

Program Layout and Execution Report

CMPE-220: Systems Software

Team Members

(Team 13)

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GitHub Repository

Repository Link:

<https://github.com/JNR-10/software-cpu>

How to Download, Compile, and Run the Program

Note: These instructions are for Linux/Mac

1. Download the Project

```
git clone https://github.com/JNR-10/software-cpu  
cd software-cpu
```

2. Install Required Dependencies

WSL:

```
sudo apt-get install -y jq  
sudo apt-get install -y dos2unix
```

Mac:

```
brew install jq  
brew install dos2unix
```

3. Run the One-Command Demo

```
chmod +x demo.sh  
dos2unix ./scripts/*.sh  
dos2unix ./demo.sh  
./demo.sh
```

Running the demo will:

- Build the entire project
- Run unit tests
- Generate CPU execution traces

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- Launch the interactive web-based trace viewer
 - Automatically open your browser to visualize CPU execution

4. Manual Build Commands

```
make all          # Build everything  
make test         # Run unit tests  
make clean        # Clean build artifacts
```

5. Running and Debugging Factorial Program

```
# Assemble factorial  
  
dos2unix ./bin/software-cpu assemble src/programs/factorial.asm build/fact.bin  
./bin/software-cpu assemble src/programs/factorial.asm build/fact.bin  
  
# Run factorial calculation  
  
dos2unix ./bin/software-cpu run build/fact.bin  
./bin/software-cpu run build/fact.bin  
  
# Interactive debugging  
  
dos2unix ./bin/software-cpu debug build/fact.bin  
./bin/software-cpu debug build/fact.bin
```

6. Quick Program Testing

```
# Integration test  
  
dos2unix ./scripts/run_general.sh tests/assembly/test_integration.asm  
./scripts/run_general.sh tests/assembly/test_integration.asm
```

```
# Factorial example  
dos2unix ./scripts/run_general.sh src/programs/factorial.asm  
./scripts/run_general.sh src/programs/factorial.asm
```

7. Trace Generation and Viewer

```
# Generate execution trace  
dos2unix ./scripts/run_general_with_trace.sh src/programs/factorial.asm factorial_trace.  
./scripts/run_general_with_trace.sh src/programs/factorial.asm factorial_trace.json  
You can view the trace in 2 places:  
1. The command line  
2. build/traces/programname_time.json
```

Team Member Contributions

- **Charles Im:** Integration, Implement main, Testing
- **Jainil Narendrakumar Rana:** Algorithm subroutine and logic.
- **Mohit Manoj Barade:** Update Memory Map, Calling Convention and Architecture
- **Shrivaikunth Krishnakumar:** Implement factorial in assembly and trace generation
- All helped with debugging, Report writing, and Demo Video Prep