

AQUAWISDOM TECHNICAL WRITE-UP FOR DEVELOPERS & IT VENDORS

Document Version: 3.0r1

Date: October 10, 2026

Target: Developers, System Engineers, IT Vendors

Purpose: Technical architecture, CRISP design, and deployment workflow.

AquaWisdom: The Open-Core On-Premises AI Platform

Education requires focus, privacy, and reliability. But modern AI tools require constant internet access, harvest student data, and charge monthly API fees. AquaWisdom changes everything. We've built a production-grade, on-premises AI ecosystem that transforms any environment into a private, offline-first intelligent library.

By leveraging local LLMs, a robust [node.js/docker](https://nodejs.org/en/packages/docker) backend and an intuitive React/Capacitor frontend, AquaWisdom delivers a zero-latency, 100% private "Agent E-reader" experience without recurring cloud API fees. The source code is publicly available in GitHub under the Business Source License (BSL 1.1), but automated deployment scripts, pre-compiled binaries, and proprietary UI hardening are reserved for paid commercial tiers.

Part 1: The CRISP AI Application Design

Standard AI chatbots give users a blank text box, leading to unpredictable, unstructured, and often hallucinated responses. AquaWisdom solves this by enforcing a **CRISP** application design philosophy directly in the backend logic:

- **Controllable:** The proprietary 6-level menu system (`m1-m6`, `#1-#7`) forces the LLM to act as a structured educational tutor. Users select exactly the depth and format of the response they want.

- **Repeatable:** By injecting strict system prompts, the AI produces consistently formatted, high-quality educational content rather than random conversational drift.
- **Intuitive:** The "Agent E-reader" UI of Android Client presents options like a digital book menu with functions of simple scrolling, clicks and text-to-speech. Users don't need prompt-engineering skills; they just tap a number to dive deeper into a topic. It also supports db off-line sync, allowing users viewing and listening back records even when away from home.
- **Secure:** The Android WebView is locked down to only trust the local Mini PC's self-signed SSL certificate. No third-party API keys are ever exposed.
- **Predictable:** The category-specific function acts as a domain guardrail. If a user asks an off-topic question in the Macbeth app, the AI gently rejects it and redirects back to the menu, preventing hallucinations and keeping the user on track.

Part 2: Private Cloud & Client-Server Architecture

AquaWisdom operates as a self-contained "Private Cloud" within the user's home or institution. By strictly adhering to a Client-Server Architecture, we decouple the frontend from the heavy AI processing, unlocking massive benefits for security, development, and multi-user access.

- **Decoupling & Containment:** The LLM (Ollama) and backend logic are strictly contained within the server's Docker network. The Android tablet (Client) only communicates via GraphQL over a local HTTPS reverse proxy. The AI is never exposed directly to the edge device.
- **Multi-User Support:** Unlike modern consumer AI apps that are restricted to a single user account or device, AquaWisdom's backend acts as a central hub for the entire household or classroom. Multiple tablets can connect concurrently, querying the same secure AI brain simultaneously.
- **Zero Prompt Engineering:** End-users never have to write complex system prompts. The backend acts as the "Agent", silently injecting the system prompts, context, and guardrails before sending the request to the LLM.
- **Better Development & Security:** Because the AI logic is centralized on the server, developers can update the AI persona, menus, or guardrails by simply updating the backend Docker image. There is no need to push an App Store update to the tablets.

Infrastructure Stack:

- Frontend: React.js + Capacitor (Native Android APK generation with embedded SQLite).
- Backend: Node.js + Express + Apollo GraphQL + TypeORM.
- Database: Local SQLite (with automated offline syncing via Docker volumes).
- AI Engine: Ollama (Optimized for `qwen3:4b-instruct` quantized models running locally).
- Infrastructure: Docker Compose isolation (one network per app), Systemd services for HTTPS Reverse Proxies, and strict 2-core CPU limits per Ollama container to prevent system starvation.

Part 3: Context-Aware & Agent-Like AI Functions

AquaWisdom doesn't just answer questions; it remembers the conversation and adapts its persona based on the active application category.

- Context Retention: The thread-specific function feeds the last 3 exchanges into the prompt, allowing the AI to remember previous questions and maintain a continuous learning dialogue.
- Agent-Like Persona Switching: The backend evaluates the category nature (Casual, Learning, Practical, Serious) and dynamically alters the AI's tone and instructions. For example, the C1 Family Hub speaks warmly like a friend, while B10 Macbeth adopts a scholarly analytical tone.
- Dynamic Menu Routing: When a user types `#1`, the AI checks the current menu to understand *what menu they are currently looking at*, generating a highly specific question based on that exact context.

The AI Resolver Engine (In Action)

Here is a simulated backend dialogue for B5 - 中國歷史 (秦始皇), showcasing the multilingual capabilities and context-aware menu routing:

User: 告訴我關於秦始皇的事

AquaWisdom AI:

📖【主選單】「秦始皇」

#1 核心內容是什麼？

#2 主要人物和作品有哪些？

#3 有什麼著名的歷史故事或典故？

#4 歷史地位和影響是什麼？

#5 歷史背景和時代意義是什麼？

💡 輸入 m2 輕鬆閱讀 / mm 所有選單

🔊 Listen | ⏮️ Rewind | ⚙️ Auto | 🌐 Lang

User: #1

AquaWisdom AI:

秦始皇(公元前259年—前210年)，名嬴政，是中國歷史上第一位完成大一統的皇帝。他結束了戰國時期的分裂局面，建立了秦朝。在位期間，他推行了「書同文、車同軌」的政策，統一了度量衡和文字，並開始修築萬里長城以抵禦北方匈奴的侵擾。雖然他的統治嚴苛且短暫，但他所建立的中央集權制度，深深影響了中國兩千多年的政治格局。

🔊 Listen | ⏮️ Rewind | ⚙️ Auto | 🌐 Lang

(Actual screenshots on Android Tablet)

三

AquaWisdom - 中國歷史

Refresh Page

Create a New Topic

Latest

秦始皇 (259 BC-210 BC)tester2

想了解更多一些他的歷史

秦始皇的故事

613

陶淵明 (365 AD-427 AD)tester2

陶淵明的故事

陶淵明的故事

503

三皇五帝 (約3000 BC-2070 BC)tester2

三皇五帝的故事

三皇五帝的故事

512

秦始皇的故事

Ask Aqua Questions

tester20m ago0

D go kgmj

Ask Aqua

Aqua Responses

tester20m ago90

D go kgmj

aqua0m ago90

歡迎來到「秦始皇」分類!

#1 核心內容是什麼?

#2 主要人物和作品有哪些?

#3 有什麼著名的故事或典故?

#4 歷史地位和影響是什麼?

#5 歷史背景和時代意義是什麼?

輸入 m2 輕鬆閱讀! mm 所有選單

試試看:輸入 #1 開始探索!

Listen

1x

Auto



And here is the same engine running for B8 - Western History (Leonardo da Vinci):

User: Tell me about Leonardo da Vinci

AquaWisdom AI:

📖【Historical Guide】"Leonardo da Vinci"

- #1 What is the historical background and context?
- #2 Who were the key figures and their contributions?
- #3 What were the decisive events or turning points?
- #4 What is the historical significance and impact?
- #5 How did this influence future generations?

💡 Enter m2 Casual Reading | mm All Menus

 Listen |  Rewind |  Rewind |  Auto |  Lang

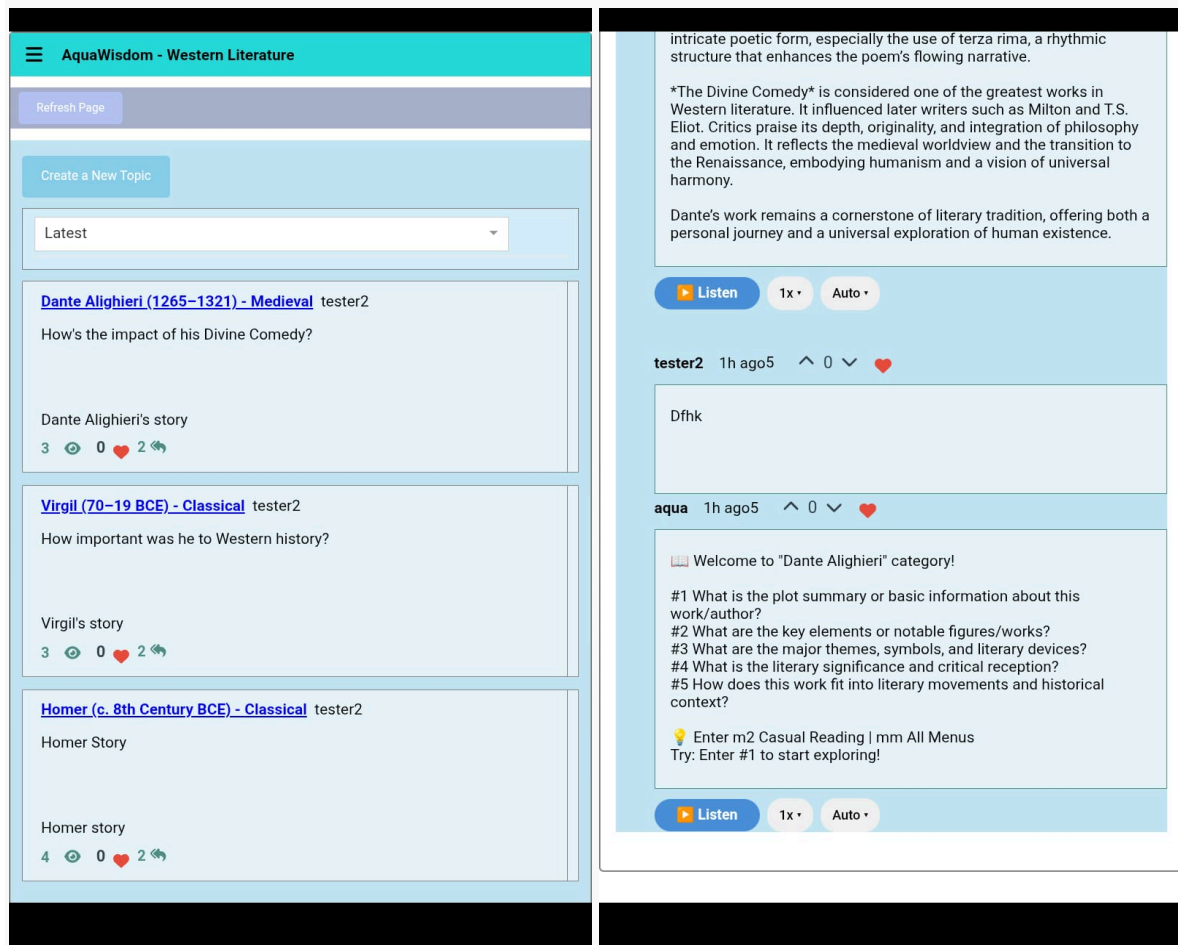
User: #1

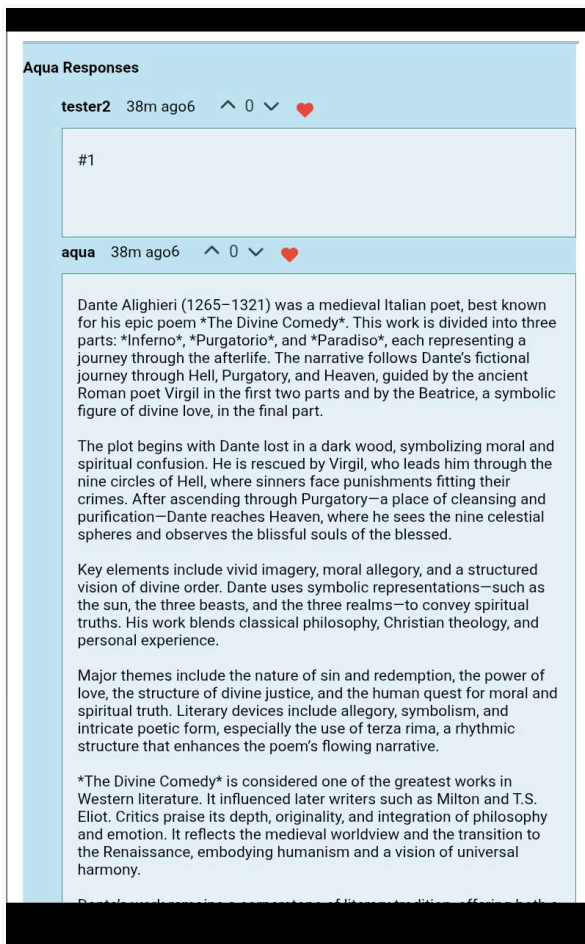
AquaWisdom AI:

Leonardo da Vinci (1452–1519) was the quintessential Renaissance man, born in Vinci, Italy. He was an artist, scientist, engineer, and inventor whose insatiable curiosity was matched only by his mastery of diverse fields. Working in Florence and Milan, he operated outside the traditional academic structures, learning from nature itself. His historical context was the High Renaissance, a period of intense cultural rebirth where art, science, and humanism converged. Da Vinci's unique genius lay in his ability to observe the natural world with the eye of a scientist and render it with the hand of a master artist.

 Listen |  Rewind |  Auto |  Lang

(Actual screenshots on Android Tablet)





The Ecosystem

AquaWisdom comes pre-loaded with a suite of dedicated educational applications, each acting as an isolated AI expert:

- B5 - 中國歷史: From ancient Chinese dynasties to modern history.
- B6 - 中國文學: Classical Chinese poetry, novels, and literary analysis.
- B7 - 三國演義: A 120-chapter interactive journey through the classic Chinese novel, *3 Kingdoms*.
- B8 - Western History: Ancient Greece to modern civilizations.
- B9 - Western Literature: Shakespeare, Victorian eras, and modernism.
- B10 - Macbeth: Deep-dive scene, character, and theme analysis.
- C1 - Family Hub: A family-safe, context-aware assistant for daily life.

Part 4: Development & Deployment Workflow (The 2-Step Process)

Because the system relies on native Android compilation and Docker containerization, the workflow is strictly divided into two steps. You compile on a Dev Machine and deploy to the Master Node.

- Step 1: Compile on Dev Machine
 - Clone the repository and install Node.js dependencies.
 - Compile the React frontend and sync Capacitor.
 - Build the native Android APK using Gradle.
 - Build the Backend Docker Image.
- Step 2: Deploy to Master Node
 - Transfer the compiled apk and Docker image to the Mini PC via.
 - Load the Docker image.
 - Start the Docker Compose stack and Systemd HTTPS proxy services on the Mini PC.

Part 5: Minimum Hardware Prerequisites

To run the Private Cloud and host the 7 isolated AI applications flawlessly, the following baseline hardware is required:

1. Master Node (Server / Mini PC):

- Form Factor: Mini PC (Intel NUC, Beelink, or similar small form factor).
- OS: Ubuntu 24.04 LTS.
- CPU: AMD Ryzen 5 (or Intel Core i3 / Intel N100 8-Core equivalent or better).
- RAM: 16GB DDR4/DDR5 (Minimum 13GB usable by OS).
- Storage: 500GB NVMe SSD.
- Network: Gigabit Ethernet port (Connected directly to the home router).
- Client Devices: Android Tablets (Minimum 2GB RAM, Android 8.0+).

2. Development Machine (For Compilation & Deployment):

- OS: Ubuntu 24.04 LTS (or any Linux distro supporting Docker).
- CPU: Modern 4-Core Processor (Intel i5 / Ryzen 5 or better).

- RAM: 16GB RAM (Minimum required for Android Gradle builds and Docker image compilation).
- Storage: 100GB free space (For source code, node_modules, and compiled Docker images).
- Software Stack: Docker, Node.js 20.x LTS, Java JDK 17, Android Studio (SDK & Build Tools), Capacitor CLI.



The Plug-and-Play Appliance

Behind the scenes, AquaWisdom is powered by a self-healing, crash-proof Mini PC master node.

- Hardware Hardening: CPU limits prevent overheating, and automated scripts ensure the system survives power outages and reboots itself cleanly.
- Automated Backups: Databases and configurations are backed up securely and automatically.
- Frictionless Setup: Pre-compiled APKs and automated deployment bundles mean the system is up and running in minutes.



Commercial Licensing & Support

Organizations lacking dedicated DevOps engineers can purchase automated deployment bundles and support:

- Individual / Freelance Developer: Free to download, modify, and test.
- Enterprise Developer: \$960 / Year (billed in 12 monthly installments of \$80/month). Includes commercial modification rights, the official Developer Setup Guide, and office-hour email technical support.
- Corporate Developer: Custom Pricing. Annual subscription fee based on company size. Includes custom SLA and enterprise support.
- NGO / Church Use License for their own use: 100% Free forever for production use.
- Home Use License: \$600 per server (Software only).
- Enterprise / Academic License: \$1,500 per server (Software only).
- Cloud / Hosted License: Custom pricing based on customer base.

- Plug-and-Play Home Package: \$998 (Off-the-shelf solution including Mini PC, Tablet, 5 User Licenses, and 1 Year Office-Hour Email Support).

To explore the open-source repository, visit:

<https://github.com/loksir/aquawisdom-ai-software>

To bring the world's first AI-driven Self-created Hist-Lit Encyclopedia to your home, visit: www.aqua-wisdom.com

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