Custom AI Agents for Software Development using GitHub Copilot/ Claude Code/Cursor

Team Sewey

Nguyen Thi Hong Hanh	S4020232
Dao Thao Phuong	S4029319
Pham Trung Nghia	S4028630
Phan Tri Hung	S4001980
Nguyen Minh Phuong	S4063236

Academic supervisor
Dr. Joshua Dwight

Industry supervisor
Mr. Huynh Ngoc Phi
Mr. Do Dang Tuan

Background and Motivation

Current AI coding tools lack a structured workflow across the Software Development Lifecycle (SDLC), leading to inconsistent outputs and manual coordination. CircuitSDD addresses this with a Specification-Driven Development workflow where specialized AI agents coordinate planning, implementation, testing, review, and documentation for more consistent and reproducible AI-assisted development.

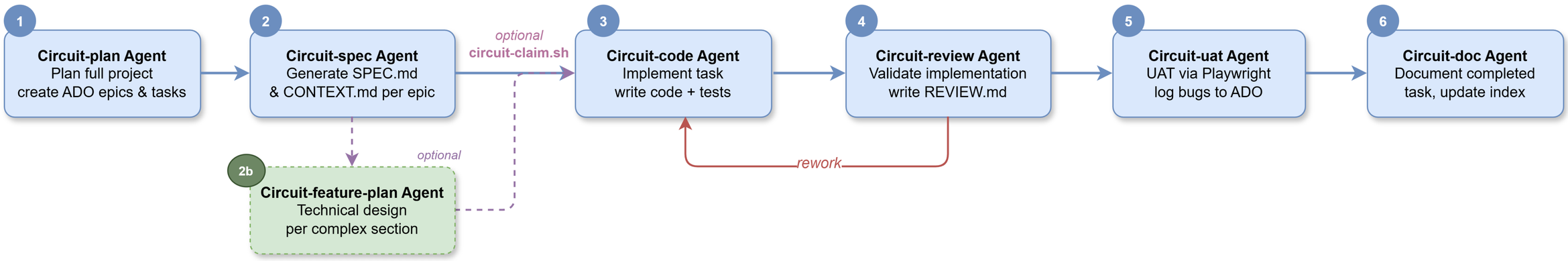
Objective and technology

CircuitSDD coordinates specialized AI agents across the SDLC, integrating GitHub Copilot, Azure DevOps, Playwright, OpenTelemetry Collector and Langfuse for agent execution, project management, automated UAT, and AI observability.

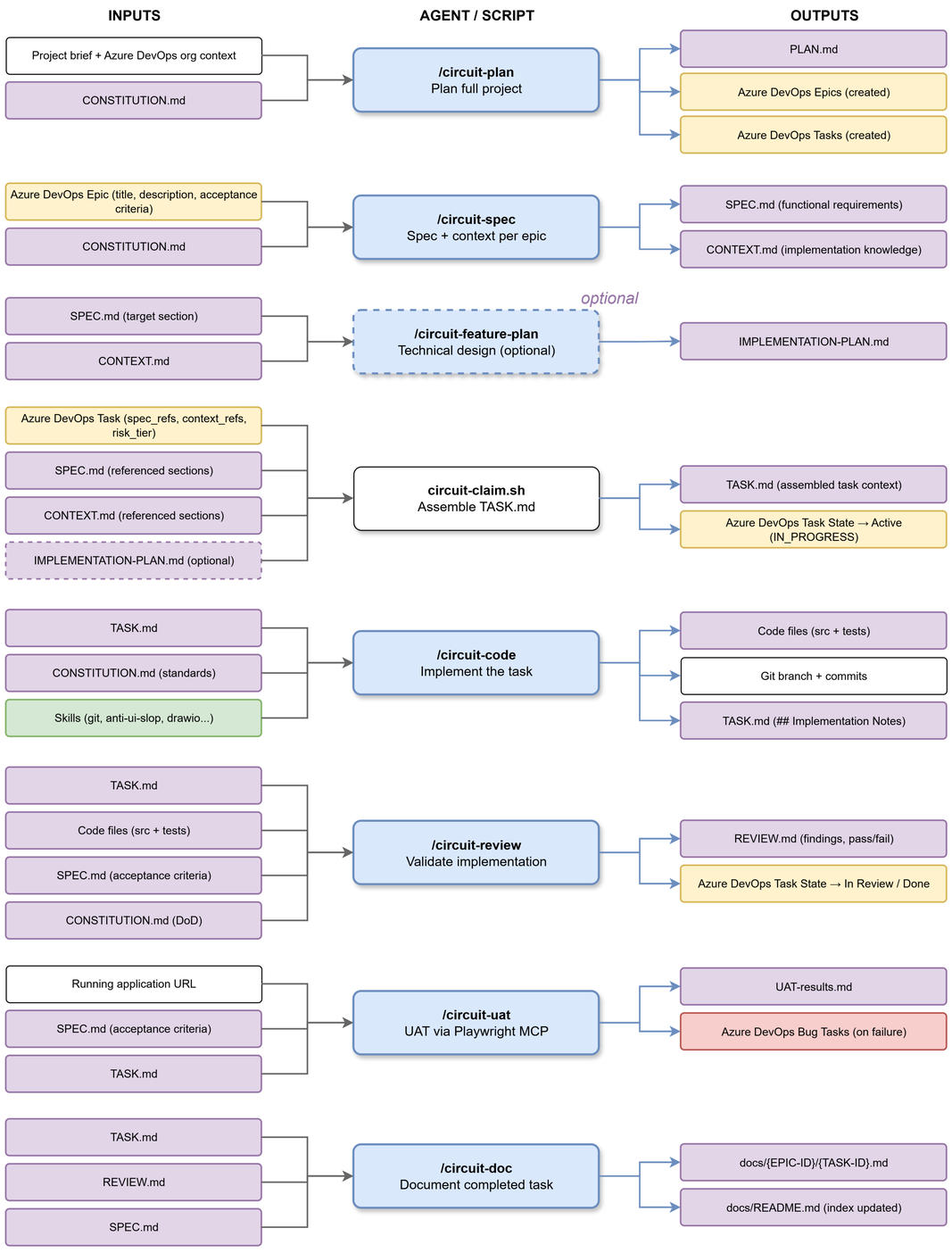
GitHub Copilot · OpenTelemetry · Langfuse · Azure DevOps · Playwright

Methodology

CircuitSDD follows a structured, agent-driven SDLC workflow, progressing from planning and specification to implementation, review, UAT, and documentation. Each stage uses specialized AI agents and integrated tool to maintain traceability, validation, and observability throughout development.



How it works



Performance evaluation

CircuitSDD is benchmarked against GitHub Spec-Kit using both quality and efficiency metrics. SonarQube measures code quality, while Langfuse tracks token usage, execution time, and estimated AI cost. Manual assessment is also used to evaluate requirement alignment and overall development quality.

Comparison field	CircuitSDD	Github Spec-kit
Security	3 Issues (Medium risk)	19 issues (High risk)
Reliability	13 Issues (Medium risk)	77 Issues (High risk)
Maintainability	143 Issues (Low risk)	411 Issues (Low risk)
Code Duplication	8.5%	3.3%
Token Usage (per feature)	~22.37M Tokens	~22.63M Tokens
Estimated Cost (per feature)	$15.15	$19.73
Execution Time (per feature)	~45min	~50min
Requirement Alignment	~85%	~80%

Conclusion and future work

CircuitSDD offers a more robust feature set than existing public SDD frameworks, extending beyond specification and code generation with multi-agent orchestration, MCP integrations, automated UAT, code-quality analysis, and observability. Future work will focus on optimising agent skills and token usage, as the current workflow is not yet fully optimised. Additional skills and MCP integrations will be explored to expand capabilities, improve efficiency, and support continuous workflow improvement.