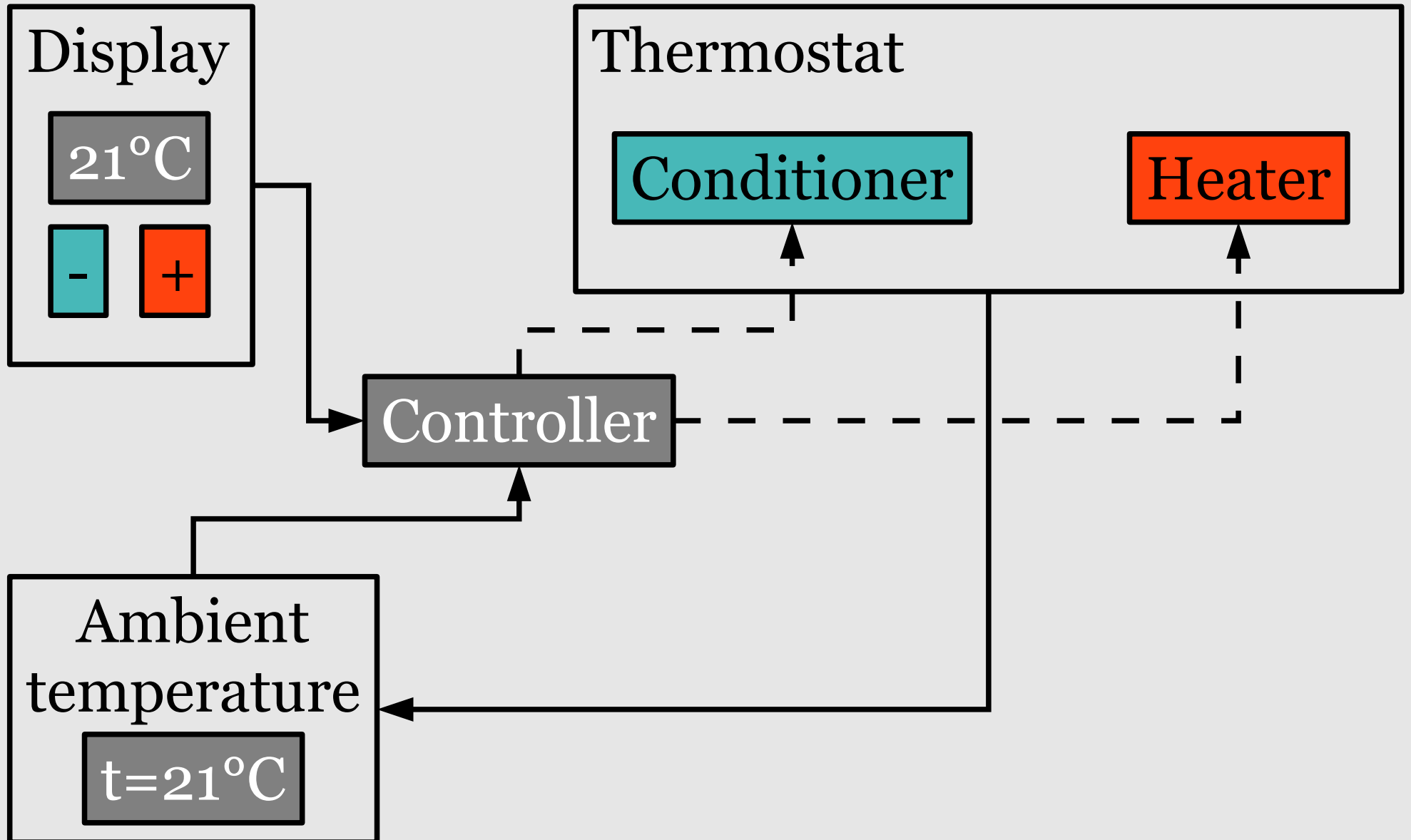


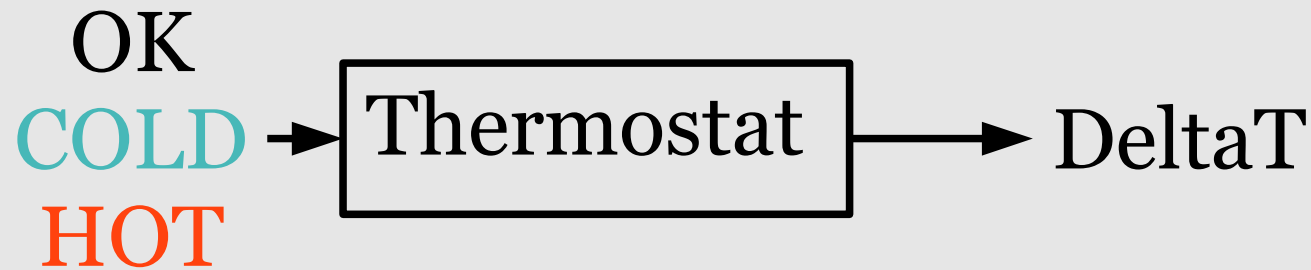
Specification of state transition models

Margarita Spichakova

Example



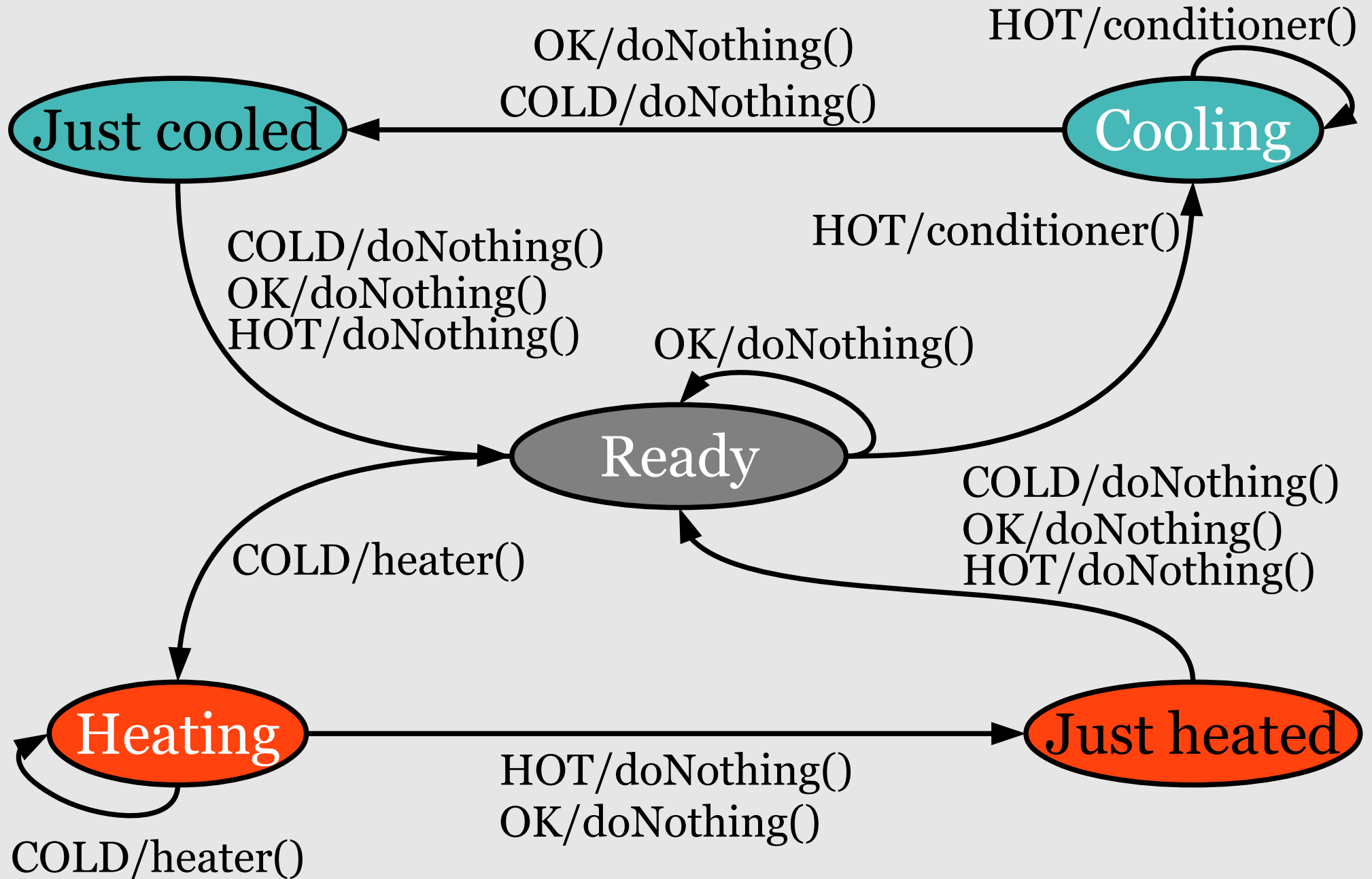
Thermostat. Behaviour table



Initial State: ready		
When current state and input are	make a transition to state	and respond by
(hot,ready)	cooling	air-conditioner
(hot,heating)	just-heated	do-nothing
(hot,cooling)	cooling	air-conditioner
(hot,just-heated)	ready	do-nothing
(hot,just-cooled)	ready	do-nothing
(okay,ready)	ready	do-nothing
(okay,heating)	just-heated	do-nothing
(okay,cooling)	just-cooled	do-nothing
(okay,just-heated)	ready	do-nothing
(okay,just-cooled)	ready	do-nothing
(cold,ready)	heating	furnace
(cold,heating)	heating	furnace
(cold,cooling)	just-cooled	do-nothing
(cold,just-heated)	ready	do-nothing
(cold,just-cooled)	ready	do-nothing

Table from the book. Daniel Ashlock. Evolutionary Computation for Modeling and Optimization

Thermostat. Finite state machine



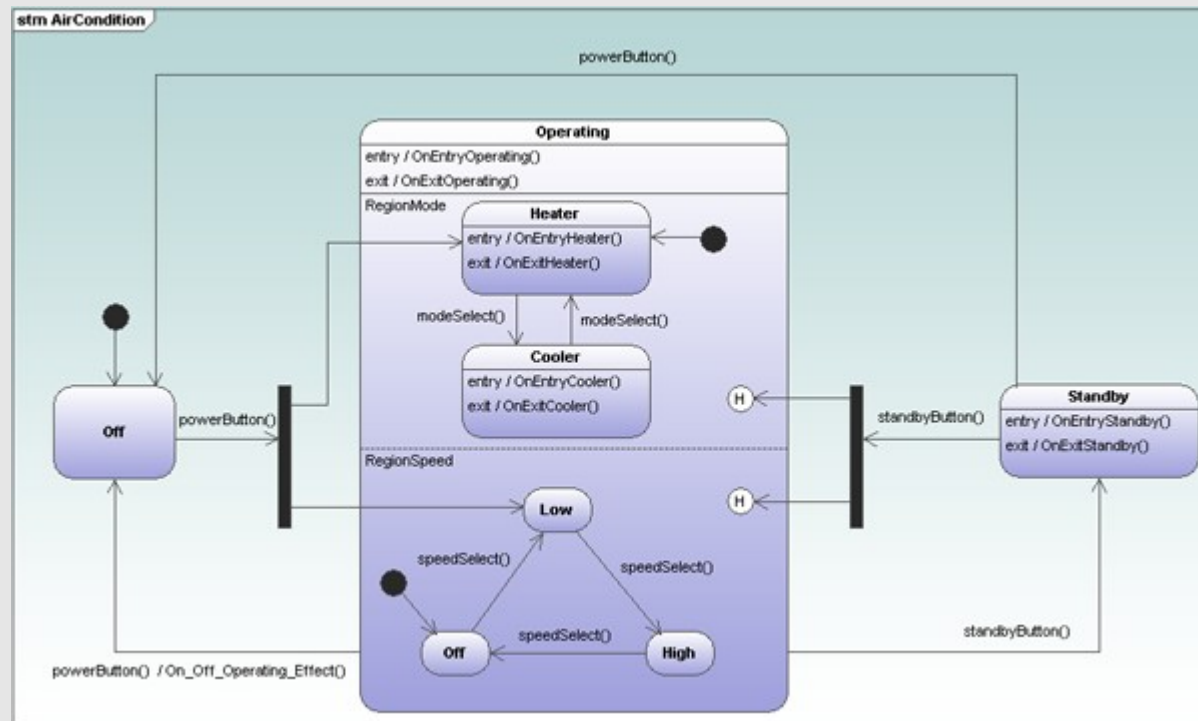
FSM as natural way to describe some things

- Protocols
- Digital logic design
- Controllers
- Reactive systems
- User interface

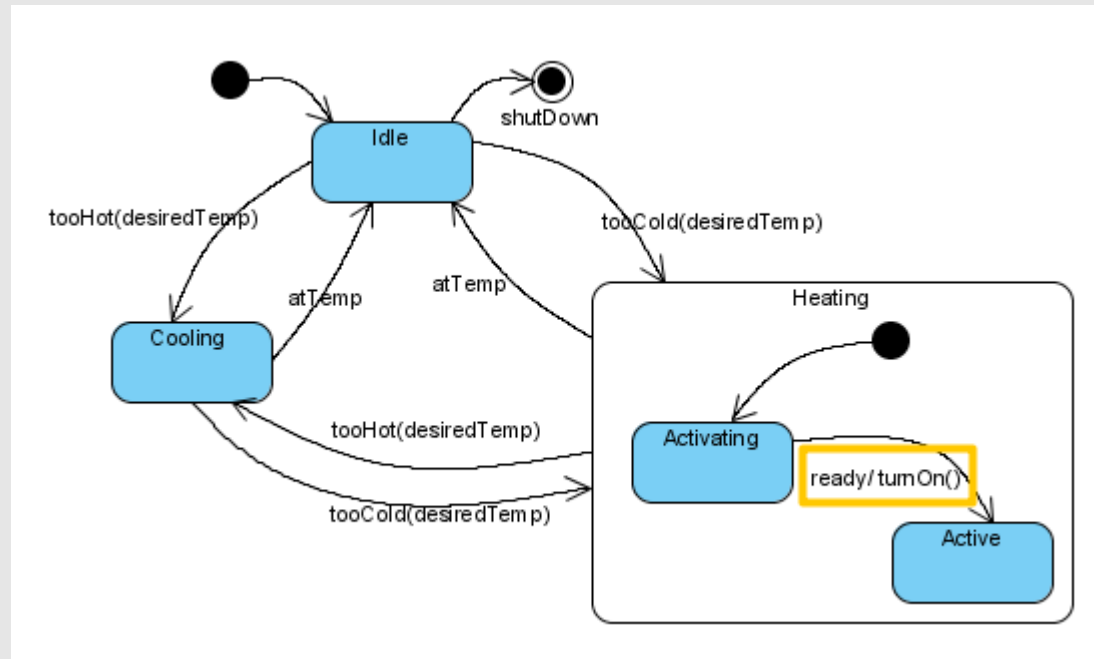
Tools

- Modelica state graph
- Simulink stateflow
- Yakindu Statechart Tools
- Umodel
- Unimod
- Stateworks
- ...

UModel - UML tool for software modeling and application development

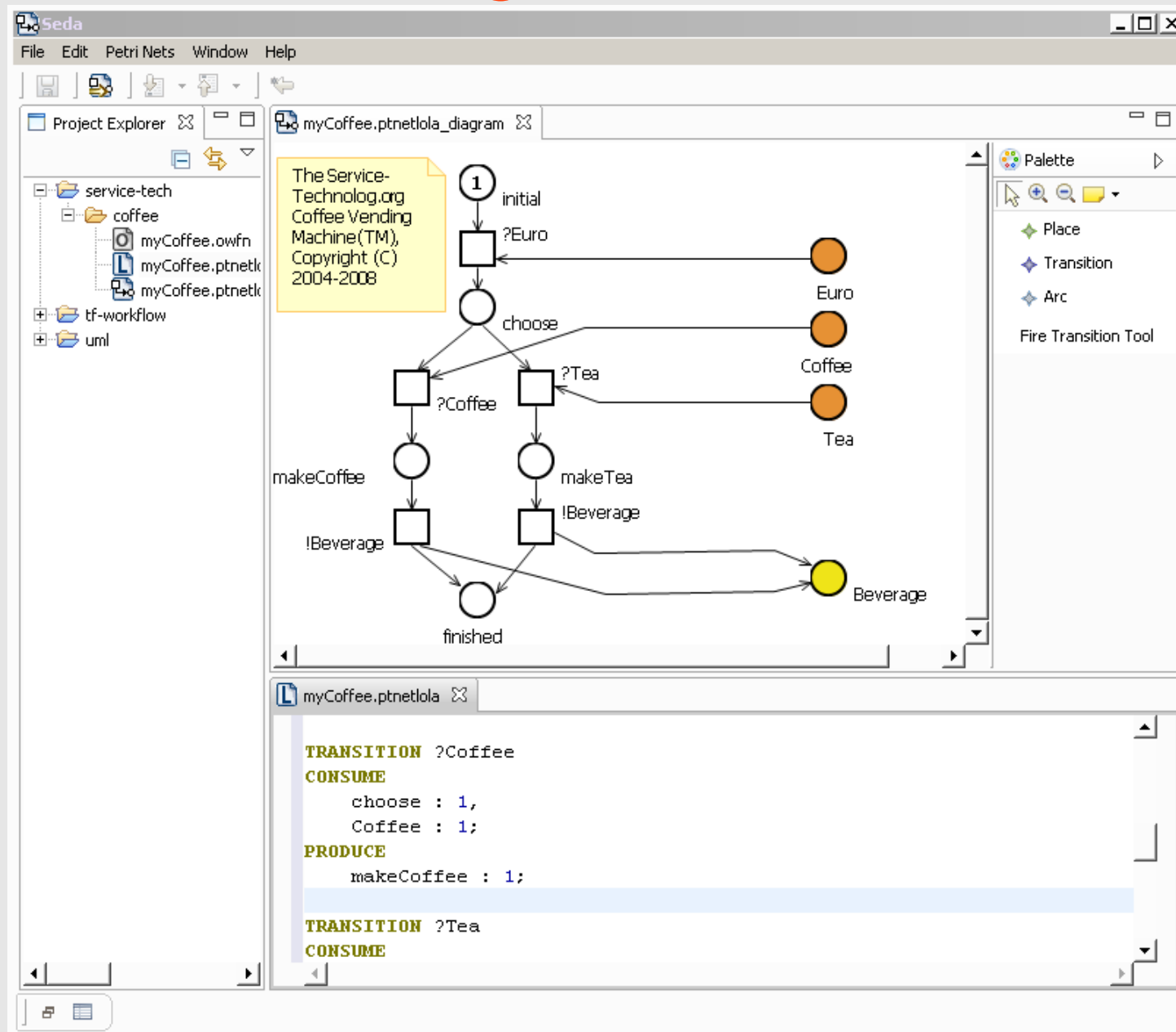


Visual paradigm for UML

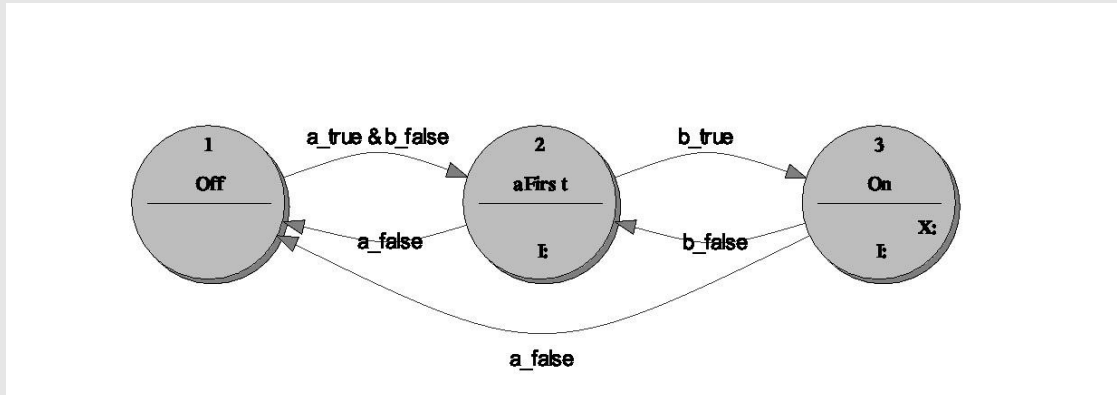


http://www.visual-paradigm.com/support/documents/vpumluserguide/94/2579/6714_creating_stat.html

SEDA

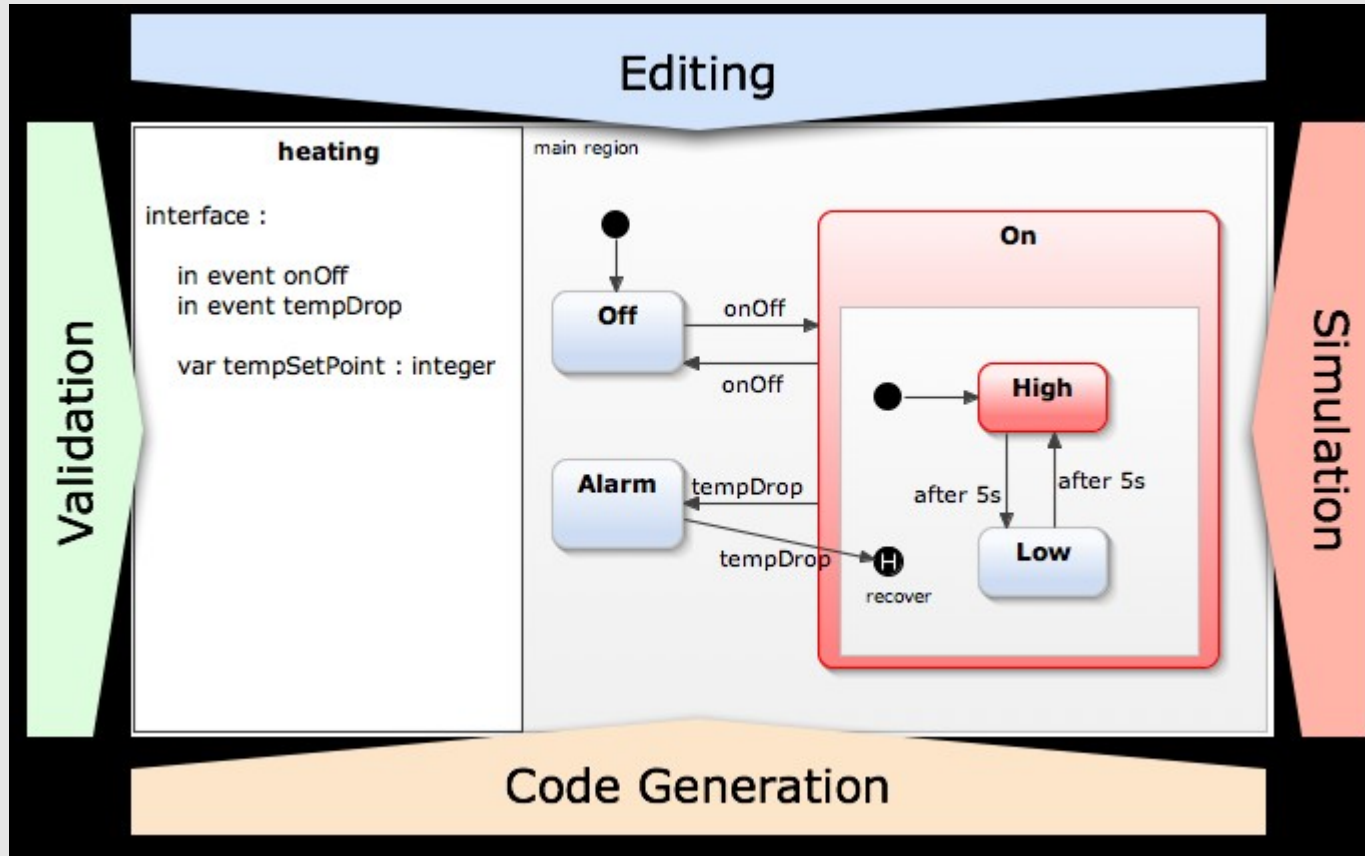


StateWORKS

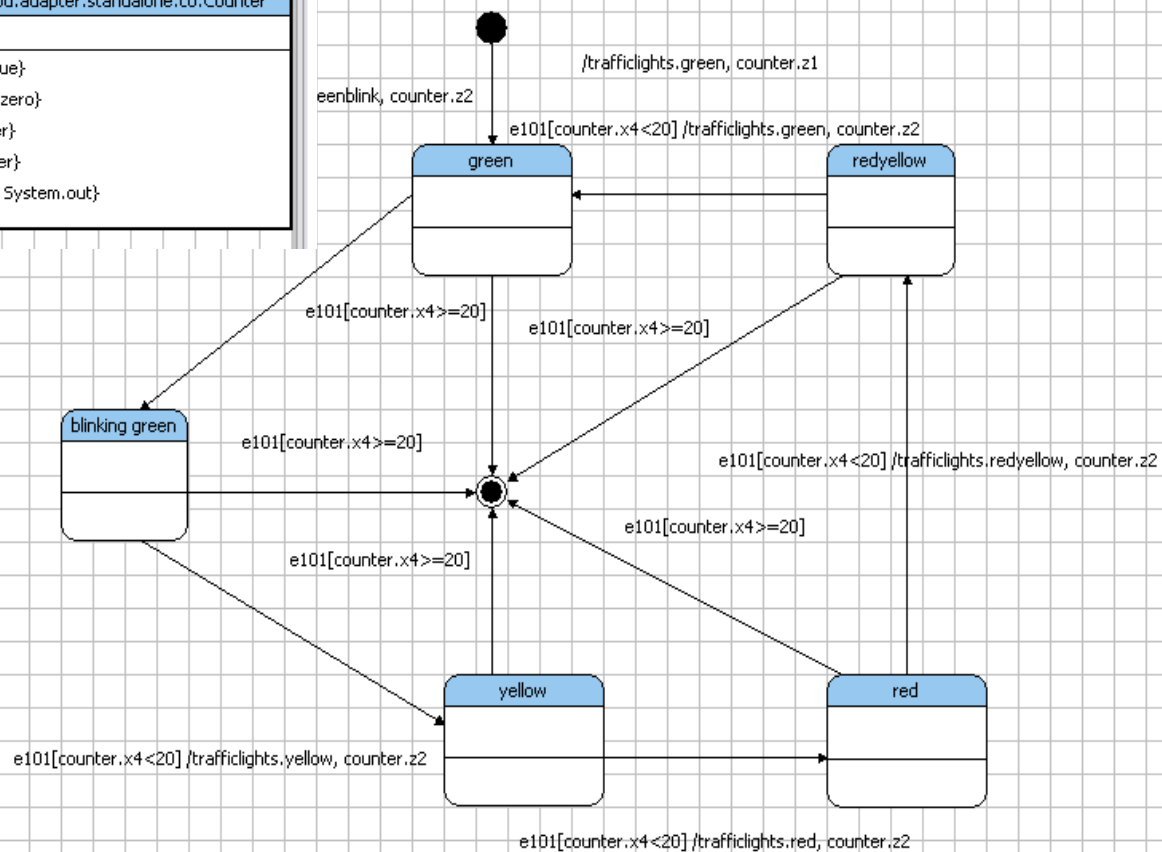
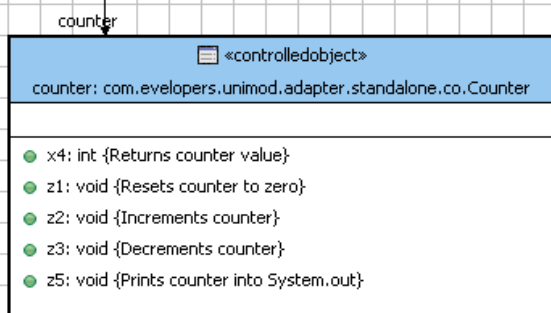
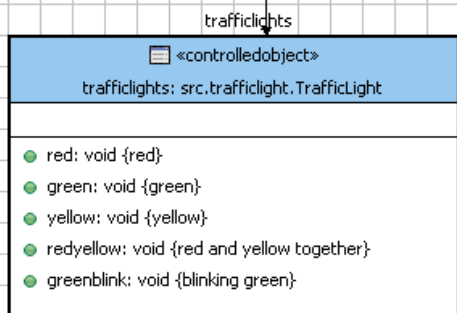
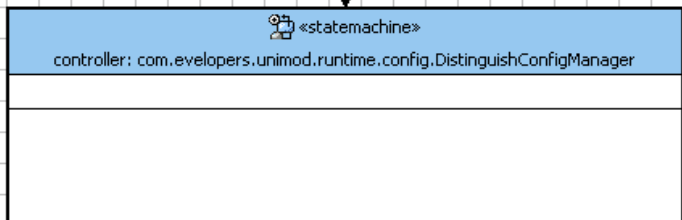
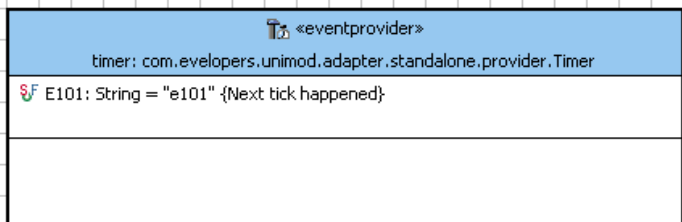


Modeling Software with Finite State Machines: A Practical Approach
<http://www.stateworks.com/overview/WhatIsStateWORKS/>

Yakindu Statechart Tools

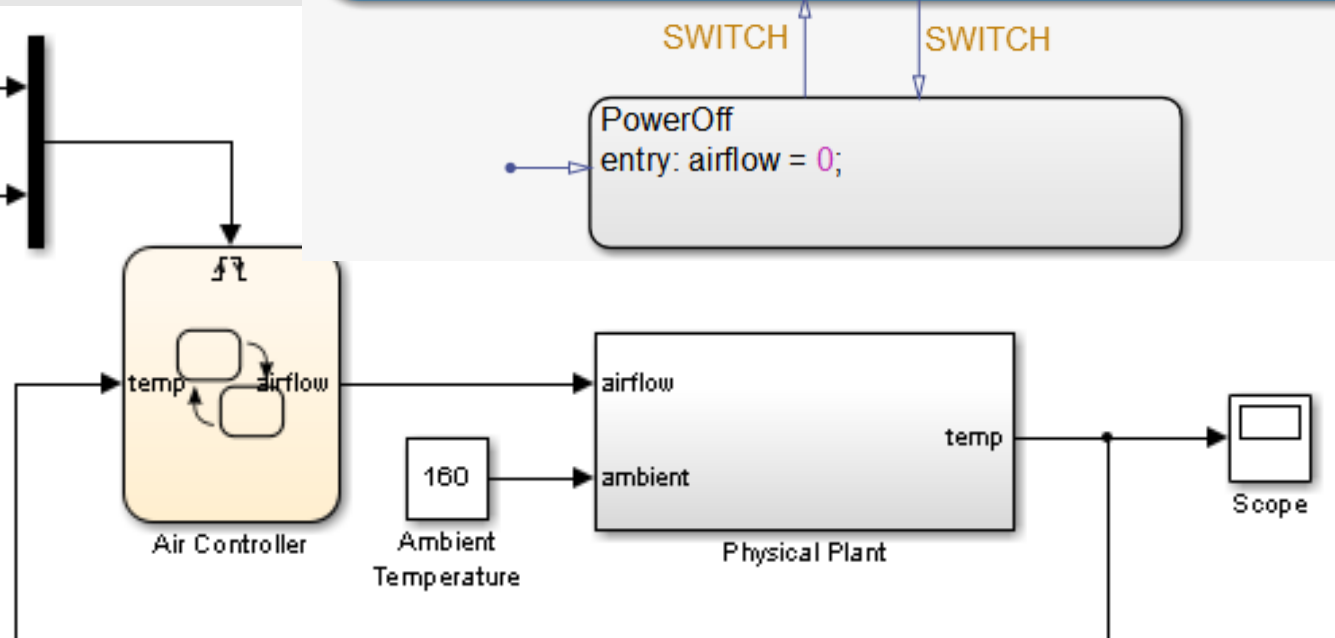
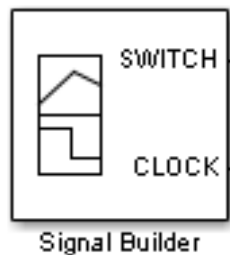
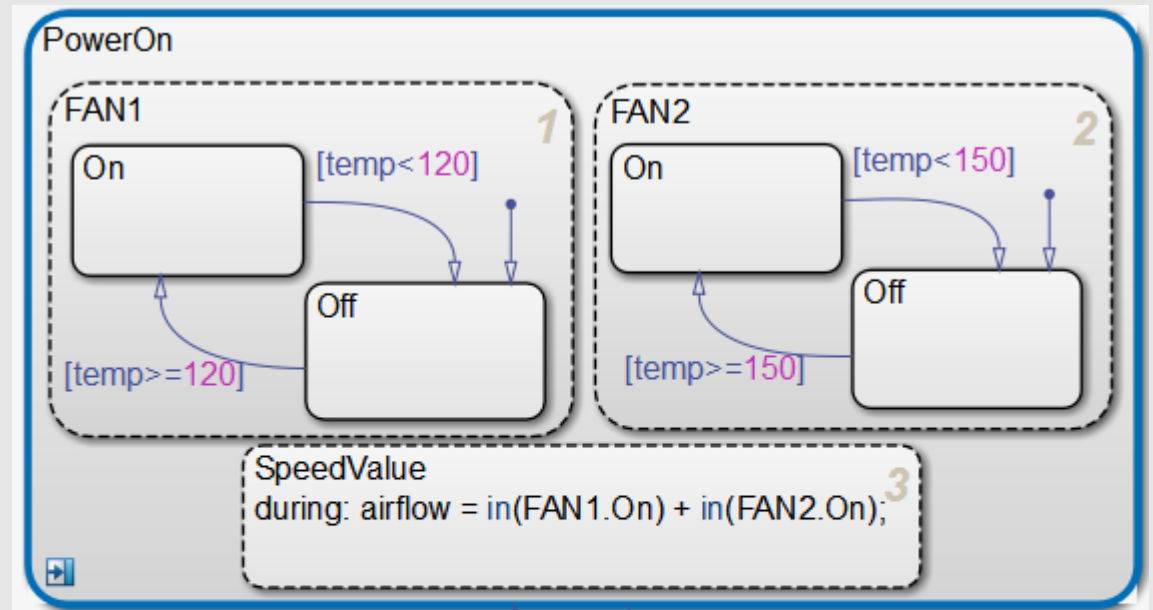


Unimod



Stateflow (Simulink). MathWorks

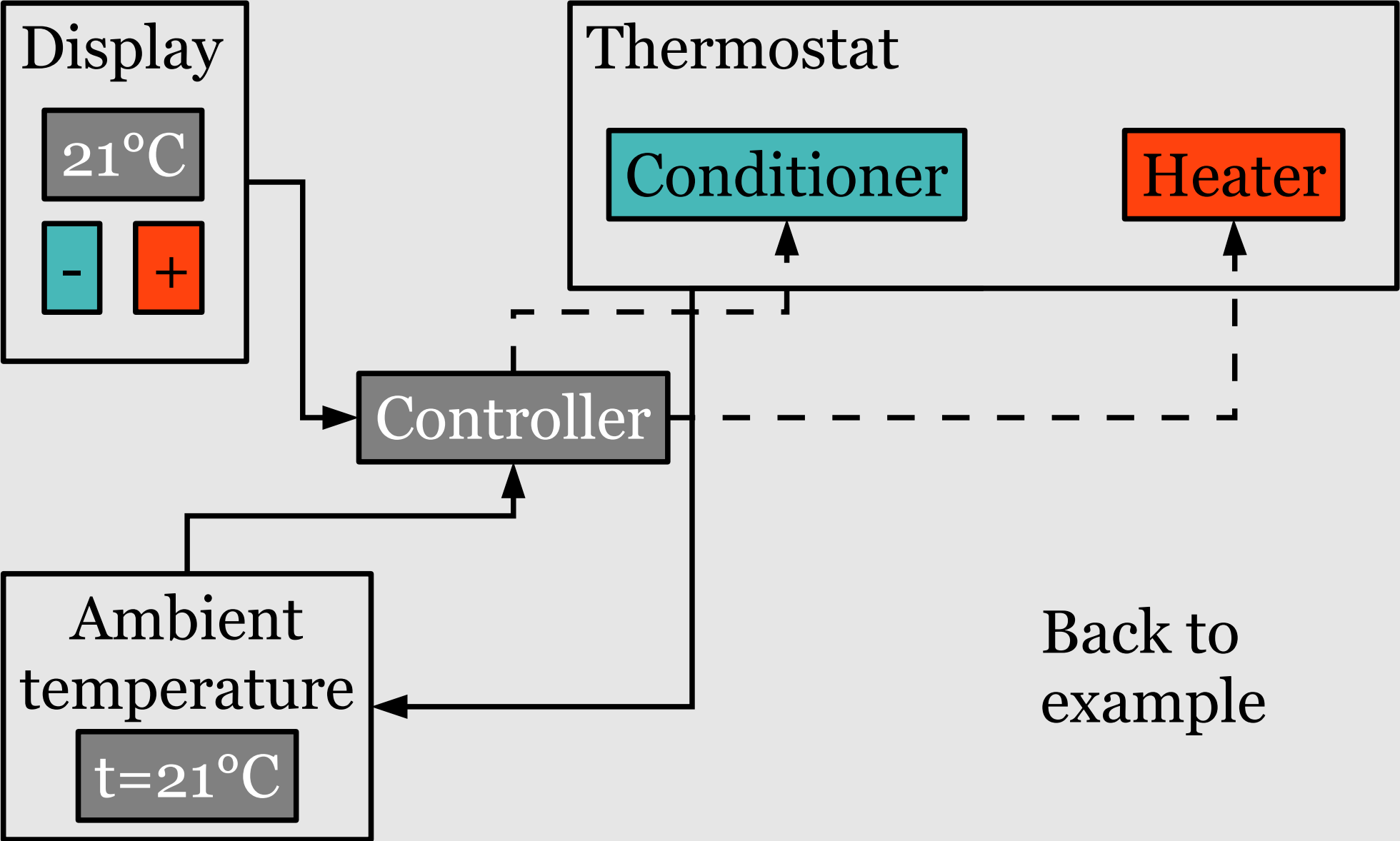
<http://www.mathworks.se/videos/introduction-to-stateflow-for-controls-applications-68889.html>



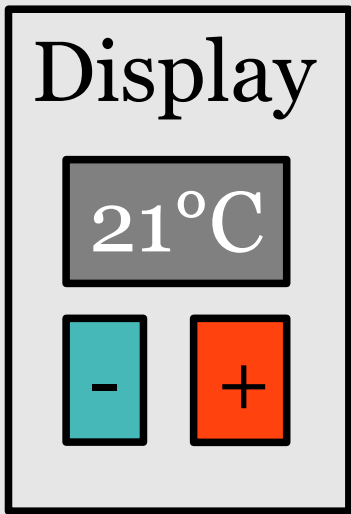
Choice

- Mealy (actions on transition) or Moore type (action on states) or both
- Actions described as external methods or inside the FSM specification
- Hierarchy of machines or several machines communicating with each other
- Memory: internal or external variables
- Concurrency (time)
- Language of events (&&, ||, ==, >, <, !)
- Language of actions

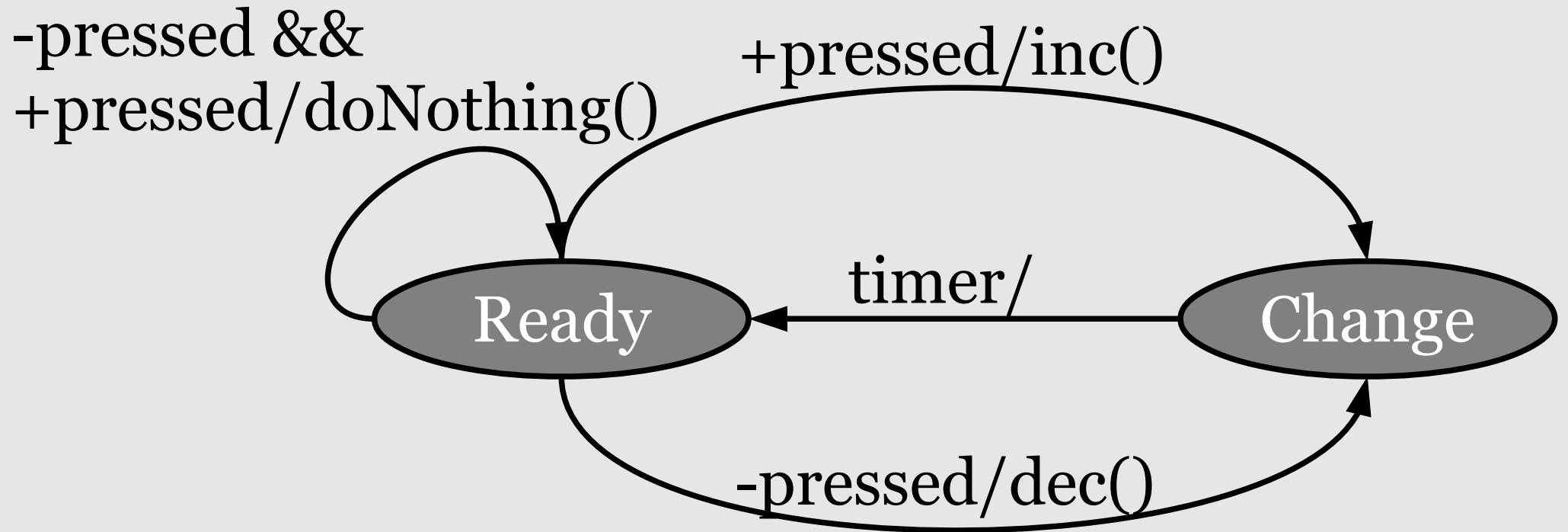
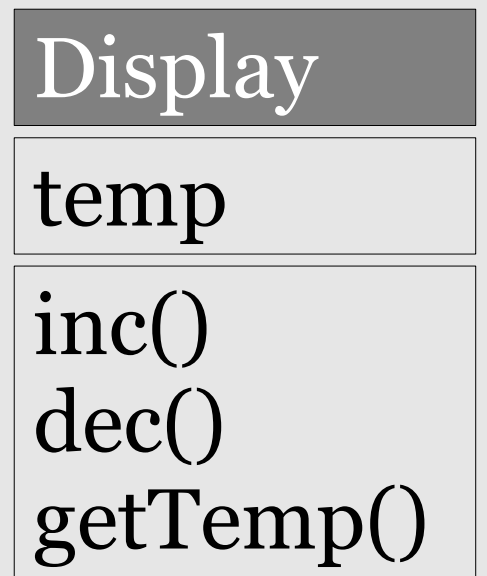
Overview



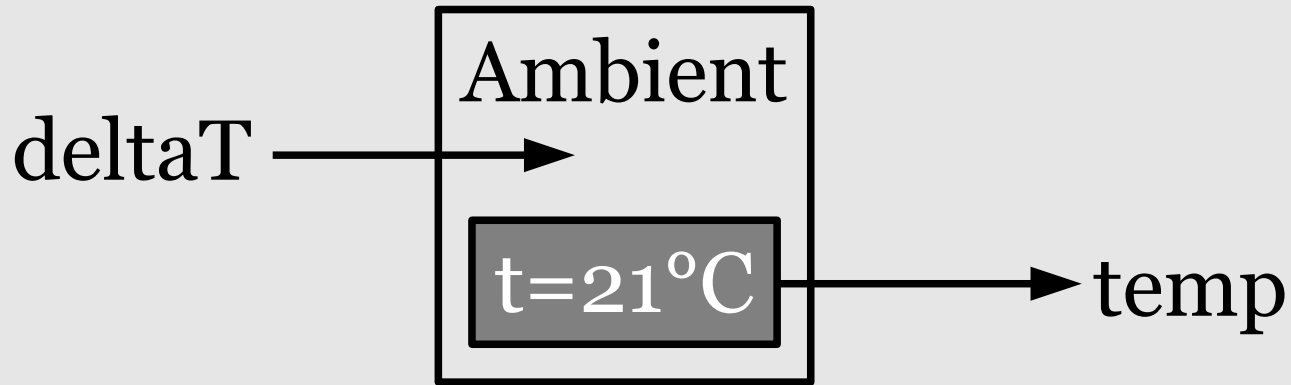
Back to example



Display



Ambient

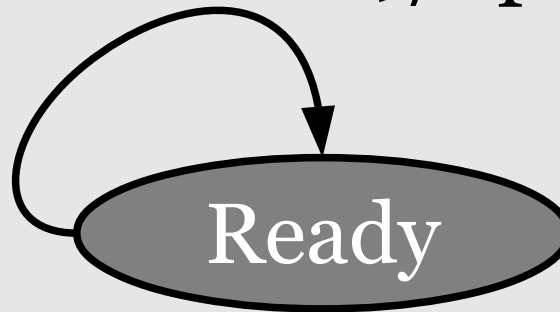


Ambient

temp
deltaT

update()
getTemp()

`timer&&(deltaT!=0)/update()`

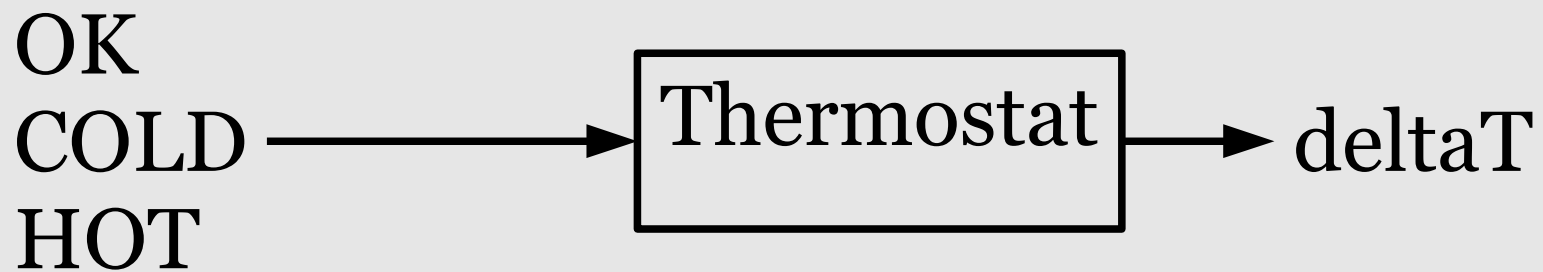


Thermostat

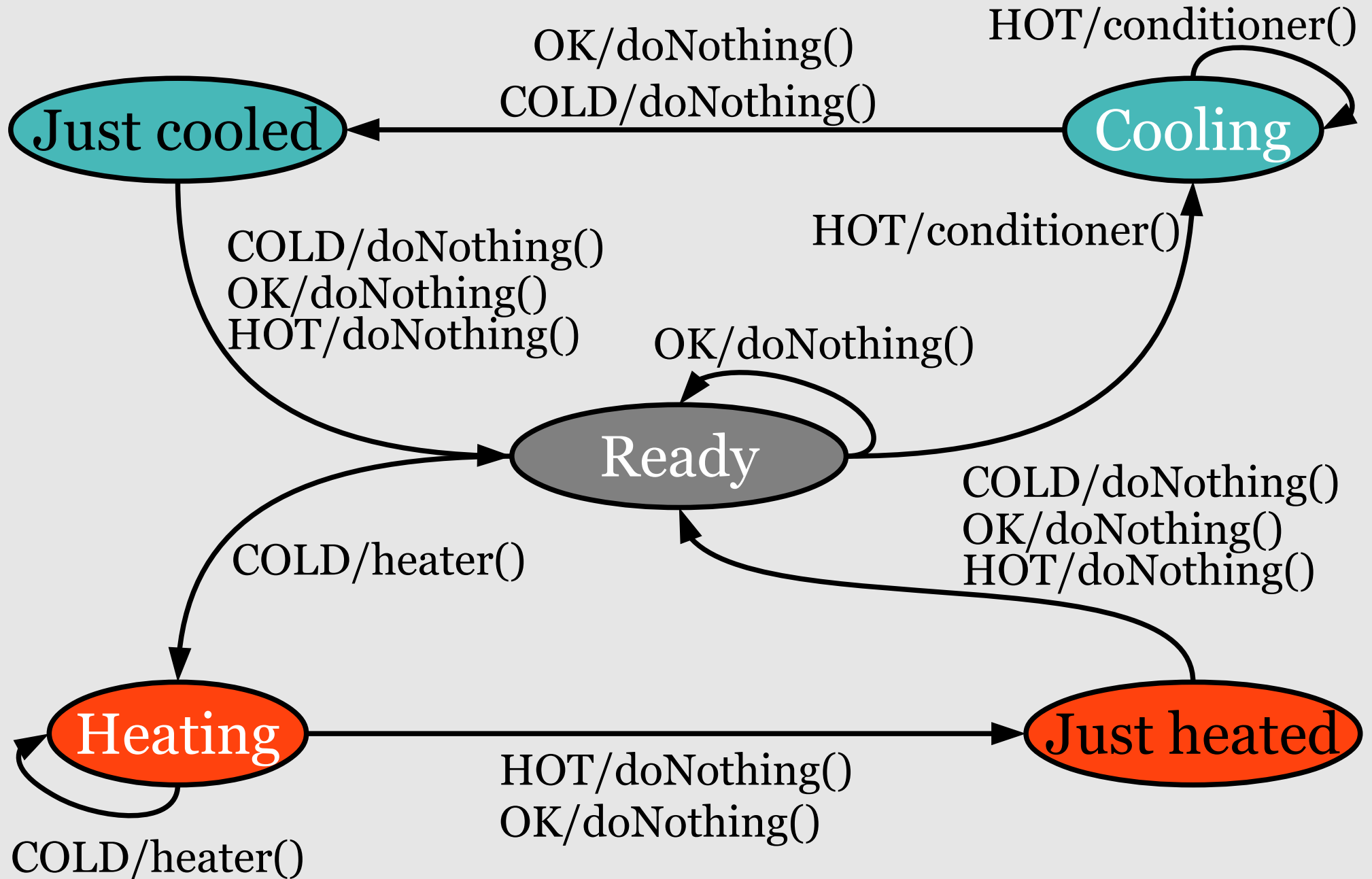
Thermostat

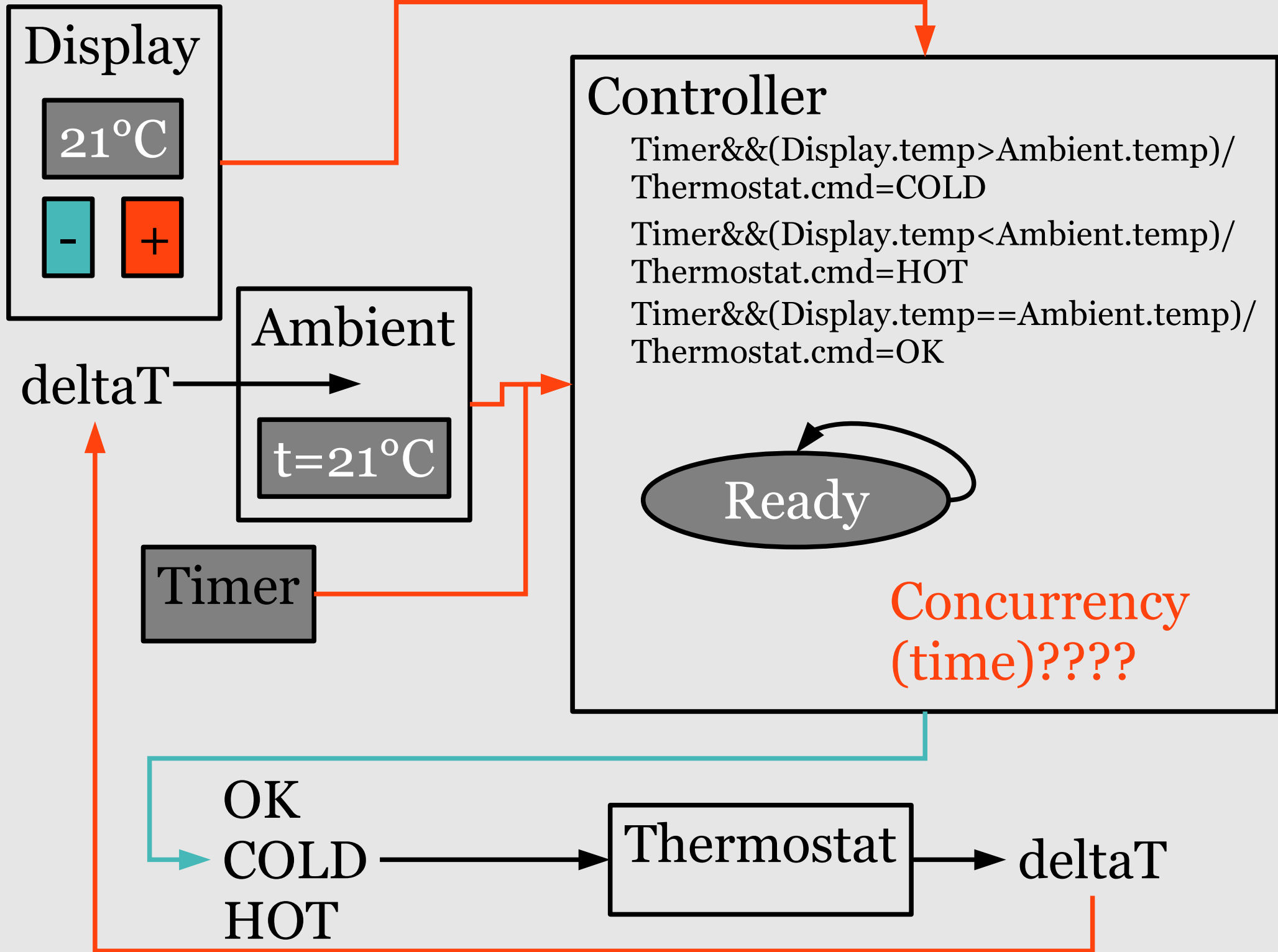
cmd
deltaT

conditioner()
heater()



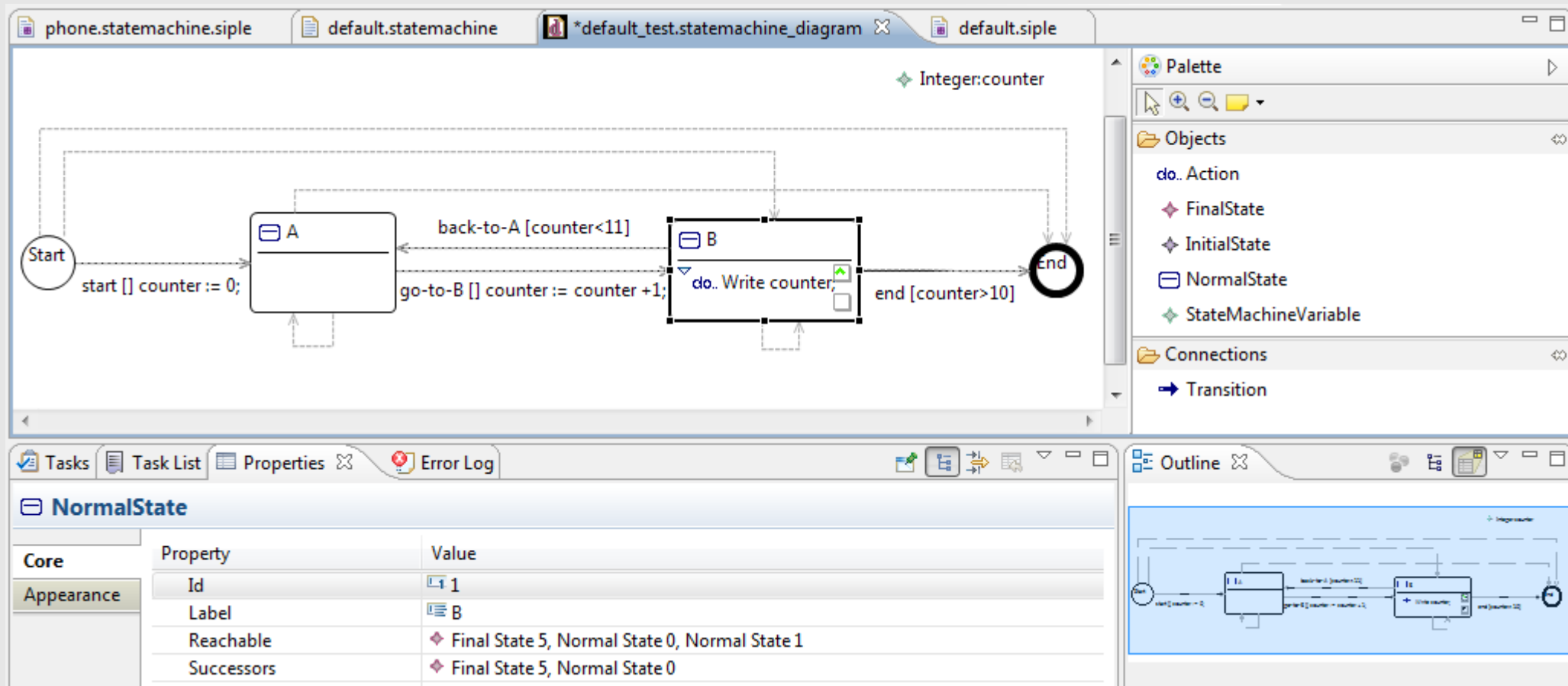
Thermostat. FSM





Interface example.

JastAdd-EMF: Attribute Grammars for Metamodel Semantics



Also

- FSM spec language FSMXML
- Tabular notation
- Diagram layout
- FSM to code