VTT Technical Research Centre of Finland Ltd
Tommi Karhela
Apros
Apros - Advanced Process Simulator

Apros (www.apros.fi) is a software for 1D modelling and dynamic simulation of industrial processes, including automation and electrical systems.

- Developed since 1986 by Fortum and VTT
- Offers **combined fidelity and comprehensiveness**
Main domains in Apros modelling & simulation
Various uses of Apros simulation

R&D
- Evaluation of new process concepts
- Integrated Process & Control design
- Development of new control strategies

Engineering
- Safety analysis
- Automation testing
- Automation engineering

Operation
- Performance analysis
- Operator training
- Control room design evaluation
- Optimisation
- Trouble-shooting
Selected References
Plug-in architecture for modelling and simulation

- **Simantics Workbench** (based on the Eclipse platform)
  - **Simantics Core**
    - semantic database (triplestore)
  - **Simantics Databoard**
    - internal data interface
- **Plug-in**
  - Modcheck
    - model validation environment
- **Plug-in**
  - SULCA
    - LCA computations
- **Plug-in**
  - APROS
    - simulation engine
- **Plug-in**
  - BALAS
    - simulation engine
- **Plug-in**
  - System Dynamics
    - simulation environment
- **Plug-in**
  - OpenModelica
    - system simulation environment
- **Plug-in**
  - Fluent
    - CFD Environment
- **Plug-in**
  - Flowbat
    - simulation engine
- **Plug-in**
  - R and Python
- **Plug-in**
  - R and Python
- **Simantics Workbench**
  - internal data interface

For more information, visit: [www.simantics.org](http://www.simantics.org)
Simantics focus areas
flexibility, connectivity and maintainability

Flexibility, connectivity

- Co-use of different simulators and expandability of the computation
- Simulation and control system integration

Simulation and design systems (CAD) integration

Team features and simulation information management

Maintainability
Process simulation

Simulation and process design integration

Design Engineers

Process design

Automation design

3D design

Common user interface environment

Simulation Engineers

Apros Process Simulation

Simantics

Other simulators: Balas, DEVS, sd, Fluent, Modelica, company specific

Plant design systems: SmartPlant Foundation, Comos, ...

Engineering Information Management

Simulation Information Management
Transformation of CAD data into Simulation Models

Design data (CAD)
- P&IDs
- Flow diagrams
- Steady state dimensioning results
- Function block diagrams
- Logic diagrams

In native format i.e. files, databases etc.

Simantics platform

Ontology for native data model

Rule based transformations

Simulators
Simantics Ecosystem

Users

- Company A
- VTT
- Fortum
- (Others)

Component and service providers

- Software Company X
- VTT
- Software Company Y
- (Others)

THTH/Simantics Division
Association for simulation interoperability and simulation based methods

Maintenance and development decisions

Simantics Platform

- Open-Modelica
- SULCA
- (others)

- Modcheck
- Apros
- Balas
- (others)
Current members of Simantics
Recent Developments in Simantics
Recent directions to apply Simantics technology
Web User Interfaces for Simulation Models

Simupedia Web UIs  Can be also embedded  Eclipse based Desktop UIs

Simantics Base Services
Web User Interfaces for Simulation Models

Case example of FMUs

Modelica Tools
e.g. Dymola, OpenModelica

Web Browser UI

FMU Export

FMI Simupedia Studio

Web Browser UI
e.g. sales man, operator, trainee

FMI Simupedia Service

Modelling Domain

User Domain

Publish