Modelling the Reactive Behaviour of SVG-based User Interfaces with Hierarchically-linked Statecharts

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October 2nd, 2009

SVG Open 2009

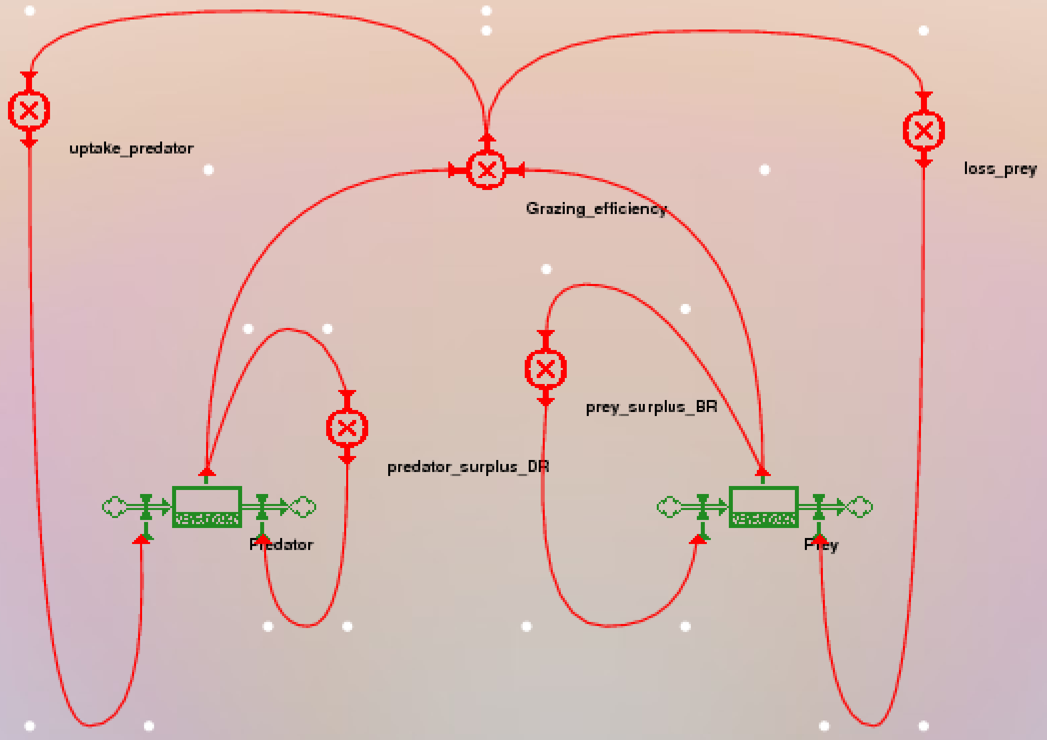
Presentation Structure

- Goals
- Previous Work
- Developing with Hierarchically-linked Statecharts
- Future work

Our Goals

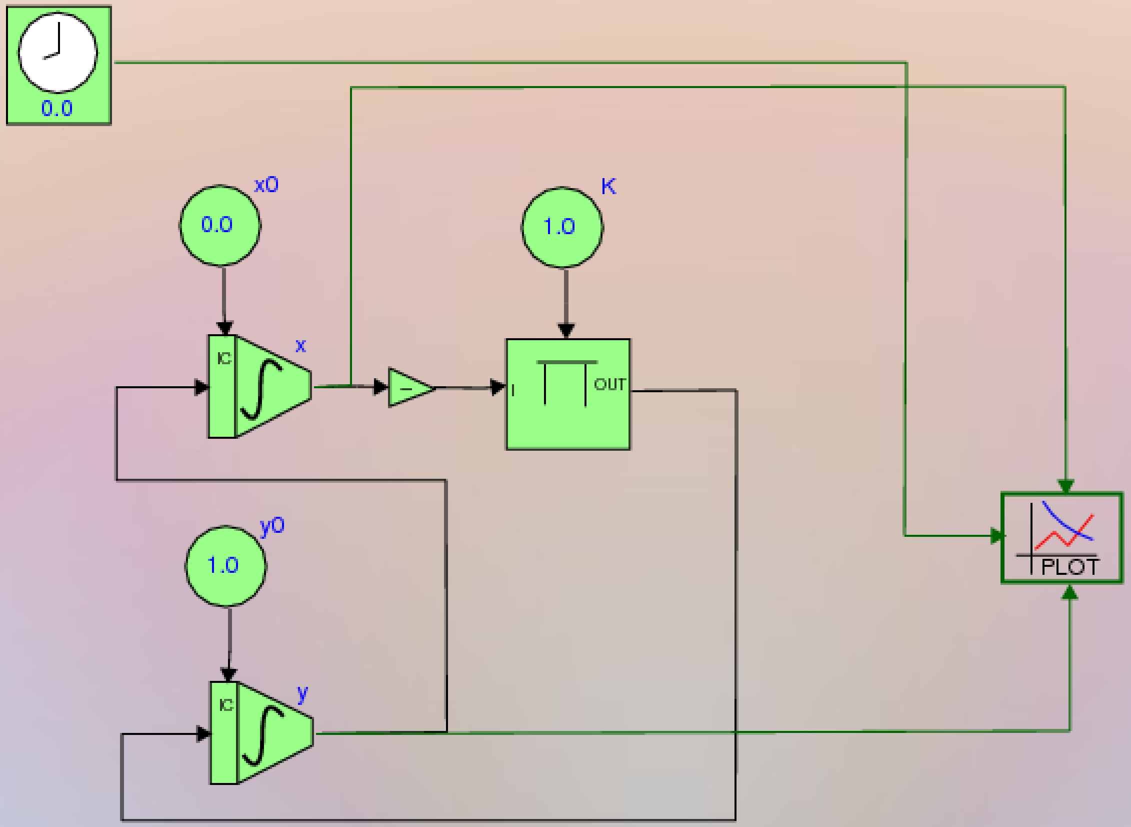
- Ease development of structurally and behaviourally complex UI's.
- UI development is hard.
- Minimize accidental complexity
- *Model everything*:
  - Faster to develop
  - More maintainable
  - Greater reliability

Forrester System Dynamics model of Predator-Prey

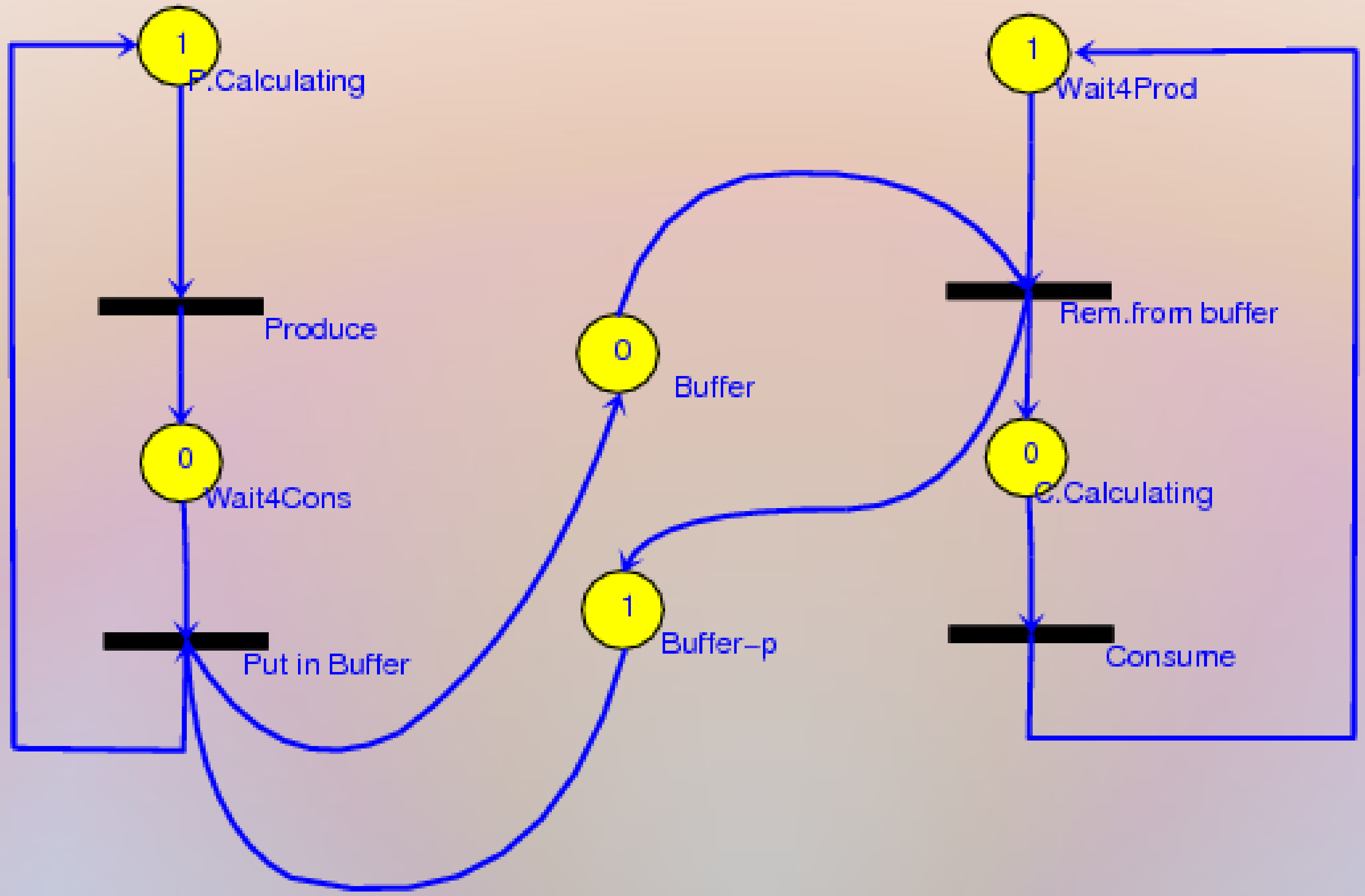


2-species predator-prey system

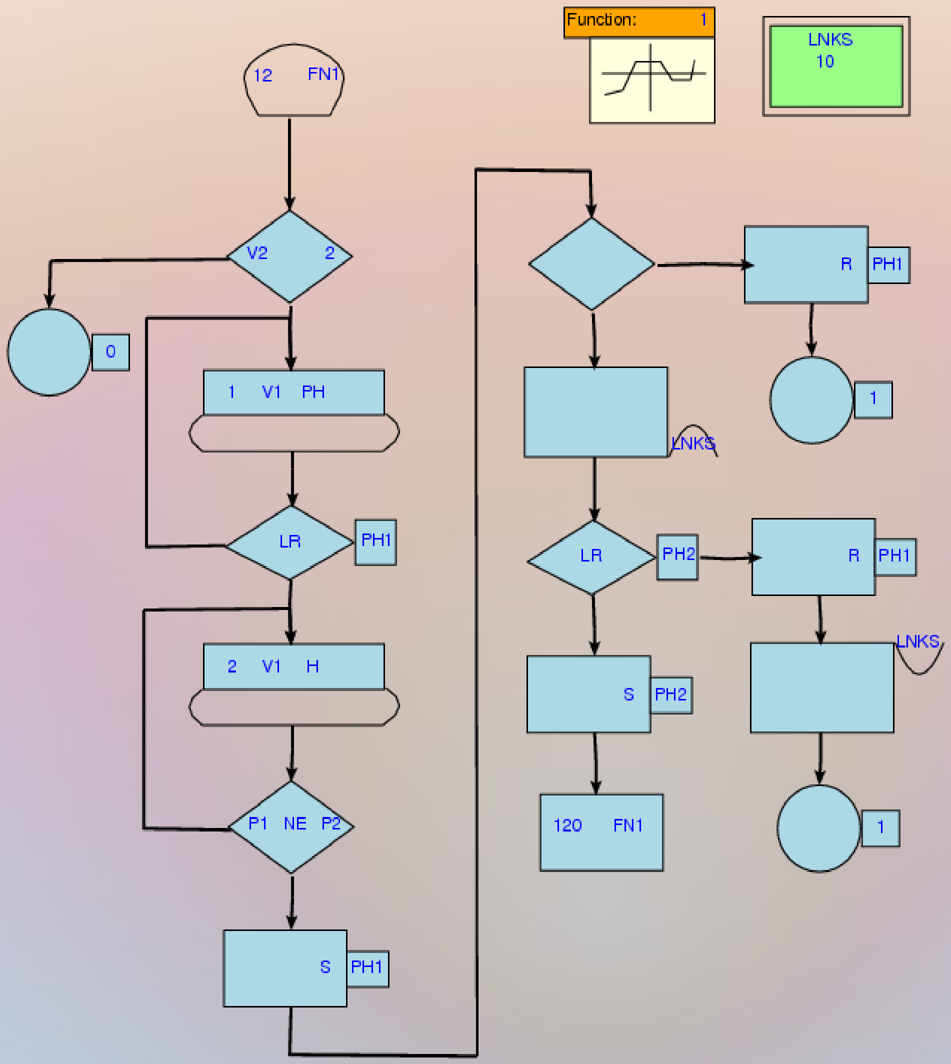
Causal Block Diagram model of Harmonic Oscillator



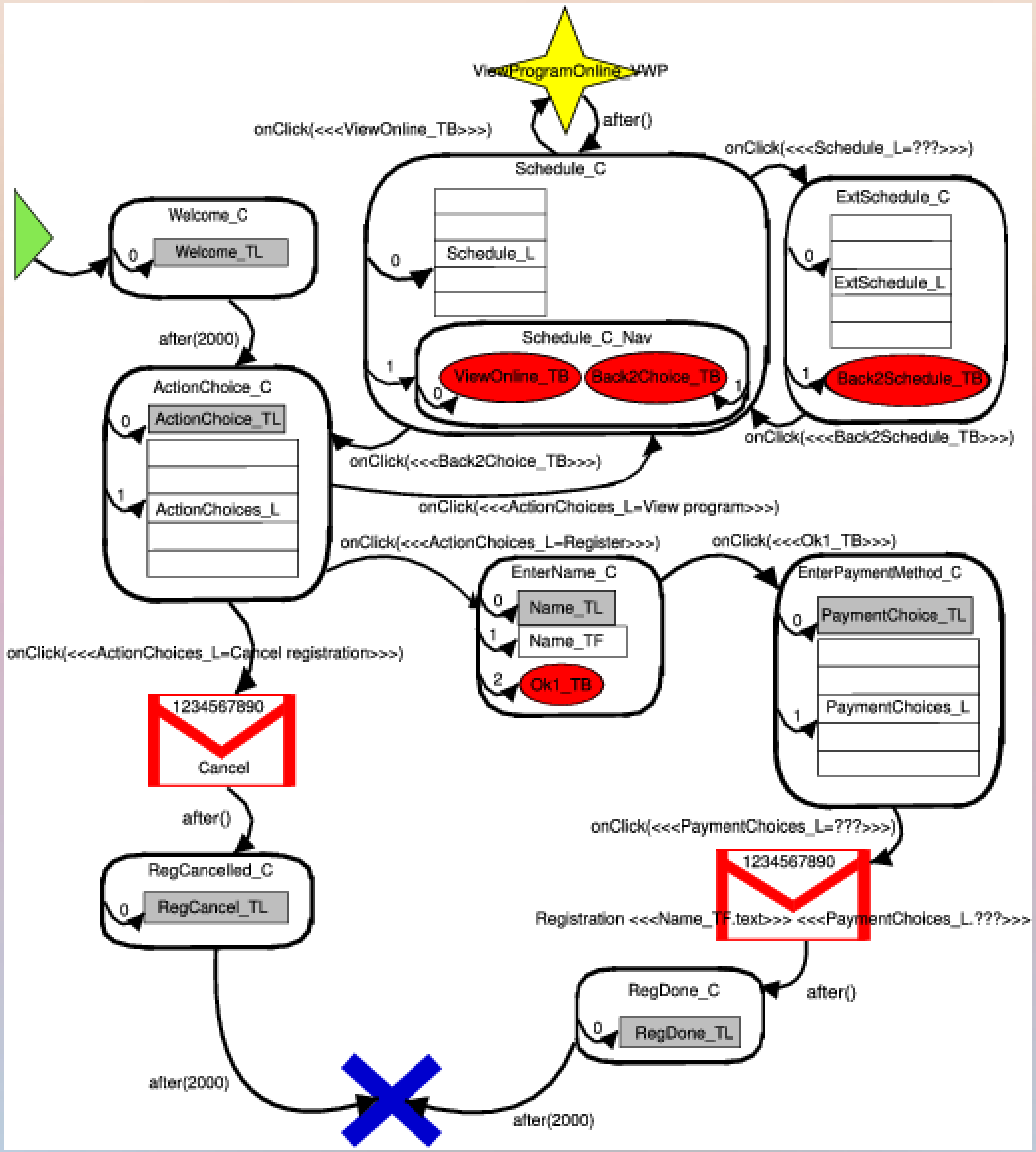
Petri Net model of Producer Consumer



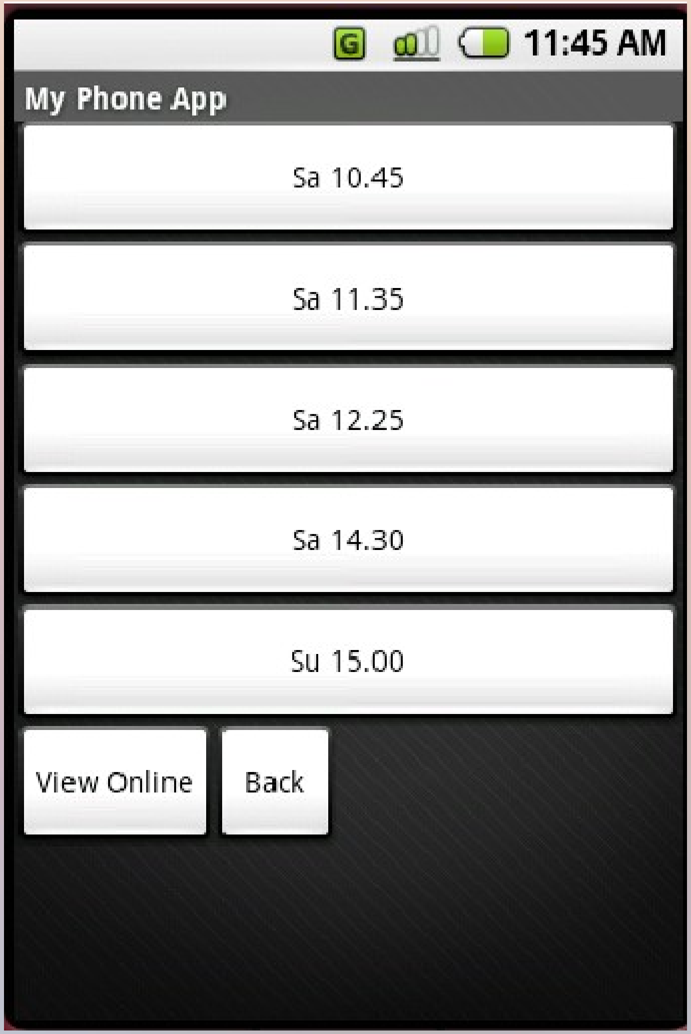
GPSS model of Telephone Exchange



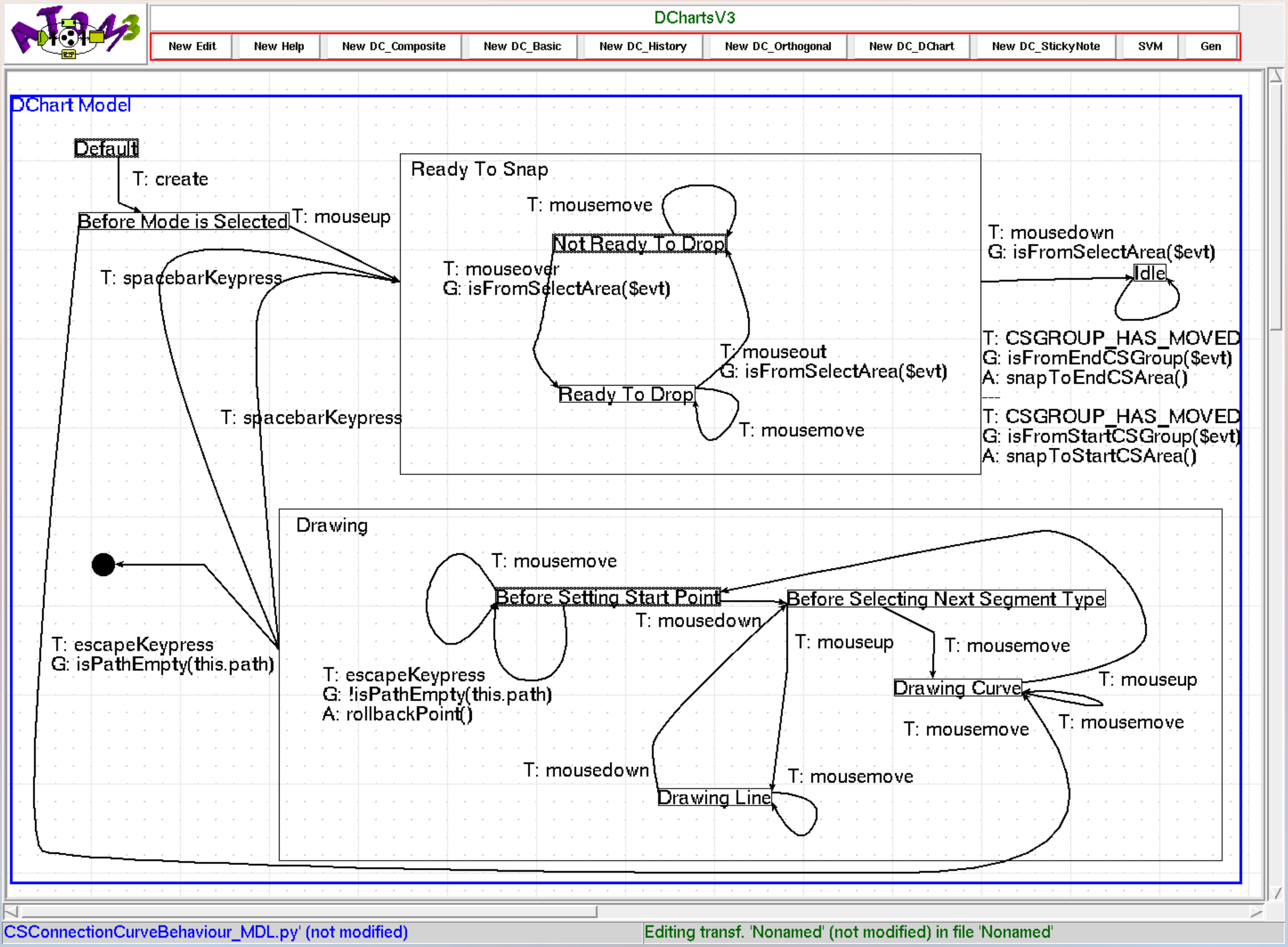
DS(V)M example application, the PhoneApps Domain-Specific model



DS(V)M example application: conference registration (Google Android)



AToM3



CSConnectionCurveBehaviour_MDL.py' (not modified)

Editing transf. 'Nonamed' (not modified) in file 'Nonamed'

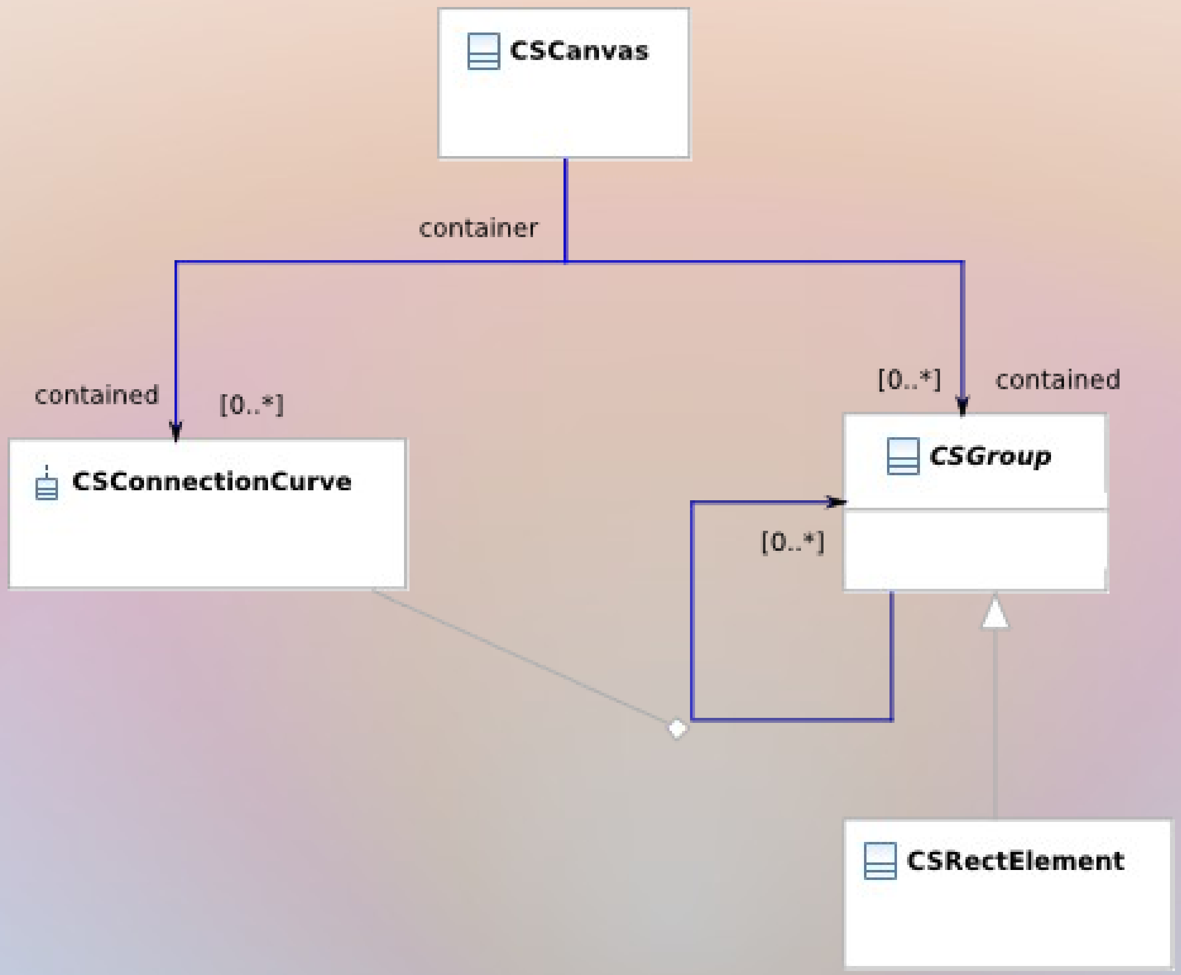
Developing with HlS

- *Model every aspect of the system-to-be-built, at the most appropriate level of abstraction, using the most appropriate formalism(s).*
- Class Diagrams and Statecharts to model UI

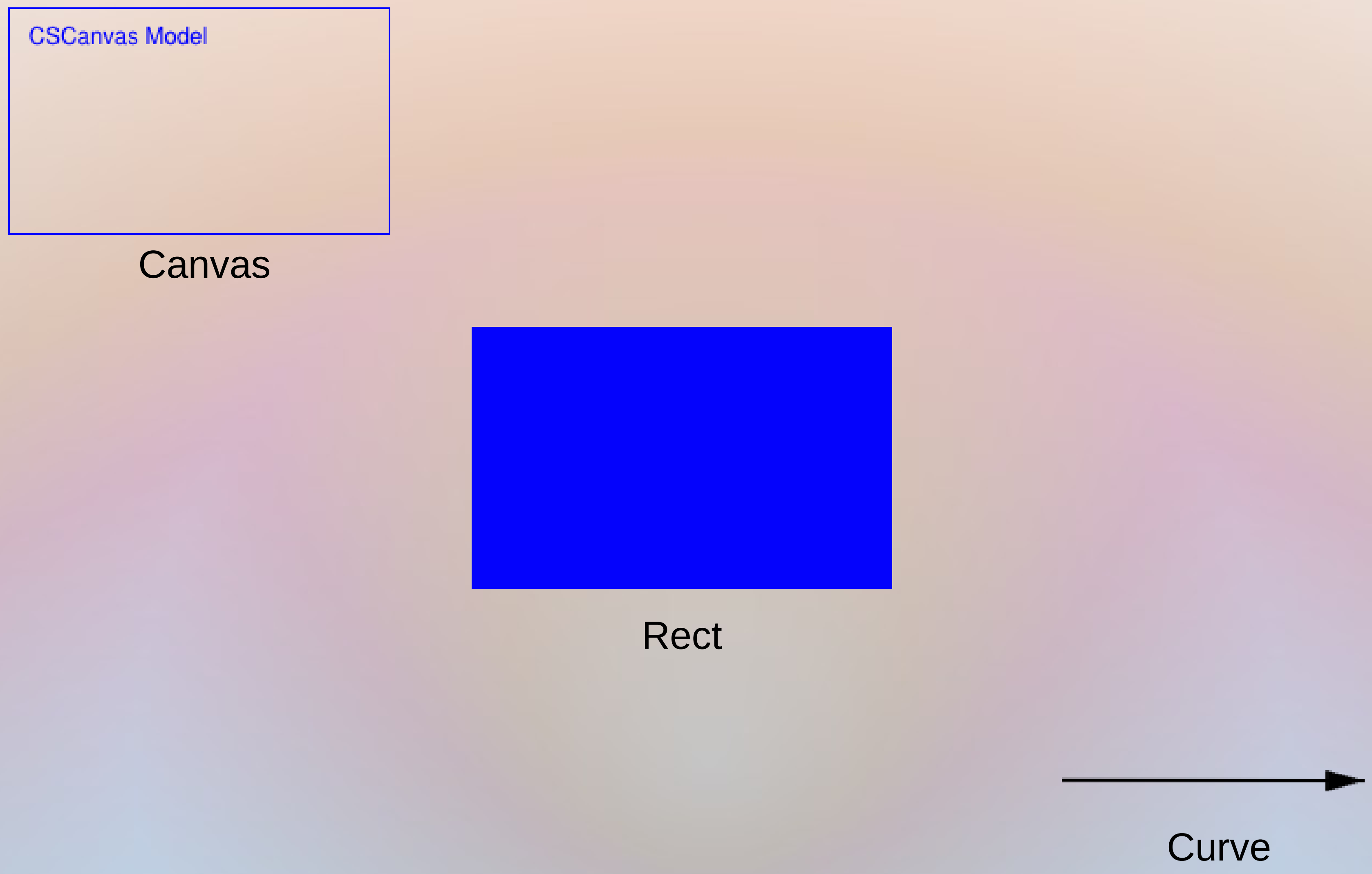
HlS Workflow

- Based on language engineering.
- Model
  - Abstract Syntax
  - Concrete Syntax
  - Behaviour
- Compile

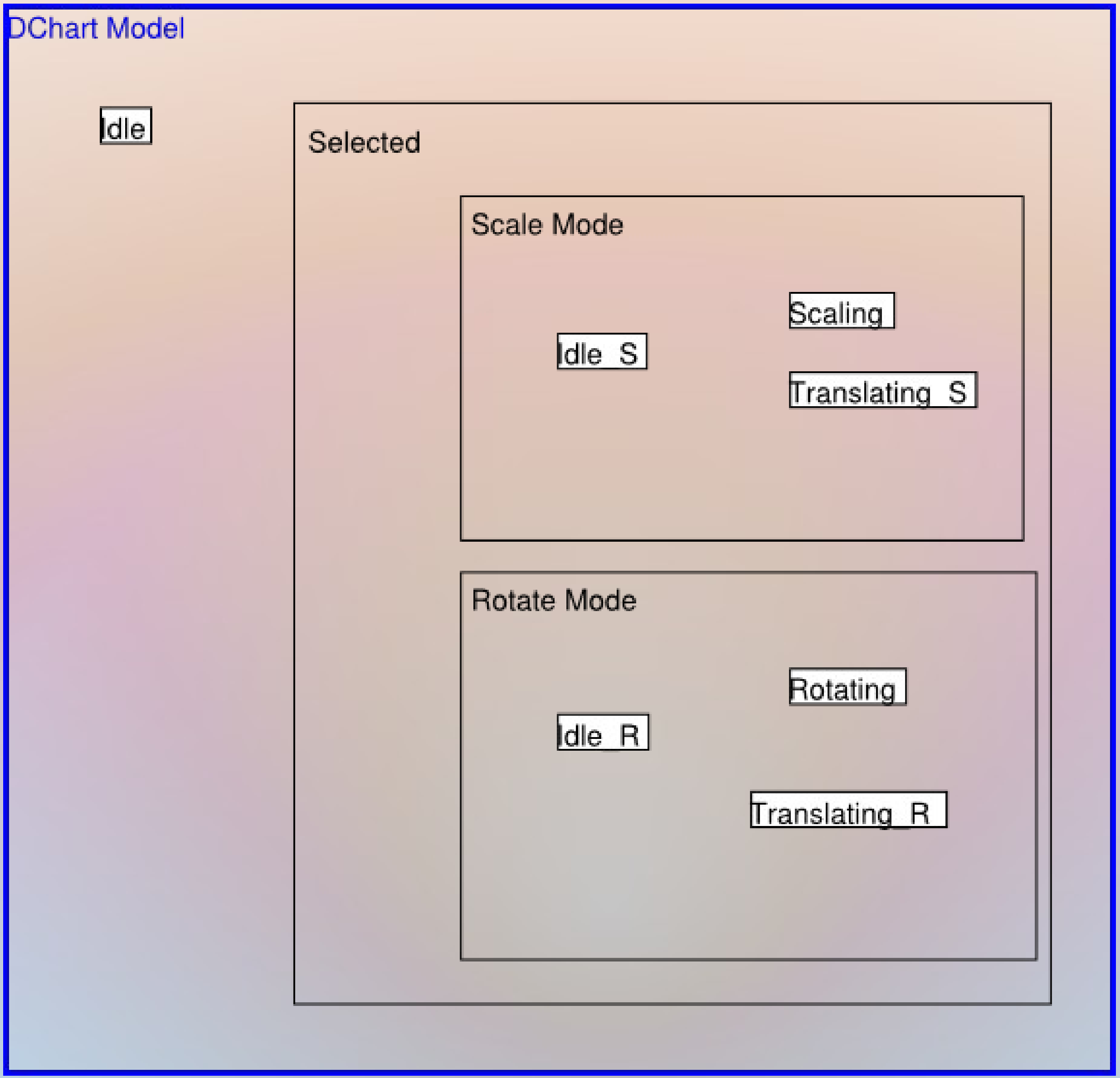
Inkscape Example (Abstract Syntax)



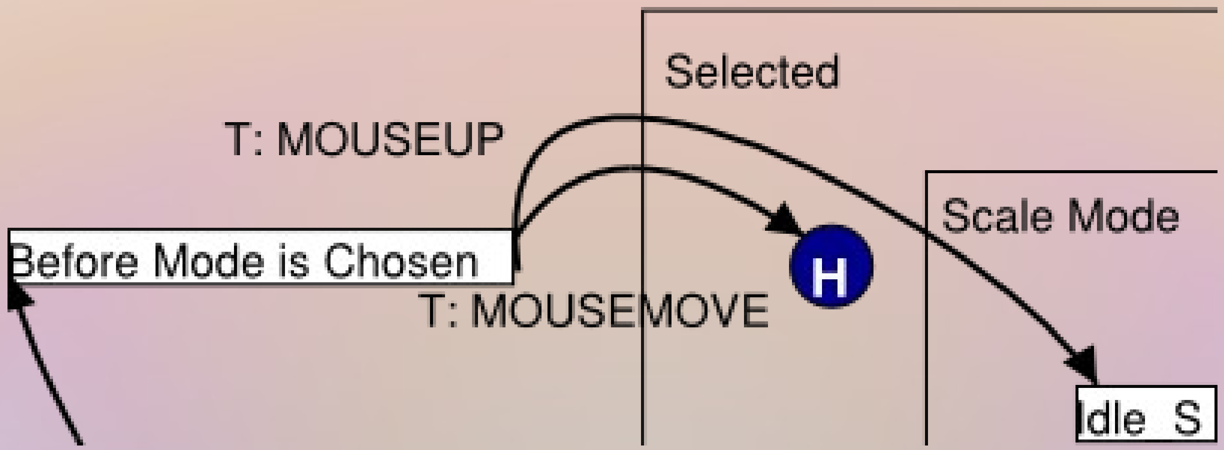
Inkscape Example (Concrete Syntax)



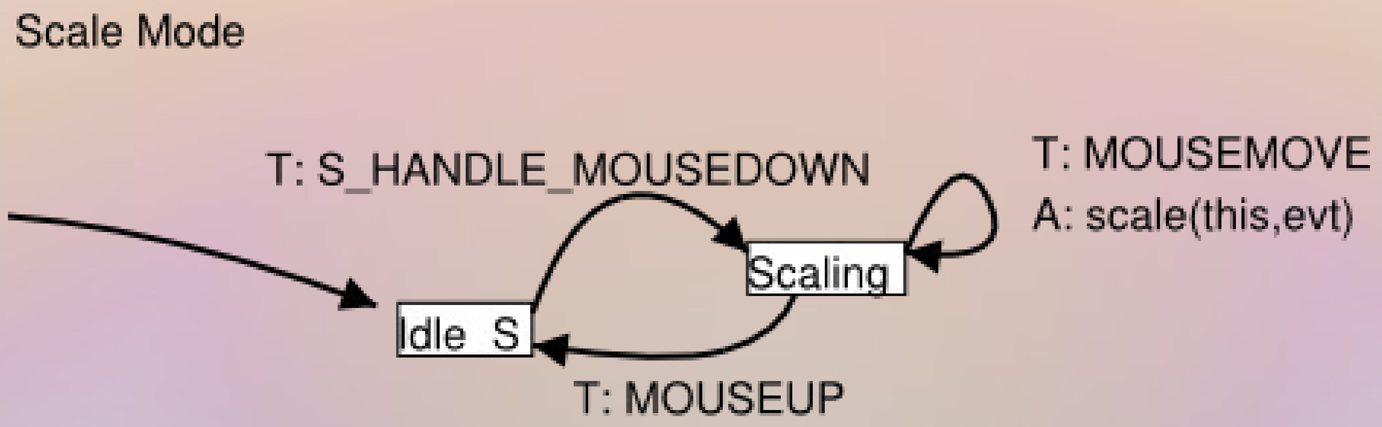
Inkscape Example (Behaviour)



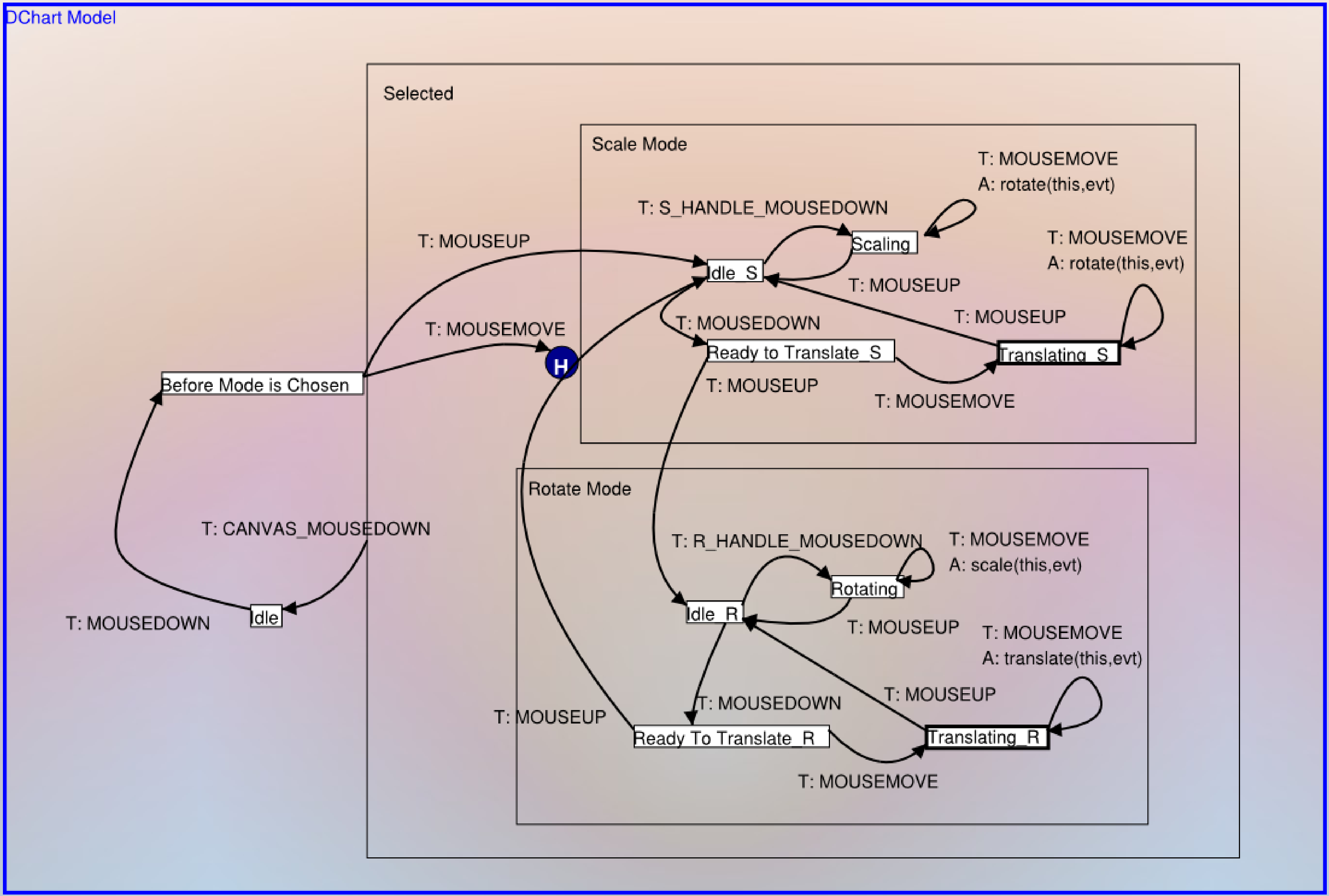
Inkscape Example (Behaviour)



Inkscape Example (Behaviour)



Inkscape Example (Behaviour)



Inkscape Example

- Compile with SCCJS
  - Produces .js file
  - Defines statechart constructor function
- Write “glue” code

Future Work

- Develop AToMPM
- Explore different “optimal” formalisms for UI specification and synthesis
- Explore use of HlS as “assembly language” for higher-level specification languages (such as Task Models)
- Analysis of models (possibly after transformation to appropriate formalisms such as Petri Nets)
- Target: handheld devices, from DSVLs