

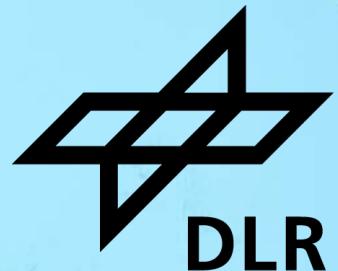
# PRACTICAL SOFTWARE CITATION FOR RESEARCH SOFTWARE DEVELOPERS, MAINTAINERS AND USERS

**Stephan Druskat**

German Aerospace Center (DLR), Institute of Software Technology

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DOI 10.5281/zenodo.15583669



# About me



- M.A. *English Philology, Modern German Literature, General and German Linguistics* (Free University Berlin)
- ~13 years *RSE* in several linguistic research projects
- Fellow of the [Software Sustainability Institute](#)
- Lead [Citation File Format](#) project
- Since 2019: SE researcher at [DLR](#) (*Sustainable Software Engineering*)
- PI [HERMES](#) project (*automating software publication with rich metadata*)
- Chair ReSA Task Force "[Software Authorship & Contribution](#)"

# Overview

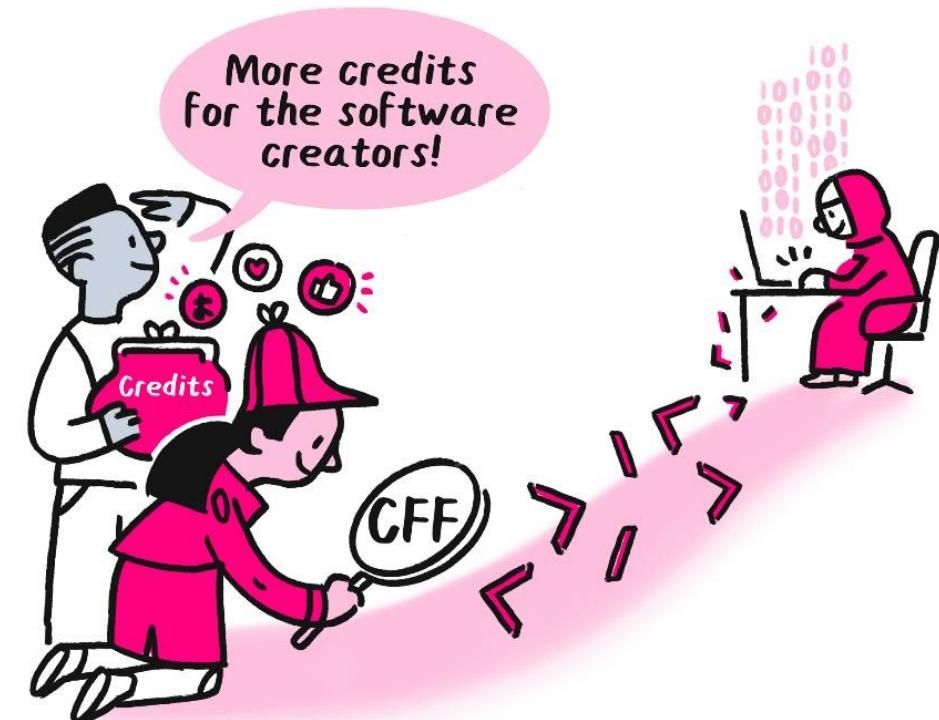


- Software citation
- Practical software citation for developers and maintainers
- Practical software citation for software users
- Wrap-up

# SOFTWARE CITATION

# Why software citation?

- Principles of research apply: disclosure of research process
- Accountability: taking credit
- **Formal citation** as established method:
  - **Importance** of software in research
  - Findability (**FAIR**)
  - **Reproducibility**
  - **Credit**
  - ...



*Scriberia*  
More credits for the software creators. The Turing Way project illustration by Scriberia. Zenodo.  
<https://doi.org/10.5281/zenodo.3332807>  
License: CC BY-4.0

# The principles of software citation



Software citation principles

Arfon M. Smith<sup>1,\*</sup>, Daniel S. Katz<sup>2,\*</sup>, Kyle E. Niemeyer<sup>3,\*</sup> and FORCE11 Software Citation Working Group

<sup>1</sup>Github, Inc., San Francisco, California, United States  
<sup>2</sup>National Center for Supercomputing Applications & Electrical and Computer Engineering Department & School of Information Sciences, University of Illinois at Urbana-Champaign, Urbana, Illinois, United States  
<sup>3</sup>School of Mechanical, Industrial, and Manufacturing Engineering, Oregon State University, Corvallis, Oregon, United States  
\*These authors contributed equally to this work.

**ABSTRACT**  
Software is a critical part of modern research and yet there is little support across the scholarly ecosystem for its acknowledgement and citation. Inspired by the activities of the FORCE11 working group focused on data citation, this document summarizes the recommendations of the FORCE11 Software Citation Working Group and its activities between June 2015 and April 2016. Based on a review of existing community practices, the goal of the working group was to produce a consolidated set of citation principles that may encourage broad adoption of a consistent policy for software citation across disciplines and venues. Our work is presented here as a set of software citation principles, a discussion of the motivations for developing the principles, reviews of existing community practice, and a discussion of the requirements these principles would place upon different stakeholders. Working examples and possible technical solutions for how these principles can be implemented will be discussed in a separate paper.

**Subjects** Digital Libraries, Software Engineering  
**Keywords** Software citation, Software credit, Attribution

**SOFTWARE CITATION PRINCIPLES**  
The main contribution of this document are the software citation principles, written fairly concisely in this section and discussed further later in the document (see Discussion). In addition, we also motivate the creation of these principles (see Motivation), describe the process by which they were created (see Process of Creating Principles), summarize use cases related to software citation (see Use Cases), and review related work (see Related Work). We also lay out the work needed to lead to these software citation principles being applied (see Future Work).

**1. Importance:** Software should be considered a legitimate and citable product of research. Software citations should be accorded the same importance in the scholarly record as citations of other research products, such as publications and data; they should be included in the metadata of the citing work, for example in the reference list of a journal article, and should not be omitted or separated. Software should be cited on the same basis as any other research product such as a paper or a book, that is, authors should cite the appropriate set of software products just as they cite the appropriate set of papers.

Submitted 24 June 2016  
Accepted 23 August 2016  
Published 19 September 2016  
Corresponding author  
Daniel S. Katz, [dkatz@peerj.com](mailto:dkatz@peerj.com)  
Academic editor  
Silvia Peroni  
DOI [10.7717/peerj.cs.86](https://doi.org/10.7717/peerj.cs.86)  
© Copyright  
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Distributed under  
Creative Commons CC-BY 4.0  
OPEN ACCESS

How to cite this article Smith et al. (2016). Software citation principles. PeerJ Comput. Sci. 2:e86 DOI [10.7717/peerj.cs.86](https://doi.org/10.7717/peerj.cs.86)

A. M. Smith, D. S. Katz, K. E. Niemeyer, and FORCE11 Software Citation Working Group, “Software citation principles,” *PeerJ Comput. Sci.*, vol. 2, no. e86, 2016, doi: [10.7717/peerj.cs.86](https://doi.org/10.7717/peerj.cs.86).

## 1. Importance

Software is cited like papers are cited.

## 2. Credit and attribution

## 3. Unique identification

## 4. Persistence

## 5. Accessibility

Citation allows access to software and metadata.

## 6. Specificity

Citation identifies the software version used in research.

# Software citation metadata



- Software has **no formalized title page**
  - Software name? Authors? Version? Publisher or source? Publication date?

The screenshot shows the RCE application window. The title bar reads "Welcome to RCE". The main menu includes File, Edit, Search, Run, Tool Integration, Configuration, Window, and Help. Below the menu is a toolbar with icons for Home, Recent Projects, and Help.

The left sidebar contains four sections:

- Example Workflows**: Try the Workflow Example Project.
- What's New?**: Browse the latest news.
- Newsletter**: Subscribe to the RCE newsletter.
- Documentation**: Open the integrated RCE Help.

A large red question mark is overlaid on the left side of the screen, pointing towards the "Documentation" section.

A modal dialog box titled "About RCE" is open in the center. It displays the RCE logo, version information (Version: 10.2.4 (Green Monkey)), and build details (Build ID: 202108191008). It also contains copyright information for DLR and Fraunhofer SCAI, and links for more information and social media.

A second red question mark is overlaid on the right side of the screen, pointing towards the "Documentation" section.

# SOFTWARE CITATION FOR DEVELOPERS AND MAINTAINERS

Bildquelle hier angeben

- 1. Determine** complete and correct software citation **metadata**
  - Authors, name, version, publication date, identifier/locator
  - Who are the authors? Where to get a persistent identifier (PID)? Which version to tag?
- 2. Provide metadata in a file in the source code repository**
  - README, LICENSE, CONTRIBUTING, **CITATION**
- 3. Publish** software with metadata
- 4. Maintain citation metadata** with your software



S. Druskat, T. Krause, C. Lachenmaier, and B. Bunzeck, *Hexatomic* (Version 1.4.2), Mar. 2023. Zenodo. DOI: [10.5281/zenodo.7778709](https://doi.org/10.5281/zenodo.7778709).

# Creating a CITATION file: CITATION.cff – Citation File Format (cff)



```
cff-version: 1.2.0
message: If you use this software, please cite it using these metadata.
title: My Research Software
abstract: This is my awesome research software. It does many things.
authors:
- family-names: Druskat
  given-names: Stephan
  orcid: "https://orcid.org/0000-0003-4925-7248"
version: 0.11.2
date-released: "2021-07-18"
identifiers:
- description: This is the collection of archived snapshots of all versions of My Research Software
  type: doi
  value: "10.5281/zenodo.123456"
- description: This is the archived snapshot of version 0.11.2 of My Research Software
  type: doi
  value: "10.5281/zenodo.123457"
license: Apache-2.0
repository-code: "https://github.com/citation-file-format/my-research-software"
```

[citation-file-format.github.io](https://citation-file-format.github.io)

# Creating a CITATION.cff file

## Option 1: cffinit

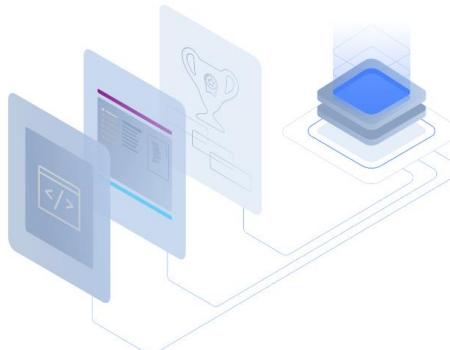


### Generate your citation metadata files with ease

CITATION.cff files are plain text files with human- and machine-readable citation information for software and datasets.

Code developers can include such files in their source code repositories to let others know how to correctly cite their software.

You can read more about the Citation File Format in the [official CFF specification website](#).



Create your CITATION.cff now, or start from an existing file!

+ Create

Update

# citation-file-format.github.io/cffinit

REPORT AN ISSUE   DOCUMENTATION

## Authors

Add all authors of the work. At least one must be provided. ⓘ

Person  
Author's name, split into four parts

Given names: Stephan | Name particle: Druskat

Family names: Druskat | Name suffix:

E-mail: stephan.druskat@dlr.de

Affiliation: German Aerospace | ORCID: https://orcid.org/0000-0003-4925-7248

Remove Done

Add person Add entity

Previous Finish Next

CITATION.cff preview

```
# This CITATION.cff file was generated with cffinit.  
# Visit https://bit.ly/cffinit to generate yours today!  
  
cff-version: 1.2.0  
title: compresssoft  
message: >  
If you use this software, please cite it using the  
metadata from this file.  
type: software  
authors:  
- given-names: Stephan  
family-names: Druskat  
email: stephan.druskat@dlr.de  
affiliation: German Aerospace Center (DLR)  
orcid: 'https://orcid.org/0000-0003-4925-7248'
```

Your CITATION.cff is valid

Download

netherlands eScience center

Version 2.3.1

# Creating a CITATION.cff file

## Option 2: IDE integration (JSON schema , [schemastore.org](https://schemastore.org))

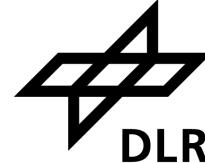


The screenshot shows a code editor interface with three tabs and a central JSON schema selector.

- Top Left Tab:** Shows a YAML file named `CITATION.cff` with version 3. It contains:
  - `authors:`
  - `cff-version: "1.2.0"`
  - `message:`A validation error message: `Incorrect type. Expected "string". yaml-schema:` is shown next to the `message:` field.
- Central Selector:** A modal titled "Select JSON schema" lists various schemas. The "Citation File Format" schema is selected and highlighted in blue, with the status "Used for current file ✓".
- Bottom Left Tab:** Shows the same `CITATION.cff` file with version 1. It includes a "Citation File Format" section with a message and examples, and a "license" section with a "license" field containing "GPL-3.0". A dropdown menu under "license" shows options like "Apache-1.0", "Apache-1.1", "Apache-2.0", and "APAFML".
- Right Side:** A preview pane shows the generated JSON schema. It includes fields for authors, orcid, cff-version, message, title, and license. The "license" field is expanded to show the list of available options: Apache-1.0, Apache-1.1, Apache-2.0, and APAFML.

# Creating a CITATION.cff file

## Option 3: Copy, paste & adapt



[citation-file-format.github.io](https://citation-file-format.github.io)

- Example snippet
- Tutorials
- Schema guide:
  - Full reference
  - Snippet for typical file
  - Snippet for file with reference
  - Snippet for file with preferred citation

```
cff-version: 1.2.0
message: "If you use this software, please cite it as below."
authors:
  - family-names: Druskat
    given-names: Stephan
    orcid: https://orcid.org/1234-5678-9101-1121
title: "My Research Software"
version: 2.0.4
identifiers:
  - type: doi
    value: 10.5281/zenodo.1234
date-released: 2021-08-11
```

# Creating a CITATION.cff file

## Option 4: Download from [Zenodo](#) publication



The screenshot shows a Zenodo publication page for the software "Hexatomic". The page includes sections for "Rights", "License", "Citation", and "Export". A large blue arrow points from the "Citation" section back to the main software listing on the left.

**Rights**

**License**

Apache License 2.0

**Citation**

Druskat, S., Krause, T., Lachenmaier, C., & Bunzeck, B. (2024). Hexatomic (v1.4.5). Zenodo. <https://doi.org/10.5281/zenodo.13959844>

**Style** APA

**Export**

**Software** Open

Published October 21, 2024 | Version v1.4.5

### Hexatomic

Druskat, Stephan<sup>1</sup> ; Krause, Thomas<sup>2</sup> ; Lachenmaier, Clara ; Bunzeck, Bastian

Show affiliations

Hexatomic is an extensible, OS-independent platform for deep multi-layer linguistic annotation of corpora. It is being developed for sustainability, in order to support research software re-use rather than new development of software with each new research project. Using Hexatomic, linguistic research projects can implement what they need on top of an existing platform. To safeguard compatibility, Hexatomic works on instances of Salt projects. Salt is a generic metamodel for linguistic data.

### Notes

If you use this software, please cite it as below.

### Files

hexatomic/hexatomic-v1.4.5.zip

hexatomic/hexatomic-v1.4.5.zip

The visualization is not showing all the files

529 VIEWS    94 DOWNLOADS

Show more details

Versions

Version	Published
Version v1.4.5	Oct 21, 2024 10.5281/zenodo.13959844
Version v1.4.4	Sep 11, 2023 10.5281/zenodo.8335596
Version v1.4.3	Sep 11, 2023 10.5281/zenodo.8335355
Version v1.4.2	Mar 28, 2023 10.5281/zenodo.7778709
Version v1.4.1	Mar 27, 2023 10.5281/zenodo.7775244

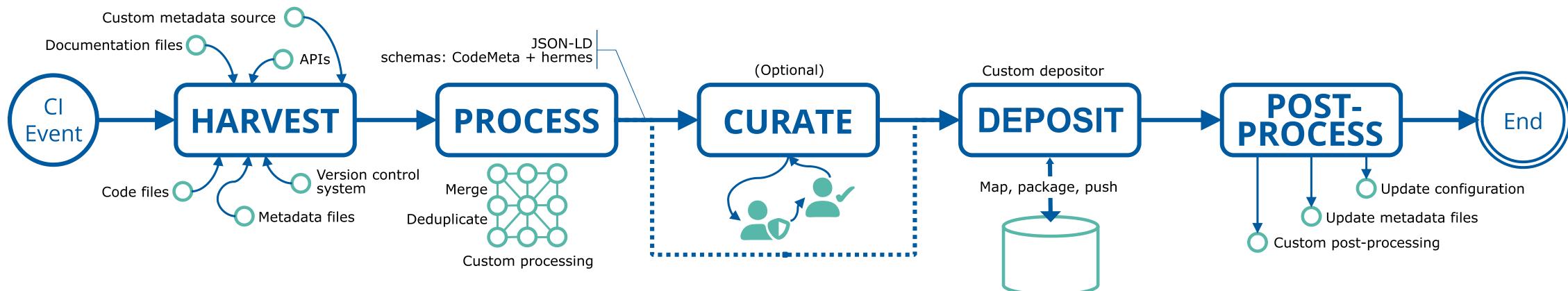
[View all 16 versions](#)

# Maintaining a CITATION file



## Develop citation metadata together with your software

- Validation/conversion with [cffconvert](#) (CLI or [GitHub Action](#))
- Tooling available for different languages:
  - Java, JavaScript/TypeScript, Julia, Python, R, Ruby, Rust, Go, Haskell, PHP, ...
- [HERMES](#) develops update automation as part of publication automation



S. Kernchen, M. Meinel, S. Druskat, et al., "[Extending and applying automated HERMES software publication workflows](#)," doi: [10.14279/ECEASST.V83.2624](https://doi.org/10.14279/ECEASST.V83.2624).

# Citation File Format integrations: GitHub\*



A screenshot of a GitHub repository page. At the top right, there are three items: 'Readme' (with a book icon), 'CC-BY-4.0 License' (with a license icon), and 'Cite this repository' (with a cite icon). Below these are three timestamped items: '10 days ago', '10 days ago', and '10 days ago'. A large callout box highlights the 'Cite this repository' section. Inside the box, the heading 'Cite this repository' is bolded. Below it, the text says: 'If you use this software in your work, please cite it using the following metadata.' A blue link 'Learn more' follows. Below this, two citation styles are shown: 'APA' and 'BibTeX'. Under 'APA', the citation is: 'Druskat, S., Spaaks, J. H., Chue Hong, N., Ha...'. There is also a small icon of a clipboard with a pencil. Below this, a button labeled 'View citation file' is visible. The background shows blurred repository files.

- Detects CITATION.cff files
- Renders citation metadata (APA, BibTeX)
- Points to CITATION.cff instance
- Documents and supports creation

A screenshot of a GitHub code editor showing a 'CITATION.cff' file. The title bar says 'cfftracker / CITATION.cff in main'. A message at the top states: 'Adding a CITATION.cff file helps users to easily cite your software from the repository overview. [Learn more](#)'. Below is a code editor interface with tabs for 'Edit new file' and 'Preview'. The code area contains the following text:

```
1 cff-version: 1.2.0
2 message: "If you use this software, please cite it as below."
3 authors:
4 - family-names: "YOUR_NAME_HERE"
5 given-names: "YOUR_NAME_HERE"
6 orcid: "https://orcid.org/0000-0000-0000-0000"
7 - family-names: "Lisa"
8 given-names: "Mona"
9 orcid: "https://orcid.org/0000-0000-0000-0000"
10 title: "cfftracker"
11 version: 1.0.0
12 doi: 10.5281/zenodo.1234
13 date-released: 2021-08-19
14 url: "https://github.com/sdruskat/cfftracker"
15
```

\* GitLab integration under development

# Citation File Format integrations: GitHub Zenodo integration – better metadata



- GitHub-Zenodo bridge reads metadata from CITATION.cff
- Previously: via API ([GitHub release](#), [Zenodo Sandbox deposit](#))
- Now: author-supplied metadata ([GitHub release](#), [Zenodo Sandbox deposit](#))

```
4 + cff-version: 1.2.0
5 + title: pseudoSoftware
6 + message: >-
7 +   If you use this software, please cite it using the
8 +   metadata from this file.
9 + type: software
10 + authors:
11 + - given-names: Stephan
12 + family-names: Druskat
13 + email: stephan.druskat@dlr.de
14 + affiliation: German Aerospace Center (DLR)
15 + orcid: 'https://orcid.org/0000-0003-4925-7248'
16 + repository-code: 'https://github.com/citable-software/cff-github-zendodo'
17 + url: 'https://citation-file-format.github.io'
18 + abstract: >-
19 +   This "software" is a demonstration-only repository with
20 +   two releases.
21 +
22 +   For both releases, the Zenodo GitHub integration
```

Published March 18, 2024 | Version with-CITATION.cff

Software Open

pseudoSoftware

Druskat, Stephan

1. German Aerospace Center (DLR)

This "software" is a demonstration-only repository with two releases. For both releases, the Zenodo GitHub integration (<https://help.zenodo.org/faq/>) automatically publishes artifacts and metadata with a DOI (on the Zenodo Sandbox). 1. The first release contains no CITATION.cff file. Hence, the Zenodo Sandbox record is populated with metadata retrieved from the GitHub API. 2. The second release contains a CITATION.cff file. Hence, the Zenodo Sandbox record is populated with metadata retrieved from the CITATION.cff file.

Notes

If you use this software, please cite it using the metadata from this file.

# Citation File Format integrations: Software Heritage Archive



The screenshot shows the Software Heritage Archive's "Browse the archive" interface. The top navigation bar includes the Software Heritage logo, a search bar, and a sidebar with various features like "Search", "Downloads", and "Help". The main content area displays the details for the GitHub repository <https://github.com/hexatomic/hexatomic>. It shows the creation date (07 March 2025), code statistics (150 branches, 42 releases), and a dropdown for the current release (v1.4.4). A red box highlights the "Citations" button in the sidebar. Below the sidebar, there is a section for generating software citations in BibTeX format, which includes a code snippet and explanatory text about the project's development for sustainability.

SoftwareHeritage  
Archive

☰ Browse the archive

Enter a SWHID to resolve or keyword(s) to search

Features

🔍 Search

⬇️ Downloads

📸 Save code now

📌 Add forge now

❓ Help

🔗 <https://github.com/hexatomic/hexatomic>

🕒 07 March 2025, 00:54:28 UTC

leftrightarrow Code Branches (150) Releases (42) Visits

⚡ Release: v1.4.4

🏷️ Release v1.4.4 created by Thomas Kr

Tag hotfix

-----BEGIN PGP SIGNATURE-----

iQEZBAABCAAdFiEEuBZPdCP0izku9ag9/  
PrgAXwgAhAj6hHpXaAJzhYoSr5wVgGVYLI  
NDaQZMGtQ1lp8Qml++xic+14CgRHZFrhF  
fBQDNef+vQBslp4pVOLfEPy7tEfE6A01Ac2s/  
Sp0386J/rZDXJg+DfzNy+9d39wihNtKPSl7rnA  
/B01MZFOwsIo1gCmaHFmtaOvD91YmqX59hRRFP  
OY+8nJbqNzYJ9pCBGECH5LnmjErJkQ==  
=Zn6M  
-----END PGP SIGNATURE-----

Target: ⚡ 500862a1cc377088248bce18ca30d  
Directory: 📂 e838fdd6cc340d1e74e47e93160

🔗 Citations

This interface enables to generate software citations, provided that the root directory of browsed objects contains a `cite.citation` file. Select below a type of object currently browsed in order to generate citations for them.

release revision directory snapshot

Format BibTeX

@software{swh-rel-240831b,  
author = "Druskat, Stephan and Krause, Thomas and Lachenmaier, Clara and Bunzeck, Bastian",  
organization = "German Aerospace Center (DLR), Friedrich Schiller University Jena and Humboldt-  
University Berlin",  
license = "Apache-2.0",  
abstract = "Hexatomic is an extensible, OS-independent platform for deep multi-layer linguistic analysis and processing of natural languages. It provides a modular architecture for building complex NLP systems and integrates various state-of-the-art components from different domains. Hexatomic is designed to be highly flexible and extensible, allowing researchers and developers to easily add new modules and integrate them into the system. The platform is built on top of the Salt framework, which provides a common infrastructure for managing and executing NLP tasks. Hexatomic is used in various research projects, such as the German National Corpus and the European Language Grid, and has been adopted by several universities and research institutions around the world. The project is open source and available on GitHub, making it accessible to a wide range of users and encouraging collaboration and innovation in the field of NLP."}

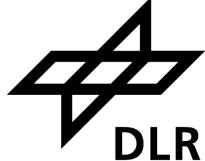
Generate software citation in BibTeX format (requires `biblatex-software` package)

It is being developed for sustainability, in order to support research software re-use rather than each new research project.  
Using Hexatomic, linguistic research projects can implement what they need on top of an existing platform.

To safeguard compatibility, Hexatomic works on instances of Salt projects. Salt is a generic metamodelling framework for domain-specific languages. Its core features include a metamodeling language, a code generator, and a runtime environment. The metamodeling language allows users to define their own domain-specific languages, while the code generator automatically generates the corresponding code. The runtime environment provides a common infrastructure for executing and managing these languages. Salt is used in various research projects, such as the German National Corpus and the European Language Grid, and has been adopted by several universities and research institutions around the world. The project is open source and available on GitHub, making it accessible to a wide range of users and encouraging collaboration and innovation in the field of NLP.

date = "2023-09-11",  
year = "2023",  
month = sep,  
doi = "https://doi.org/10.5281/zenodo.6900689",  
repository = "https://github.com/hexatomic/hexatomic".

# Citation File Format integrations: Reference managers



Import in [Zotero](#) from GitHub via browser plugin

The screenshot shows the Zotero interface with the following citation details:

Citation Key: druskatHexatomic2021

Item Type: Software

Title: Hexatomic

Programmer: Druskat, Stephan; Krause, Thomas

(...) Abstract: Hexatomic is an extensible software for deep multi-layer annotation of linguistic corpora

Series Title: Version 0.6.0-SNAPSHOT

Date: 2021-03

System: Place: Company: Prog. Language: Java

ISBN: Short Title: URL: <https://github.com/hexatomic/hexatomic>

Rights: Apache-2.0

Archive: Loc. in Archive: Library Catalog: GitHub

Import in [JabRef](#) from CITATION.cff file

The screenshot shows the JabRef interface with the following citation details:

untitled\* - JabRef

Software (Druskat2021)

Author: Stephan Druskat and Jurriaan H. Spaaks and Neil Chue Hong and Robert J. Baker, James M. Bliven, Spencer Willighagen, Egon Pérez-Suárez, David Konovalov, Alexander

Title: Citation File Format

Date: 2021-08-09

Citationkey: Druskat2021

Abstract: CITATION.cff files are plain text files with human- and machine-readable citation information for software. Code developers can include them in their repositories to let others know how to correctly cite their software. This is the specification for the Citation File Format.

Comment: If you use CFF in your research, please cite it using these metadata.

## Software publication with a PID

- ❶ Institutional / discipline-specific / general purpose **repositories** (DOIs)
- ❶ Archiving in the [\*\*Software Heritage Archive\*\*](#) (SWHIDs, ISO 18670)
- ❷ Software journals ([\*\*JOSS\*\*](#)): DOI, peer review, archiving (for *one* version)

## NOT software publication

- + Making a package version publicly available in a package repository
- ✘ GitHub/GitLab releases, or public repositories

# Publishing / archiving software versions: Zenodo / InvenioRDM

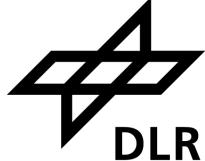


- Software type, concept/collection & version DOIs
- Manual upload, automated upload (API), DOI prereservation

The screenshot shows a Zenodo software record page for the project "Hexatomic". The top navigation bar includes a search bar, "Communities", "My dashboard", "Log in", and "Sign up". Below the header, it displays "Published October 21, 2024 | Version v1.4.5". The main content area features a large image of the Hexatomic logo, which is a blue hexagon with white text. To the right of the image are statistics: "529 VIEWS" and "94 DOWNLOADS". A "Show more details" link is present. Below this is a "Versions" section listing several versions of the software, each with a DOI and a date. The "hexatomic/hexatomic-v1.4.5.zip" file is highlighted in blue, showing its size as 1.7 kB and 505 Bytes. A note states "The previewer is not showing all the files." At the bottom, there's a "View all 16 versions" link and a "Cite all versions?" note.

Version	Date
v1.4.5	Oct 21, 2024
v1.4.4	Sep 11, 2023
v1.4.3	Sep 11, 2023
v1.4.2	Mar 28, 2023
v1.4.1	Mar 27, 2023

# Publishing / archiving software versions: Software Heritage Archive's [Save Code Now](#)



- [Identifiers](#) for revisions, releases, snapshots, directories, content

## ≡ Save code now

You can contribute to extend the content of the Software Heritage archive by submitting an origin save request. To do so, fill the required info in the form below:

### Origin type

git

### Origin url

Submit

Help

Browse save requests

A "Save code now" request takes the following parameters:

- **Origin type:** the type of software origin. Currently, the supported types are:
  - git, for origins using Git
  - hg, for origins using Mercurial
  - svn, for origins using Subversion
  - cvs, for origins using CVS
  - bzr, for origins using Bazaar
  - tarball, for tarball origins (supported formats: [.jar](#), [.tar](#), [.tar.bz2](#), [.tar.gz](#), [.tar.lz](#), [.tar.xz](#), [.tar.zst](#), [.zip](#))

### 🔗 Permalinks

### 🔗 Citations

To [reference](#) or [cite](#) the objects present in the Software Heritage archive, permalinks based on [SoftWare Hash IDentifiers \(SWHIDs\)](#) must be used.

Select below a type of object currently browsed in order to display its associated SWHID and permalink.

content

directory

revision

snapshot

🔗

archived

repository

🔗

archived

swh:1:cnt:06a18ca7815ff62ddacaed804ea22bebd07f6ccf

Iframe embedding

```
swh:1:cnt:06a18ca7815ff62ddacaed804ea22bebd07f6ccf;
origin=https://github.com/softwarepub/hermes;
visit=swh:1:snp:4864d0544a564267aa78882f02a44802b1fd61a3;
anchor=swh:1:rev:fbc9aa4000eb01e09f05c58cecf83f379918ffb;
path=/src/hermes/commands/cli.py;
lines=38-47
```

Add contextual information

Copy identifier

Copy permalink

# SOFTWARE CITATION FOR SOFTWARE USERS

Bildquelle hier angeben

# Citing software: Ideal and best effort cases



S. Druskat, T. Krause, C. Lachenmaier, and B. Bunzeck, *Hexatomic (Version 1.4.2)*, Mar. 2023. Zenodo. DOI: .

The hexatomic authors, *hexatomic (Version a0c59ed)*, Mar. 2023.  
Software              Heritage              Archive.              SWHID:  
<https://archive.softwareheritage.org/swh:1:dir:b9d71b12a1fcb5e7b064c27f5edecb4bcf264a2e;anchor=swh:1:rev:a0c59edf8be8c1d7c045745e4bd043f7369c7d1b>.

# Citing software: When to cite software, and at which level?



**Cite software whenever it represents relevant previous work**

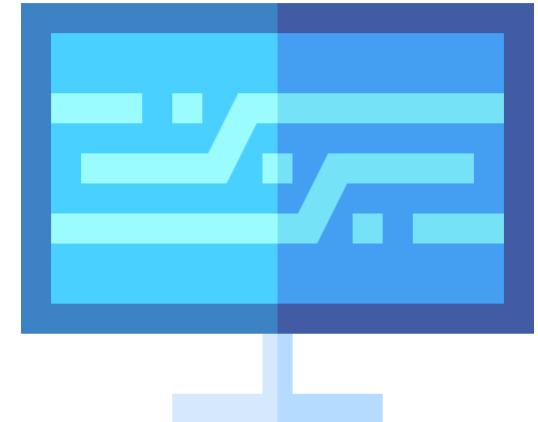
- Cite software **versions**
  - When you have used them to yield research results
  - When you discuss or compare their features or properties
  - When you use them in your own software
- Cite software **projects**
  - When you discuss properties of the project
  - When you list them as examples, e.g., for a software type

# Citing software: Which software to cite?



**Cite the software that you have used, or discuss, directly**

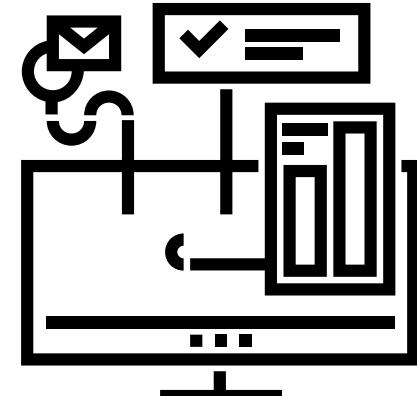
- Cite software that you have **run to process\*** data
  - Models, simulations, digital twins
  - Command line tools, graphical applications, services
  - Computational notebooks, scripts
  - ...
- Where relevant, cite **direct** dependencies, or **crucial** packages
- Cite software you mention or discuss



# Citing software: Cite only the software?



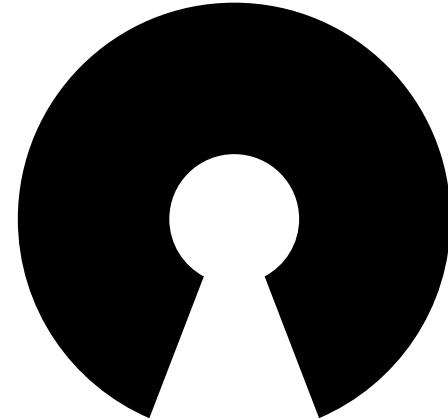
- Have you used the software to yield **research results**?
  - Provide **usage metadata/information** to enable reproducibility  
([ROCrater](#), computational workflows, containerization)
  
- Have the authors asked specifically to **cite a paper or other work**?
  - Cite the paper, but also **cite the software itself**



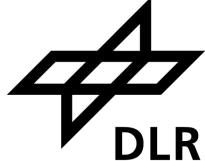
# Citing software: Where to get citation metadata from?



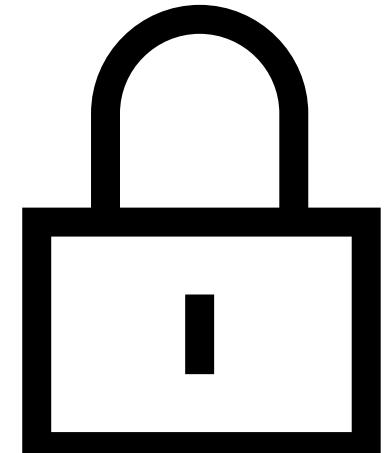
- Software distribution or documentation
- User interface (--help, Help > About)
- **Open source software**
  - *Source code repository*
    - DOI or link to published version 
    - Citation metadata file (CITATION.cff, codemeta.json) 
    - Link to releases in package repository (PyPI, CRAN, ...)?
  - *Software Heritage Archive* 



# Citing software: Where to get citation metadata from?



- Software distribution or documentation
- **Closed source software**
  - User interface (--help, Help > About)



# Citing software: Which software citation metadata to trust?



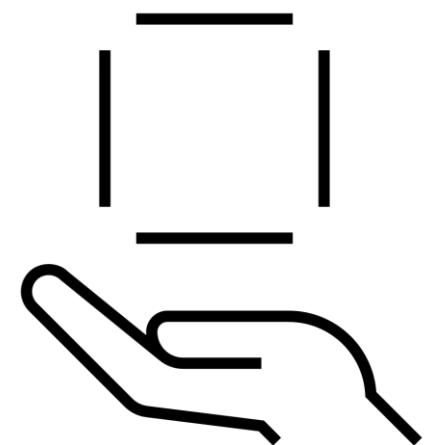
**Generally, DOIs and authors are the most trustworthy metadata sources**

## Potential pitfalls

- Publication automation (software name, authors)
- Unmaintained metadata files (authors, versions, PIDs)

**⚠ Do not use!**

- Version control / package repository metadata for authorship



**Compile metadata carefully and do cross-checks. Don't guess metadata!**

# Citing software: How to deal with missing metadata?



- **Authors' names:** Use a group author (*The <name> authors*)
- **Software name:** Use something that makes sense
- **Version identifier:** Use a tag/commit/revision identifier; use an MD5 checksum
- **Publication date:** Use the tag/commit/revision date
- **Platform & PID:** If possible, archive on SWH and use SWHID: <identifier>



# Citing software: How to format the software reference?



- Hack the style to include all relevant metadata
- If you use LaTeX, consider using BibLaTeX and [biblatex-software](#)

- [2] [Software] A. Pontzen, R. Roškar, G. Stinson, and R. Woods, *pynbody: N-Body/SPH analysis for python* (Coordinated by Astrophysics Source Code Library), May 2013. ASCL: ⟨ascl:1305.002⟩,
- [12] [Software Release] The CGAL Project, *The Computational Geometry Algorithms Library* version 5.0.2 (Coordinated by CGAL Editorial Board), 2020. SWHID: ⟨swh:1:rel:636541bbf6c77863908eae744610a3d91fa58855;origin=https://github.com/CGAL/cgal/⟩.



# WRAP-UP

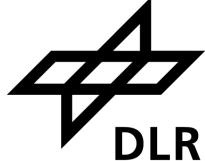
Bildquelle hier angeben

# Key points



- Software citation **acknowledges the importance of software** in research, **improves the reproducibility** of research and **provides credit**
- Software citation relies on **correct and complete metadata**
- Software developers/maintainers should **provide software citation metadata**, e.g., in a CITATION.cff file
  - Tooling can help create and maintain citation metadata
- Software users should cite **software (versions)** whenever they use them
- Software developers should **cite the direct dependencies** of their software
- **Making software citation an established practice** requires further culture change and better tooling

# Thank you!



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- Resources:  [citation-file-format.github.io](https://citation-file-format.github.io)  
 [researchsoft.org/tf-authorship-contribution](https://researchsoft.org/tf-authorship-contribution)
- References: A. M. Smith, D. S. Katz, K. E. Niemeyer, and FORCE11 Software Citation Working Group, "**Software citation principles**," *PeerJ Comput. Sci.*, vol. 2, no. e86, 2016, doi: [10.7717/peerj-cs.86](https://doi.org/10.7717/peerj-cs.86).  
S. Kernchen, M. Meinel, S. Druskat, et al., "**Extending and applying automated HERMES software publication workflows**," *Electronic Communications of the EASST*, vol. 83, 2025, doi: [10.14279/ECEASST.V83.2624](https://doi.org/10.14279/ECEASST.V83.2624).
- Images: b/w images CC0-1.0, “Computer” by [Freepik \(Flaticon\)](#), all others "DLR" (CC BY-NC-ND 3.0)
- Slides: doi: [10.5281/zenodo.15583669](https://doi.org/10.5281/zenodo.15583669) 