

swMATH and Software Heritage

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What is swMATH?

The largest catalogue for mathematical software!

- **42 721** referenced **software packages**
- accessible through the **zbMATH Open** portal, the world largest online resource for mathematicians
- We index **software, authors** and **research articles**, making our software metadata a connected resource in the academy



What is the link rotting challenge we are facing at swMATH?

Netgen

swMATH ID: 6679
 Software Authors: J. Schöberl, J. Gerstmayr, R. Gaisbauer
 Description: NETGEN: An advancing front 2D/3D-mesh generator based on abstract rules. The algorithms of the automatic mesh generator NETGEN are described. The domain is provided by a Constructive Solid Geometry (CSG). The whole task of 3D mesh generation splits into four subproblems of special point calculation, edge following, surface meshing and finally volume mesh generation. Surface and volume mesh generation are based on the advancing front method. Emphasis is given to the abstract structure of the element generation rules. Several techniques of mesh optimization are tested and quality plots are presented.
 Homepage: <http://www.hpfem.jku.at/netgen/>
 Programming Languages: C++
 Keywords: automatic mesh generator NETGEN
 Related Software: NGSolve; Gmsh; TetGen; Triangle; PETSc; FEniCS; CGALmesh; ParaView; hypre; CGAL; Matlab; OpenFOAM; Trilinos; DistMesh; Python; deal.ii; Neper; CUDA; FEAP; PARDISO
 Cited in: 193 Publications

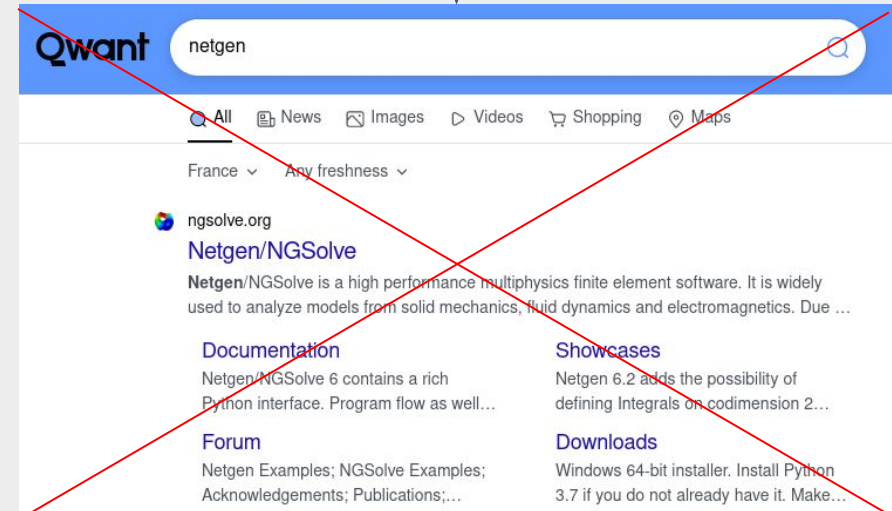
Hmm. We're having trouble finding that site.

We can't connect to the server at www.hpfem.jku.at.

If you entered the right address, you can:

- Try again later
- Check your network connection
- Check that Firefox has permission to access the web (you might be connected but behind a firewall)

Try Again



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swMATH & SWH

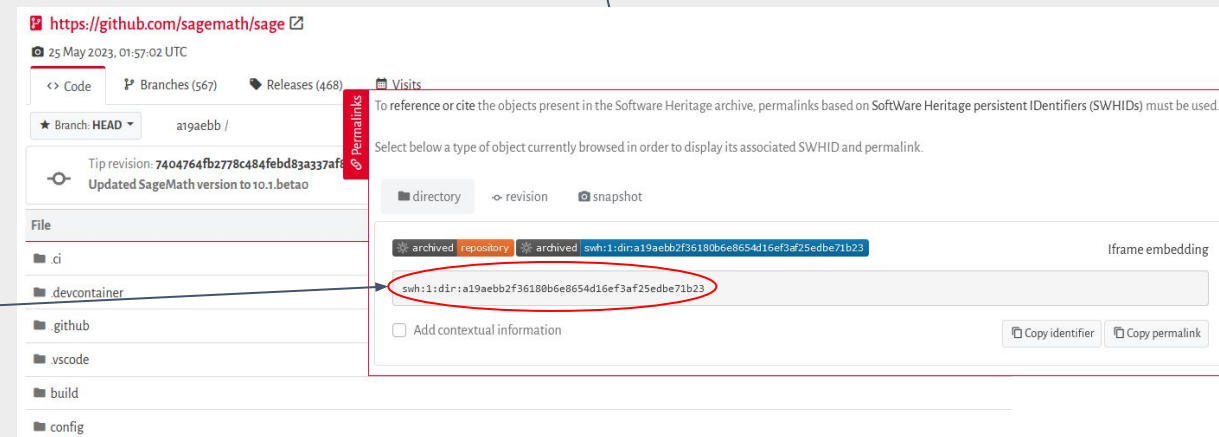
- swMATH has started using the SWH API to archive GitHub repositories for mathematical software
- The SWH API provides saving methods we used for our database
- See :

<https://github.com/zbMATHOpen/SwhSaveNowBatch>

SageMath

swMATH ID: 825
Software Authors: The Sage Developers; William Stein; David Joyner; David Kohel; John Cremona; Eröcal, Burçin
Description: Sage (SageMath) is free, open-source math software that supports research and teaching in algebra, geometry, number theory, cryptography, numerical computation, and related areas. Both the Sage development model and the technology in Sage itself are distinguished by an extremely strong emphasis on openness, community, cooperation, and collaboration: we are building the car, not reinventing the wheel. The overall goal of Sage is to create a viable, free, open-source alternative to Maple, Mathematica, Magma, and MATLAB. Computer algebra system (CAS).
Homepage: <http://www.sagemath.org>
Source Code: <https://github.com/sagemath/sage>
Keywords: orms; Python; Cython; Sage; Open Source; Interfaces
Related Software: Magma; GAP; OEIS; SINGULAR; GitHub; Sage-Combinat; PARI/GP; Mathematica; Macaulay2; Maple; Python; LMFDB; ecddata; nauty; Maxima; DLMF; Matlab; SciPy; Gfan; Traces
Cited in: 2,157 Publications
 This software is also referenced in ORMS.

SWHID



The screenshot shows the GitHub repository page for SageMath. A red box highlights the SWHID (Software Heritage Identifier) for the repository: `swh:1:dir:a19aebb2f36180b6e8654d16ef3af25edbe71b23`. A red arrow points from the 'SWHID' text box to this highlighted SWHID. The screenshot also shows the repository's file structure, including 'ci', 'devcontainer', 'github', 'vscode', 'build', and 'config'.



Component Overview

Archive, Reference, Describe and Cite

Scholarly repositories:

- InvenioRDM - SWH (CERN)
- DataVerse - SWH (KNAW-DANS)

Publishers:

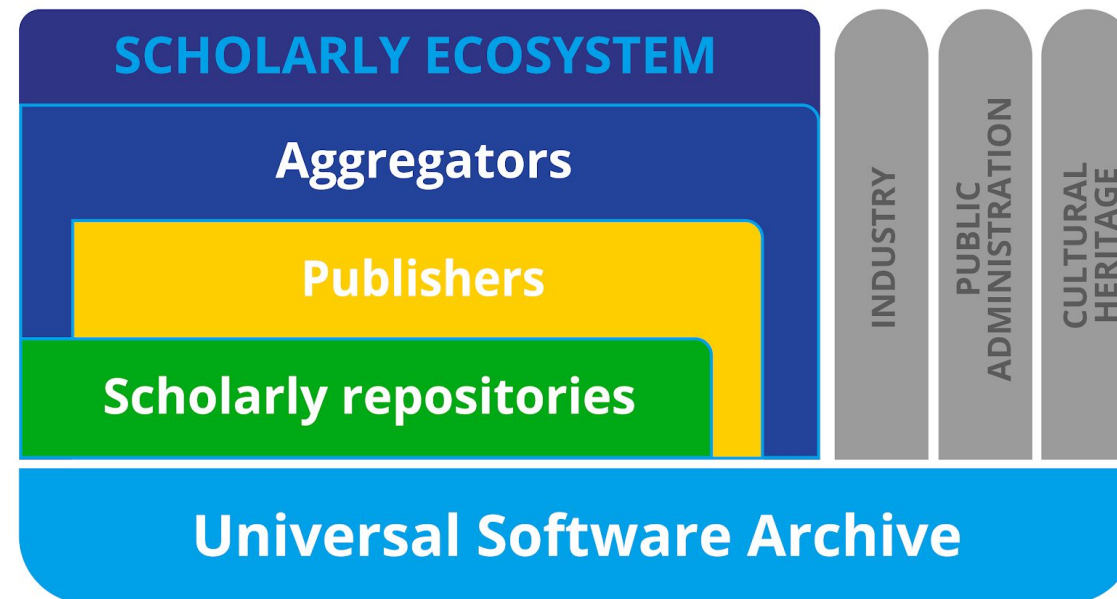
- Dagstuhl - SWH (LZI)
- Episciences - SWH (INRIA)

Aggregators:

- swMATH - SWH (FIZ)
- OpenAire - SWH (OPENAIRE)



RSAC
EOSC Research Software
APIs & Connectors



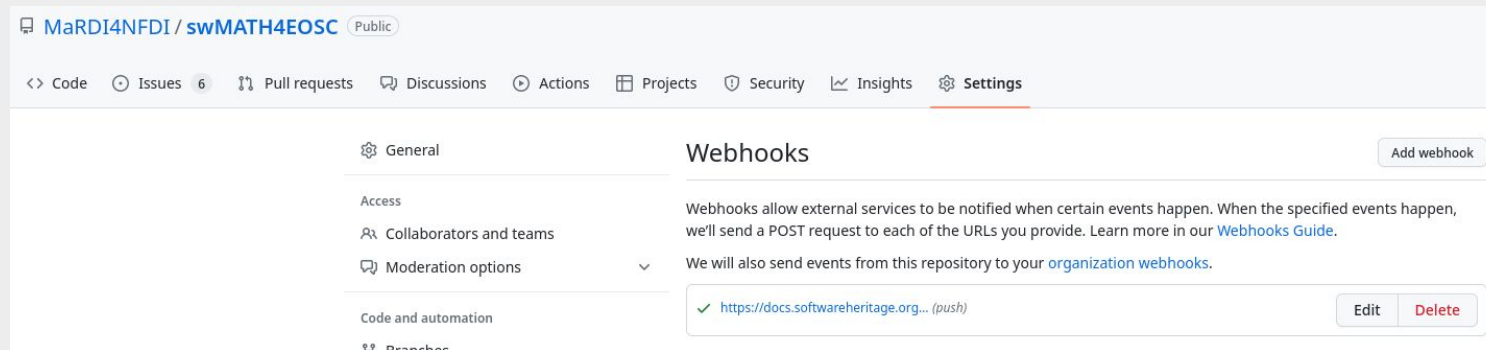
swMATH future plans with the RSAC components

Making Mathematical Software and their Metadata Valuable to Scholars

- **FAIRCORE4EOSC** will support 9 components, including the Research Software APIs & Connector (**RSAC**) component, to make the **European Open Science Cloud** a *FAIR* infrastructure.
- **swMATH** will be publicly exposed thanks to a *Mediawiki* instance and deployed on the **MaRDI4NFDI** infrastructure
- **swMATH** will be a stakeholder of the **RSAC** component co developed with **Software Heritage**

The SWH WebHook

- This feature leaves use to safely archive your software at each step of its evolution
- A real plug and play technology!
- swMATH uses the SWH Webhook to automatically archive the features we develop for FAIRCORE4EOSC:





FAIRCORE4EOSC
Core Components Supporting a FAIR EOSC

A live demo with Shiraz now!



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FAIRCORE4EOSC

Core Components Supporting a FAIR EOSC

Q&A Session



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