A Domain Specific Language for performance modeling

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Agenda

- Introduction
- Example: CWI lunch model
- Demo
Domain Specific Language

- Language tailored for a specialized domain
  - SQL -> databases
  - HTML -> web content
  - Shell script -> Unix/Linux automation
  - Rebel -> Specification of financial products (SWAT CWI)

- In contrast to general purpose languages
  - C, C++, java etc.
Domain: Performance Modeling

- **Limitations of existing tools**
  - Mainly graphical (drag n click)
  - Lack of crucial behavioral primitives
    - Processor Sharing models
    - Synchronization
    - Custom prioritization in queues

- **Using a framework**
  - Implementing too low level details
  - Mostly event oriented

- **Goal:**
  - Process oriented performance modeling language
  - Include modeling primitives from prior modeling experience
Performance Modeling DSL Tool

Compile time

Language Definition (Antlr4 Grammar)

Run time

Parser visitor

Model instance

Engine: Java+SSJ
Backend: Discrete event simulation

- **Three ingredients:**
  - **Model (workflow):**
    - A triggers B
    - B waits for C
    - Queueing models
    - Single/multi process
    - FIFO / ROUND ROBIN / RANDOM
  - **Behavior (timings):**
    - How long?
    - How much?
    - Based on data/measurements.
  - **Event list (bookkeeping):**
    - When?
    - In what order?
    - List of events with time of occurrence
Backend: Discrete event simulation

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- When?
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Language basics (JSON inspired)

- **Declarations:**
  - `<identifier> : Type`
  - `<type identifier> .<identifier> : Type`
  - `<identifier> : <attribute> | <component>`
  - `<function> <argument>*= <expression>`

- **Orchestration:**
  - `<component> -> <component>`

- **Expressions:**
  - `-Assignment:  x=2, y='test'`
  - `-Comparison:  x<y, value=='foo'`
  - `-Predicate:  x>2, a&&b`
Example: CWI lunch time QoS (stereotype process)
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I’m hungry. Shall we go for lunch?
Example: CWI lunch time QoS (stereotype process)

I’m hungry
Shall we go for lunch?

OK
Example: CWI lunch time QoS (stereotype process)

What are we waiting for?

We’re ready, let’s go
Example: CWI lunch time QoS (stereotype process)

We’re ready, let’s go

Meal or sandwich?

What are we waiting for?
Example: CWI lunch time QoS (stereotype process)

What are we waiting for?

We’re ready, let’s go

Perhaps not
Example: CWI lunch time QoS (stereotype process)

We’re ready, let’s go

Perhaps not

To snack or not to snack

What are we waiting for?
Example: CWI lunch time QoS (stereotype process)

We’re ready, let’s go

Perhaps not

To snack or not to snack

What are we waiting for?
Demo
Questions