Real-time Simulation of Detailed Vehicle Model with FMI

3DEXPERIENCE

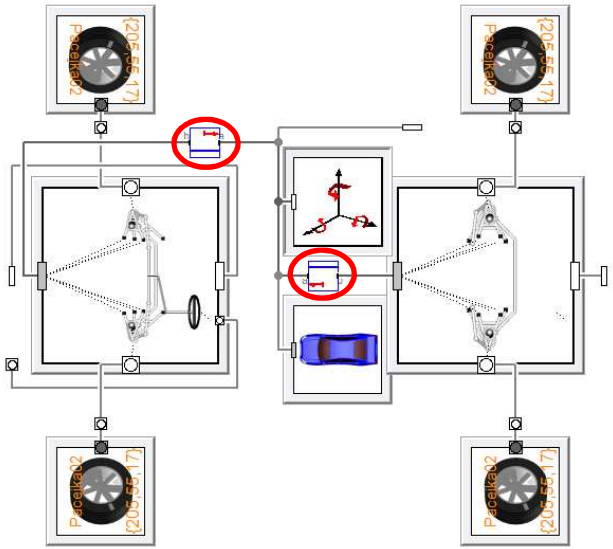
Modelon

concurrent REAL-TIME

AUTOSAR Builder™

DASSAULT SYSTEMES | IF WE ask the right questions we can change the world.

Vehicle Model



- **150 DOFs** (Degrees-of-Freedom)
- Inline integration - Implicit Euler
- 1 ms step size

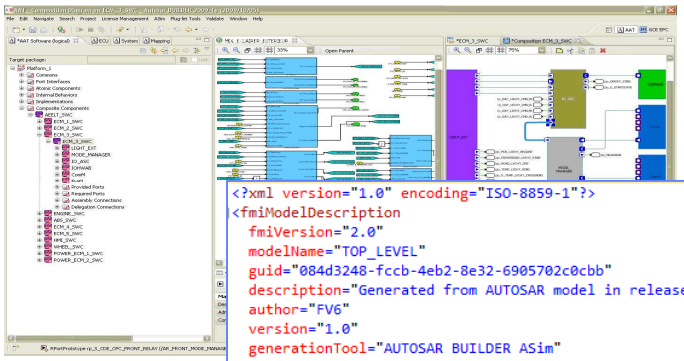
- Decoupling front and rear wheel suspensions respectively from the body
- Decoupling each wheel from the wheel suspensions
- **Speed-up of 1.5**

- Parallelizing gives a **further speed-up of 2.8** with 4 cores

Paper: Parallel Model Execution on Many Cores
Hilding Elmqvist, Sven Erik Mattsson and Hans Olsson
Tuesday, March 11, 13:40

Cruise Controller FMU

Existing cruise controller exported from AUTOSAR Builder and imported in Dymola



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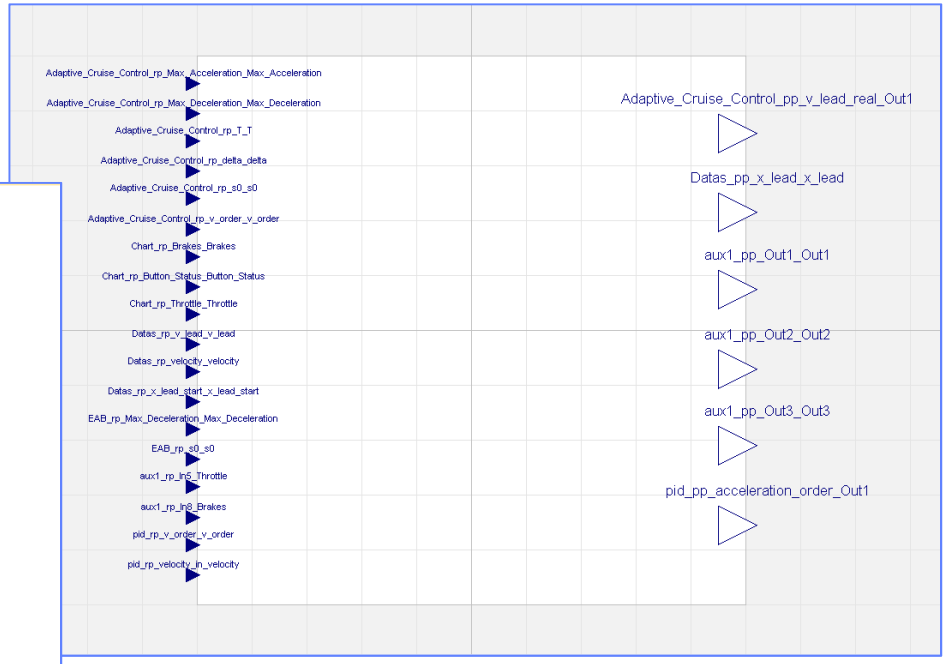
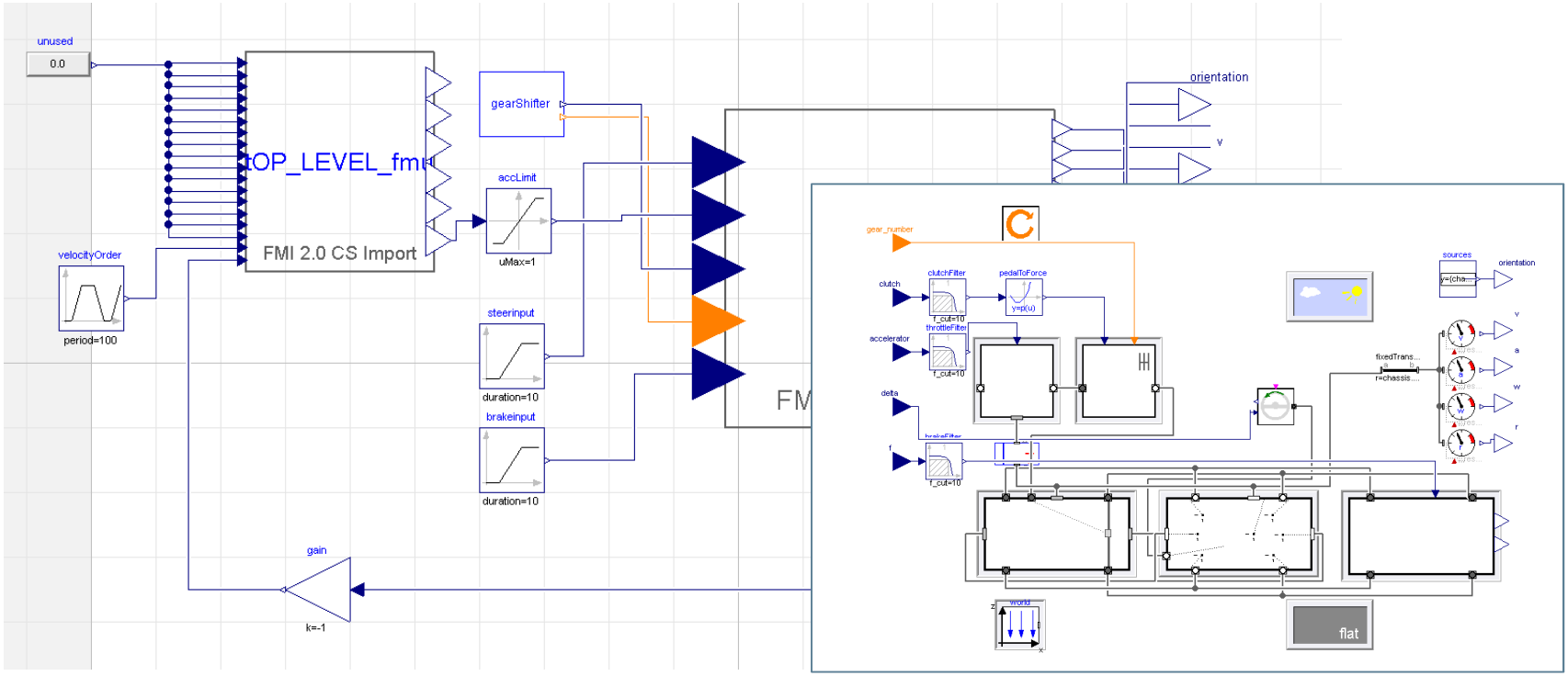
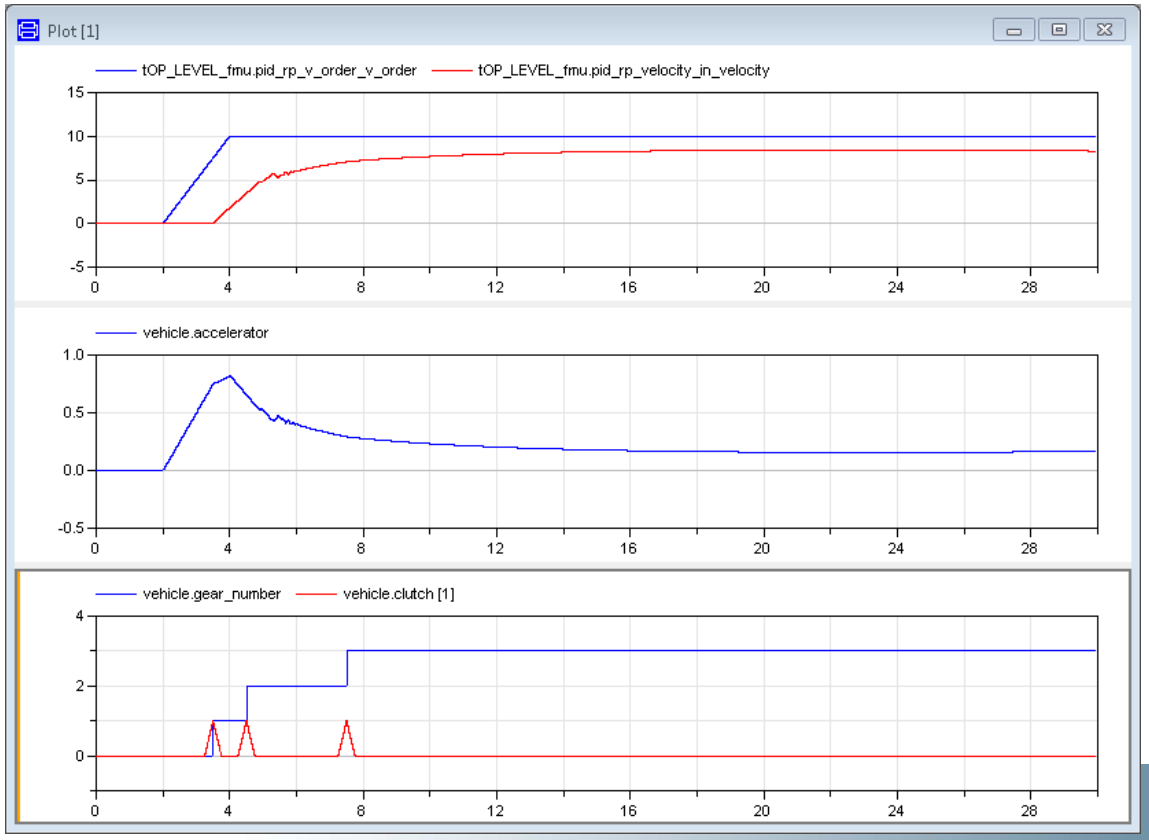


FMU Software-In-the-Loop Simulation



FMU Software-In-the-Loop Simulation

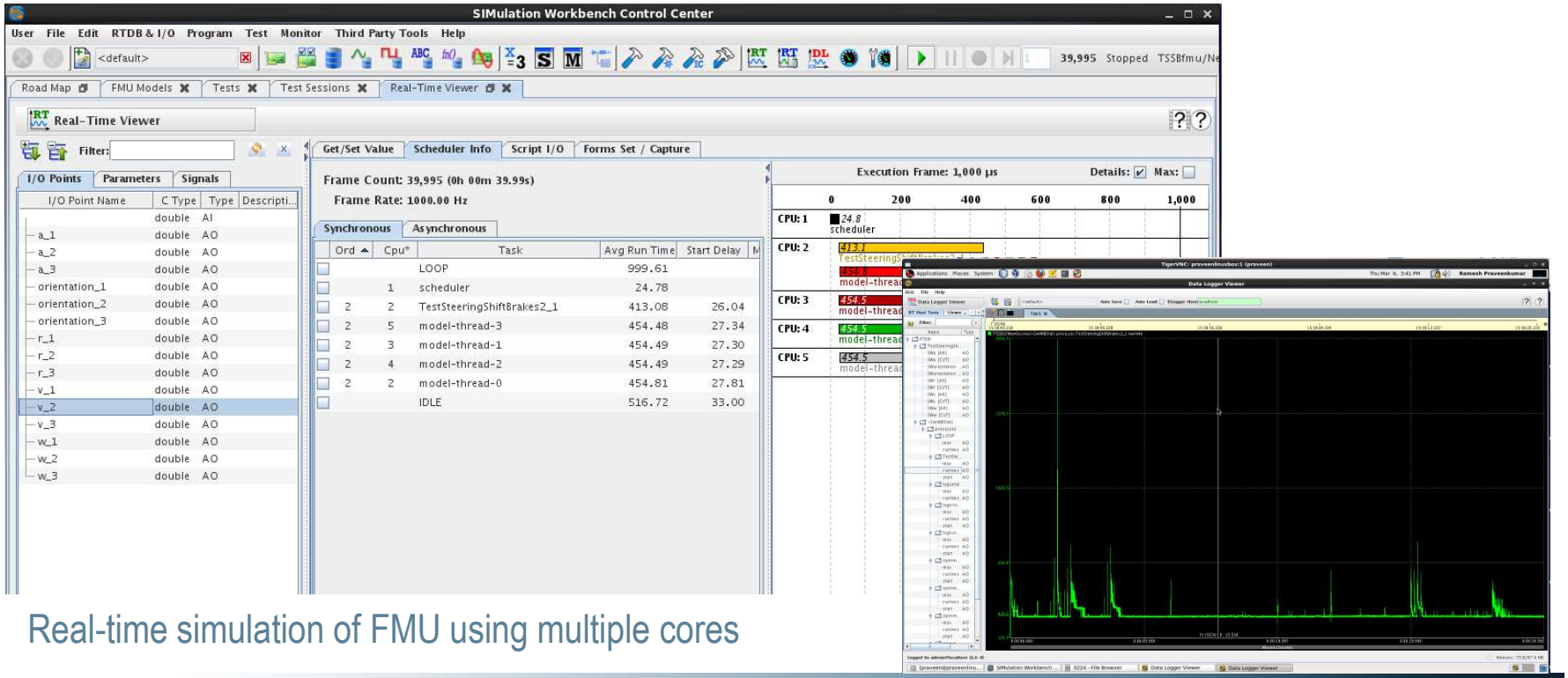


Velocity and velocity reference
(AUTOSAR FMU inputs)

Accelerator signal
(Vehicle FMU input)

Gear number and clutch
(Vehicle FMU input)

HIL Simulation with Concurrent



- Real-time simulation of FMU using multiple cores