dotcom/COSMOLOGY.git
cd COSMOLOGY

# Copy environment variables
cp .env.example .env
# Edit .env with your configuration

# Start services
docker-compose up -d

# Access the application
# Frontend: http://localhost:3000
# Backend API: http://localhost:8000
# API Docs: http://localhost:8000/docs
```

Documentation Structure

- **Architecture (architecture.md)**: System design and component interactions
- **API Reference (api-reference.md)**: Complete API endpoint documentation
- **User Guide (user-guide.md)**: How to use the system
- **Deployment (deployment.md)**: Installation and configuration guide

Support

For issues and questions, please visit our GitHub repository (https://github.com/nbbulk-dotcom/COSMOLOGY/issues).