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AI for Bharat Hackathon

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Problem Statement : Build an AI-powered solution that helps people learn faster, work smarter, or become more productive while building or understanding technology. [AI for Learning & Developer Productivity]

Brief about the Idea: SochStack

The Gap: 90% of developer-focused AI tools solve *syntactical* problems (writing functions), but 0% address *macro-level system architecture*. Developers lack a safe, automated way to simulate distributed systems and understand latency trade-offs without expensive manual setups.

SochStack is an AI-powered learning platform that helps developers understand distributed system design through real-time simulation instead of theory. It transforms architecture learning into an interactive experience where users can see how design decisions impact latency, scalability, and performance.

Using a multi-agent system on Amazon Bedrock, SochStack debates architectural choices, generates mock AWS infrastructure, and runs simulated traffic to visually expose bottlenecks, enabling developers to learn system design through live metrics and experimentation.

1. **How different is it?**

The Benchmark: Standard Tools (e.g., Copilots/LLM's): Output *static code blocks*.

SochStack: Outputs a dynamically deployed, benchmarking environment.

2. How it solves the problem: It uses a "Debate Engine" enforcing a maximum of 10 rounds of debate between three distinct AI agents before generating infrastructure.

3. Unique Selling Proposition (USP): *"Agentic Consensus to CloudFormation"*

The Swarm: Orchestrates three specific personas: An Architect Agent (proposes design), a Latency Critic Agent (analyzes end-to-end latency), and a Security Guard Agent (validates least-privilege access).

The Engine: Converts their finalized consensus directly into a deployable AWS CloudFormation template.

List of features offered by the solution

1. Multi-Agent Design Debate: Specialized Bedrock agents critique architectures for algorithmic inefficiencies and network hop counts.

2. Automated Mock Provisioning: Uses AWS Lambda and Amazon SNS to simulate micro services and message passing instantly.

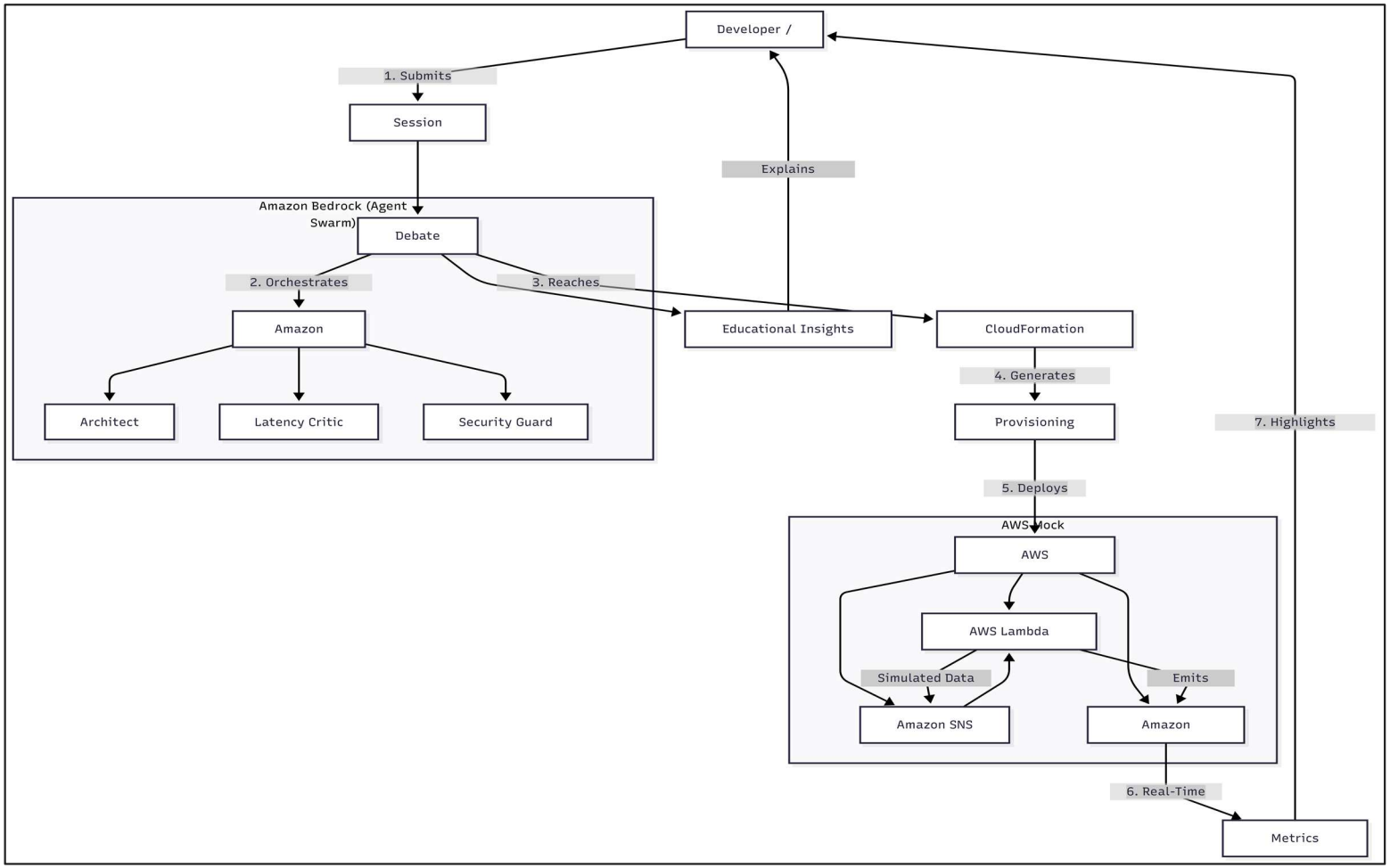
3. Live Workload Simulation: Generates synthetic requests at configurable rates (e.g., 100 to 1000 RPS) to mimic production load.

4. Real-Time Metrics Visualization: Displays p50, p95, and p99 latencies dynamically via Amazon CloudWatch, highlighting bottlenecks based on the formula:

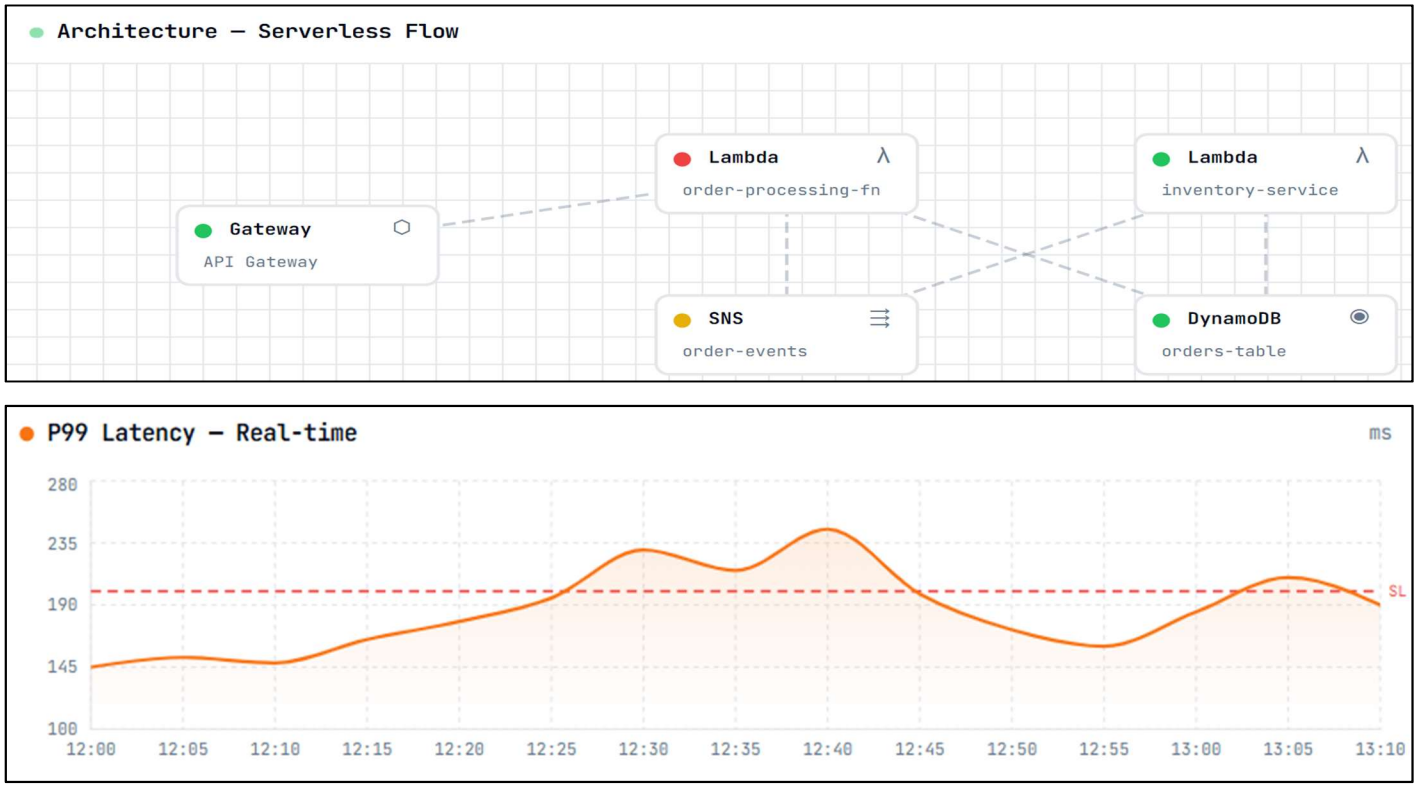
$$\text{Impact} = \frac{L_{\text{component}}}{\sum L_{\text{system}}} \times 100\%$$

5. Educational Insights Engine: Explains why the bottleneck occurred (e.g., CAP theorem trade-offs) and links back to the agent debate history.

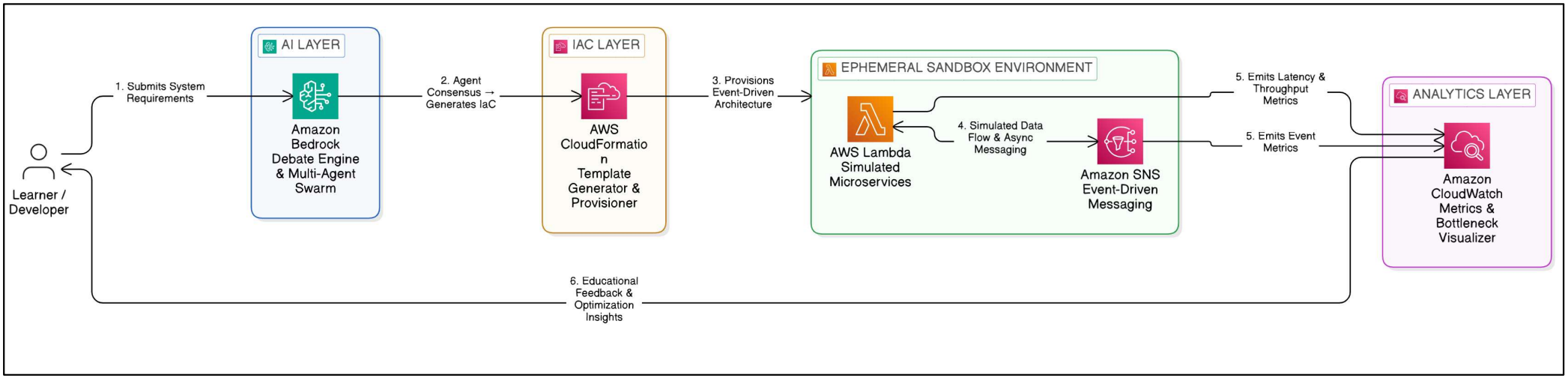
Process flow diagram or Use-case diagram



Wireframes/Mock diagrams of the proposed solution



Architecture diagram of the proposed solution:



Technologies to be used in the solution:

1. **Amazon Bedrock:** Foundational LLM routing for the Agent_Swarm (Architect, Latency_Critic, Security_Guard).

2. **AWS CloudFormation:** Infrastructure-as-Code (IaC) generation and stack teardown.

3. **AWS Lambda:** Executing mock microservices and simulating processing latency via time.sleep() environment variables.

4. **Amazon SNS:** Simulating asynchronous, event-driven message passing.

5. **Amazon CloudWatch:** Emitting custom metrics (ProcessingLatency, ErrorRate) and alarming on thresholds.

Estimated implementation cost :

Highly Cost-Efficient (100% Serverless):

1. Compute: AWS Lambda charges $0.20 per 1 million requests. A standard 5-minute user simulation running at 100 RPS costs less than $0.01.

2. Messaging: Amazon SNS provides 1 million free publishes per month.

3. AI Inference: Amazon Bedrock token costs for a maximum 10-round debate are isolated to the design phase, averaging ~$0.05 per session.

4. **Teardown**: Session Manager automatically deletes the CloudFormation stack upon exit, guaranteeing zero zombie-infrastructure costs.

Future Roadmap & Market Viability

Phase 1 : Educational Sandbox (MVP)
AI-powered learning platform where users simulate distributed architectures, view real-time latency metrics, and learn system design through agentic debate on AWS mock infrastructure.

Phase 2 : Enterprise Integration
Export AI-approved architectures as Terraform HCL and production-ready Infrastructure-as-Code pipelines for real-world deployment.

Phase 3 : Chaos Engineering
Inject controlled failures (SNS disconnects, Lambda throttling, EC2 overload) to teach resilience, scalability, and fault-tolerant design.

Phase 4 : Market Expansion
B2B licensing to EdTech platforms, corporate cloud training programs, and enterprise onboarding for junior cloud engineers.

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Thank You