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## Galaxy CoDex for finding tools, workflows, and training

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# Galaxy CoDex for finding tools, workflows, and training

B er enice Batut, Wendi Bacon, Paul Zierrep, Matthias Bernt,  
Nicola Soranzo, Johan Gustafsson

Galaxy Community Conference 2024

# The Problem of the [microGalaxy] community

Giving visibility to the resources for the [microGalaxy] community

- What is available in the Galaxy ecosystem for [microbiological] data analyses?
  - Tools
  - Workflows
  - Training
- How can we make a catalog that can be up-to-date?
- How can we get usage of these resources?

A black and white photograph of various tools including pliers, a hammer, and a screwdriver on a wooden workbench. The tools are arranged on a wooden surface, with a hammer and a pair of pliers in the foreground and another pair of pliers and a screwdriver in the background. The text "First step" is overlaid in the center of the image.

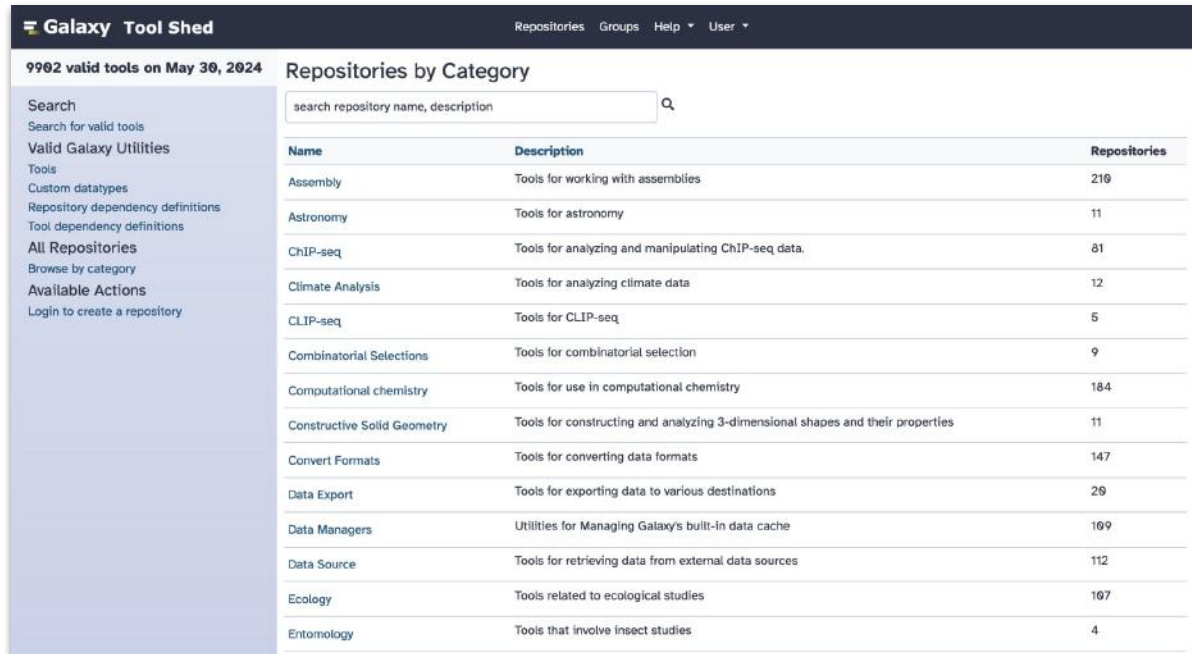
# First step

Extract Tools

# Extract Tools from the Galaxy ToolShed

BUT

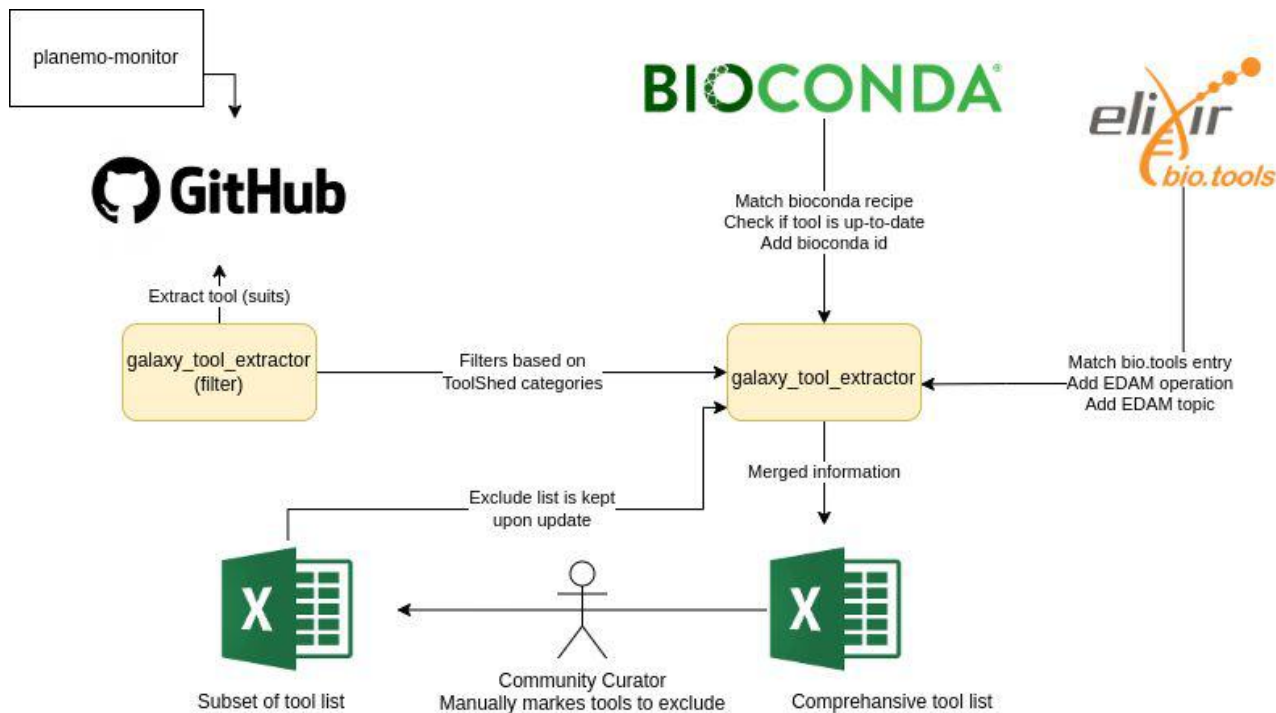
- Not interested all individual tools/wrappers but suites
- Hard to query programmatically



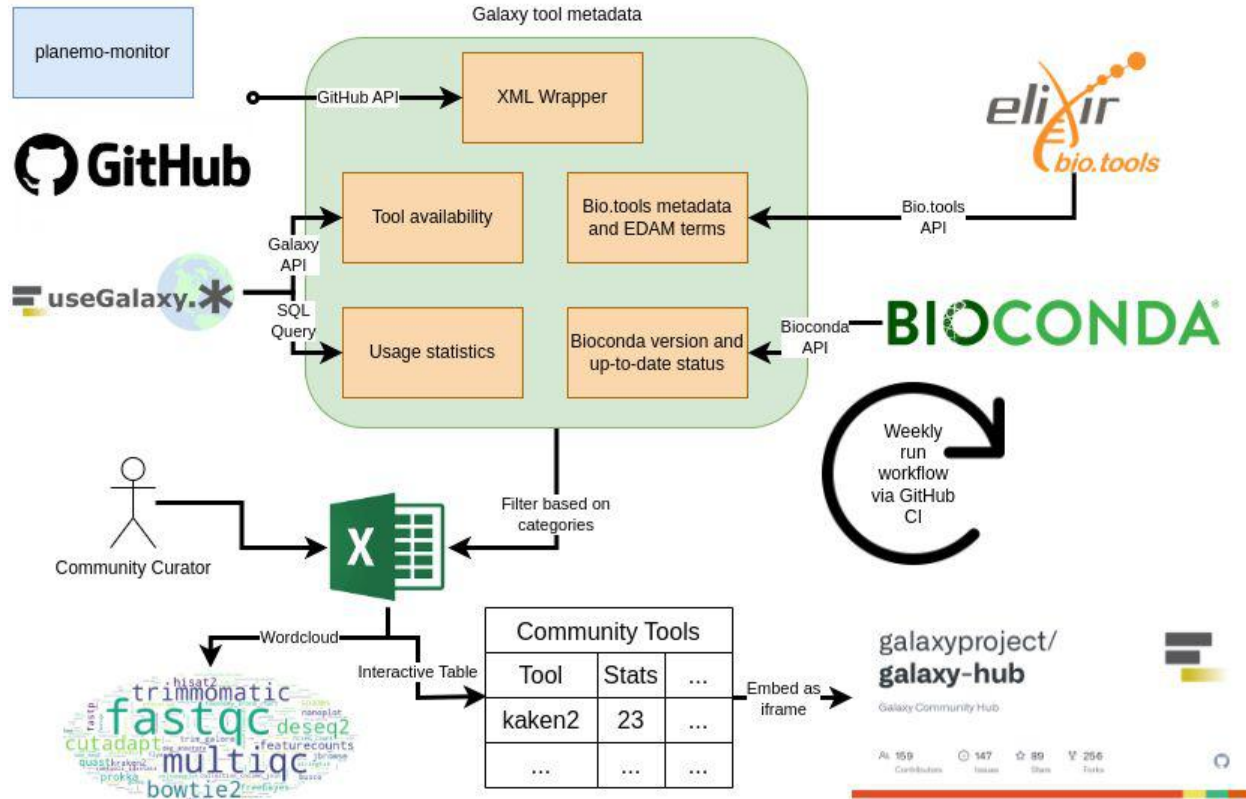
The screenshot shows the Galaxy Tool Shed interface. At the top, it says "Galaxy Tool Shed" and "9902 valid tools on May 30, 2024". The main heading is "Repositories by Category". There is a search bar for repository names and descriptions. Below the search bar is a table with three columns: Name, Description, and Repositories. The table lists various categories and their corresponding tool counts.

Name	Description	Repositories
Assembly	Tools for working with assemblies	210
Astronomy	Tools for astronomy	11
ChIP-seq	Tools for analyzing and manipulating ChIP-seq data.	81
Climate Analysis	Tools for analyzing climate data	12
CLIP-seq	Tools for CLIP-seq	5
Combinatorial Selections	Tools for combinatorial selection	9
Computational chemistry	Tools for use in computational chemistry	184
Constructive Solid Geometry	Tools for constructing and analyzing 3-dimensional shapes and their properties	11
Convert Formats	Tools for converting data formats	147
Data Export	Tools for exporting data to various destinations	20
Data Managers	Utilities for Managing Galaxy's built-in data cache	109
Data Source	Tools for retrieving data from external data sources	112
Ecology	Tools related to ecological studies	107
Entomology	Tools that involve insect studies	4

# Extract Tools: Galaxy Tool extractor



# Galaxy Tool Extractor → Galaxy Tool Metadata Extractor



# Galaxy Tool Metadata Extractor output

## Output

1. JSON
2. TSV Table
3. Online, interactive, and queryable table

[https://galaxyproject.github.io/galaxy\\_codex/](https://galaxyproject.github.io/galaxy_codex/)

## Including

- Metadata (EDAM, etc)
- Tool availability on usegalaxy.\*
- Usage on usegalaxy.eu

Custom Search Builder (1)

Filter: Data | Condition | Value

Show 10 entries

Expand	Galaxy wrapper id	Galaxy wrapper version	Conda version	Conda id	Status	bio.tool id	bio.tool name
	kraken2tax			1.2+galaxy0			
	bracken		2.9				
	kraken_biom		1.2.0				
	kraken_taxonomy_report		0.0.3				
	krakentools		1.2				
	pureclip		1.0.4				
	kraken						
	kraken2		2.1.1				

**EDAM operation** Taxonomic classification

**EDAM topic** Taxonomy, Metagenomics

**Description** Kraken2 for taxonomic designation.

**bio.tool description** Kraken 2 is the newest version of Kraken, a taxonomic classification system using exact k-mer matches to achieve high accuracy and fast classification

**bio**

**Status** To update

**Source** <http://ccb.jhu.edu/software/kraken/>

**ToolShed categories** Metagenomics

**ToolShed id** kraken2

**Galaxy wrapper owner** iuc

**Galaxy wrapper source** [https://github.com/galaxyproject/tools-iuc/blob/master/tool\\_collections/kraken2/kraken2/](https://github.com/galaxyproject/tools-iuc/blob/master/tool_collections/kraken2/kraken2/)

Showing 1 to 8 of 8 entries (filtered from 1,336 total entries)

Previous 1 Next



# Getting Tools for a community

1. Add your community to the Galaxy Tool Metadata Extractor pipeline by adding new folder in the data/community folder
2. Review the generated table to add status (keep/exclude/deprecated) to tools
3. Embed the interactive table in your community page on the Hub

Tutorial : <https://gxy.io/GTN:T00426>

**Galaxy Training!** Development in Galaxy Learning Pathways Help Settings Search Tutorials

## Creation of an interactive Galaxy tools table for your community

Author(s) Bérénice Batut

### Overview

**Questions:**

- Is it possible to have an overview of all Galaxy tools for a specific scientific domain?
- How can I create a new overview for a specific Galaxy community or domain?

**Objectives:**

- Create a community reviewed table for Galaxy tools within a specific scientific domain
- Embed an interactive table in a community page

**Time estimation:** 1 hour

**Level:** Introductory

**Supporting Materials:**

- Published: Mar 13, 2024
- Last modification: Feb 27, 2024
- License: Tutorial Content is licensed under [Creative Commons Attribution 4.0 International License](#). The GTN Framework is licensed under [MIT](#)
- PURL: <https://gxy.io/GTN:T00426>
- Revision: 2

**Table of Contents:**

- Add your community to the Galaxy Tool Metadata Extractor pipeline
- Review the generated interactive table
- Embed the interactive table in your community page on the Hub
- Conclusion
- Frequently Asked Questions
- Feedback
- Citing this Tutorial

Galaxy offers thousands of tools. They are developed across various GitHub repositories. Furthermore, Galaxy also embraces granular implementation of software tools as sub-modules. In practice, this means that tool suites are separated into Galaxy tools, also known as wrappers, that capture their component operations. Some key examples of suites include [Methur](#) and [OpenMS](#), which translate to tens and even hundreds of Galaxy tools.

While granularity supports the composability of tools into rich domain-specific workflows, this decentralized development and sub-module architecture makes it **difficult for Galaxy users to find and reuse tools**. It may also result in Galaxy tool developers **duplicating efforts** by simultaneously wrapping the same software. This is further complicated by a lack of tool metadata, which prevents filtering for all tools in a specific research community or domain, and makes it all but impossible to employ advanced filtering with ontology terms and operations like [EDAM ontology](#).

The final challenge is also an opportunity: the global nature of Galaxy means that it is a big community. Solving the visibility of tools across this ecosystem and the potential benefits are far-reaching for global collaboration on tool and workflow development.

To provide the research community with a comprehensive list of available Galaxy tools, [Galaxy Tool Metadata Extractor](#) was developed to collect Galaxy wrappers from a list of Git repositories and automatically extract their metadata (including Conda version, [bio.tools](#) Identifiers, and EDAM annotations). The workflow also queries the availability of the tools and usage statistics from the three main Galaxy servers (usegalaxy.\*).



# Community effort to improve tool annotation

[← Back to Events](#)

## Hackathon - Improving the annotation of Galaxy resources for microbial data analysis and beyond

*This hackathon aims to improve the annotation of Galaxy resources for microbial data analysis and beyond*

**Date:** March 11 - 15, 2024

**Contact:** Bérénice Batut, Paul Zierep

### Objectives

The objective of this hackathon is to improve the annotation of the Galaxy resources (tools, workflows, tutorials) for data analysis by:

- Linking microbial Galaxy tools to bio.tools to obtain EDAM ontology annotation
- Improving bio.tools annotations
- Annotating existing microbial-related tutorials with EDAM terms
- Reflecting on the addition of EDAM terms to workflows
- Reflecting on missing terms in the EDAM ontology for microbial data analyses
- Brainstorming about a way to connect tool annotations to improve training and workflows

This hackathon is open to other communities than microGalaxy

## Adding and updating best practice metadata for Galaxy tools using the bio.tools registry

Author(s) Bérénice Batut Johan Gustafsson Paul Zierep

### Overview

#### Questions:

- How are Galaxy tools linked to EDAM ontology?
- How to connect Galaxy tools to bio.tools?
- What is bio.tools?
- How to add, and update, entries in bio.tools?

#### Objectives:

- Identify Galaxy tools without bio.tools entry
- Create a bio.tools entry
- Update a bio.tools entry
- Add EDAM ontology terms to a bio.tools entry
- Link a Galaxy tool to its corresponding bio.tools entry

**Time estimation:** 1 hour

**Level:** Introductory

**Supporting Materials:**

**Published:** Mar 6, 2024

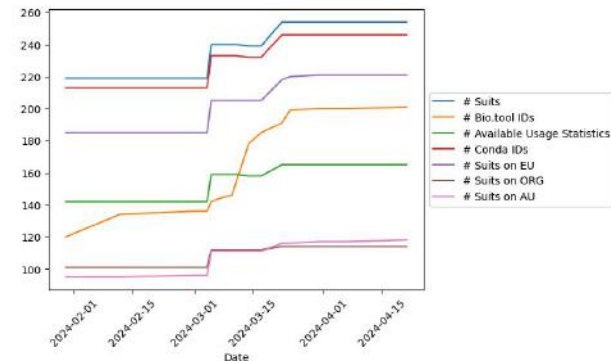
**Last modification:** Mar 5, 2024

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**PURL:** <https://gxy.io/GTN:T09421>

**Revision:** 8

Progress of the Galaxy Tool Metadata Extractor

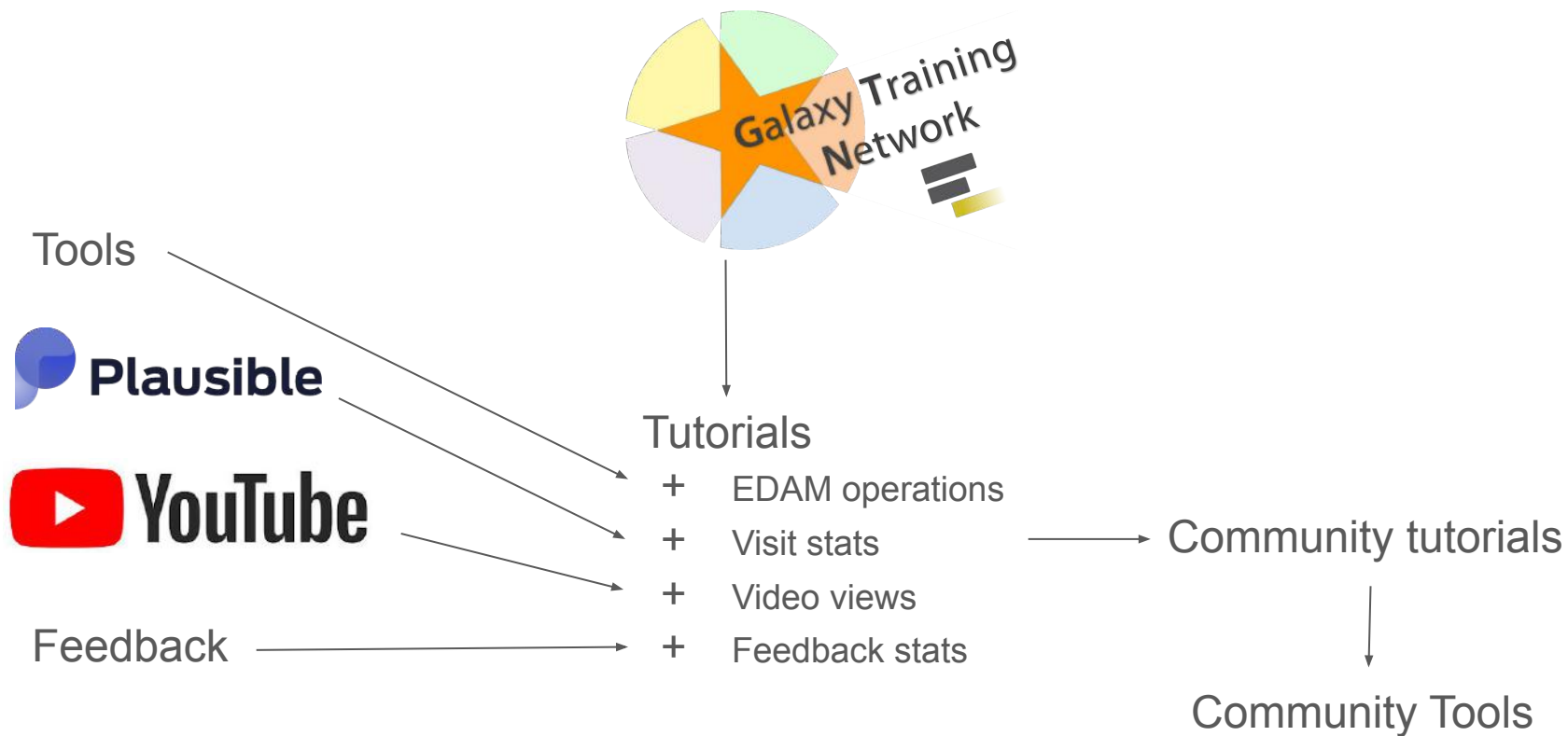




# Beyond Tools

From Galaxy Tool Metadata Extractor to  
Galaxy Communities Dock or Galaxy CoDex

# Extract Training





WHAT  
NOW

# Next steps

1. Extract Workflows

# Next steps

1. Extract Workflows
2. Create a packaging for community resources
  - a. Home page template
  - b. Deployment configuration files



# Next steps

1. Extract Workflows
2. Create a packaging for community resources
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3. Develop best practices

# Next steps

1. Extract Workflows
2. Create a packaging for community resources
  - a. Home page template
  - b. Deployment configuration files
3. Develop best practices
4. Integrate more communities
  - a. Current communities
    - i. microGalaxy
    - ii. Imaging
    - iii. Biodiversity
  - b. Plan
    - i. Single-cell
    - ii. Yours?

## 5. Involve the whole Galaxy community

### Who?

- Community leads
- Community members
- Tool developers
- Web developers
- Admin
- PIs
- Everyone

### To do what?

- Test
- Give Feedbacks
- Suggest Ideas / Needs
- Help with interface
- & more

**Goal: Make the Galaxy CoDex for the community by the community**

# Thank You!

[github.com/galaxyproject/galaxy\\_codex](https://github.com/galaxyproject/galaxy_codex)

