

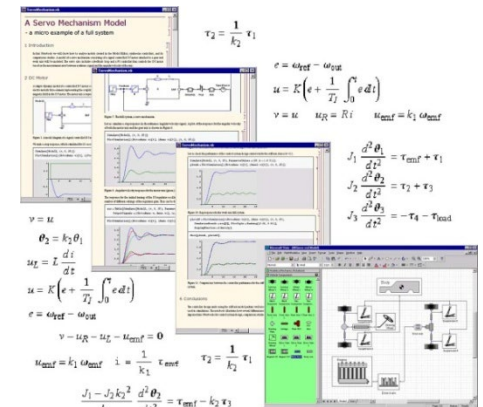
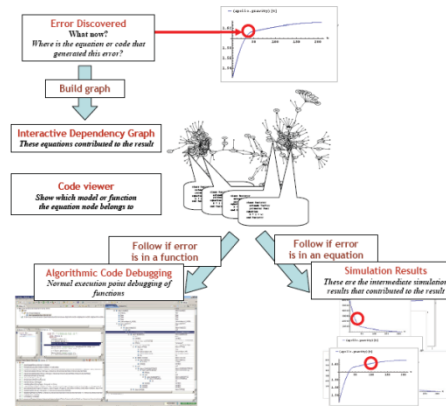
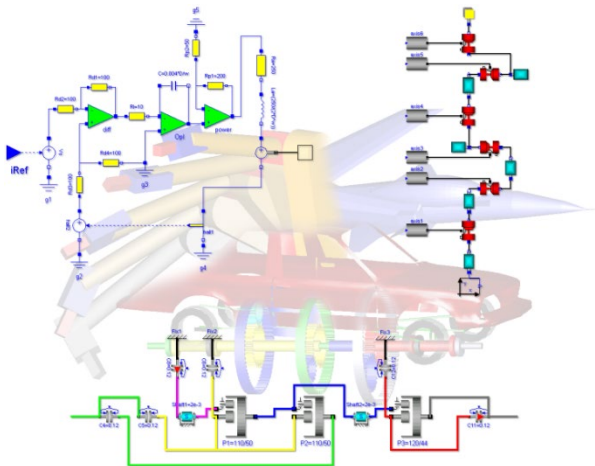
OpenModelica.org

Presentation, Status and Future Developments

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2025-02-03

Open Source Modelica Consortium
PELAB, Linköping University
St Anna IT Research Institute



- **OpenModelica**
 - What is OpenModelica?
 - The past
- **OpenModelica Technical Overview**
 - OMC, OMShell, OMNotebook, OMEdit, ModelicaML, OMSimulator, OMPython, OMJulia, OMMatlab
- **OpenModelica Development Environment**
 - MetaModelica
 - The Eclipse Environment (MDT)
 - OMEdit & VSCode
 - Web & Cloud
- **OpenModelica Latest Developments**

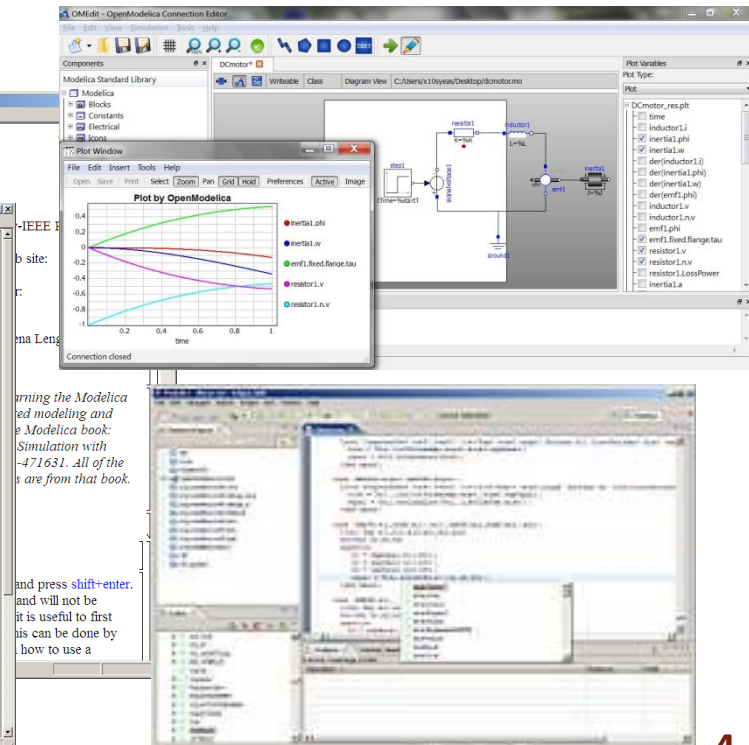
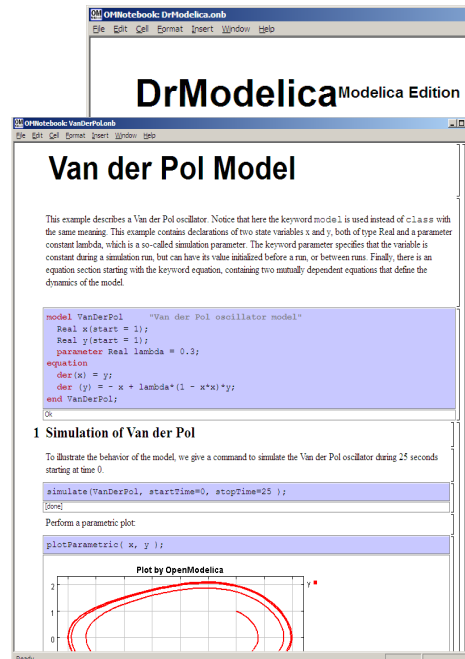
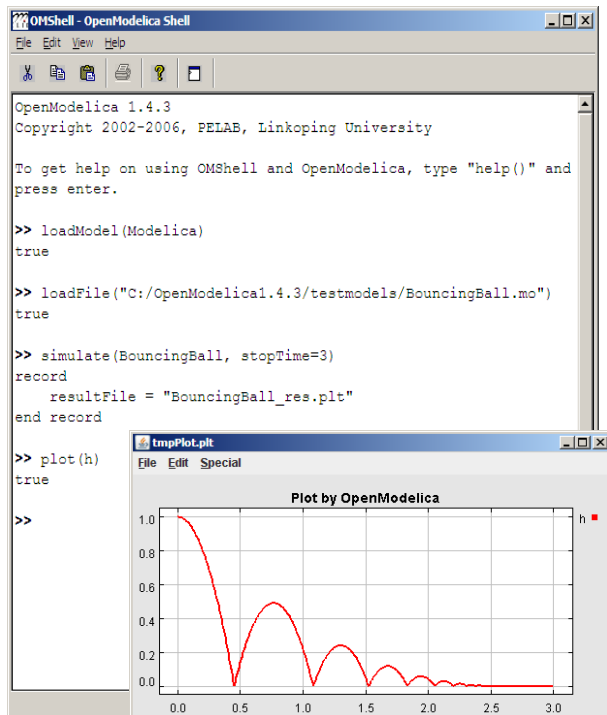
OpenModelica is ... *its developers,
testers, bug reporters, contributors
and OSMC members*

Thank you!

Linuslangenkamp, TeusvanderStelt, yurivict, JamesZhanchunyuan, jgillis, slichtzzz, cbermperi, anotheruserofgithub, abhinck, achary, adeas31, adrpo, afshe, alash325, alexchandel, AlexeyLebedev, Andreas, andsa, AnHeuermann, ankar, anotheruserofgithub, Ariel, arun3688, a-severin, asodja, atosinenko, azazi, bernhardbachmann, bernhard-thiele, bjozac, casella, choeger, chrjo5, crupp2, davbr, david-polak, dhedberg, dietmarw, Dongliang Li, donida, edgarlopez, ericmeyers, farkasrebus, fbergero, florosx, frape315, Frenkel TUD, frisk, friskerik, fritzmark, g-bjoza, g-karbe, g-pavgr, haklu, hanke, harka011, henjo, henrikt-ma, hkiel, hubert, janK, jansilar, jensdo, jgillis, jhare950, JKRT, joshbode, jschueller, kadelhak, Kaie Kubjas, kajny, Karim, kbalzereit, krsta, laguna, leist, lenaRB, leonardo, leo-recover, levsa, Liebman, lochel, mahge, mahge930, marchartung, mater, mflehmg, modlfo, mohsen, mtiller, mwalther, niemisto, niklwors, nimen, nutaro, ofstardust, otto@mathcore.com, pavalpr, perost, petar, petfr, phannebohm, pierre-haessig, ppriv, ptaeuber, ptauber, rahulp13, rakhiwarriar, rbulatow, rfranke, ricli576, robbr48, rruusu, RuedKamp, sanguinariojoe, sebco011, SimplyDanny, sjoelund.se, sjolund, smiz, sp1187, spinnau, stebr461, sturmk, syeas460, tbeu, thieriot, thorade, tmtuomas, Unknown, vaden, vasaie_p, vaurich, vitalij, vomiskam, vruge, vwaurich, wbraun, wibraun, wuzhu.chen, x02danhe, x02kajny, x02lucpo, x05andfe, x05andre, x05simel, x06hener, x06henma, x06klasj, x06krino, x06mikbl, x07simbj, x08joekl, x08kimja, x97davka, x98petro

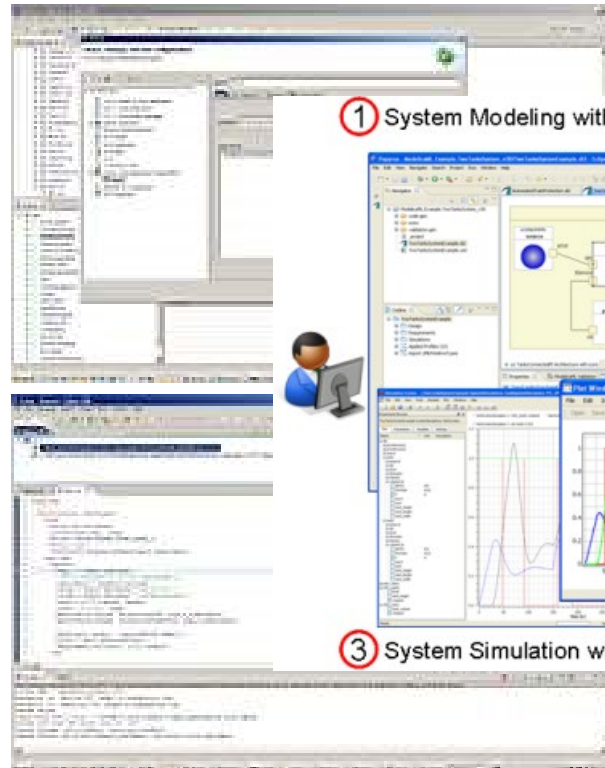
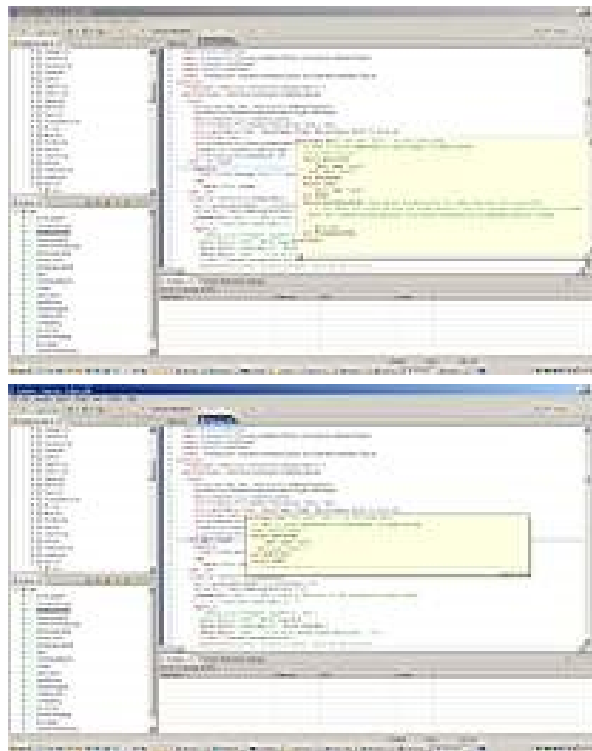
What is OpenModelica? (I)

- Advanced Interactive Modelica compiler (OMC)
 - Supports MSL v4.0.0/v3.2.3/master
- Basic and tools and advanced environments for creating models
 - OMShell - an interactive command handler
 - OMNotebook - a literate programming notebook
 - OMEdit - Connection Editor, *Transformational and Algorithmic Debugger*, 3D Viewer
 - OMPlot - OpenModelica Plotting
 - OMSens - Sensitivity analysis
 - OMOptim - OpenModelica Optimization Editor
 - OMPython/OMJulia/OMMatlab - OpenModelica Python/Julia/Matlab Environment
 - IDE integrations - advanced textual environment in Eclipse/VSCode
 - OMSimulator - co-simulation of composite models or SSPs using FMUs
 - OM.jl - Julia-based framework



What Is OpenModelica? (II)

- Advanced Development Environments
- Modelica Development Tooling (MDT) - started in 2005
 - Code Assistance, Debugging, Outline & a lot more
 - *Used for OpenModelica development*
 - Used in many OpenModelica Development Courses
 - *Replaced by OMEdit and VSCode*
- ModelicaML UML/SysML integration



① System Modeling with ModelicaML

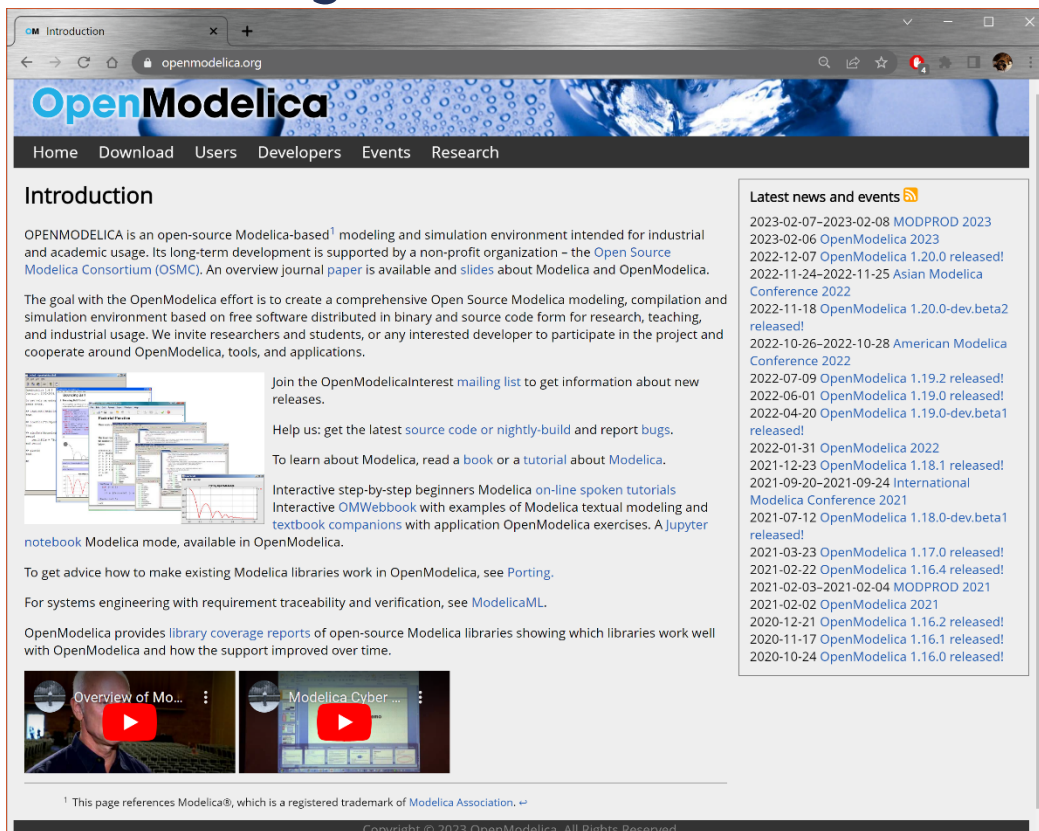
② Modelica Code Generation



③ System Simulation with Modelica Tools

What is OpenModelica? (III)

- Open-source community services
 - Website (New) and Support Forum
 - Source versioning (github.com)
 - Trac with bug database (->Github)
 - Development courses
 - Mailing lists



The screenshot shows the OpenModelica website homepage. The header includes the OpenModelica logo and navigation links: Home, Download, Users, Developers, Events, Research. The main content area is titled "Introduction" and describes OpenModelica as an open-source Modica-based modeling and simulation environment. It mentions its long-term development is supported by the Open Source Modica Consortium (OSMC). The page also features a "Latest news and events" section with a list of releases and conferences, and a "Join the OpenModelicaInterest mailing list" section. At the bottom, there are video thumbnails for "Overview of Mo..." and "Modelica Cyber...".

Introduction

OPENMODELICA is an open-source Modica-based¹ modeling and simulation environment intended for industrial and academic usage. Its long-term development is supported by a non-profit organization – the [Open Source Modica Consortium \(OSMC\)](#). An overview journal [paper](#) is available and [slides](#) about Modica and OpenModelica.

The goal with the OpenModelica effort is to create a comprehensive Open Source Modica modeling, compilation and simulation environment based on free software distributed in binary and source code form for research, teaching, and industrial usage. We invite researchers and students, or any interested developer to participate in the project and cooperate around OpenModelica, tools, and applications.

Join the OpenModelicaInterest [mailing list](#) to get information about new releases.

Help us: get the latest [source code](#) or [nightly-build](#) and report bugs.

To learn about Modica, read a [book](#) or a [tutorial](#) about Modica.

Interactive step-by-step beginners Modica [on-line spoken tutorials](#)

Interactive [OMWebbook](#) with examples of Modica textual modeling and [textbook companions](#) with application OpenModelica exercises. A [Jupyter notebook](#) Modica mode, available in OpenModelica.

To get advice how to make existing Modica libraries work in OpenModelica, see [Porting](#).

For systems engineering with requirement traceability and verification, see [ModelicaML](#).

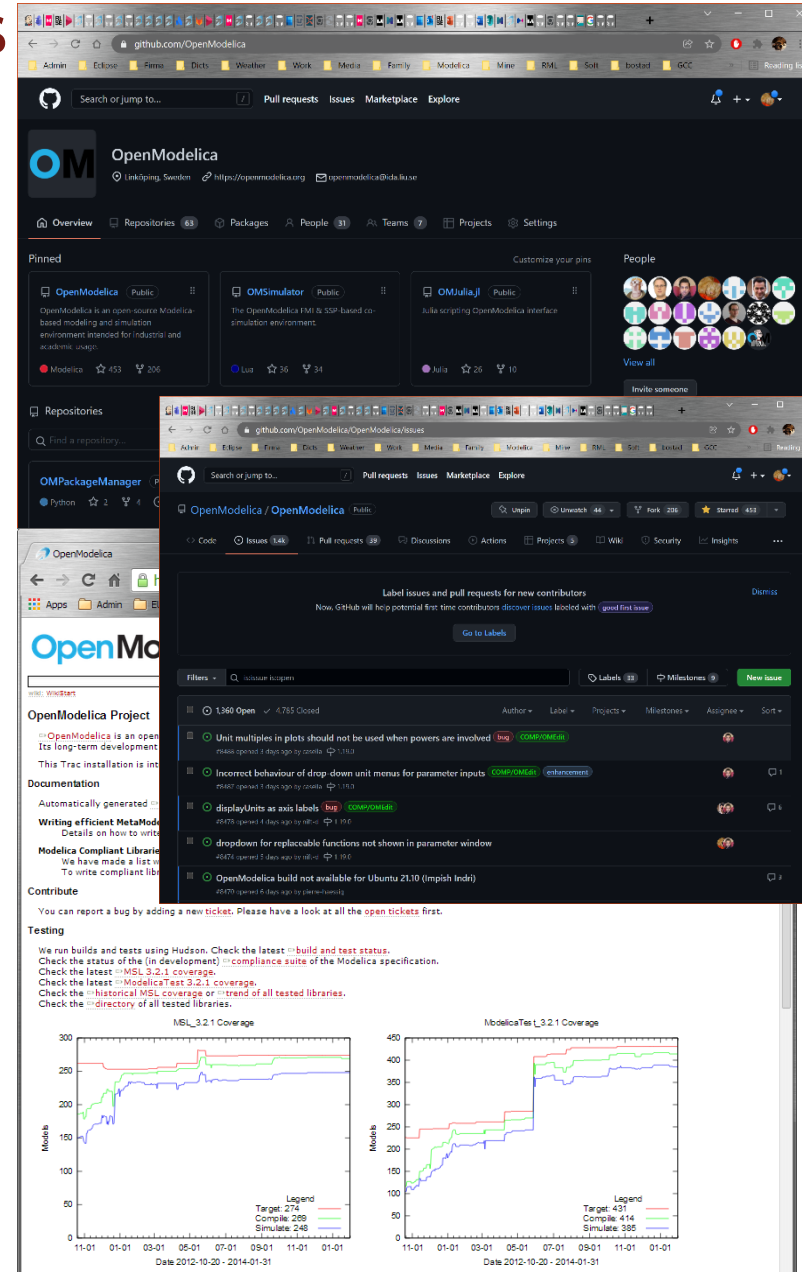
OpenModelica provides [library coverage reports](#) of open-source Modica libraries showing which libraries work well with OpenModelica and how the support improved over time.

Latest news and events

- 2023-02-07-2023-02-08 MODPROD 2023
- 2023-02-06 OpenModelica 2023
- 2022-12-07 OpenModelica 1.20.0 released!
- 2022-11-24-2022-11-25 Asian Modica Conference 2022
- 2022-11-18 OpenModelica 1.20.0-dev.beta2 released!
- 2022-10-26-2022-10-28 American Modica Conference 2022
- 2022-07-09 OpenModelica 1.19.2 released!
- 2022-06-01 OpenModelica 1.19.0 released!
- 2022-04-20 OpenModelica 1.19.0-dev.beta1 released!
- 2022-01-31 OpenModelica 2022
- 2021-12-23 OpenModelica 1.18.1 released!
- 2022-06-01 OpenModelica 1.19.0 released!
- 2021-07-12 OpenModelica 1.18.0-dev.beta1 released!
- 2021-03-23 OpenModelica 1.17.0 released!
- 2021-02-22 OpenModelica 1.16.4 released!
- 2021-02-03-2021-02-04 MODPROD 2021
- 2021-02-02 OpenModelica 2021
- 2020-12-21 OpenModelica 1.16.2 released!
- 2020-11-17 OpenModelica 1.16.1 released!
- 2020-10-24 OpenModelica 1.16.0 released!

¹ This page references Modica®, which is a registered trademark of Modica Association. ²

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The screenshot shows the OpenModelica GitHub repository page. The header includes the OpenModelica logo and navigation links: Overview, Repositories, Packages, People, Teams, Projects, Settings. The main content area is titled "OpenModelica / OpenModelica" and shows the repository details, including the number of stars (453) and forks (206). The "Issues" tab is selected, showing a list of open issues. The issues are categorized by labels such as "bug", "enhancement", "documentation", and "compliance". The bottom section shows two line graphs: "MSL 3.2.1 Coverage" and "ModelicaTest_L3.2.1 Coverage", both showing coverage over time from 2012 to 2021.

OpenModelica / OpenModelica

1,360 Open • 4,785 Closed

Unit multiples in plots should not be used when powers are involved (bug) [COMPLIANCE]

Incorrect behaviour of drop down unit menu for parameter inputs (COMPLIANCE) [enhancement]

displayUnits as axis labels (bug) [COMPLIANCE]

dropdown for replaceable functions not shown in parameter window

OpenModelica build not available for Ubuntu 21.10 (imish indri)

Contribute

You can report a bug by adding a new [ticket](#). Please have a look at all the [open tickets](#) first.

Testing

We run builds and tests using Hudson. Check the latest [build](#) and [test status](#).
Check the status of the (in development) [compliance suite](#) of the Modica specification.
Check the latest [MSL 3.2.1 coverage](#).
Check the latest [ModelicaTest 3.2.1 coverage](#).
Check the [historical MSL coverage](#) or [trend of all tested libraries](#).
Check the [directory](#) of all tested libraries.

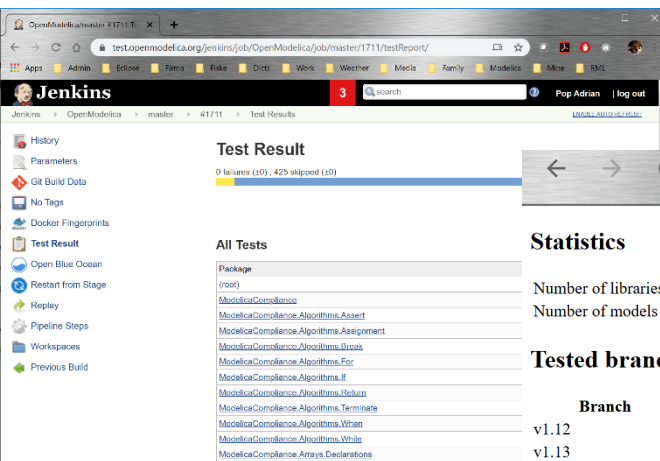
MSL 3.2.1 Coverage

ModelicaTest_L3.2.1 Coverage

What is OpenModelica? (IV)

■ Open-source community services

- Extensive testing - unit & library coverage: 88 (+8) libraries, 18492 (+3k) models with interactive result comparison. 10+ test servers currently
 - <https://libraries.openmodelica.org/branches/overview-combined.html>
 - Linux (GCC & CLANG), Windows (MinGW GCC & Clang), Mac OS (GCC & Clang)
 - Platforms: x86, x86_64, ARM, M1, M2
 - 3 runtimes: FMI, C runtime, C++ runtime
- ~10,449 tests ran on each pull request via Jenkins
- Automatic nightly builds for Window & Linux & Mac OS

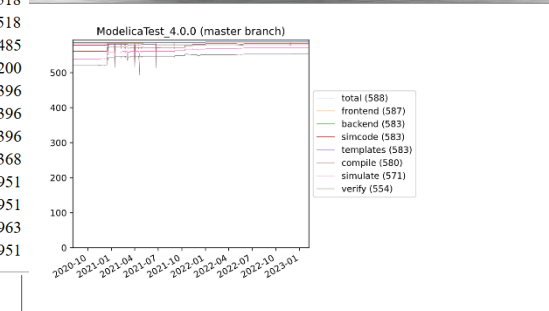
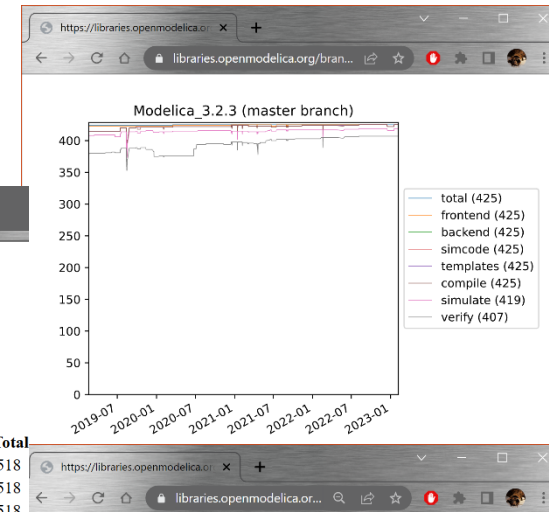


Statistics

Number of libraries 88
Number of models 18492

Tested branches

Branch	Version	Build time	Execution time	# Simulate	# Total
v1.12	OMCompiler v1.12.0-v1.12.0.7+ga21325026	2023-02-25 18:13:16	3 days, 18:00:56	8208	11518
v1.13	OMCompiler v1.13.2	2023-02-25 21:40:47	1 day, 22:30:31	8369	11518
v1.14	OMCompiler v1.14.2-v1.14.2.6+g5c52d52477	2023-02-25 22:56:20	2 days, 0:50:08	8539	11518
v1.16	OMCompiler v1.16.5-v1.16.5.1+g6adae6a043	2023-02-26 00:15:00	1 day, 22:42:14	8396	11518
v1.17	OMCompiler v1.17.0-v1.17.0.10+g03f0da6bf5	2023-09-23 02:42:54	1 day, 21:17:54	9266	12485
v1.18	OMCompiler v1.18.1	2024-04-06 02:43:27	3 days, 9:08:03	11055	14200
v1.19	OMCompiler v1.19.3	2024-10-26 02:46:32	4 days, 12:59:04	15416	17396
v1.20	OMCompiler v1.20.0-v1.20.0.1+g2faf7aa0ea	2024-10-26 03:53:13	3 days, 1:05:27	15473	17396
v1.21	OMCompiler v1.21.2	2024-10-26 05:03:56	3 days, 6:37:39	15592	17396
v1.22	OMCompiler v1.22.3-v1.22.3.1+g24592ab6d0	2024-10-28 02:03:17	3 days, 8:08:52	15815	17368
v1.23	OMCompiler v1.23.0-v1.23.0.4+g332e81aa64	2025-01-29 23:28:27	3 days, 7:12:26	16384	17951
v1.24	OMCompiler v1.24.3-v1.24.3.2+g1fcd964f50	2025-01-29 23:53:47	3 days, 7:55:06	16435	17951
master	OMCompiler v1.25.0-dev.346+g2571d79937	2025-01-30 00:30:18	3 days, 11:48:23	16492	17963
newInst-newBackend	OMCompiler v1.25.0-dev.343+g4ce79069ca	2025-01-29 15:32:11	5 days, 0:17:22	3821	17951



What is OpenModelica? (V)

- **An incubator platform for research**
 - 11 PhDs since 2004 (Debugging, Parallelization, PDEs Extensions, Julia, Traceability)
 - 40+ Master's theses since 2004
 - Both the students and the project benefit
- **Master theses at PELAB 2006-2018**
 - Refactoring/Parsing and Language extensions
 - UML/SysML view of Modelica code
 - 2D and 3D visualization tools
 - Static and runtime debugging tools
 - Advanced code generation and parallelization of simulation code
 - Bootstrapping and Java Interface
 - Function pointers
 - NVIDIA for Cuda and OpenCL parallel simulation
 - OMEdit - Modelica Connection Editor
 - OMWeb - server based Modelica simulation for teaching
 - OMCcc parser
 - PDE-solver using ParModelica
- **External Master theses**
 - Model based diagnostics at ISY (Dep. Of Electrical Engineering)
 - Monte-Carlo simulation of Satellite Separation Systems at SAAB
 - Interactive Simulations (EADS)
 - Additional Solvers + Event handling (FH-Bielefeld)
 - EADS - ModelicaML
- **A Base for commercial and open source products**
 - MathCore AB, Bosch Rexroth, VTT, Equa, Evonik, ABB, RTE

OpenModelica Roadmap - Past

1997 - started as a master thesis

2003 - first usable internal version

2004 - first external version: OpenModelica 1.1

2005 - more development: OpenModelica 1.3.1

2006 - major milestone

- Translated the whole compiler to MetaModelica
- Integrated Development Environment for the compiler
- OpenModelica website started
- Moved the code repository to Subversion management
- Extended the OpenModelica environment with new tools
- 4 versions released during the year
- External people start using OpenModelica
 - ~ 200 downloads/month
 - first development course at INRIA

OpenModelica Roadmap - Past

2007 - continued development and community involvement

- Improvement in website, support and documentation
- Answered ~1000 questions on the forum
- Portability is highly improved, ported to 4 platforms
 - Linux, Mac, Solaris, Windows (version 1.4.3)
- Improvement of the compiler development tools in Eclipse
- OpenModelica Community starts to react
 - contribute code & report bugs & request enhancements & participate in answering questions in the OpenModelica forum
 - participate at courses and workshops
- New server acquired for better community services
- Increased usage: ~600 downloads/month
- Open Modelica Consortium created in December 4
 - 4 months of work
 - 9 organizations as members already (3 Universities, 6 Companies)
 - discussions are ongoing with other 6 companies

2008 - Further work on the compiler

- Release 1.4.4 and 1.4.5
 - Linux, Mac, Solaris, Windows
- New Solver Interface
- Refactoring
- Dynamic loading of functions
- Merging of MathCore front-end code
- 744 commits in Subversion
- Other things I don't remember

OpenModelica Roadmap - Past

2009

- Work mainly happened in OSMC (partially on a non-public branch)
- **Front-end**
 - Refactoring (OSMC)
 - Enumerations (OSMC)
 - Java Interface and Bootstrapping (Martin Sjölund)
 - MultiBody flattening (OSMC)
 - Constraint connection graph breaking (VTT + OSMC)
 - Support for Modelica 3.x and 3.x annotations (OSMC)
- **Back-end**
 - Tearing in the back-end (Jens Frenkel)
 - Template Code Generation and CSharp backend (Pavol Privitzer, Charles University Prague)
 - Interactive Simulations (EADS)
 - C++ Code generation (Bosch Rexroth)
 - Java Interface and Bootstrapping (Martin Sjölund)
 - Additional Solvers + Events (Willi Braun, FH-Bielefeld)
- **General**
 - New ModelicaML + SysML prototype (EADS)
 - 1144 commits in subversion (Since 2009 to February 8, 2010)
 - Bug fixes (OSMC)
 - Release 1.5.0 and 1.5.0-RC_X (Linux, Mac, Solaris, Windows)
- **More things I don't remember**

OpenModelica Roadmap - Past

2010 - 2011

- Support for Modelica Standard Library 3.1 (Media & Fluid in works)
- **Front-end**
 - MultiBody flattening (OSMC)
 - Support for Modelica 3.x and 3.x annotations (OSMC)
 - Performance Enhancements
 - Stream connectors
 - Media & Fluid work is on the way
- **Back-end**
 - Back-end redesign (Jens, Willi, Martin, Per, Adrian, Kristian, Filippo)
 - Tearing in the back-end (Jens Frenkel)
 - Template Code Generation and CSharp backend (Pavol Privitzer, Charles University Prague)
 - Interactive Simulations (EADS)
 - C++ Code generation (Bosch Rexroth)
 - Additional Solvers + Events + Linearization (Willi Braun, FH-Bielefeld)
- **General**
 - OMEdit - new connection editor
 - Bootstrapping OMC (90% finished)
 - 2550 commits in subversion from 2010 to Feb. 7, 2011 (double than 2009-2010)
 - Bug fixes ~300+ (OSMC)
 - Release 1.6.0 (Linux, Mac, Windows)
 - Downloads Windows (~16434) , Linux (~8301), Mac (~2816)
- **More things I don't remember**

OpenModelica Roadmap - Past

2012 - 2013

- Support for Modelica Standard Library 3.2.1 including Media & Fluid
- **Front-end**
 - Performance Enhancements
 - Media & Fluid work
 - Operator overloading
 - New instantiation module started
- **Back-end**
 - Modular back-end with more optimization modules (Jens, Willi, Martin)
 - New simulation runtime redesign (Willi, Lennart, Jens, Martin, Adrian)
 - C++ Code generation (Bosch Rexroth)
 - FMI export & import
 - Initialization, Jacobians (Lennart Lochel, Willi Braun, FH-Bielefeld)
 - Support for parallelization (Martin)
 - Parallel extensions in functions
- **General**
 - Uncertainties support (OpenTURNS connection & Data reconciliation)
 - MDT GDB debugging based on GDB and the bootstrapped compiler
 - OMEdit - improvements
 - Bootstrapping OMC (100% finished) using Boehm GC
 - 3909 commits in subversion from 2012 to Feb. 4, 2013
 - 2000 forum posts (questions and answers)
 - Bug fixes ~247+ (OSMC)
 - Release 1.9.0 (Linux, Mac, Windows)
 - Downloads Windows (~45307) , Linux (~15543), Mac (~5367)
- **More things I don't remember**

OpenModelica Roadmap - Past

- **2014 - 2017 - Most focus on libraries support & performance**
 - MSL 3.2.1 (100% build/98% simulate), ModelicaTest 3.2.1, PetriNet, Buildings, PowerSystems, OpenHydraulics, ThermoPower, and ThermoSysPro
 - Switch to bootstrapped compiler
- **Front-end, Back-end, Simulation Runtime, Graphical Clients**
 - Development switched to bootstrapped compiler since November 2014
 - Partially new graph-based front-end with better support for libraries
 - Improved back-end: initialization, system solving, parallelization, cse optimization, dynamic optimization
 - Faster and much more user friendly OpenModelica Connection editor
- **General**
 - ~9000 commits in subversion from Feb. 2014 to Feb., 2016
 - Bug fixes
 - Release 1.9.2 (Linux, Mac, Windows)

OpenModelica Roadmap - Past

- 2018 - 2020 - focus on performance, scalability, bug fixes
- **New Front-End - status**
 - The new front-end ~90% complete, (see #4138 on Trac)
 - 100+ times faster, 5+ times less memory consumption (no array expansions, no expansion of for loops in equations)
 - The new front-end also brings better support for libraries
 - Developed in line with MCP-0019: Flattening
 - Currently 423/424 models from MSL 3.2.3 pass the new front-end
 - Last year 107/387 models from MSL 3.2.3 passed the new front-end
- **New Front-End - remaining work**
 - Expandable connectors (add virtual nodes)
 - Making the backend cooperate with the new way the DAE is produced
 - Support for state machines
 - (Support for MetaModelica)
- **OMEdit - better Modelica support**
 - Much more stable OMEdit, a lot of bug fixes and new usability features
 - Auto completion support
 - Support for OMSimulator
 - Redeclare and Replaceable Support
 - Waiting for the new front-end to become mature enough so we don't frustrate users
- **OMSimulator**
 - Combined FMI & TLM support, SSP support
 - OMEdit GUI support
- **General**
 - From Feb 2018 - Feb 2020
 - 30+ contributors
 - 2k commits (OpenModelica/OMCompiler/OMEdit)
 - 313 commits (OMSimulator)
 - Releases 1.13.0, 1.13.1, 1.13.2, 1.14.1

OpenModelica Roadmap - Past

- 2020 - 2023 - focus on performance and usability
- OMC & Clients
 - Performance & scalability improvements
 - Bug fixes and enhancements to OMC, OMCedit, FMI, Runtime, Backend, etc.
 - Replaceable support in OMCedit
 - New Frontend by default in 1.16.x in OMCedit, 1.17.x by default in OMC
 - Some FMI export fixes and enhancements
 - Fixes and improvements in the C++ runtime - better coverage
<https://libraries.openmodelica.org/branches/overview-c++.html>
 - Reimplementation of synchronous features
 - New API in OMCedit based on the new frontend (DFD Bosch, DFD LBL)
 - Package Manager
 - New state-estimation algorithm (DFD EDF)
- OMSimulator
 - Combined FMI & TLM support, SSP support
 - OMCedit GUI support
 - Improved SSP support better OMCedit integration
- General
 - From Feb 2020 - Feb 2023
 - 33+ contributors
 - 3k commits (OpenModelica/OMCompiler/OMCedit)
 - 350 commits (OMSimulator)
 - Releases 1.16.x, 1.17.x, 1.18.x, 1.19.x, 1.20.x

OpenModelica Roadmap - Past

- 2023 - 2024 - focus on coverage, GUI
- OMC & Clients & OMSimulator
 - Performance & scalability improvements
 - Bug fixes and enhancements to OMC, OMEdit, FMI, Runtime, Backend, etc.
 - FMI export fixes and enhancements
 - Better coverage: <https://libraries.openmodelica.org/branches/overview.html>
 - New API in OMEdit based on the new frontend
 - New Backend improvements
 - Improved FMI 3.x and SSP support in OMSimulator and better OMEdit integration
 - Improved OM FMI export based on cmake
- OMC / OMEdit - new API for instance hierarchy editing
 - The work on this (P & A) has been released active by default v1.22 and we were able to solve 6+ yrs old issues
- General
 - From Jan 2023 - Feb 2024
 - 29+ contributors
 - 909 commits (OpenModelica/OMCompiler/OMEdit)
 - 54 commits (OMSimulator)
 - Releases 1.21.x, 1.22.x

■ Testing procedure

- <https://libraries.openmodelica.org/branches/overview-combined.html>
- Run tests on previous OpenModelica version until 1.12.x
- Detect both model regression and performance regression, all information saved in a database
- 65 libraries, 15067 models with interactive result comparison.
 - 10+ dedicated test servers
 - Linux (GCC & CLANG), Windows (MinGW GCC), Mac OS (GCC)
 - Platforms: x86, x86_64, ARM, M1, M2
 - 5 runtimes: FMI, C runtime, C++ runtime, oldInst, daeMode

Statistics

Number of libraries 65

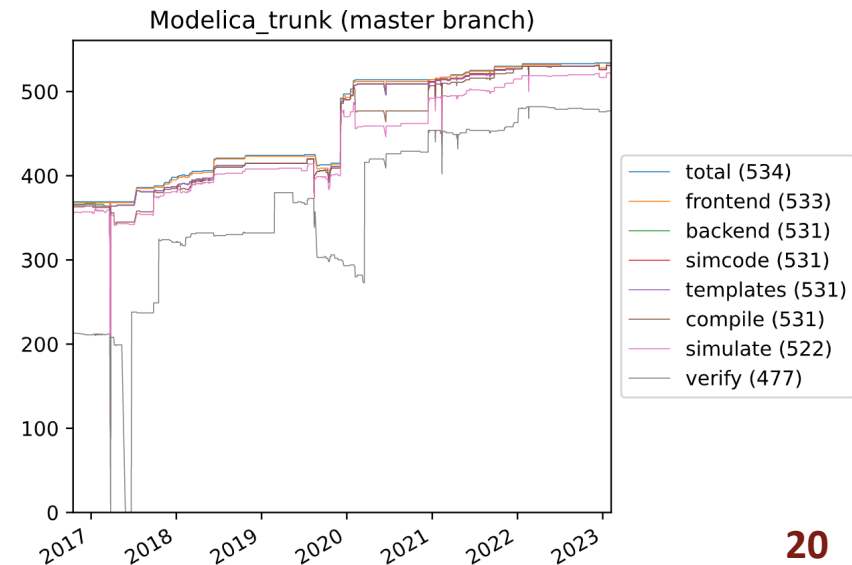
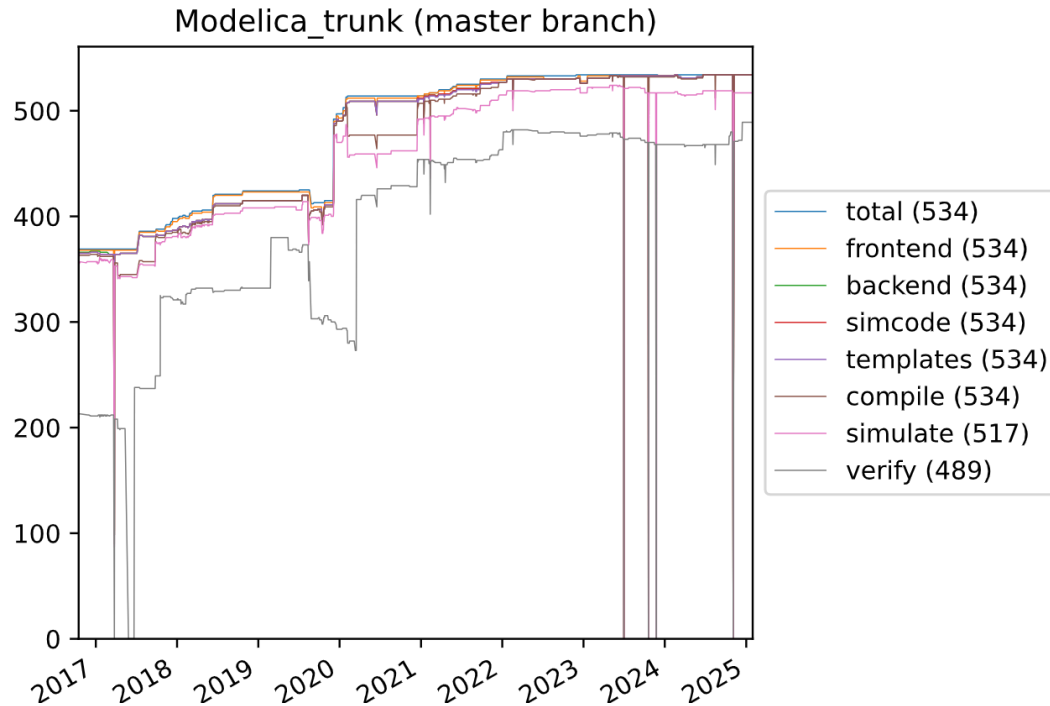
Number of models 15067

Tested branches

Branch	Version	Build time	Execution time	# Simulate	# Total
v1.12	OMCompiler v1.12.0-v1.12.0.7+ga21325026	2023-02-04 04:08:09	4 days, 14:22:45	10527	15067
v1.13	OMCompiler v1.13.2	2023-02-04 06:07:24	2 days, 12:11:50	10708	15067
v1.14	OMCompiler v1.14.2-v1.14.2.6+g5c52d52477	2023-02-04 07:14:33	2 days, 15:39:34	10864	15067
v1.16	OMCompiler v1.16.5-v1.16.5.1+g6adae6a043	2023-02-04 08:24:13	2 days, 14:00:15	10722	15067
v1.17	OMCompiler v1.17.0-v1.17.0.10+g03f0da6bf5	2023-02-04 09:36:10	2 days, 0:37:58	11394	15067
v1.18	OMCompiler v1.18.0-v1.18.0.38+ga767f054d8	2023-02-04 10:35:55	2 days, 3:27:06	12121	15067
v1.19	OMCompiler v1.19.2-v1.19.2.2+g9baf633d57	2023-02-04 11:47:26	2 days, 23:53:41	13104	15055
v1.20	OMCompiler v1.20.0-v1.20.0.1+g2faf7aa0ea	2023-02-04 12:31:41	2 days, 17:33:18	13088	15055
master	OMCompiler v1.21.0-dev.233+geac10d9a03	2023-02-06 03:22:38	2 days, 17:56:59	13151	15067

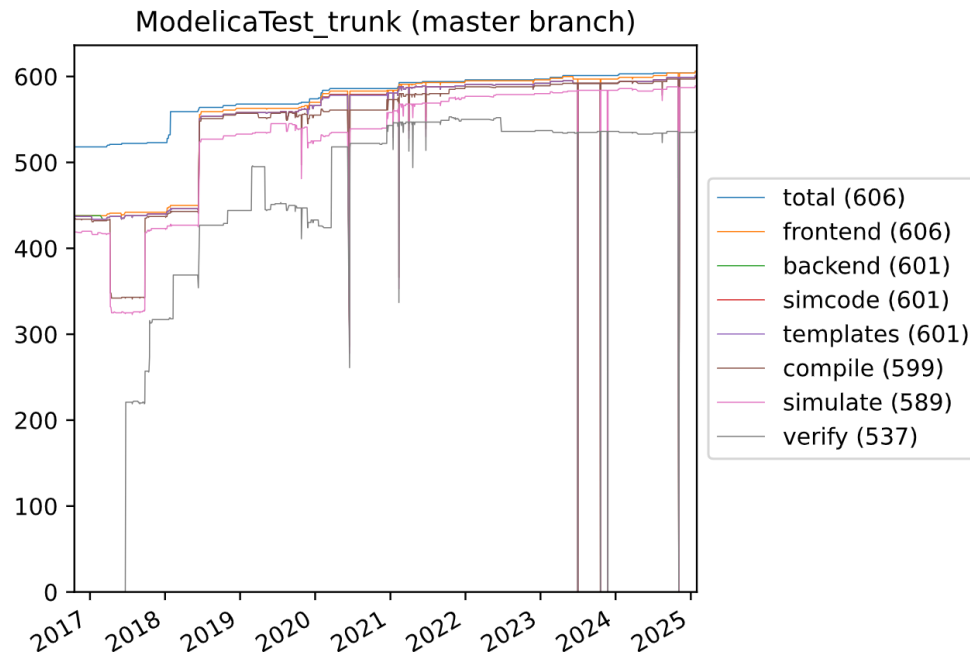
OpenModelica Testing (II)

- 2025-02-03 v1.25.0-dev - total 534 - build 534 (100%) - sim 517 (96%)
- Up 1% since last year

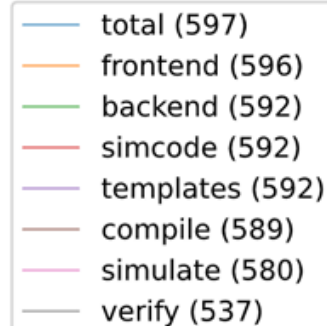


OpenModelica Testing (III)

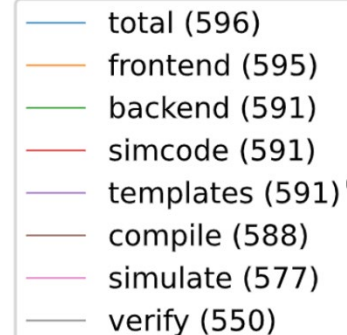
- 2025-02-03 v1.25.0-dev - total 606 - build 599 (99%) - sim 580 (97.2%)
- Up 1% since last year



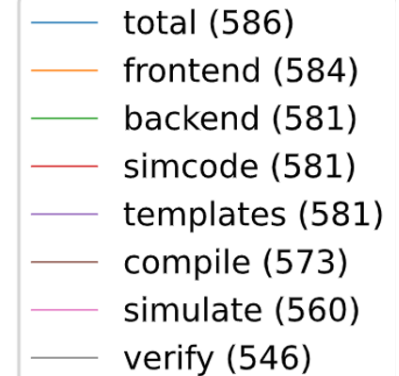
2024



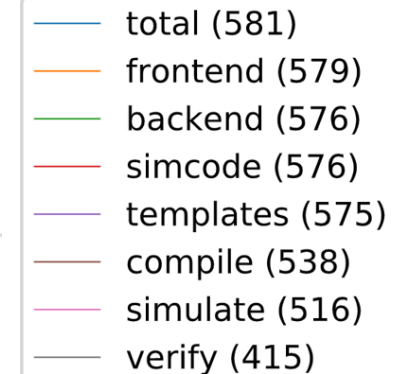
2022



2021



2020



OpenModelica Statistics (1)

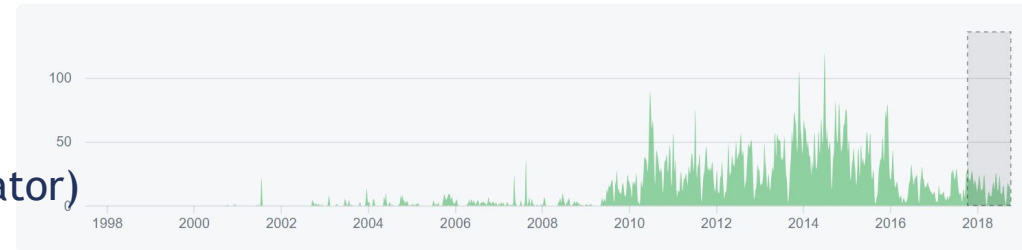
- Moved the source code to github May 2015
- Mature code base:
<https://github.com/OpenModelica>
- ~9000K+ lines of code and tests

- From Feb 2017 - Feb 2020
 - ~30+ contributors / year
 - ~2k commits / year
(OMCompiler & OMEdit & OMSimulator)

Feb 5, 2018 – Feb 3, 2019

Contributions: Commits ▾

Contributions to master, excluding merge commits

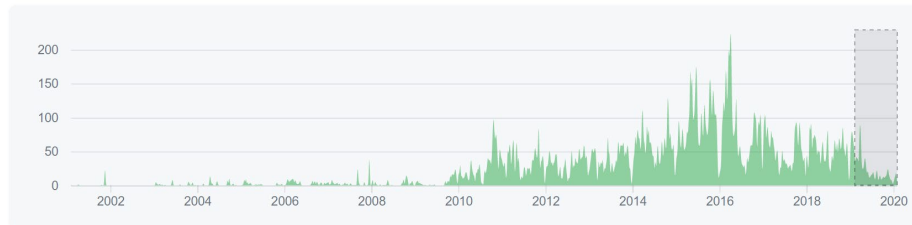


OpenModelica Statistics (2)

Feb 12, 2019 – Feb 3, 2020

Contributions: Commits ▾

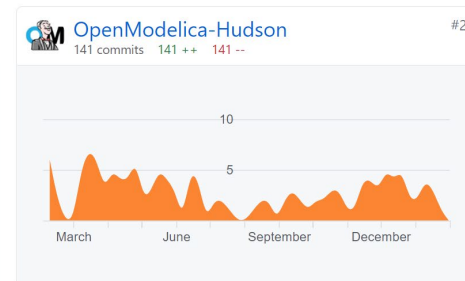
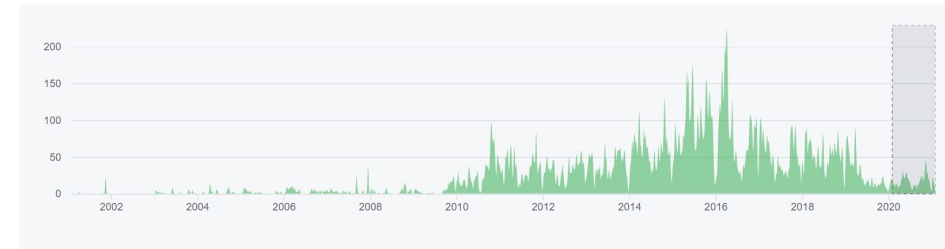
Contributions to master, excluding merge commits



Feb 3, 2020 – Feb 1, 2021

Contributions: Commits ▾

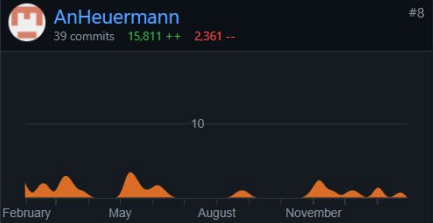
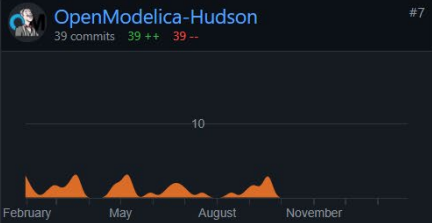
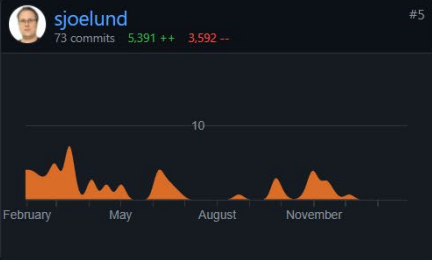
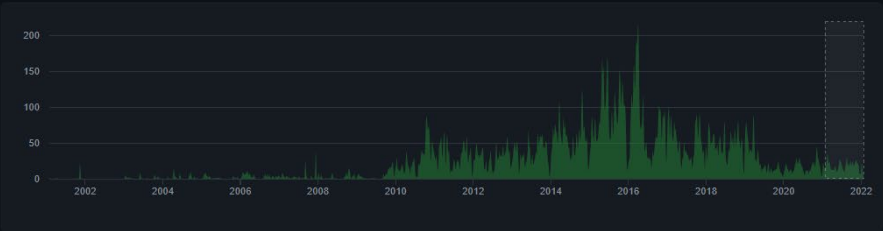
Contributions to master, excluding merge commits



Jan 31, 2021 – Jan 30, 2022

Contributions: Commits

Contributions to master, excluding merge commits and bot accounts

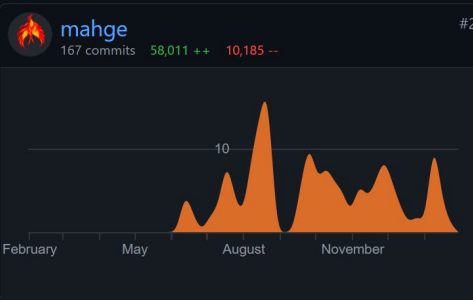
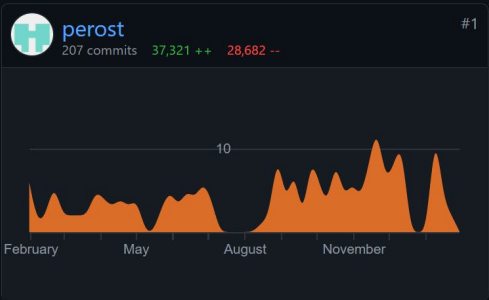
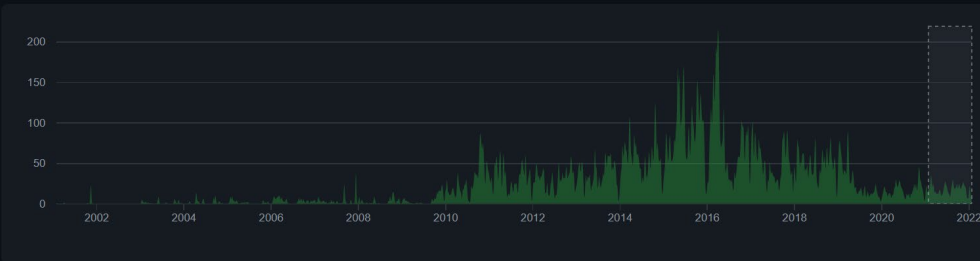


OM Statistics (3)

Jan 31, 2021 – Jan 30, 2022

Contributions: Commits

Contributions to master, excluding merge commits and bot accounts



Contributions to master, excluding merge commits and bot accounts

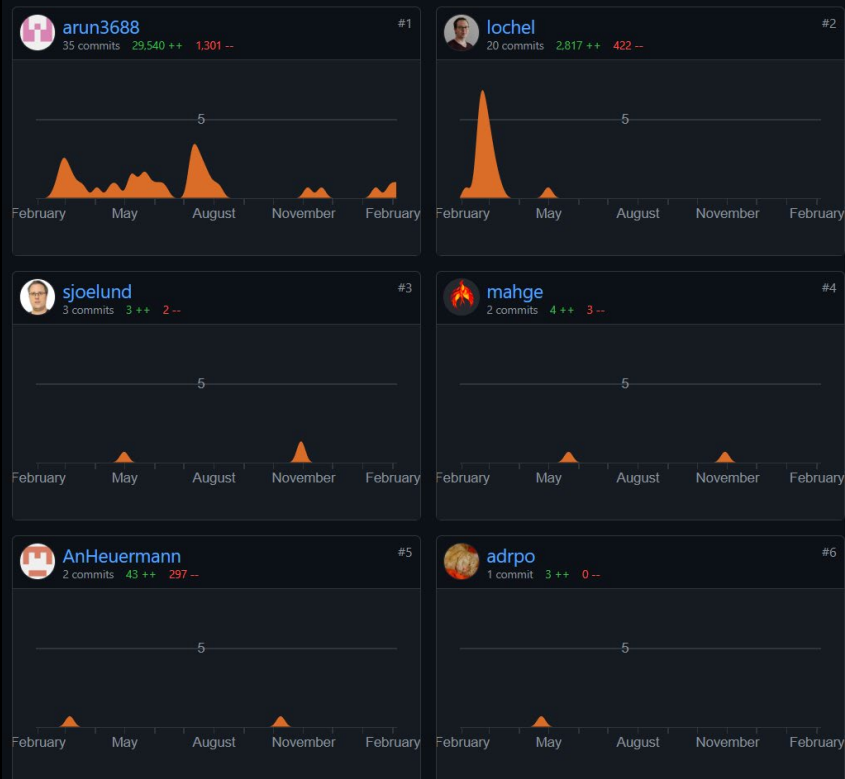
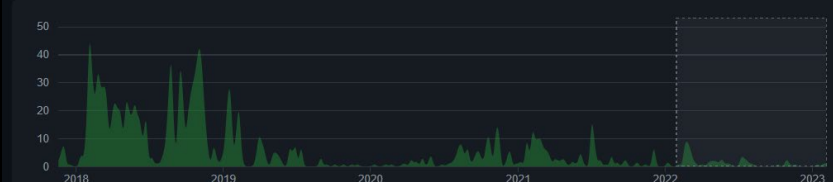


OM Statistics (4)

Jan 30, 2022 – Feb 6, 2023

Contributions: Commits

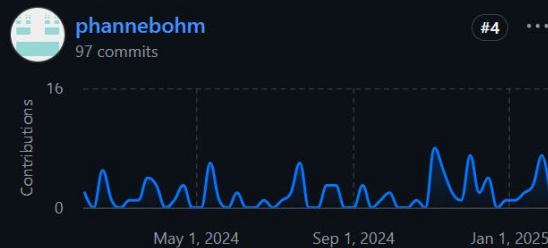
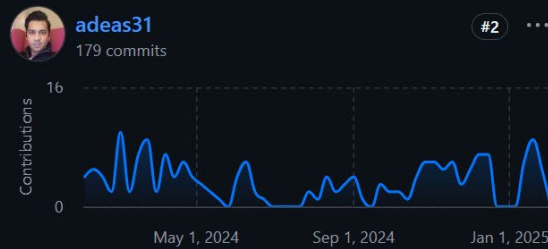
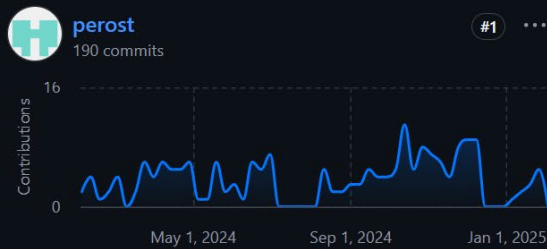
Contributions to master, excluding merge commits and bot accounts



OM Statistics (5)

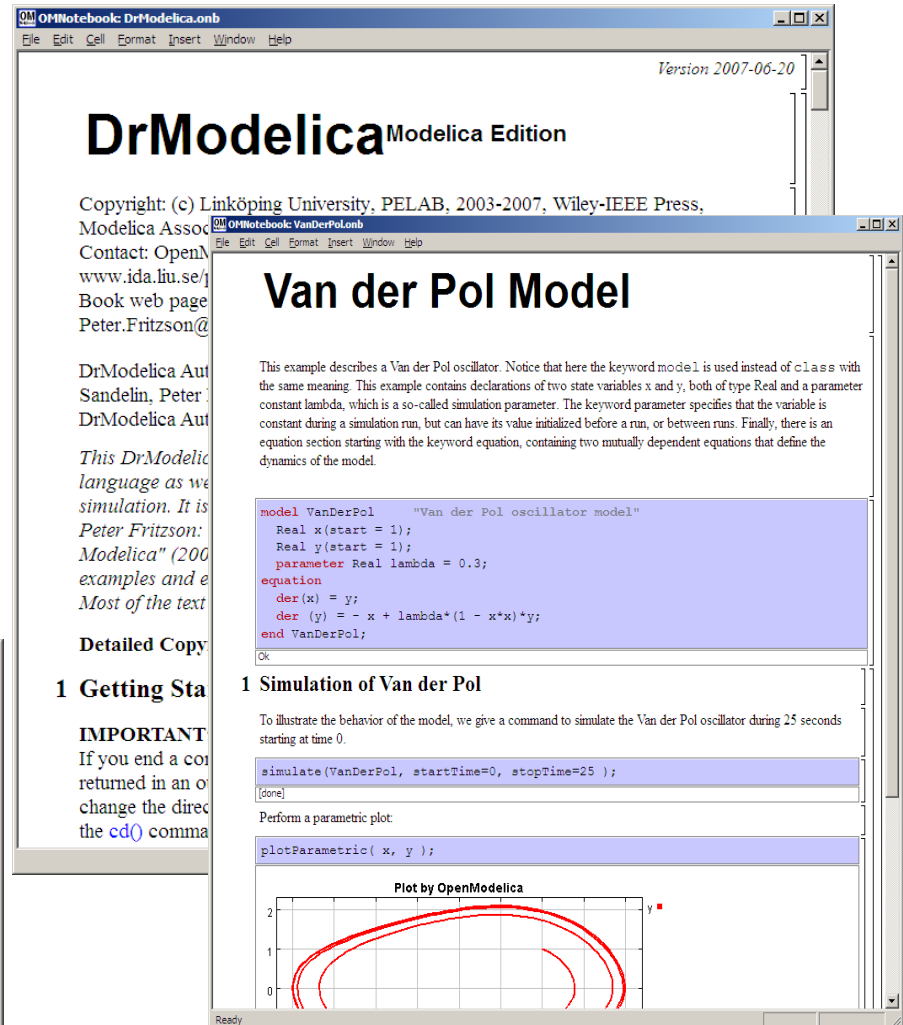
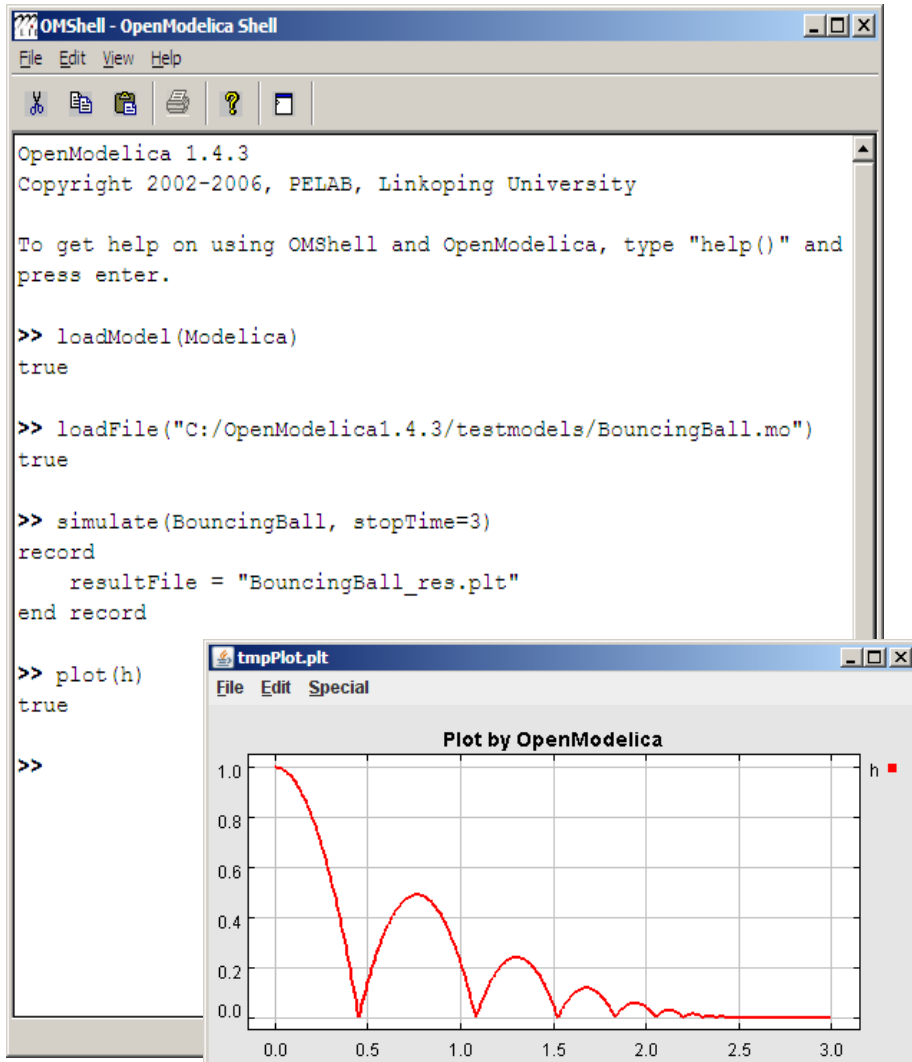
Commits over time

Weekly from Feb 4, 2024 to Feb 2, 2025



- OpenModelica
 - What is OpenModelica?
 - The past
- OpenModelica Technical Overview
 - OMC, OMShell, OMNotebook, OMEdit, ModelicaML, OMSimulator, OMPython, OMJulia, OMMatlab
- OpenModelica Development Environment
 - MetaModelica
 - The Eclipse Environment (MDT)
 - OMEdit & VSCode
 - Web & Cloud
- OpenModelica Latest Developments

OMShell & OMNotebook



OMEdit- OpenModelica Connection Editor

OMEdit - OpenModelica Connection Editor

File Edit View Simulation FMI Export Debug QMSimulator Git Tools Help

Libraries Browser

Filter Classes

Libraries

- OpenModelica
- ModelicaReference
- ModelicaServices
- Complex
- Modelica
- UsersGuide
- Blocks
- ComplexBlocks
- StateGraph
- Electrical
- Magnetic
- Mechanics
 - MultiBody
 - UsersGuide
 - World
 - Examples
 - Elementary
 - DoublePendulum**
 - DoublePendulumInitTip
 - ForceAndTorque
 - FreeBody
 - InitSpringConstant
 - LineForceWithTwoMasses
 - Pendulum
 - PendulumWithSpringDamper
 - PointGravity
 - PointGravityWithPointMasses
 - PointGravityWithPointMasses2
 - SpringDamperSystem
 - SpringMassSystem
 - SpringWithMass
 - ThreeSprings
 - RollingWheel
 - RollingWheelSetDriving
 - RollingWheelSetPulling
 - HeatLosses
 - UserDefinedGravityField
 - Surfaces
- Utilities
- Loops
- Rotational3DEffects
- Constraints
- Systems
- Forces

DoublePendulum

Modelica.Mechanics.MultiBody.Examples.Elementary.DoublePendulum E:/OpenModelica-v1.14.0-d...mentary/DoublePendulum.mo

Diagram View

Messages Browser

All Notifications Warnings Errors

Welcome Modeling Plotting Debugging

- Implemented mainly in MetaModelica (401 packages) and a C/C++ runtime
- Is available as a dynamic library (faster than CORBA/ZMQ)
- Used from OMEdit, OMNotebook, OMShell, OMOptim, OMPython, EclipseMDT, VSCodeModelicaExtension, Language Server
- Automatically generated API that can be used from QT

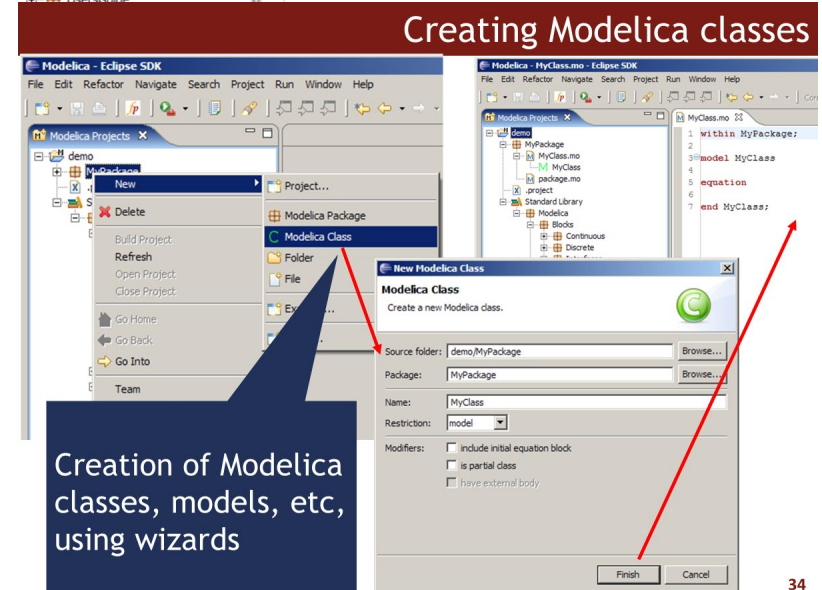
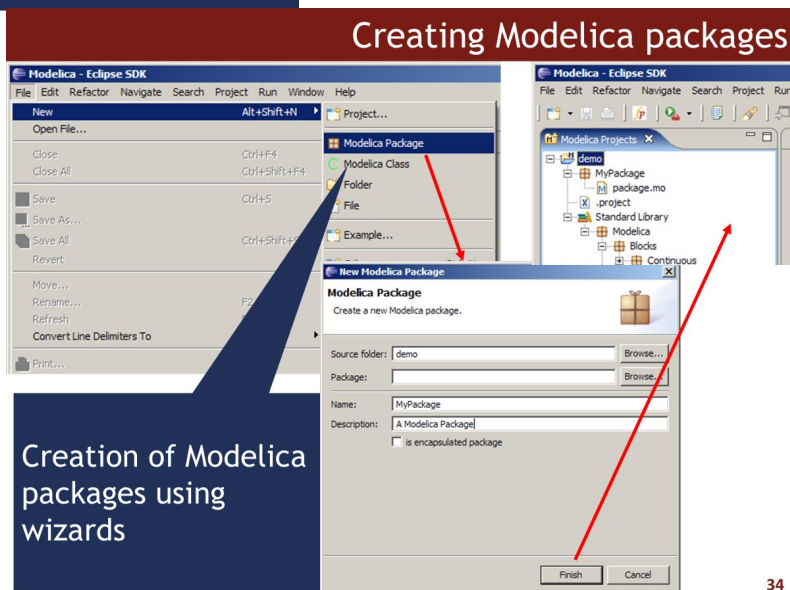
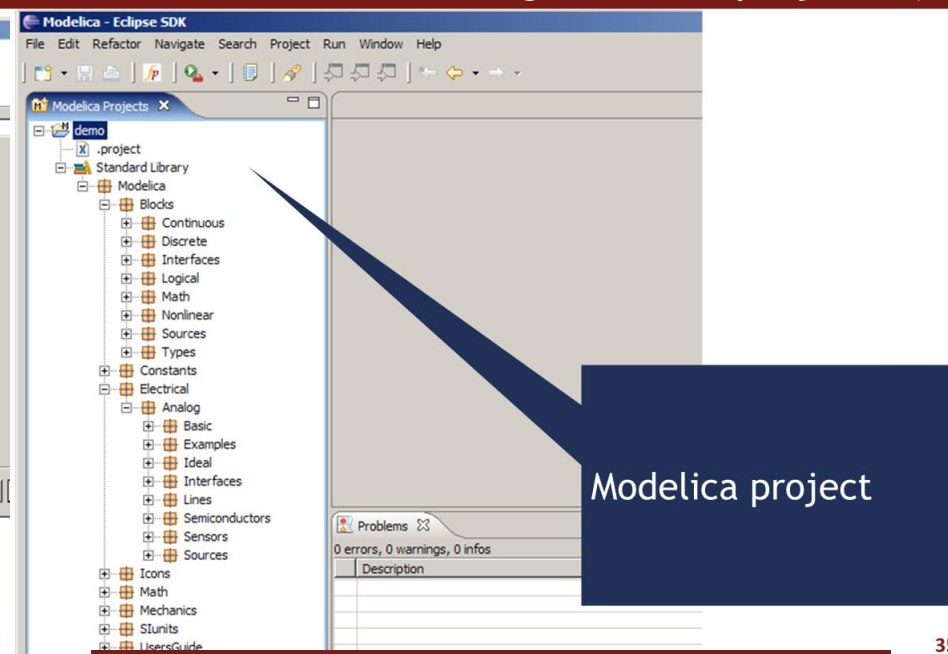
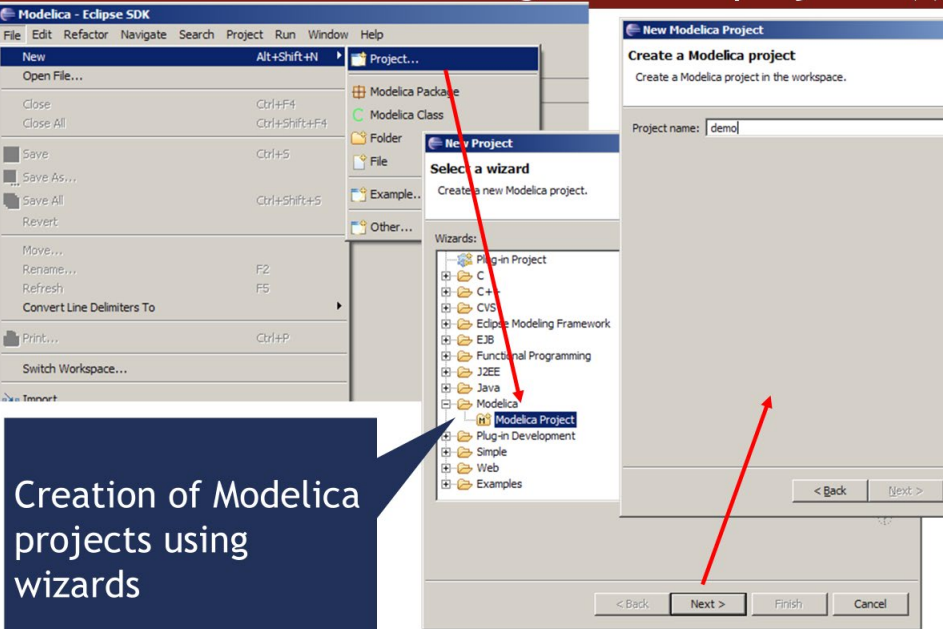
- OpenModelica
 - What is OpenModelica?
 - The past and present
- OpenModelica Technical Overview
 - OMC, OMShell, OMNotebook, OMEdit, ModelicaML, OMSimulator, OMPython, OMJulia, OMMatlab
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 - MetaModelica
 - The Eclipse Environment
 - OMEdit & VSCode
 - Web & Cloud
- OpenModelica Latest Developments

- **OMC**
 - Implemented mainly in MetaModelica and C/C++
- **Modelica**
 - classes, models, records, functions, packages
 - behavior is defined by equations or/and functions
 - equations
 - differential algebraic equations and conditional equations
- **MetaModelica extensions**
 - local equations
 - pattern equations
 - match expressions
 - high-level data structures: lists, tuples, option and uniontypes

Eclipse MDT - Functionality (I)

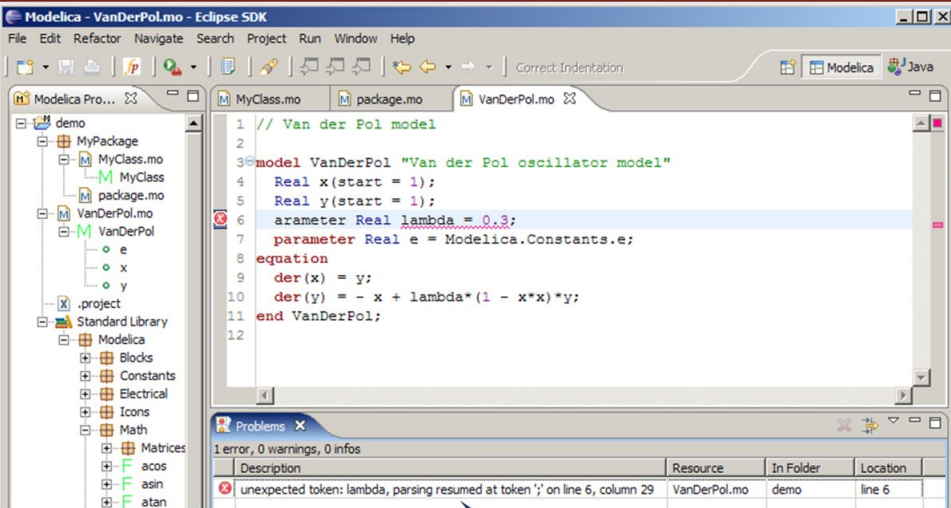
MDT - Creating Modelica projects (I)

Creating Modelica projects (II)



Eclipse MDT - Functionality (II)

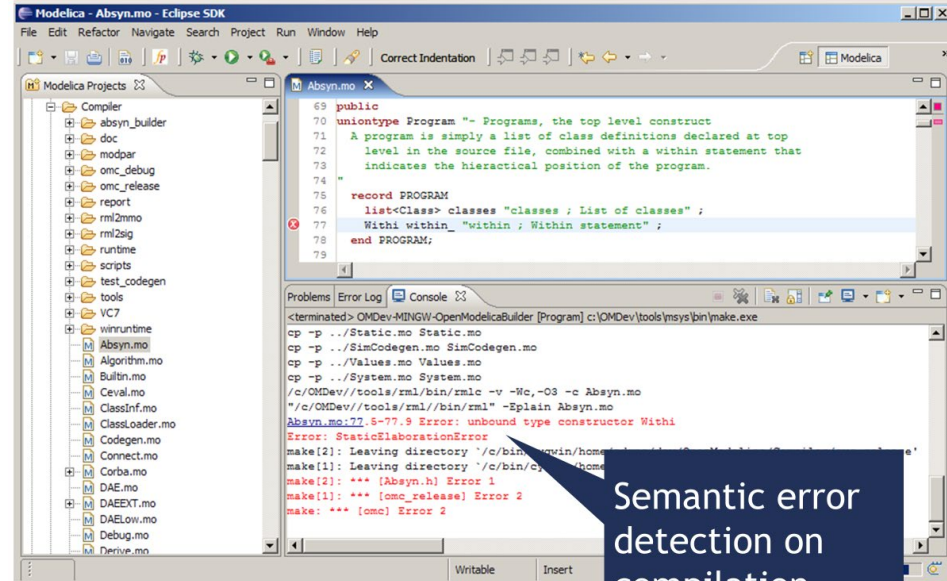
Error detection (I)



Parse error
detection on
file save

35

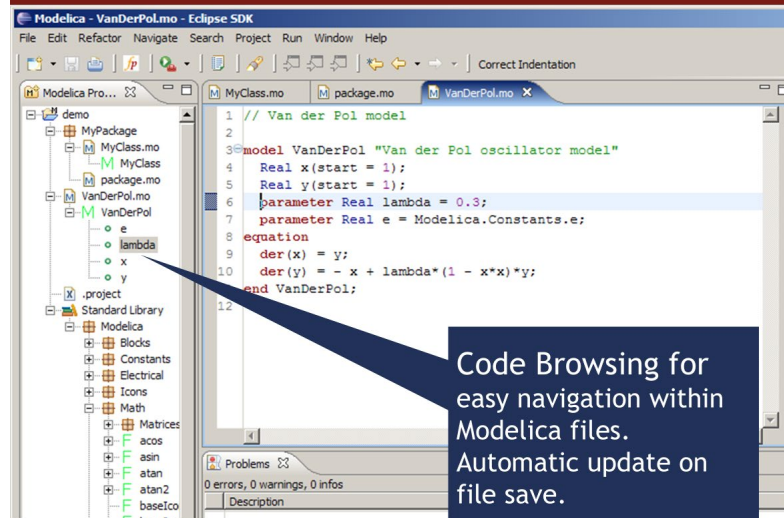
Error detection (II)



Semantic error
detection on
compilation

35

Code browsing



Code Browsing for
easy navigation within
Modelica files.
Automatic update on
file save.

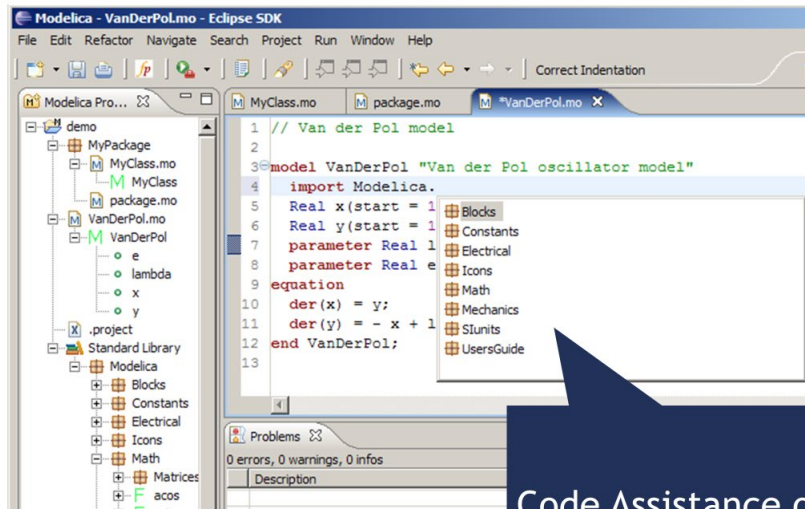
34

34

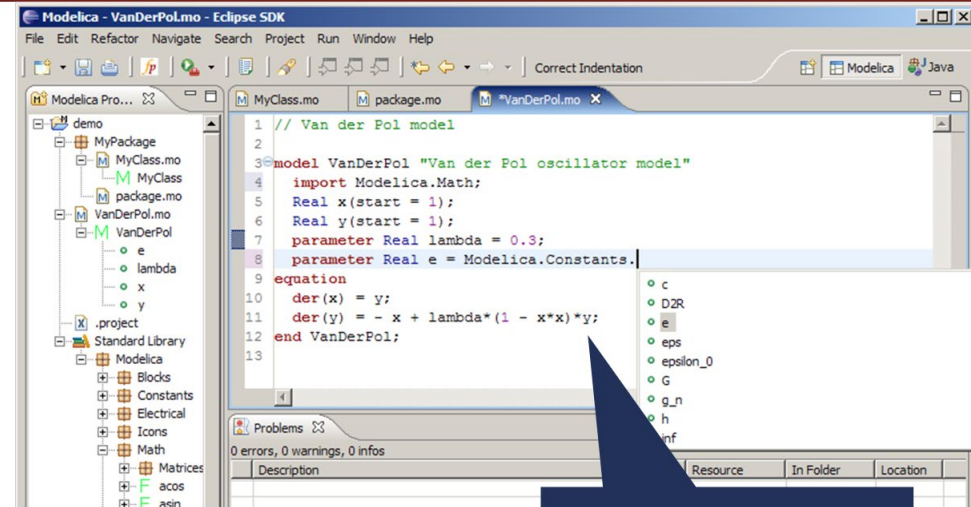
Eclipse MDT - Functionality (III)

Code assistance (I)

Code assistance (II)

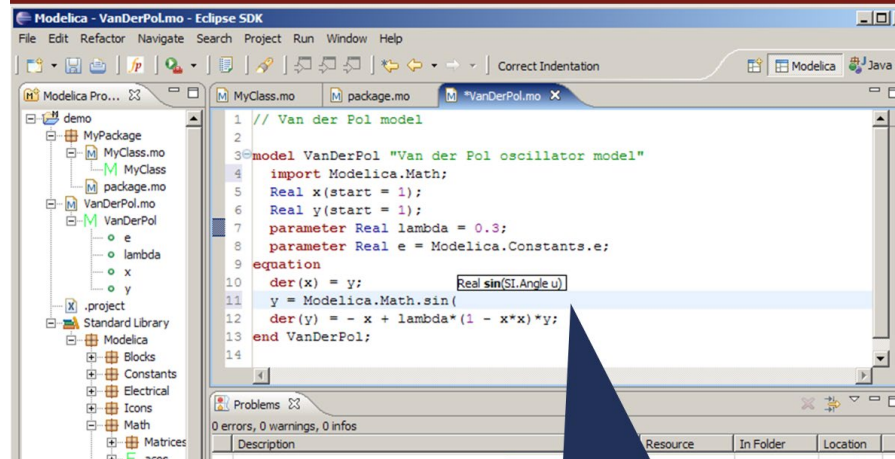


Code Assistance on imports



Code Assistance on assignments

Code assistance (III)



Code Assistance on function calls

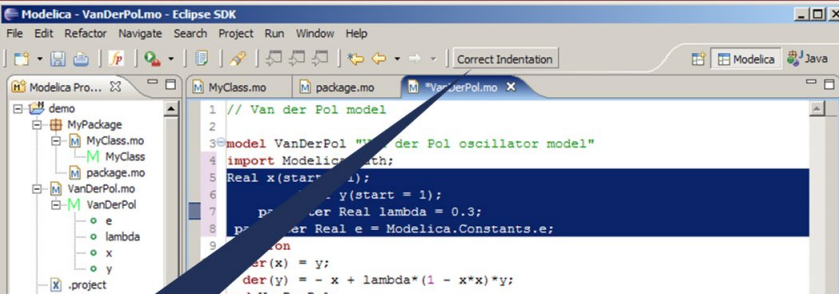
36

35

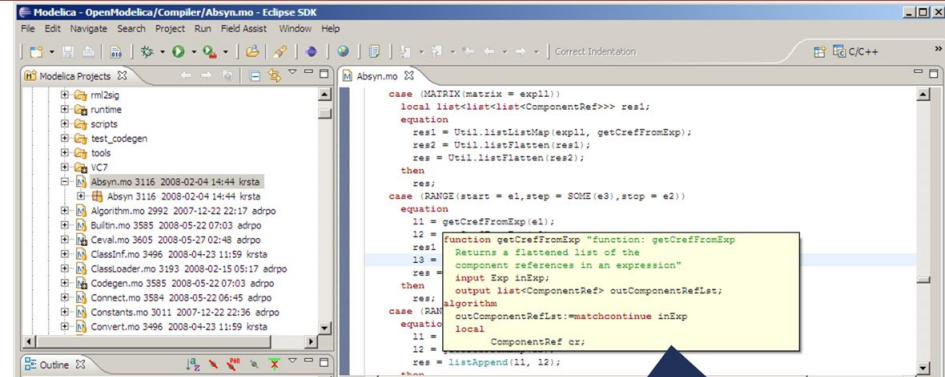
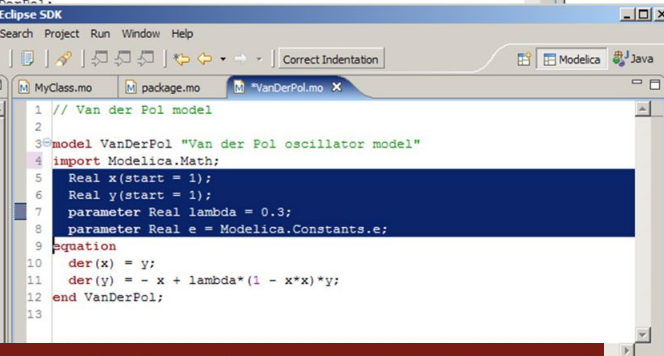
Eclipse MDT - Functionality (IV)

Code indentation

Code Outline and Hovering Info



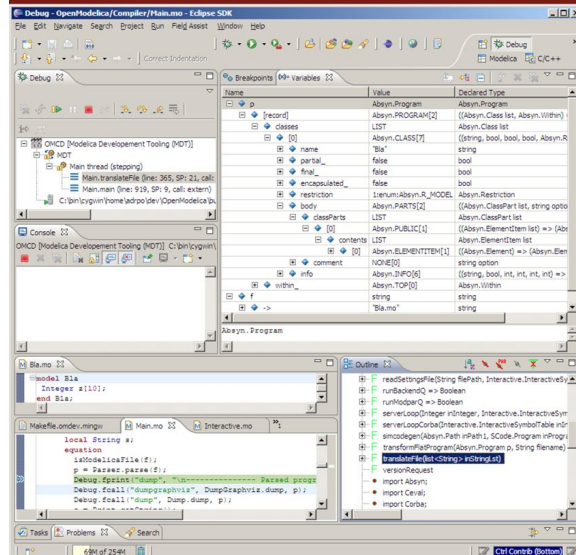
Code Indentation



Identifier Info on Hovering

Code Outline for easy navigation within Modelica files

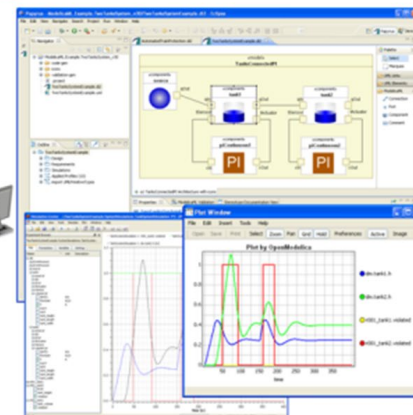
Eclipse Debugging Environment



- Type information for all variables
- Browsing of complex data structures
- GDB based

Eclipse environment for ModelicaML

① System Modeling with ModelicaML



② Modelica Code Generation

③ System Simulation with Modelica Tools

OMEdit Debugging Environment

[illegible]

VSCode Extensions

MetaModelica Extension and The Language Server

Visual Studio Code > Programming Languages > MetaModelica



MetaModelica

AnHeuermann | 514 installs | ★★★★★ (0) | Free

MetaModelica, Susan and Modelica language support.

[Install](#) [Trouble Installing?](#)

[Overview](#) [Version History](#) [Q & A](#) [Rating & Review](#)

CI passing

MetaModelica and Susan in Visual Studio Code

This extension adds support for the Modelica, Optimica, MetaModelica and Susan languages to Visual Studio Code. This extension is meant to use for developers of OpenModelica. If you want Modelica support use the great extension [Modelica by SimplyDanny](#) which is the base for this extensions.

Features

Syntax Highlighting

```
2 model LotkaVolterra "Lotka-Volterra equations"
3   Real x(start = 1) "Prey";
4   Real y(start = 1) "Predator";
5   parameter Real lambda = 0.5;
6   input Real u;
7   equation
8     der(x) = x - x * y - lambda * u;
9     der(y) = -y + x * y - ..... u;
10 end LotkaVolterra;
```

```
3 function myMetaModelicaFunction
4   input list<Real> x;
5   output list<Integer> y = {};
6   algorithm
7     _ := match x
8     local
9       Real yi;
10
11   case {} algorithm
12     Error.addMessage(Error.INTERNAL_ERROR, {getInstanceName() + " failed."});
13   then ();
14   else algorithm
```



Modelica Language Server

OpenModelica | 160 installs | ★★★★★ (0) | Free

[Experimental] Modelica language server

[Install](#) [Trouble Installing?](#)

[Overview](#) [Version History](#) [Q & A](#) [Rating & Review](#)

Modelica Language Server

Build passing

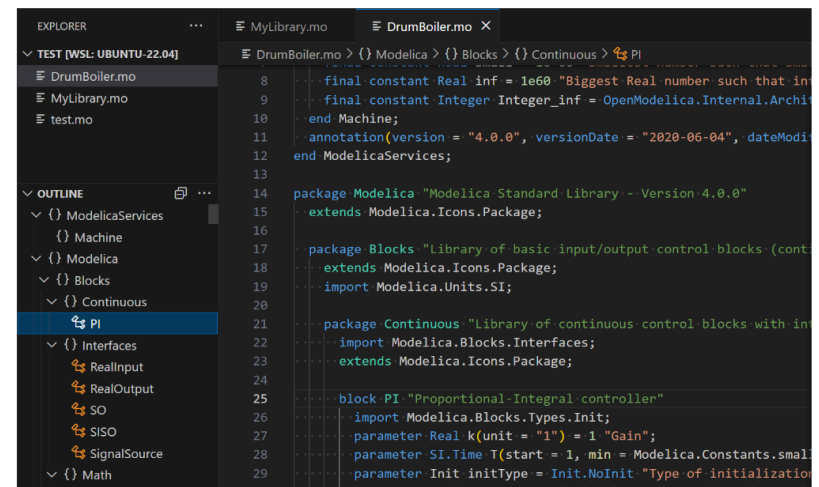
A very early version of a Modelica Language Server based on [OpenModelica/tree-sitter-modelica](#).

For syntax highlighting install extension [AnHeuermann.metamodelica](#) in addition.

Functionality

This Language Server works for Modelica files. It has the following language features:

- Provide Outline of Modelica files.



- **OMEdit in the browser**
 - Docker-based, apache2, noVNC, etc.
 - Contact us for the configuration settings

The screenshot displays the OMEdit - OpenModelica Connection Editor interface within a web browser. The browser address bar shows the URL: `tutorial.openmodelica.org:9009/vnc.html?path=vnc&autoconnect=true&resize=remote&reconnect=true&show_dot=true`.

The main window features a menu bar (File, Edit, View, SSP, Simulation, Data Reconciliation, Sensitivity Optimization, Debug, Tools, Help) and a toolbar. The left sidebar contains a Libraries Browser with a tree view showing various blocks, including PID_Controller, Filter, and others. The central plot area, titled "Plot : 1", shows a graph of "loadTorque.phi (deg)" versus "time (s)". The curve starts at 0 and rises smoothly to approximately 100 degrees by 4 seconds.

On the right, the Variables Browser shows a table of variables and their values:

Variables	Value	Display Unit	Description
PI			
driveAngle	90.0002...	deg	Referenc... to move
inertia1			
inertia2			
integrator			
kinematicPTP			
loadTorque			
der(phi)	-8.1...e-06		Angle of ...port.phi)
flange			
phi	105.271...	deg	Angle of ...port.phi)
tau	10	N.m	Accelera...nge.tau)
tau_constant	10.0	N.m	Constant ...rotation)
w	-8.1...e-06	rad/s	Angular v...der(phi))
speedSensor			
spring			
torque			

At the bottom, the Messages Browser shows a status bar indicating 100% completion. The output window displays the following text:

```

/tmp/OpenModelica_nobody/OMEdit/Modelica.Blocks.Examples.PID_Controller/PID_Controller -port=43307 -logFormat=xmltcp -
override=startTime=0,stopTime=4,stepSize=0.008,tolerance=1e-06,solver=dassl,outputFormat=mat,variableFilter=.* -r=/tmp/
OpenModelica_nobody/OMEdit/Modelica.Blocks.Examples.PID_Controller/res.mat -w -lv=LOG_STATS -inputPath=/tmp/
OpenModelica_nobody/OMEdit/Modelica.Blocks.Examples.PID_Controller -outputPath=/tmp/OpenModelica_nobody/OMEdit/
Modelica.Blocks.Examples.PID_Controller
The initialization finished successfully with 3 homotopy steps.
### STATISTICS ###
The simulation finished successfully.

```

The bottom status bar shows the coordinates X: -138, Y: 55 and the time 18:34 Sunday 05 February.

- Web Browser Editor and OMSimulator in the cloud
 - Started in the HUBCAP project, Collaboration with Perpetual Labs
 - TypeScript based front-end (using a tree-sitter parser)
<https://github.com/OpenModelica/OMFrontend.js>
 - OpenModelica based backend
<https://github.com/OpenModelica/OMWebService>
 - For a demo see: <https://youtu.be/hCvNJBWqaUw?list=PL3ewLNwzPhxIBF-xp6tvmJUuQov1j9ofT&t=1586>

The screenshot displays a web browser interface for a live share session. The left sidebar shows session details, including participants (Joe Gregory, Andrey Vasilyev) and contacts. The main area is divided into two panes. The left pane shows the Modelica code for a Chua circuit, with components like Inductor L, Resistor R, Conductance G, and Capacitors C1 and C2. The right pane shows the corresponding circuit diagram, labeled 'Circuit', with components L, R, G, C1, C2, and a ground symbol. The status bar at the bottom indicates the file is 'Test Files', the session is 'Live Share Chat: 8 new', and the layout is 'us'.

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Latest Developments (2024-2025)

- 2024 - 2025 - focus on coverage, scalability and usability
- OMC & Clients & OMSimulator
 - Performance & scalability improvements
 - Bug fixes and enhancements to OMC, OMEdit, FMI, Runtime, Backend, etc.
 - Better coverage
<https://libraries.openmodelica.org/branches/overview.html>
 - Fixes and improvements to the New API in OMEdit
 - New Backend developments, Flexible arrays at runtime
 - Improved FMI3 and SSP2 support in OMSimulator and better OMEdit integration
 - Continue on OpenModelica - CRML integration, GUI (DFD EDF)
 - Updated OMDev package on Windows to the newest MinGW/Msys2 packages
- General
 - From Feb 2023 - Feb 2024
 - 25+ contributors
 - 682 commits (OpenModelica/OMCompiler/OMEdit)
 - 76 commits (OMSimulator)
 - Releases 1.22.x, 1.23.x, 1.24.x

Thank You! Questions?

TeusvanderStelt, yurivict, JamesZhanchunyu, jgillis, slichtzzz, cbermperi, linuslangenkamp, anotheruserofgithub, abhinck, achary, adeas31, adrpo, afshe, alash325, alexchandel, AlexeyLebedev, Andreas, andsa, AnHeuermann, ankar, anotheruserofgithub, Ariel, arun3688, a-severin, asodja, atosinenko, azazi, bernhardbachmann, bernhard-thiele, bjozac, casella, choeger, chrjo5, crupp2, davbr, david-polak, dhedberg, dietmarw, Dongliang Li, donida, edgarlopez, ericmeyers, farkasrebus, fbergero, florox, frape315, Frenkel TUD, frisk, friskerik, fritzmark, g-bjoza, g-karbe, g-pavgr, haklu, hanke, harka011, henjo, henrikt-ma, hkiel, hubert, janK, jansilar, jensdo, jgillis, jhare950, JKRT, joshbode, jschueller, kadelhak, Kaie Kubjas, kajny, Karim, kbalzereit, krsta, laguna, leist, lenaRB, leonardo, leo-recover, levsa, Liebman, lochel, mahge, mahge930, marchartung, mater, mflehmig, modlfo, mohsen, mtiller, mwalther, niemisto, niklwors, nimen, nutaro, ofstardust, otto@mathcore.com, pavalpr, perost, petar, petfr, phannebohm, pierre-haessig, ppriv, ptaeuber, ptauber, rahulp13, rakhiwarriar, rbulatow, rfranke, ricli576, robbr48, rruusu, RuedKamp, sanguinariojoe, sebco011, SimplyDanny, sjoelund.se, sjolund, smiz, sp1187, spinnau, stebr461, sturmck, syeas460, tbeu, thieriot, thorade, tmtuomas, Unknown, vaden, vasaie_p, vaurich, vitalij, vomiskam, vruge, vwaurich, wbraun, wibraun, wuzhu.chen, x02danhe, x02kajny, x02lucpo, x05andfe, x05andre, x05simel, x06hener, x06henma, x06klasj, x06krino, x06mikbl, x07simbj, x08joekl, x08kimja, x97davka, x98petro

OpenModelica Project

<http://www.OpenModelica.org>