Software Heritage

THE GREAT LIBRARY OF SOURCE CODE

Building sustainable infrastructures for (research) software

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March 11, OECD Workshop on research software

Software Heritage : a decade of commitment (2015-2025)

Laying the foundations (2015-2019)

2015
Project launched
Inria initiates Software Heritage

Jun 30th 2016
Public unveiling
Universal source code archive vision

Apr 3rd 2017
UNESCO
Agreement: Source Code is digital heritage

June 7th 2018
Archive opens
Public access unveiled at UNESCO HQ

Feb 2019
Paris Call
Global policy call on source code

Building *infrastructure* and raising awareness (2019-2023)

Dec 2023
First mirror
Independent full archive online at ENEA

Feb 2022
National roadmap
SWH labeled as a research infrastructure

Jul 2021
Open Science Plan
France recommends and supports SWH for research

Dec 2020
EOSC recognition
Key infrastructure for Research software

Building solutions and strategic initiatives (2023-2025)

Feb 2024
SWH Sec(urity)
Cybersecurity Research using the archive

Nov 2024
CodeCommons
Reference data source for transparent responsible AI

Apr 2025
ISO SWHID
Software Hash Identifier Is ISO/IEC 18670 standard

Jun 2025
Advisory Board
Prepare the organization for the future

Inria

unesco

IBM · Microsoft · TII Technology innovation institute · HUAWEI · cnrs · Infosys · cea · aws · Google · Université Paris Cité · openinventionnetwork

AdaCore · GitHub · Université de Pise · Sorbonne Université · Université de Lorraine · Sant'Anna · NWO · université Paris-Saclay

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Inria with unesco

The largest open source code archive

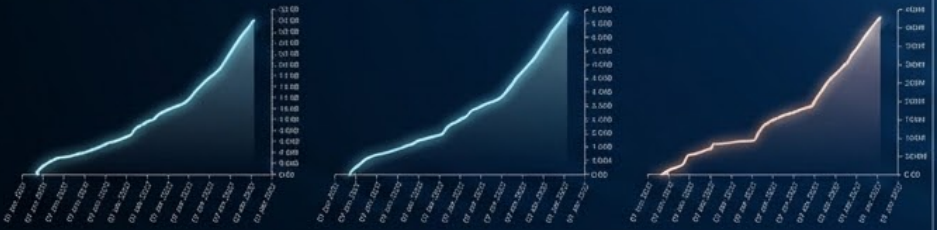
Unique digital common good built in France since 2015

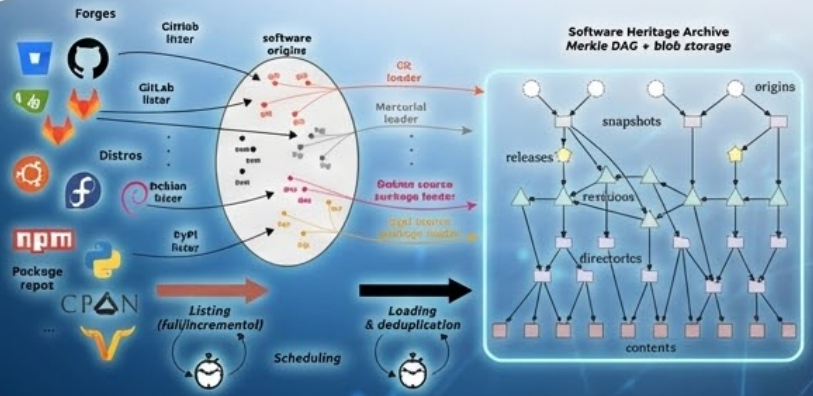
Cultural Heritage | Industry | Research | Public Administration

Source files
28,152,651,759

Commits
5,920,787,012

Projects
429,963,770





5000+ platforms

All versions, all history development in a single graph

- **50 × 10^9** nodes
- **800 × 10^9** edges
- **~ 2 PB** of storage

ensures **availability**
guarantees **integrity**
allows **traceability**

} of source codes

One infrastructure for **multiple** needs
replicated, open, **multistakeholders**

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The mirror network:

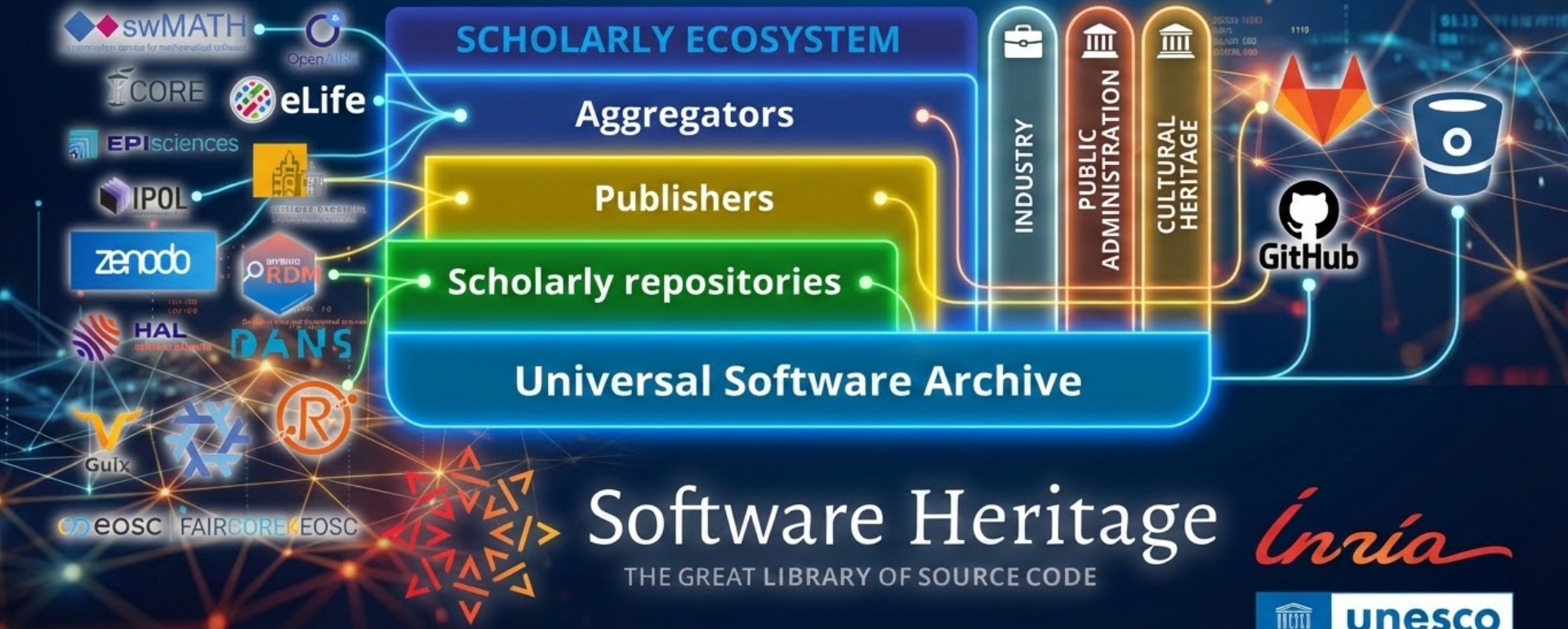
Creates a space for distributed ownership and collaboration

coherence through centralization

resilience through replication

Serving the scholarly ecosystem

Creating connections and mutualizing efforts



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From the **Software Sky** to **Institutional Insight**: Anatomy of an Observational Pipeline

Observation parameters (config file)

Stage 0: The Software Sky

The process begins with a complete map of the software universe, built from the Software Heritage archive, containing all observable software 'stars'. This stage is configured by observation parameters and a spectral filter definition (email domain selection).

Phase 1: Target Selection

Identify the stars associated with a specific institution by selecting contributors using institutional identifiers, which isolates the relevant region of the software sky for focused observation.

Quality Gate: Signal Strength Check

Before proceeding, the ploeline verifies that the selected region contains enough observable signals (software contributions) to produce statistically meaningful results.

Eigeat to Nous Raba

Phase 2: Gravitational Cleaning (Deforking)

The process renvents gravitational artifects such as mitrers and fures from the data to retain only the physically meaningful celestial objects (original software projects).

Phase 4: Spectral Enrichment

Each observed object is euriched with spectral data—such as activits, domains, and licenses—collected from multiple observation instruments to provide a deeper understanding.

Adeptive Observation Scheduling

This fecture ensures the automatic relation of observation tokens to bypass iecsument (PPO limits, ensuring continuous data collection.

Observation Cache

A oer vivleen observation log is maintained, preventing redandant measurements and speeding up subsequent analyzes.

Activity

Domains

Licenses

Phase 5: Astrophysical Analysis

The enticed observations are analysed to compute metrics, classily objects into scientific domains, and generate a synthetic, comprehensive view of the observed system.

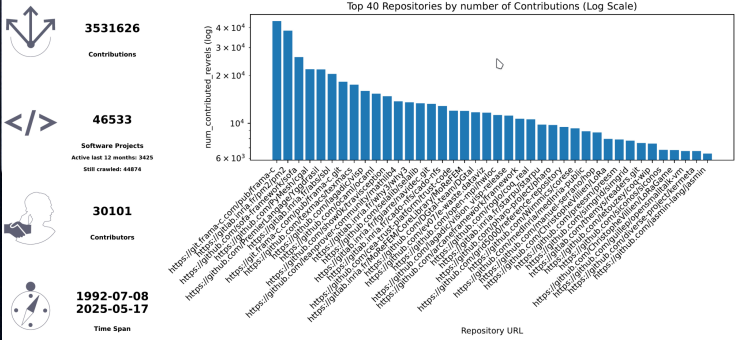
Phase 6: High-Resolution Imaging & Report

3531626
Contributions

46533
Software Projects
Active last 12 months: 3425
Still crawled: 44874

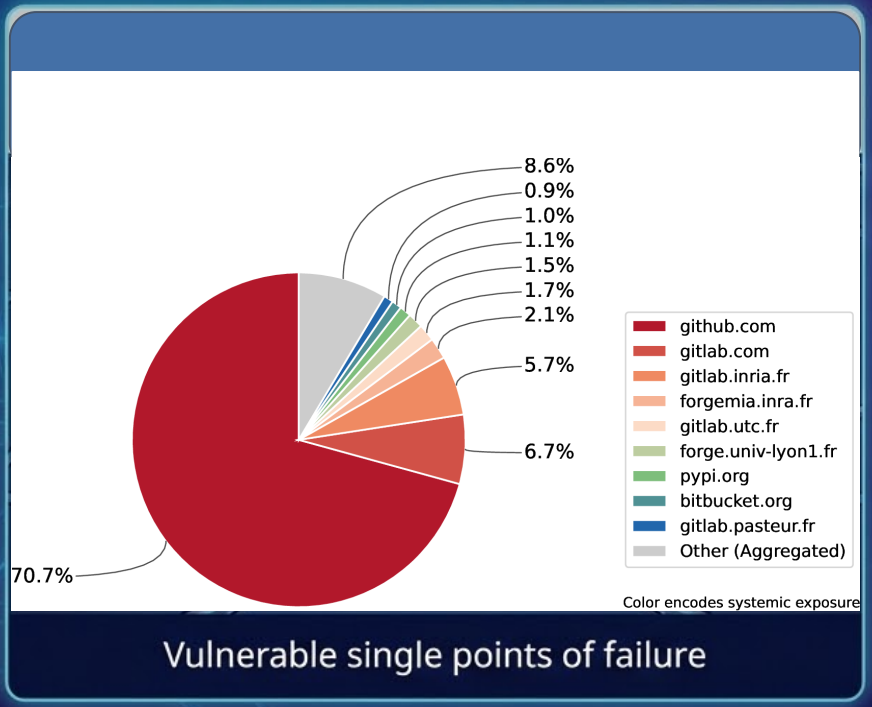
30101
Contributors

1992-07-08
2025-05-17
Time Span



The new frontier: ecumenical resilience

Global Concentration = Global Risk



Vulnerable single points of failure

The systemic response

Today

All the code, also niche and legacy

SWHID, ISO 18670 for integrity/traceability

Enables long term reproducibility

Tomorrow (needs 20x resources!)

strategic autonomy for all

automatic recovery

global fault tolerance

Key principle: avoid balkanisation, mutualize core infrastructure