ACTIVE SIMULATION

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Basic description

• Allows model execution of state machines, activities, interactions and parametrics
• Execution can occur along simulated time

Why do this?
  – To validate the model by simulating triggers and seeing whether the modelled system responds as intended

Caveat
  – Only a subset of SysML elements is supported
Tool

- Cameo Simulation Toolkit
  - An package that needs to be bought and used in addition to Cameo Systems Modeller
Process logic (a ‘non-exhaustive’ description)

1. Simulate triggers (signals)
2. Triggers cause state transitions
3. Transitions stimulate activity execution
4. Activities update value properties
5. New triggers can travel between structures through ports
6. Triggers cause state transitions
7. Updates in value properties stimulate updates in other value properties through parametric equations
8. Updates in value properties can comply with or violate constraints, derived from requirements

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Example 1- Description (not in model)

1. A telescope operator changes several administrative states for a Dish
2. INFRA detects strong winds, leading TM to put a Dish into a stow-lock state

Citation: Dish state machines (draft) by Corrie Taljaard
Execution colour key

An element that is currently being executed

The last visited element

A visited element

http://mynutratek.com/blog/
Execute!

PRESS

Fitted Selection - Op

Simulate triggers (signals)
state machine  Operator [Operator]

Central Control - Op / Central Control - Op

Disable Selection - Op / Disable Selection - Op

Op Operate Dish MID

Enable Selection - Op / Enable Selection - Op

Not Fitted Selection - Op / Not Fitted Selection - Op

Fitted Selection - Op / Fitted Selection - Op

Triggers cause state transitions
Exploring the Universe with the world's largest radio telescope
• A similar sequence occurs for the block ‘TM MID’, which also owns a state machine
• The triggers for each of its transitions are also linked to activities

This results in:
The sequence of triggers:

‘Enable Selection – Op’ → ‘Central Control – Op’

results in:
Then. The trigger:

‘Strong Wind’

results in an interaction between the blocks ‘INFRA SA’, TM MID’, and ‘DISH MID’

which results in:
Example 2 (not in model)

- While the Dish is in stow-lock state, a systems engineer decides to do a **cost rollup**
- The systems engineer does this as follows:
A **reasoning pattern** is defined by first creating a specific block and constraint block pair.
• A parametric diagram is then used to relate these two blocks.
A PBS is then created, and the reasoning pattern is applied to this PBS.
• An **instance** of this PBS is generated and cost values are specified for all component instances.
• Lastly, **execute!**
"We've done a computer simulation of your projected performance in five years. You're fired."

THANK YOU