Simulation Kernel Quick Start Guide

Overview

This Java-based Simulation Kernel provides a reusable time-stepped simulation environment with an interactive console, single-step control, and waveform logging (GTKWave). It is suitable for modeling complex systems like restaurant operations, multi-agent interactions, and more, using a Verilog-inspired simulation loop.

Build & Run

1. Compile the simulation:

   make

2. Run the simulation:

   make run

3. The interactive console will start:

   sim>

Console Commands

- help : Show all available commands.
- list : List all simulation objects.
- show <object> : View the state of an object.
- set <object> <field> <value> : Modify an object's attribute.
- tick [N] : Advance simulation by N ticks (default 1).
- run <N> : Run simulation for N ticks continuously.
- log start <filename> : Begin waveform logging to <filename>.vcd.
- log stop : Stop waveform logging.
- quit : Exit the simulation console.

Waveform Logging (GTKWave)

1. From the console:

   sim> log start simulation.vcd

   sim> run 100

   sim> log stop

2. Open GTKWave:

```
gtkwave simulation.vcd
```

3. Analyze tick-by-tick state changes visually.

Workflow Summary

- Build & run the simulation.
- Use the console for inspection, modification, and single-stepping.
- Log signals to a VCD file for GTKWave waveform visualization.
- Extend by adding new entities via SimEntity inheritance.

Next Steps

- Add breakpoints and watchpoints.
- Implement event scheduling (time-based triggers).
- Create competitive multi-simulation scenarios.
- Write up the methodology (ChatGPT + yEd workflow advantages).