DOI: 10.15497/RDA00053

FORCE11
The Future of Research Communications and e-Scholarship

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Use cases and identifier schemes for persistent software source code identification

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research data sharing without barriers
rd-alliance.org

9th September 2020 - RDA France annual Meeting

Software Source Code Identification Working Group

The SCID WG Goal : **capture and analyze** the software identification state-of-the-art in the scholarly ecosystem

Co-chairs

- Roberto Di Cosmo
- Martin Fenner
- Daniel S. Katz

RDA page
https://www.rd-alliance.org/groups/software-source-code-identification-wg

Repository
https://github.com/force11/force11-rda-scidwg

Chronology...

03/2018 Spawned at RDA **P11** in Berlin from the
- RDA Software Source Code IG &
- FORCE11 Software Citation Implementation WG

10/2018 - TAB endorsement

4/2019 - RDA **P13**, Philadelphia
- **WG kick-off**

10/2019 - **FORCE2019**, Edinburgh Full day hackathon on research software

03/2020 - RDA VP15 session online

07/2020 - Output in community review **DOI:10.15497/RDA00053**

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Authors of the SCID WG output (alphabetical order by name)

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- Alice Allen, Astronomy Source Code Library & U. Maryland, USA
- Anita Bandrowski - University of California San Diego, USA
- Peter Chan - Stanford University Libraries, California, USA
- Roberto Di Cosmo - Software Heritage, Inria and University of Paris, France
- Martin Fenner - DataCite, Germany
- Leyla Garcia - ZB MED Information Centre for Life Sciences
- Morane Gruenpeter - Inria, Software Heritage, France
- Catherine M Jones - UKRI STFC, UK
- Daniel S. Katz - University of Illinois at Urbana-Champaign, USA
- John Kunze - California Digital Library, University of California, USA
- Moritz Schubotz - swMATH, FIZ Karlsruhe, Germany
- Ilian T. Todorov - UKRI STFC Daresbury Laboratory, UK
- And the participants of the SCID WG (listed in Appendix B)

Editor: Morane Gruenpeter - Inria, Software Heritage, France

Output structure

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- Introduction
  - The SCID WG
- Definitions
  - Actors in the scholarly ecosystem
  - What do we want to identify or the granularity of software?
  - What is at stake
- Use cases
  - Classified into one of the following actions: archiving, referencing,describing, citing
- Identifiers schemas
  - Intrinsic identifiers
  - Extrinsic identifiers
- Summary of findings
- Conclusion

Definition: Actors

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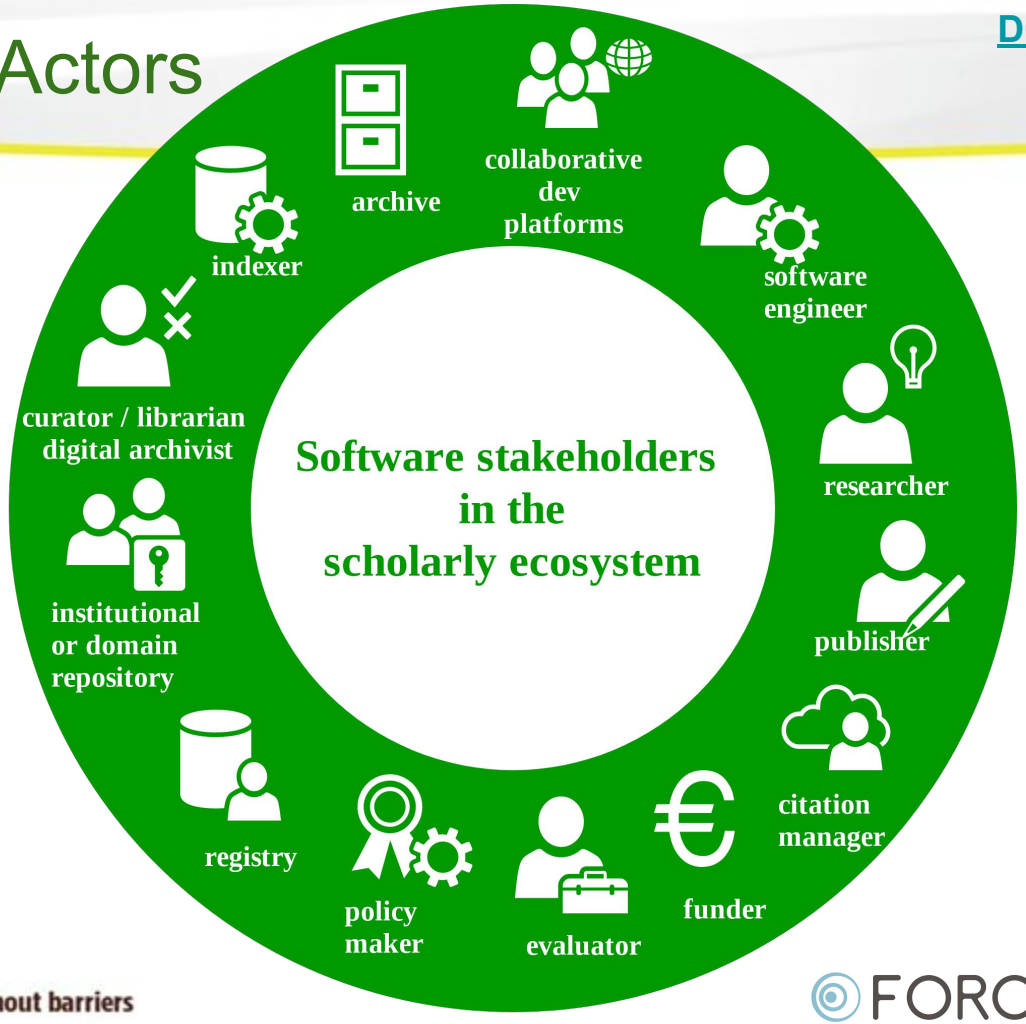


Identification target - what do we want to identify?

Software concept / project / collection

Description in registry, a homepage or any other form of metadata record

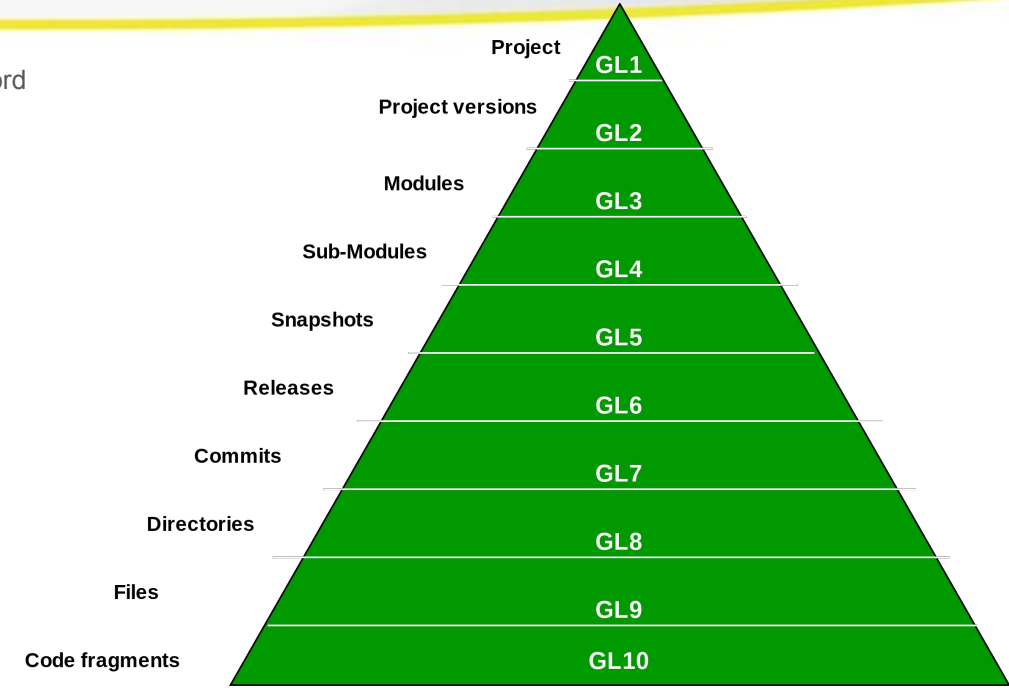
- Project versions (for example Python2 and Python3)
- Modules
- Sub-modules

Software artifact

- Executable (download link)
- Software source code
  - Dynamic artifact - current development code (on collaborative development platform)
  - Archived copy
    - Snapshot (all branches, all dev history)
    - Release / Package
    - Commit- a specific point in development history
    - Directory
    - File
    - Algorithm

Software context

- Complementary artifacts - Software artifacts that are external to the source code
  - the software environment, tutorial (Jupyter notebook), Data (input/output data), etc.
- Articles
- Documentation



GL= Granularity Level

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What is at stake

[Archive]

ensure (research) software artifacts *are not lost*

[Reference]

ensure (research) software artifacts *can be precisely identified*

[Describe]

make it easy to *discover / find* (research) software artifacts

[Credit]

ensure *proper credit* is given *to authors*

The use cases collection (a small excerpt)

Actor	Use case description	Action	Identification target
Archive	Identify all the software artifacts I hold	Archiving, referencing	Release and smaller artifacts
Citation manager	Curate the software citation entries	Credit	Project, release
Curator / librarian / digital archivist	Catalog and browse the development history of legacy software source code for preservation purposes (The Apollo mission source code is a good scenario on how making code available on GitHub isn't enough for persistence purposes)	Archiving	Project, release and smaller artifacts depending on the reference
Publisher	Create/retrieve identifiers quickly for use in the paper for all software including commercial packages.	Referencing, describing	Any item (all granularity levels)
Registry	Identify and curate the software entries I hold	Archiving, referencing, describing, credit	Project
Researcher as a software user (RSU)	Access and use SSC no longer available on a collaborative platform	Archiving	Snapshot, release, revision, directory

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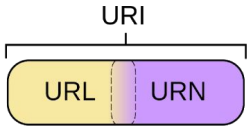
Identifiers schemas

HAL-ID

Digital Object Identifier



Wiki Item identifier (Qxxx)

ASCL.net
Astrophysics Source Code Library

Software Identification

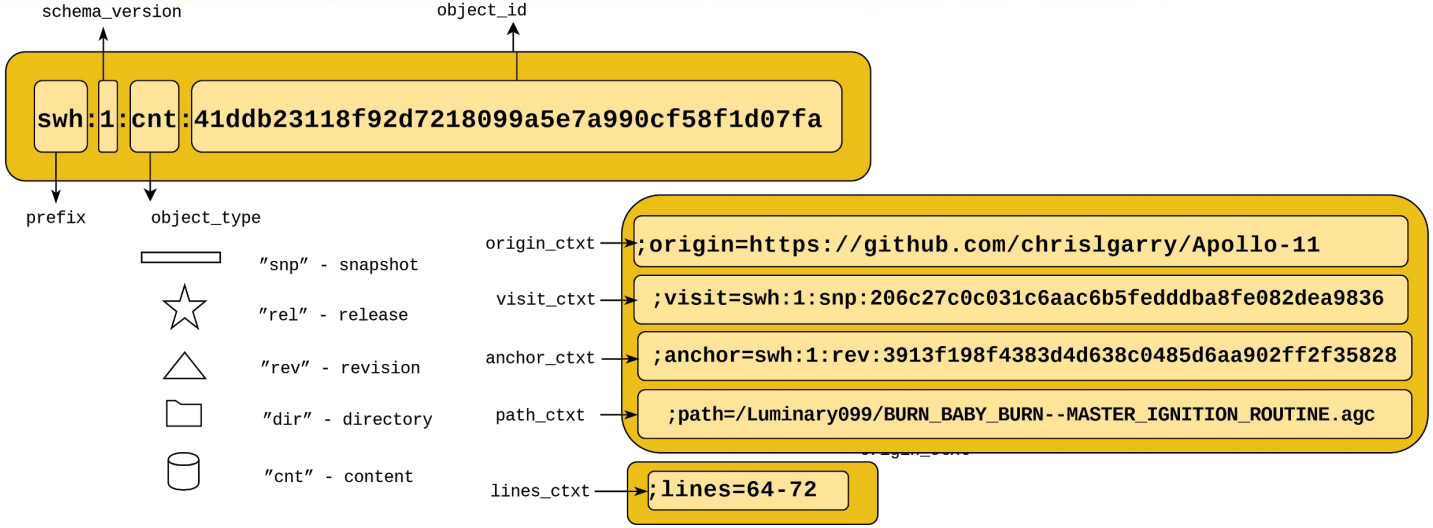
ARK
Archival Resource Key

Handle
Handle System identifiers

SWHID
Software Heritage identifiers

Intrinsic identifier: the Software Heritage ID (SWHID)

- **Intrinsic**: compute a unique **digital fingerprint**
- **decentralised**: do not need a registry, only agreement on a standard
- **cryptographically strong** identifiers

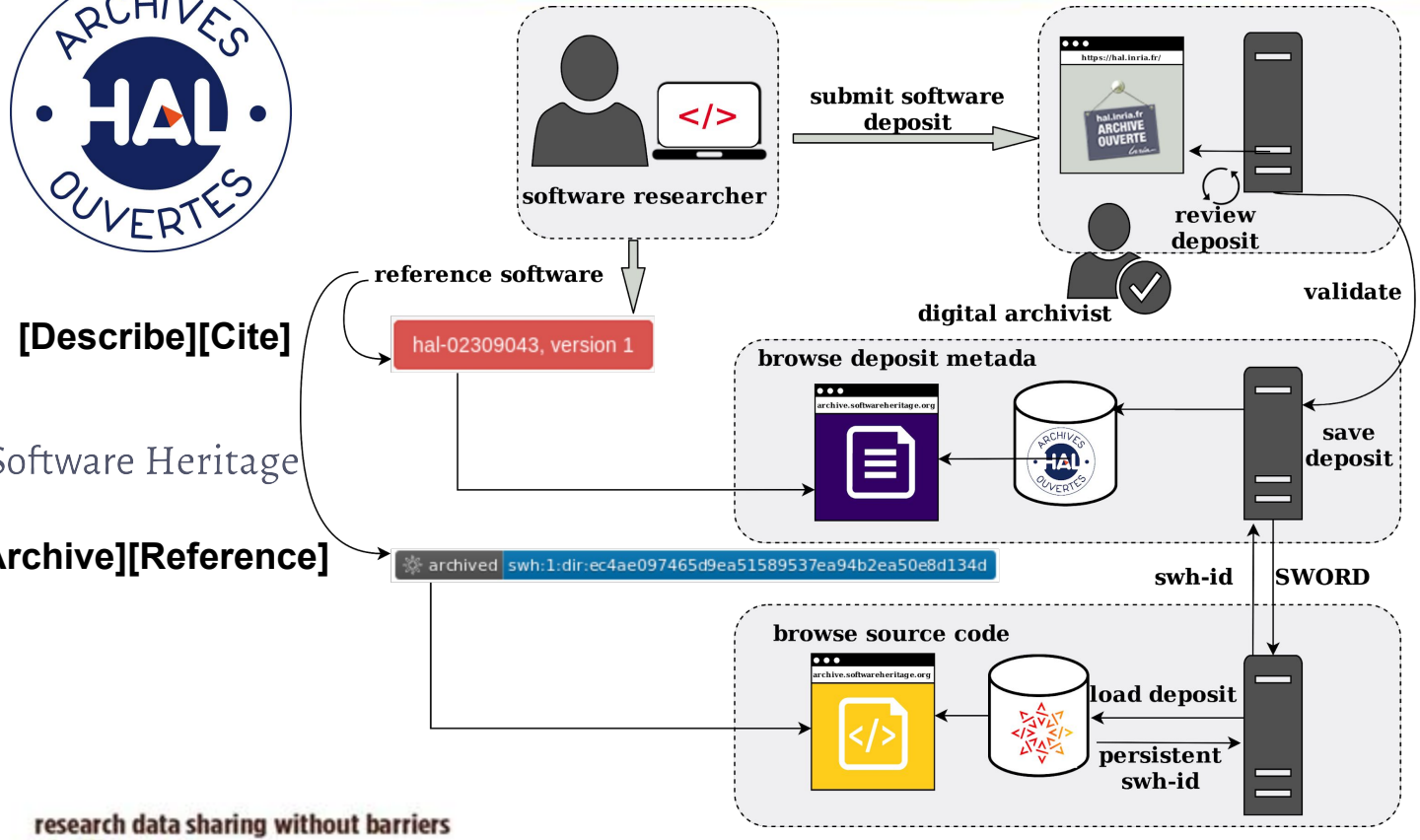


Extrinsic identifier: the **HAL ID**

[Deposit guide]

[Describe][Cite]

[Archive][Reference]



Summary

Granularity level (GL)	ID target	Extrinsic identifiers									Intrinsic identifiers	
		ASCL	***ARK***	***DOI***	***HAL***	***URL***	***RRID***	***SwMath***	***Wikidata***		***Hash***	***SWHID***
									entity	*property*		
GL1	project	X	X	X	X	X	X	X	X			
GL2	project version		X						X			
GL3	module		X						X			
GL4	repository		X			X				X		
GL5	repository snapshot		X							X		X
GL6	release		X	X						X	X	X
GL7	commit		X							X	X	X
GL8	directory		X	X	X*					X	X	X
GL9	file		X	X							X	X
GL10	Code fragment		X									X

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Next steps

- **Version 2** of the SCID WG output will be published integrating comments
- The working group has now **completed** its work
- Maintenance of the SCID output transfers to the **SSC IG**
- Related groups on Software :
  - RDA, ReSA and FORCE11 FAIR for Research Software Working Group (FAIR4RS WG)
    - Launched in July
    - Welcome to join the work defining FAIR principles for research software
  - EOSC software infrastructures task force (SIRS TF)
    - Publish recommendations in December
  - RDA Software Source Code Interest Group (SSC IG)
    - Ongoing IG since 2017
  - FORCE11 Software Implementation Working Group (SCIWG)
    - Ongoing WG about software citation