1st Annual OpenModelica Workshop Feb 2, 2009

Workshop Opening

OpenModelica – Status and Directions

Peter Fritzson

To All Participants!

Very Welcome to this First Annual OpenModelica Workshop!

Goals for the OpenModelica Effort

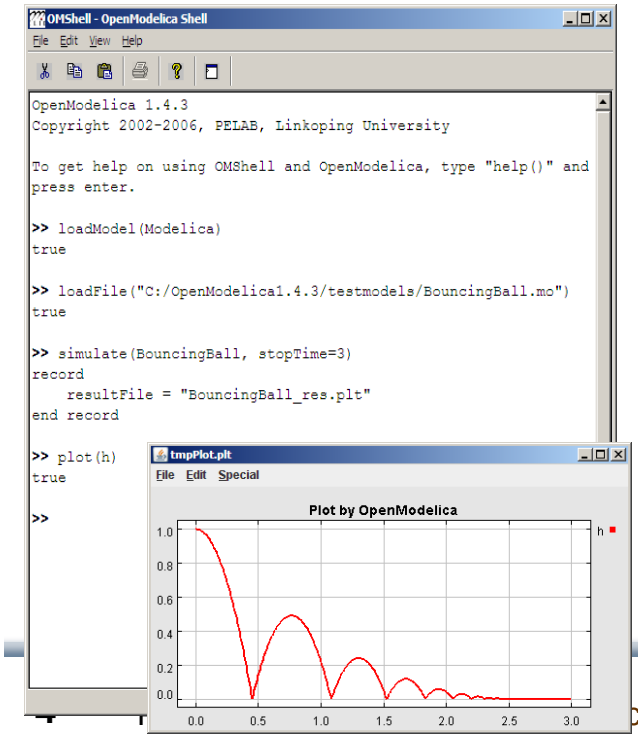
- Comprehensive modeling and simulation environment for research, teaching, and industrial usage
- Open-source for both academic and commercial usage
- Invitation for open-source cooperation around OpenModelica, tools, and applications

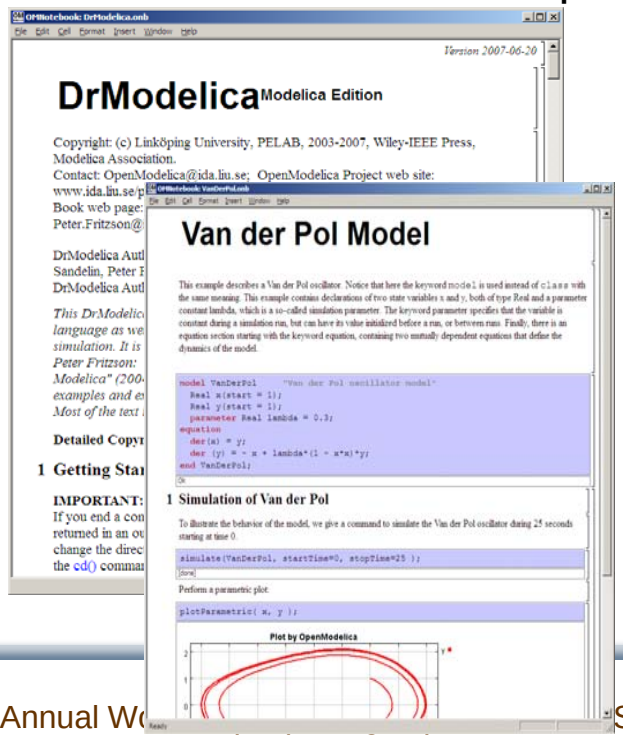
Current OpenModelica www.openmodelica.org

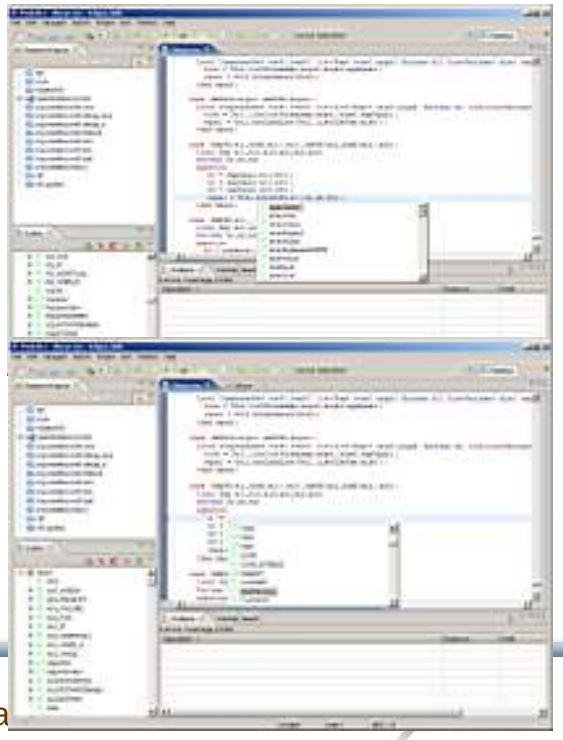
- Advanced Interactive Modelica compiler (OMC)
  - Supports most of the Modelica Language
- Basic environment for creating models
  - OMShell – an interactive command handler
  - OMNotebook – a literate programming notebook
  - MDT – an advanced textual environment in Eclipse

* ModelicaML UML Profile

* MetaModelica transforms





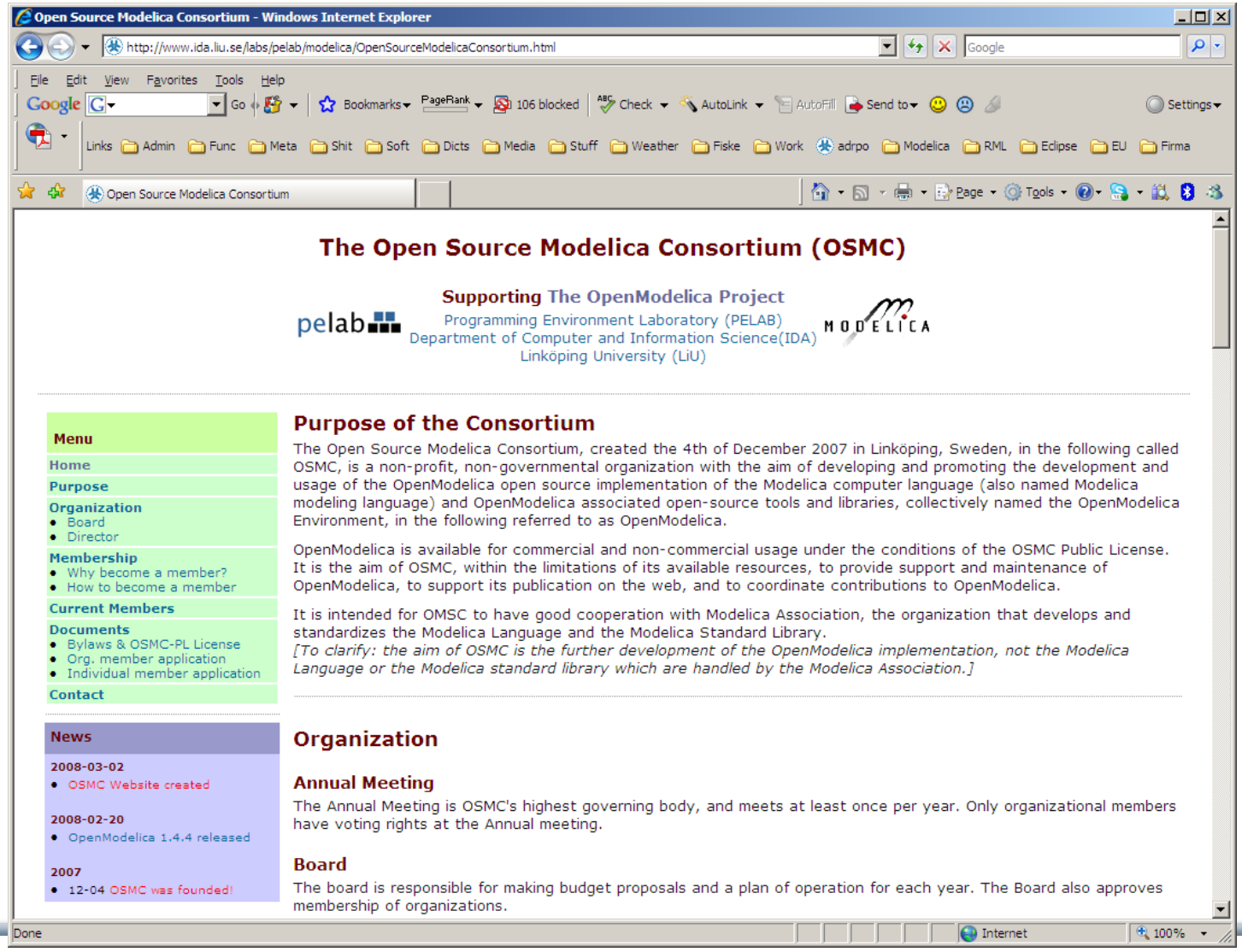


New Release
OpenModelica 1.4.5 Released Jan 31, 2009

- Improved support for several platforms Linux, MacOS, Windows (2000, XP, Vista). Easy installation now available for these platforms.
- New Qt-based 2D plotting including scalable plots, zooming, logarithmic plots, grids (all platforms) and simple 3D visualization (Windows).
- Less memory consumption and better memory management over time.
- Modelica 3.0 parsing support.
- Export of DAE to XML and MATLAB.
- Support for record and strings as function arguments.
- Many bug fixes.
- Additional free graphic editor SimForge (developed at Politecnico di Milano) can be used with OpenModelica.

The Open Source Modelica Consortium

Open Source Modelica Consortium Web Site



Purpose of the Consortium

- The Open Source Modelica Consortium, created the 4th of December 2007 in Linköping, Sweden, in the following called OSMC, is a non-profit, non-governmental organization with the aim of developing and promoting the development and usage of the **OpenModelica open source implementation of the Modelica computer language** (also named Modelica modeling language) and OpenModelica **associated open-source tools and libraries**, collectively named the OpenModelica Environment, in the following referred to as OpenModelica.
- OpenModelica is **available for commercial and non-commercial usage under the conditions of the OSMC Public License**. It is the aim of OSMC, within the limitations of its available resources, to provide **support and maintenance of OpenModelica**, to support its publication on the web, and to **coordinate** contributions to OpenModelica.

Open Source Modelica Consortium Created Dec 4, 2007

7 Founding Organizational Members

- Bosch-Rexroth AG, Germany
- Equa Simulation AB, Sweden
- TLK Thermo, Germany
- VTT, Finland
- Linköping University, Sweden
- Hamburg University of Technology/TuTech, Institute of Thermo-Fluid Dynamics, Germany
- Technical University of Braunschweig, the Institut of Thermodynamik, Germany

Open Source Modelica Consortium – Expanded to 19 Organizational Members, 31 Dec, 2008

Companies and Institutes (11 members)

- Bosch-Rexroth AG, Germany
- Equa Simulation AB, Sweden
- TLK Thermo, Germany
- VTT, Finland
- MostforWater, Belgium
- MapleSoft, Canada
- Emmeskay Inc., USA
- IFP, Paris, France
- Siemens Turbo Machinery AB
- ABB Corporate Research
- MathCore Engineering AB

Universities (8 members)

- Linköping University, Sweden
- Hamburg University of Technology/TuTech, Institute of Thermo-Fluid Dynamics, Germany
- Technical University of Braunschweig, the Institut of Thermodynamik, Germany
- Université Laval, the modelEAU group, Canada
- Griffith University, Australia
- University of Queensland, Australia
- Politecnico di Milano, Italy
- Mälardalen University, Sweden

Open Source Modelica Consortium Individual Members

(23 individual members, 1 February 2009)

- Peter Fritzson, Adrian Pop, Alf Isaksson, Francesco Casella, David Broman, Håkan Lundvall, Kristoffer Norling, Henrik Eriksson, Mikael Blom, Klas Sjöholm, Bernhard Bachmann, Kristian Stavåker, Simon Björklén, Magnus Leksell, Henrik Magnusson, Joel Klinghed, Kim Jansson, Oliver Lenord, Juha Kortelainen, Per Sahlin, Eric Meyers, Gerhard Schmitz, Michael Hanke

Open Source Modelica Consortium – OSMC Board of Directors

- **Oliver Lenord**, OSMC Chairman; Manager, Bosch-Rexroth, Germany
- **Per Sahlin**, OSMC Vice Chairman; CEO, Equa Simulation AB,
- **Peter Fritzson**, OSMC Director; Prof, Linköping University, Sweden
- **Juha Kortelainen**, Manager, VTT, Finland
- **Gerhard Schmitz**, Prof, Univ. Hamburg, Germany
- **Alf Isaksson**, Manager, ABB Corp. Research, Sweden
- **Francesco Casella**, Prof, Politecnico di Milano, Italy

- (Proposed to become new Board member later today: **Jan Brugård**, CEO, MathCore Engineering AB, Sweden)

What Happened from Dec 2007 to Now?

- Dec 4, 2007 – OSMC Creation
- Early Spring 2008 –bugfixing, Dynamic Loading, 1.4.4 release
- Late Spring 2008 – Development and bugfixing speeded up (Adrian finished his PhD June 2008, could work almost fulltime for OSMC from May 2008) Filippo visited
- Early fall 2008 – Compiler memory management improvement completed. (with new API to C code)
- Mid fall 2008 – most unparsing/refactoring work completed. Most of new release 1.4.5 completed. Also better installation for Mac and Linux platforms.
- End of fall 2008 – OSMC-Mathcore deal completed. MathCore frontend merged with OpenModelica (but not yet public). Modelica 3.0 parsing support completed. Some more work on release 1.4.5

OSMC Board – 13 Meetings Dec 2007 – Dec 31 2008

Meeting dates

- 071204
- 071217
- 080204
- 080229
- 080616
- 080902
- 080926
- 081016
- 081104
- 081106
- 081112
- 081119
- 081211

Board Work

- Planning the OSMC work
- Admitting new members
- Planning the workshop
- Negotiating MathCore-OSMC deal of cooperation and source code contributions
- Budget
- etc.

Main OSMC Work Planned for Spring 2009

- Focus on OpenModelica compiler frontend improvements to support the Modelica Standard Libraries!
- Support for New Fluid/Media Library (needs the new stream connector concept)
- Support for the MultiBody Library
- Complete the comment-preserving unparser/refactoring functionality
- Complete the new solver interface

Main OSMC Work Planned for fall 2009

- Compiler Frontend support for almost complete Modelica 3.0/3.1, e.g. including balanced model checking, complete array iterators, etc.
- Performance improvements of the Compiler Frontend to handle flattening of large models (better scalability)
- Support for arrays that do not expand into elements (important for large arrays and for pre-compiled models)

Additional Work During 2009 (Mostly by Master Students/ PhD students)

- Support for 3.0 graphic annotations
- Complete the work on compiler enhancements for bootstrapping the compiler (gives better programmability for the OMC developer, e.g. for-loops, while-loops, etc. available together with MetaModelica, and avoids maintenance of two compilers)
- External Java cross-callability support (e.g. Java external functions)
- Restructuring the code generator for easier supporting different code generation variants
- Improved openmodelica.org web site

- Also: research on multi-core parallel code generation
- Also: research on SysML-Modelica integration
- Also: research on type systems and semantics
- ...

Some Ideas for OSMC Work During 2010

- Further improved OpenModelica Frontend (probably for Modelica 3.2)
- Improved compiler backend support for simulation
- Improved modularity of the compiler
- Algorithmic code debugging for Standard Modelica
  (based on a generalization of the existing MetaModelica debugger)
- Further improvements in the Compiler development environment (OMDev)

OPENPROD – New OpenModelica related Project

- Duration: May 2009 – May 2012 (3 years)
- Budget: approx 11 Meuro, 94 Manyears
- 25 partners
- Very important for future OpenModelica development

Main workpackages

- Integrated hardware software modeling by Modelica - UML - SysML integration.
- Model compiler enhancements.
- Compilation of Modelica to parallel multi-core platforms.
- Tool interoperability.
- Application demonstrators.

Current OPENPROD 25 Partners (may expand)

- Siemens Industrial TurboMachinery AB
- Siemens AG, Sector Energy
- Bosch-Rexroth AG
- SKF Sverige AB
- Nokia
- Pöyry
- LMS Imagine S.A.
- Electricité de France
- Equa Simulation AB
- MathCore Engineering AB
- TLK Thermo GmbH
- IFP
- VTT
- Fraunhofer FIRST
- INRIA Rocquencourt
- CEA LIST
- Linköping University
- Fachhochschule Bielefeld
- ETH Zürich
- Technische Universität Braunschweig
- Metso Automation
- Appedge
- University of Lyon INSA
- PSA
- Ericsson AB

Conclusions

- OpenModelica work accelerated during the past year
- The Open Source Modelica Consortium got started and expanded from 7 to 19 organizational members
- Good prospects for the future – towards a standard high quality open source Modelica implementation in Modelica

Questions?

www.openmodelica.org