
Visually.
Making Invisible Hardware Tangible.

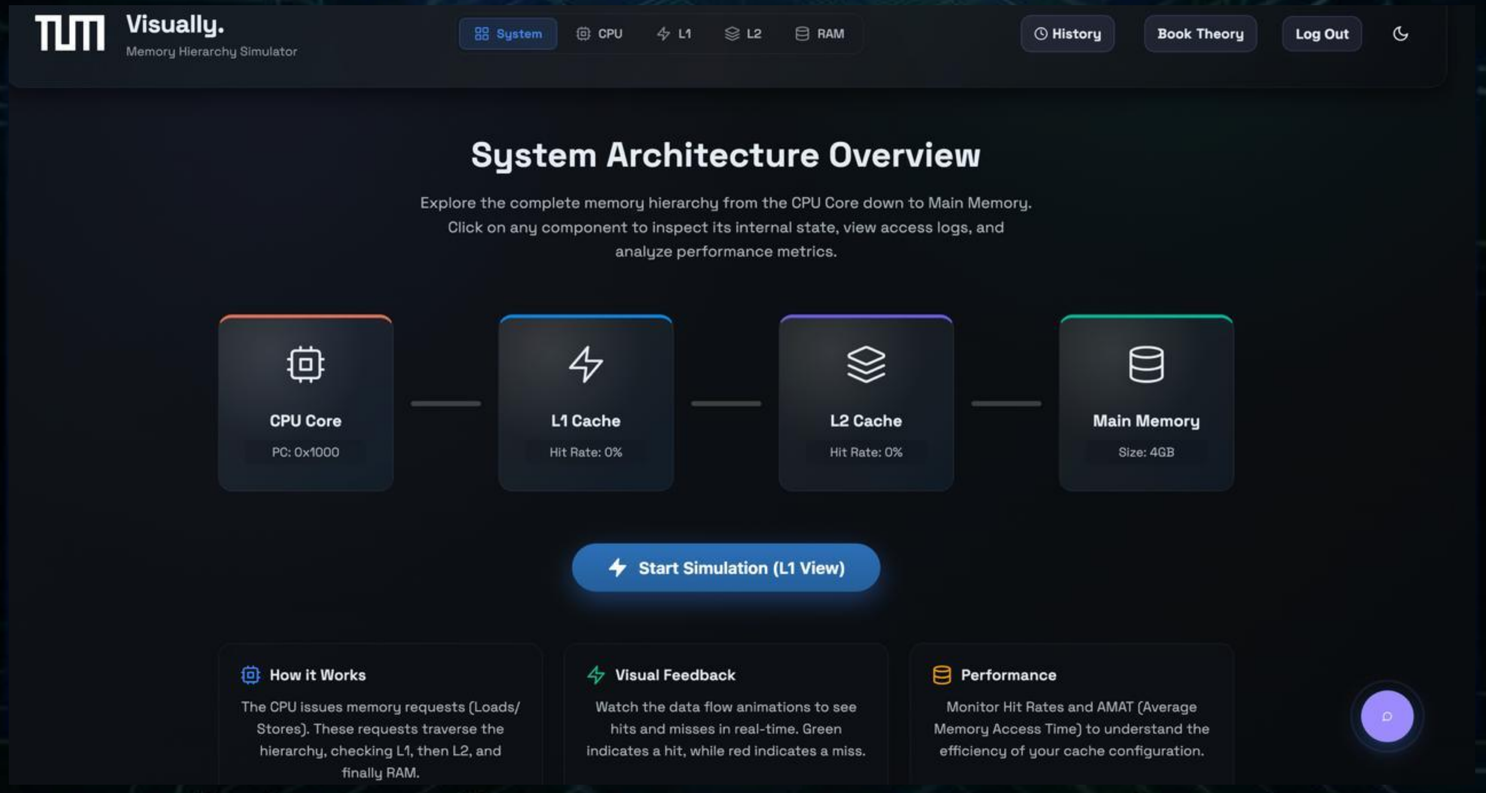
The Problem

Computer Architecture is abstract and difficult to learn.

Current tools are text-based, static, and lack interactivity.

Students cannot ‘see’ the data moving.

The Solution



A web-based, interactive CPU simulator.
Visualizes the full memory hierarchy (L1 Cache, L2 Cache, RAM).
Features real-time animation of data flow and hit/miss logic.

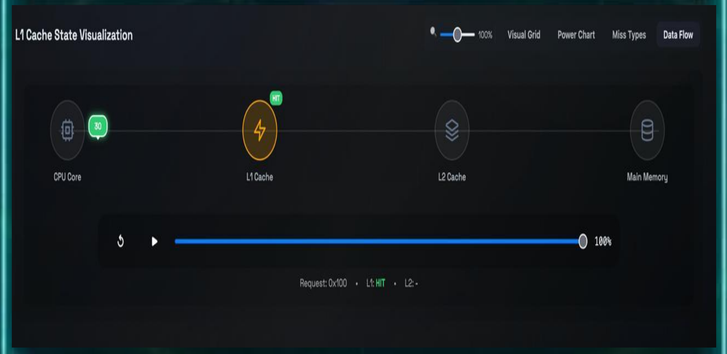
Deep Tech Features

Multi-level Hierarchy Simulation

Multi-level Hierarchy Simulation

Simulates L1, L2, and RAM interactions with realistic latency.

Live Dataflow Animation



Live Dataflow Animation

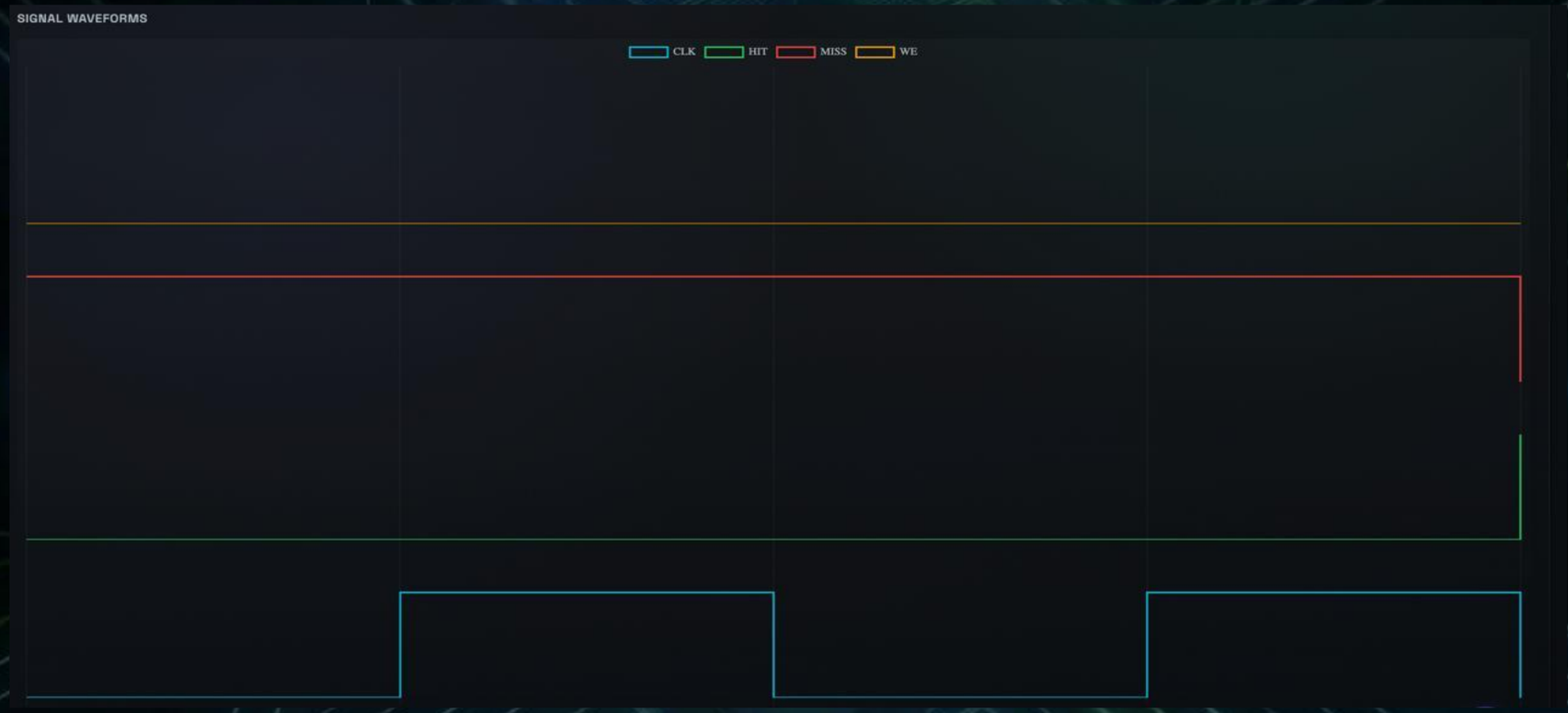
Real-time animation showing the precise timeline of memory accesses.

CPU Register View

CPU Register View

Live view of CPU registers showing changing values inside the processor.

Power & Waveforms



Real-time power analysis of memory accesses.

Dynamic energy consumption graphs and estimations.

Cycle-accurate latency metrics for performance analysis.

The AI Tutor & Integration

Integrated AI Chatbot (BYO-Key)
Virtual professor explains misses and answers questions.

University Login Integration
Seamless login for persistence and progress tracking.

Gamified Learning
Engaging challenges and leaderboards for students.

Adoption Strategy

Milestone 1

Phase 1:
Hackathon Showcase
Free tier for immediate use and feedback.

Milestone 2

Phase 2:
University Pilot
Pilot with University Architecture courses.

Milestone 3

Phase 3:
Analytics Dashboard
Analytics for professors to track student progress.

Project CacheFlow: The Future of Architecture Education

The Technical Innovation

- **Full Hierarchy Simulation:** Visualizing the complete data path between L1, L2, and RAM (not just single-level).
- **Physics-Based Metrics:** Real-time Power Waveforms, energy consumption, and cycle-accurate latency.
- **Deep Inspection:** Live view of CPU Registers, Branch Prediction (1-bit/2-bit), and Dataflow animation.

The User Experience & Strategy

- **AI-Integrated Learning:** Integrated Chatbot (BYO-Key) acts as a personalized tutor for analyzing misses.
- **University-Ready:** Built-in SSO Login for student persistence and progress tracking.
- **Adoption Model:** Gamified challenges to ensure student engagement and easy professor integration.

Status: Live Demo Available. | **Goal:** Replacing static text tools with dynamic simulation.