

THE CHALLENGE

The IntelliFL framework is a robust Python simulation engine with **10 aggregation strategies** and **Byzantine attack mitigation**—but it was CLI- only, lacked documentation, and had no testing infrastructure for reproducible research.

THE SOLUTION

Trust: Comprehensive pytest suite ensuring reproducible simulation results

Integration: FastAPI backend enabling programmatic & browser-based access

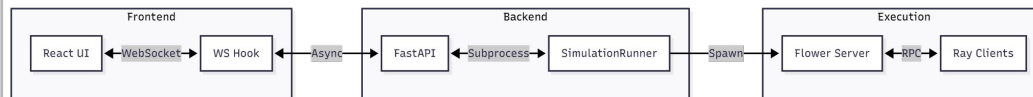
Accessibility: React 19 frontend with guided configuration wizard

Velocity: Modern DX toolchain with parallel test execution

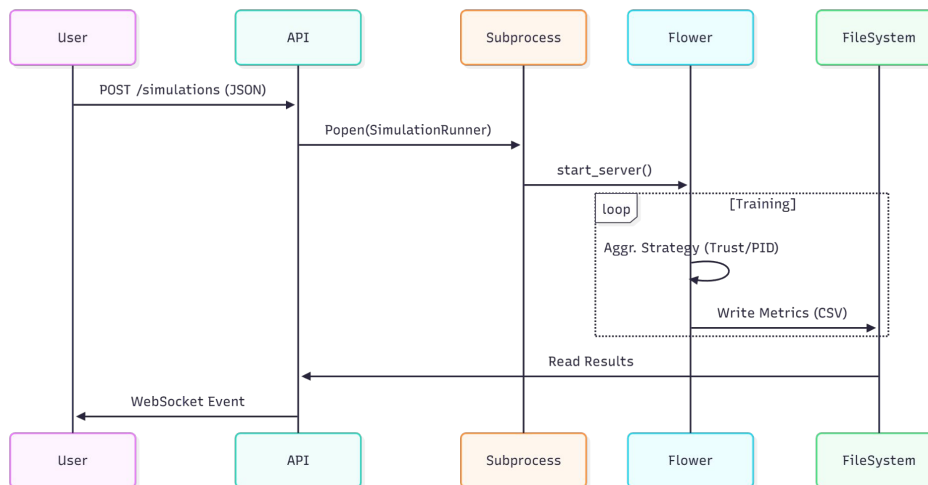
TECHNOLOGIES

Backend: Python, FastAPI, pytest, Flower api
 Frontend: React 19, Vite, Recharts
 Data: Hugging Face Datasets
 CI/CD: GitHub Actions, CodeCov

SYSTEM ARCHITECTURE



SIMULATION WORKFLOW



IMPACT

1,136 Tests
Comprehensive pytest suite

95% Coverage
Mission-critical code validated

12 Endpoints
RESTful API + async I/O

50+ Components
React 19 SPA with Recharts

Extensibility
API design enables cloud or automation integrations

Velocity
Reduced test runtime to under 90 seconds

Reproducibility
Ensures trustworthy simulation results