Agentathon 2026

-Developer Productivity and Tooling-

--TraceOps--

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–PES University–

PROBLEM STATEMENT

There is no system today that can automatically investigate software incidents and reason about root causes and fixes.

Modern software systems fail frequently — due to configuration errors, faulty deployments, and resource exhaustion.

When incidents occur, engineers are forced to manually:

- Dig through massive volumes of logs
- Correlate behavior across services and configurations
- Guess possible root causes
- Write incident reports after the fact

This workflow is slow, error-prone, and heavily experience-dependent — leading to prolonged outages and delayed recovery.

Existing monitoring tools show alerts and dashboards — they do not perform reasoning.

EXISTING SOLUTIONS

Current tools such as monitoring dashboards, log aggregators, and alerting systems provide visibility — but not intelligence.

They can tell you that something is broken, but not why it broke or what to do next.

Metrics platforms (e.g., Prometheus, Grafana) show system health — not root causes

Log tools surface errors — but require manual investigation

On-call engineers must still correlate data across services and configurations

There is no built-in reasoning or fix planning

There is no system today that performs automated incident reasoning and fix recommendation.

OUR APPROACH

We propose **TraceOps** — a multi-agent incident investigation system that automates first-level incident triage by combining agentic reasoning with grounded system access using open-source **MCP Filesystem Server.**

Multi-Agent Workflow:

-> Ingestion Agent — Extracts failure signals from logs

-> Context Agent (MCP-grounded) — Fetches configs and repository files via MCP

-> Root-Cause Agent — Generates and ranks root-cause hypotheses

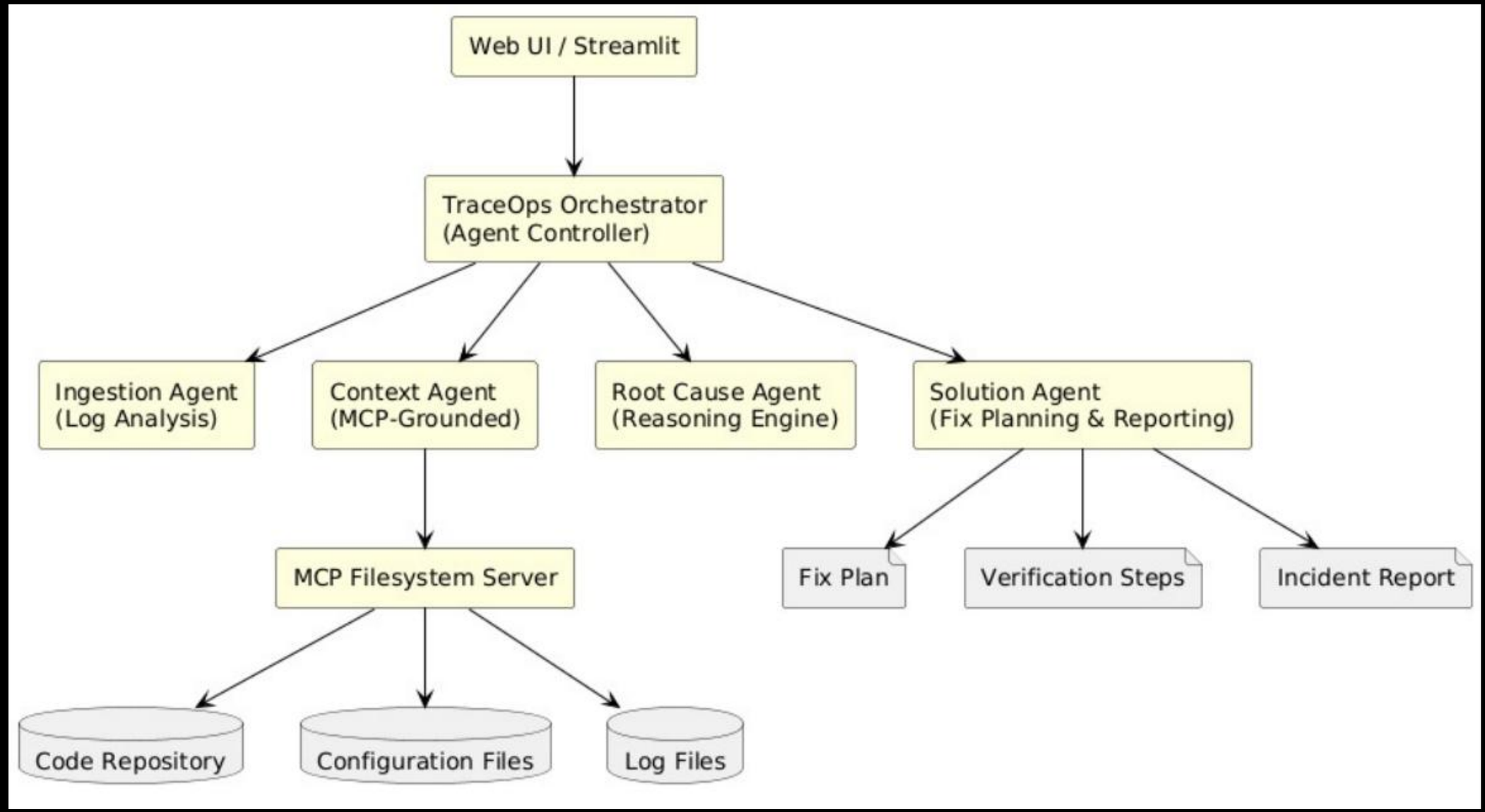
-> Solution Agent — Produces fix plans, verification steps, and incident summaries

MCP Integration:

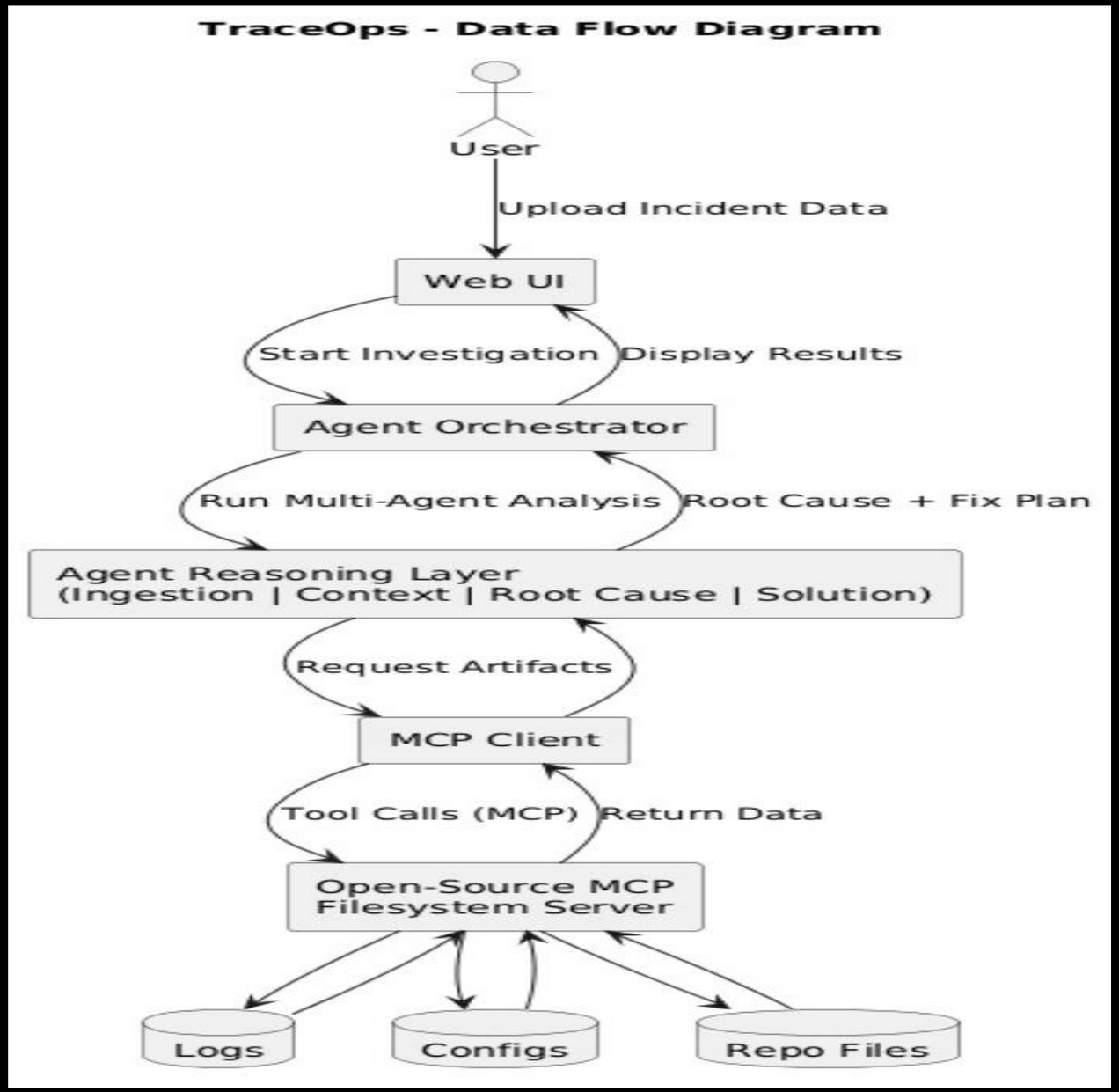
All system artifacts are accessed through an open-source MCP Filesystem Server, enabling tool-grounded reasoning and preventing hallucinated system state.

This decouples reasoning from system access and reflects a scalable, enterprise-style agent architecture.

OUR APPROACH



DATA FLOW DIAGRAM



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TECH STACK

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Application
- Python
- Streamlit (Web UI)

Agent System
- LLM-powered multi-agent pipeline
- Custom agent orchestrator
- Structured reasoning & tool calls

MCP Integration
- Open-source MCP Filesystem Server
- MCP client for grounded system access

Data Sources
- Code repositories
- Configuration files
- Incident logs

Deployment
- Local runtime (extensible to cloud)

FEASIBILITY

1. Technically achievable in hackathon scope
- Modular, pipeline-based multi-agent design
- Small, realistic system surface (logs, configs, repo)
- No dependency on live production infrastructure
- MCP Filesystem Server enables immediate grounding

2. Proven building blocks
- LLMs already perform log analysis and code understanding well
- MCP provides a standardized tool interface for system access
- Agent orchestration is deterministic and debuggable

3. Demo-ready by design
- Controlled incident scenarios
- Real codebase and log bundles
- Clear success criteria (root cause + fix plan)

4. Extensible beyond the hackathon
- Same agents can plug into GitHub, CI/CD, and log platforms via MCP
- Architecture supports deeper reasoning, monitoring, and remediation

The system is realistic, deployable, and demonstrates practical agentic reasoning.

RESEARCH AND REFERENCES

1.Model Context Protocol & Specifications

- Model Context Protocol Official Documentation(https://modelcontextprotocol.io/docs/) – Comprehensive guides on MCP architecture, transport layers, and core primitives for protocol implementation.
- MCP GitHub Repository(https://github.com/modelcontextprotocol/modelcontextprotocol) – Official specification, SDKs, and reference implementations.

2.MCP Server Implementations

- mark3labs/mcp-filesystem-server(https://github.com/mark3labs/mcp-filesystem-server) – Go-based MCP filesystem server for agent-driven file operations.
- cyanheads/filesystem-mcp-server(https://github.com/cyanheads/filesystem-mcp-server) – TypeScript-based filesystem MCP server with advanced search/replace and directory traversal.

3.Multi-Agent LLM Systems for Incident Response

- Multi-Agent LLM Orchestration for Incident Response(https://arxiv.org/html/2511.15755v2) – Demonstrates that multi-agent orchestration achieves 100% actionable recommendations vs. 1.7% for single-agent systems in incident diagnosis (348 controlled trials).
- Exploring LLM-based Agents for Root Cause Analysis(https://arxiv.org/html/2403.04123v1) – Research on LLM agents with tool access for real-world incident root cause analysis in operations contexts.
- A Survey of AIOps in the Era of Large Language Models(https://arxiv.org/html/2507.12472v1) – Comprehensive survey of LLM applications in AIOps, covering anomaly detection, RCA, and mitigation solution generation.

AI tools were used for ideation, architecture design, and draft generation.

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Thank You