MariaDB AI Based Architecture Review and Logs Analyzer Tool

AI-Powered Architecture Review and Logs Analysis for MariaDB Databases

What This Tool Does

An AI-powered tool that performs the following:

- **Reviews** MariaDB database topologies deployed in various Customer environments to answer critical architecture questions
- **Analyzes** MariaDB and MaxScale logs to identify critical issues and perform root cause analysis
- **Identifies** key issue patterns and prepares sequence of critical events by parsing log files

Key Features

Feature	Description
AI Based Architecture Review	Comprehensive analysis with Workload & Capacity Assessment, HA/DR Assessment and Bottleneck Detection
AI Based Per-Node Analysis	Individual node diagnostics with CPU, memory, swap, and resource recommendations
AI Based Logs Analysis	Intelligent MariaDB and MaxScale log interpretation with issue detection
AI Chat Assistant	Interactive Q&A for report-specific follow-up questions

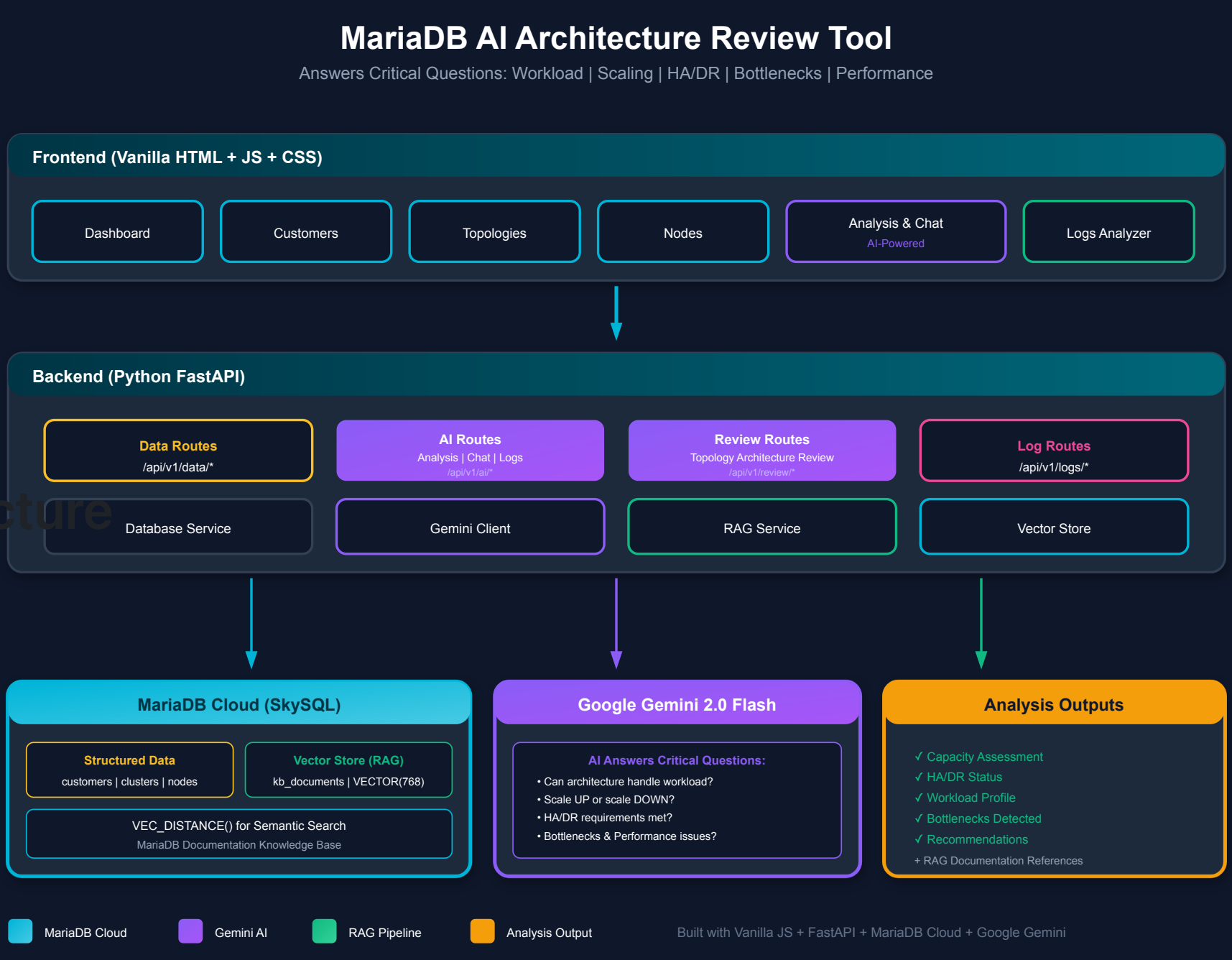
Critical Questions Answered

- Can it handle current workload?
- Should we scale up?
- Can we scale down (save cost)?
- Is HA/DR properly configured?
- What bottlenecks exist?
- What's the workload profile?
- What critical events occurred and what is the potential root cause?

Database Topologies Supported

Topology	Description
Standalone	Single MariaDB node
Master-Replica	Async replication (1 master, N replicas)
Semi-Sync	Semi-synchronous replication
Galera	Fully synchronous multi-master cluster
MaxScale	Any topology with MaxScale proxy

Architecture



Technology Stack

AI/ML

- **Google Gemini 2.0 Flash** - Large language model
- **Sentence Transformers** - Text embeddings (all-MiniLM-L6-v2)
- **MariaDB VECTOR** - Native vector storage
- **VEC_DISTANCE** - Similarity search

Backend & Frontend

- **Python 3.10+ / FastAPI** - Backend API
- **Vanilla JavaScript** - Frontend UI
- **MariaDB Cloud (SkySQL)** - Data & Vector Store

RAG Pipeline

```
Query → Embed → Vector Search → Context → Augment Prompt → AI Response
```

1. User requests analysis
2. System builds search query from cluster metrics
3. Embeddings searched in MariaDB `doc_embeddings` table
4. Relevant MariaDB KB documentation retrieved
5. Cluster data + RAG context combined
6. Gemini 2.0 generates comprehensive review

User Workflow

1. **Add Customer** - Create customer profiles to organize analyses
2. **Define Database Topology** - Configure Galera, Replication, or Standalone setups
3. **Add Nodes** - Input GLOBAL STATUS, GLOBAL VARIABLES, and system resources
4. **Run AI Analysis** - Get AI-powered architecture review with documentation context
5. **Ask Follow-up Questions** - Use the AI Chat Assistant for analysis-specific Q&A

AI Based Analysis Types

Type	Description	Access
Architecture Review	Full cluster analysis	Topologies page → "Architecture Review"
Node Analysis	Individual node diagnostics	Nodes page → "Node Analysis"
Logs Analyzer	AI log interpretation	Topologies/Nodes page → "Logs Analyzer"

Future Enhancements

1. **Analysis History & Persistence**
    - Store AI analysis responses in database
    - Save chat Q&A history for all modules
2. **Reinforcement Learning from User Feedback**
    - 5-star rating system for analysis quality
    - Continuous improvement loop
3. **Prompt Optimization** - Better AI responses
4. **Knowledge Base Expansion** - More MariaDB documentation

Acknowledgments

- **MariaDB Corporation** - Database technology and cloud platform
- **Google** - Gemini AI API
- **Hugging Face** - Sentence Transformers

Thank You!

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MariaDB Cloud

AI Gemini 2.0 Flash

RAG Enabled