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Dymola 2022

Overview of new features

21 May 2021

3DEXPERIENCE®

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Executive Summary

Model editing

- Fine-grained control of what signals are exported in an FMU

Simulation

- Possible to terminate simulation after max run-time, even if stuck in external code
- Run simulation until all transients damp out
- Plot bar charts and area charts, or externally generated contents including HTML

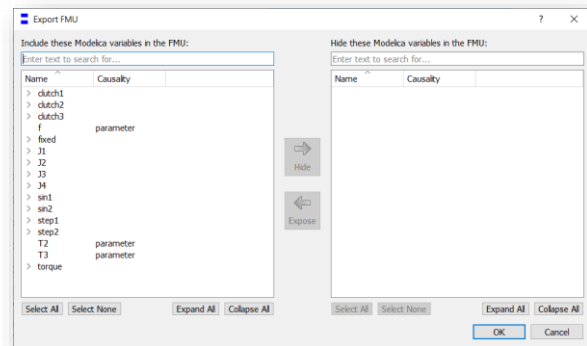
Environment

- Support for Windows Subsystem for Linux (compilation, FMU cross-compilation)
- Follows the latest Modelica language specification and MSL 4.0.0

Model Editing

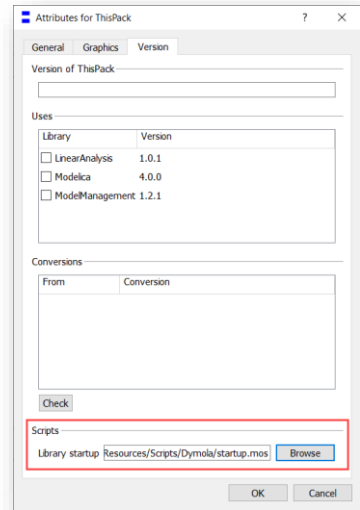
Filter signals when exporting FMU

- ▶ Select individual signals to expose in exported FMU
 - ▷ Allows fine-grained control of the FMU interface
 - ▷ By default follows selection of model description filters (e.g. “black box”)
 - ▷ Inputs cannot be hidden
 - ▷ Same for `translateModelFMU()`
- ▶ Complements signal filtering for import of FMUs



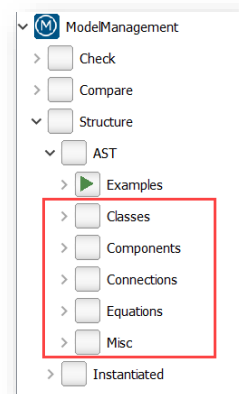
Library startup script

- ▶ Run a script when opening a package
 - ▷ Any setup needed for the library
 - ▷ Applies to top-level packages only
- ▶ Default requires no change in library
Resources/Scripts/startup.mos
- ▶ Change default with Attributes>Version



Miscellaneous improvements

- ▶ Support for Modelica Language Specification 3.5
- ▶ Improved model editing API in ModelManagement.Structure.AST
 - ▷ Restructured and extended
- ▶ Shortcut for File>Search
 - ▷ Ctrl-Shift-F



Simulation

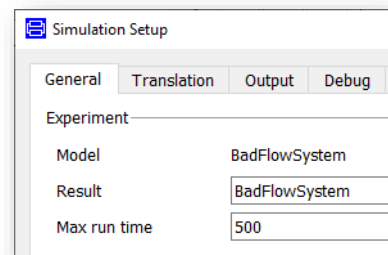
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7



Maximum runtime of simulation

- ▶ Terminates simulation after a maximum run time
 - ▷ Wall-clock time, not CPU time
 - ▷ Run time unit is independent of simulation time unit
 - ▷ Can be stored in model
- ▶ Applied to both single simulations and batch runs
 - ▷ Total run time for batch simulation
- ▶ Checked by Dymola so it works even if the simulation is stuck in
 - ▷ Imported FMUs
 - ▷ External C code



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8



Transient mode to reach steady-state

- ▶ Runs simulation until transients damp out (or until stop time)
 - ▷ Checks the derivatives of all states
 - ▷ Tolerance can be set, 0.02 by default
 - ▷ Set in Simulation>Setup>General
- ▶ Does not detect
 - ▷ Periodic steady states
 - ▷ Steady-state of a subset of the states

Formal definition

Terminate simulation when for each state x_i

$$|\text{der}(x_i)| \leq \text{tolerance} * (|x_i| + |\text{nominal}_i|) / 2$$

where tolerance is

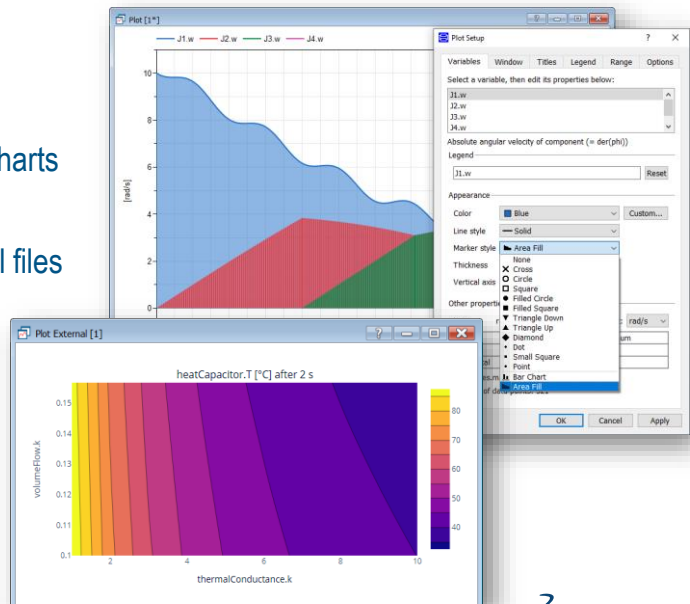
`Advanced.Simulation.SteadyStateTerminationTolerance`

if non-zero, or by default

$0.02 / \min(T_{\text{stop}} - T_{\text{start}}, 500 * \text{interval_length})$

Enhanced plotting

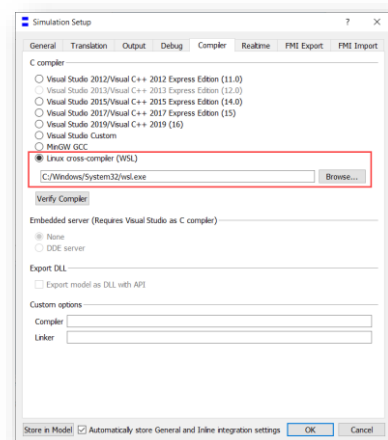
- ▶ Plotting bar charts and area charts
 - ▷ New marker styles
- ▶ Support for plotting of external files
 - ▷ PNG or SVG format
 - ▷ HTML with active content from e.g. “plotly” in Python



Environment

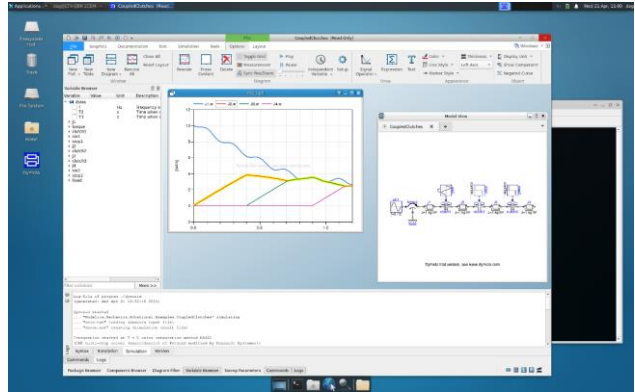
Compilation using Windows Subsystem for Linux

- ▶ Windows Subsystem for Linux (WSL)
 - ▷ Runs Linux under a micro-kernel in Windows 10
 - ▷ Typical distributions: Ubuntu 20.04 LTS and Kali
- ▶ Generated C code is compiled using WSL
 - ▷ Native gcc/clang compiler on the Linux system
 - ▷ Fully integrated in Dymola and transparent
- ▶ Cross-compilation for Linux on Windows
 - ▷ Generate FMUs with Windows and Linux code directly



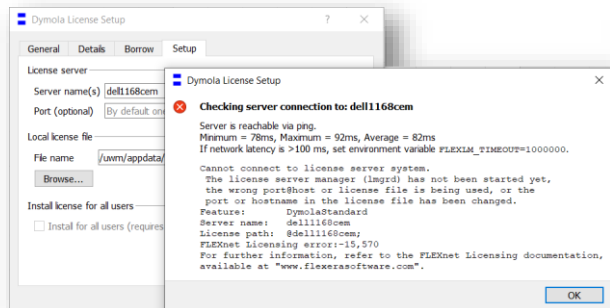
Dymola running on WSL

- ▶ Dymola for Linux runs under WSL
 - ▷ Need to install window manager
 - ▷ Remote desktop (xrdp)



Environment

- ▶ Improved diagnostics when connecting to a license server
 - ▷ Name server lookup
 - ▷ Connection to server computer
 - ▷ Network latency
 - ▷ License server responding
- ▶ Intel compiler discontinued



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