Web-Based Simulator of Superscalar RISC-V Processors

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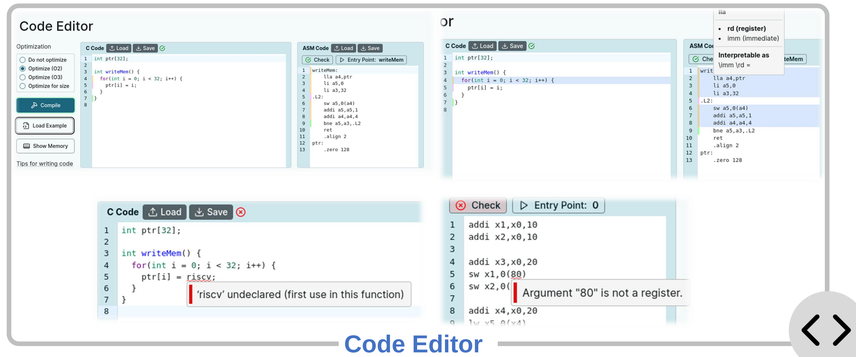
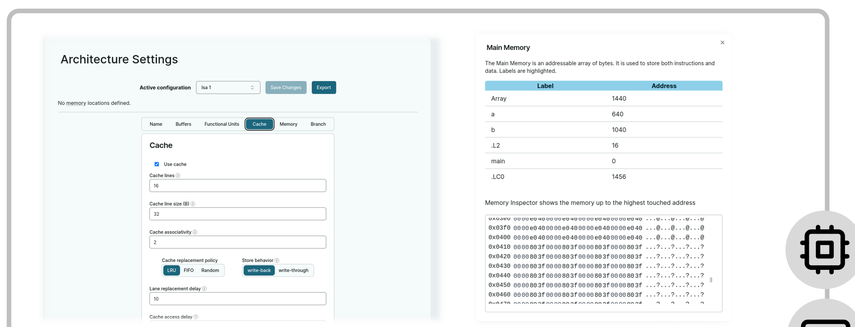
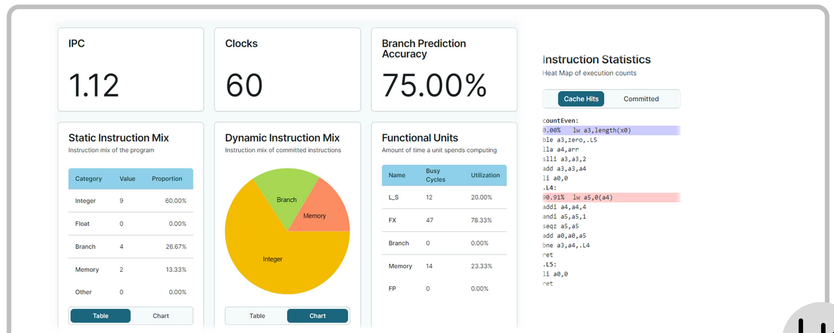


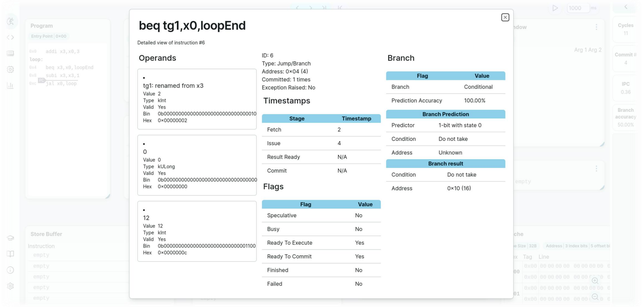
Code Editor



Processor Architecture



Runtime Statistics



Instruction Details

1 Motivation and Goals

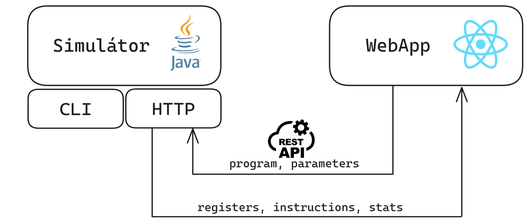
Mastering computational architectures is essential for developing fast and power-efficient programs. Our advanced simulator empowers both IT students and professionals to grasp the fundamentals of superscalar processors and HW-SW co-design. With customizable processor architecture, full C compiler support, and detailed performance statistics, this tool offers a comprehensive learning experience. Enjoy the convenience of a modern, web-based GUI to enhance your understanding and skills.

2 Feature Highlights

- **User-Friendly Interface**: Simple and illustrative web presentation with detailed information on each block and instruction.
- **Fully Configurable Processors**: Customize issue width, register fields, reorder, load and store buffers, branch predictors, functional and memory units, along with cache memory settings including size, associativity, cache line size, and replacement strategy.
- **Forward and Backward Simulation**: Flexibility to simulate in both directions for thorough analysis.
- **GCC Compiler Interface**: Build C code into assembly using various optimization levels with syntax highlighting and pairing between C and assembly code.
- **Comprehensive Performance Statistics**: Access static and dynamic metrics such as FLOPs, IPC, branch prediction accuracy, unit utilization and cache hit rate.
- **Benchmark CLI**: Command-line interface for benchmarking complex programs.

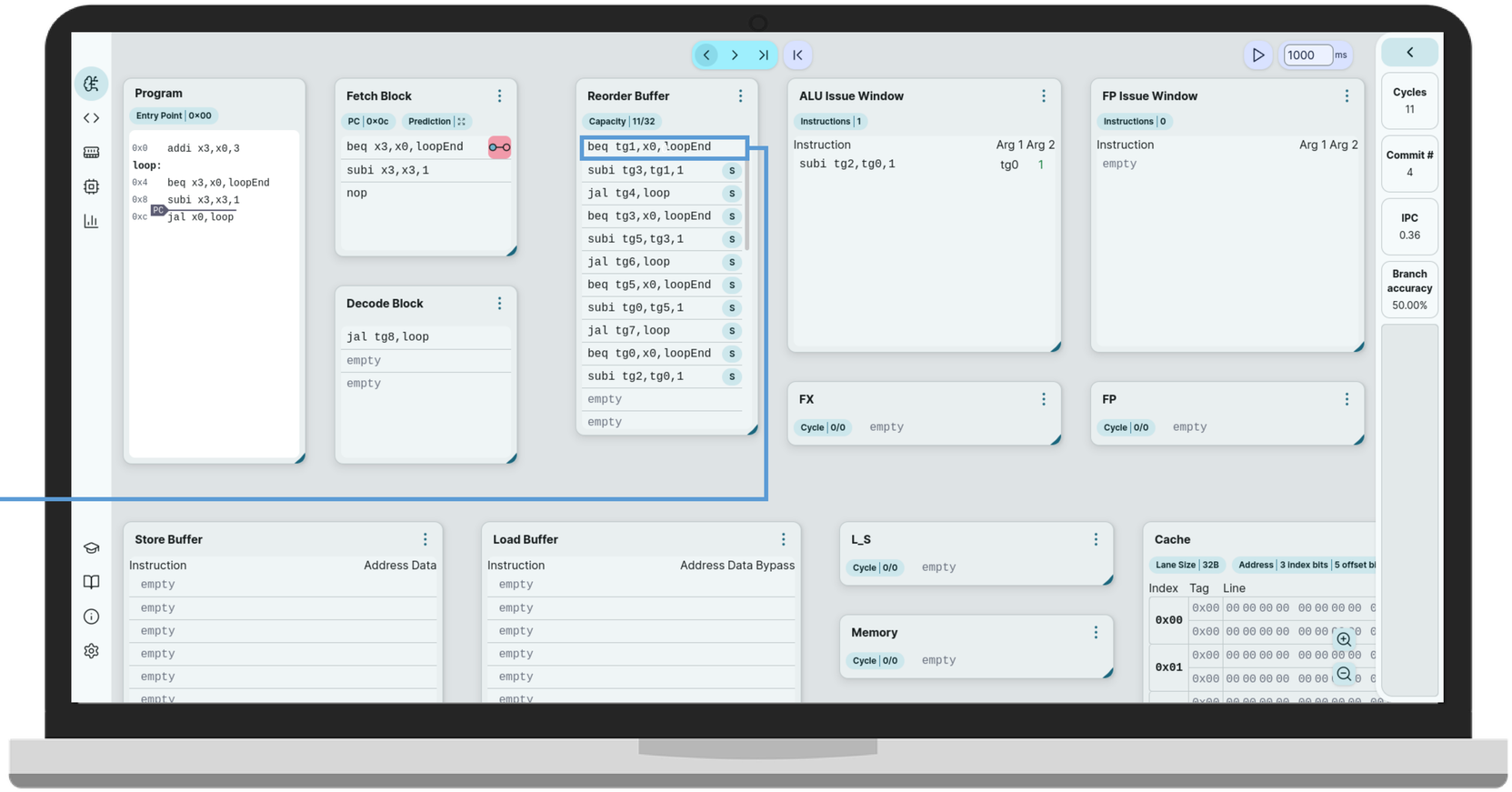
3 Implementation, Testing and Deployment

- **Fully Containerized Solution**: Implemented in Docker for seamless deployment and scalability.
- **Extensive Static Unit Testing**: Achieves 83% code coverage.
- **Robust Dynamic Testing**: Supports 100 concurrent users with a median latency under 1.2 seconds on an Intel i5-8300 laptop and 16GB RAM.



4 Video Tutorial, Source Codes and Live Demo

Short Video Tutorial | Source Codes | Live Demo



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