

# Connecting Galaxy – A short look & tell

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## Overview of Galaxy

Galaxy is an open source, web-based platform for data intensive biomedical research

Many “ready to use” tools like plotting, searching in dbs or data conversions

Idea: Use tools provided by Galaxy in an external software (e.g. chemotion-elN) without media break

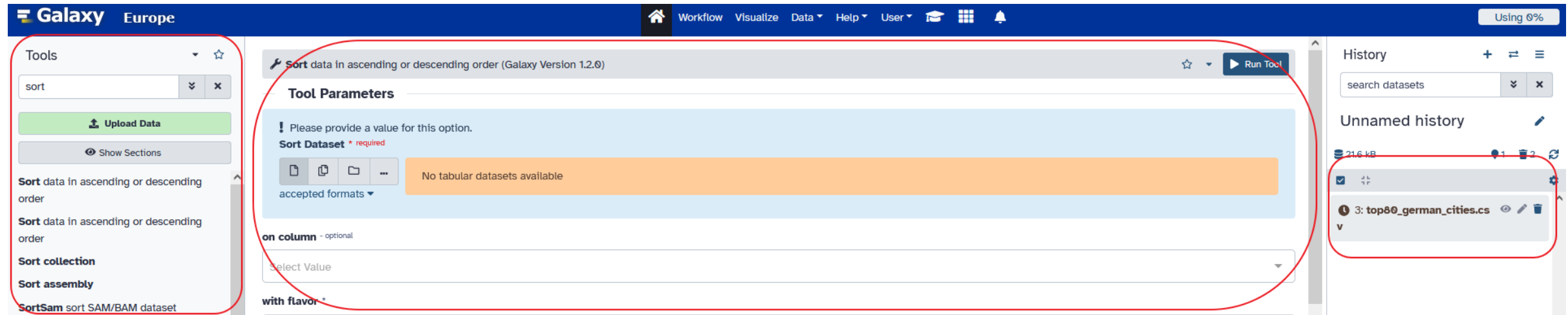
There are different “public” instances of galaxy:

- <https://galaxyproject.org/>
- [usegalaxy.eu/](https://usegalaxy.eu/)
- [test.galaxyproject.org](https://test.galaxyproject.org)

And much more, can be self hosted

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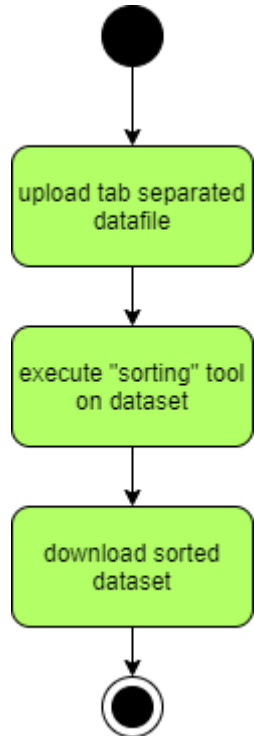
## Browser UI of Galaxy



Left: tool you can use, you can create your own tool in another process

Middle: detailed information about selected item (sorting tool). It gives you detailed infos about inputparameter,...

Right: infos about history(ies). A history is one of the concepts of organizing things like data, jobs, ...



	ID	Name	Population
2	1	Berlin	3677472
3	2	Hamburg	1906411
4	3	Munich (München)	1487708
5	4	Cologne (Köln)	1073096
6	5	Frankfurt am Main	759224
7	6	Stuttgart	626275
8	7	Düsseldorf	619477

Used tool is called “Sort” and sorts data in desired direction on a chosen column

1	61	Wurzburg	120533
2	17	Wuppertal	354572
3	64	Wolfsburg	123949
4	24	Wiesbaden	27895
5	60	Ulm	126949
6	74	Trier	11057
7	6	Stuttgart	626275
8	52	Solingen	158957
9	78	Siegen	101516
10	77	Salzgitter	103694
11	43	Saarbrücken	179634
12	39	Rostock	2084
13	67	Reutlingen	116456

Life demo on [galaxy.eu](https://galaxy.eu)



Open API docu: <https://test.galaxyproject.org/api/docs>

Many endpoints, some not yet migrated/documented

- Authentication based on API – key of user
  - authentication by URL param
  - authentication in header
  - (authentication by session cookie)

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<https://test.galaxyproject.org/api/whoami?key=cdfdc5cbbce327>

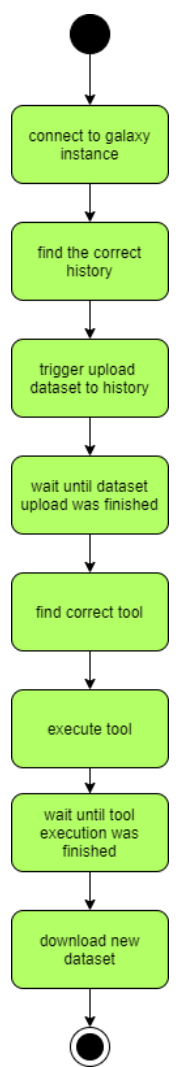
```
curl -X 'GET' \
'https://test.galaxyproject.org/api/whoami' \
-H 'accept: application/json' \
-H 'x-api-key: cdcfdc5cbbce3273c137c137c137c137'
```

```
curl -X 'GET' \
'https://test.galaxyproject.org/api/whoami' \
-H 'accept: application/json' \
-H 'Cookie: galaxysession=cdfcdc5cbbce3...
```

The image is a screenshot of the 'Manage API Key' page in the Google Cloud console. At the top, the title 'Manage API Key' is displayed in a large, dark blue font. Below the title, a subtitle in a smaller, dark grey font reads: 'An API key will allow you to access via web API. Please note th'. The main content area is enclosed in a light grey border and features a section titled 'Current API key' in a bold, dark grey font. Below this title, there is a horizontal bar with a light blue background. On the left side of this bar is a small icon of a key. To the right of the icon, the text 'cdcfdc5cbb...' is visible, followed by a large black rectangular redaction box. Below the horizontal bar, the text 'created on Friday Jun 28th 14:57:39 2024 GMT+2' is displayed in a dark grey font.

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## UseCase in java demo app



Dataset has more than one identifier

Python: Bioblend  
Java: blend4j

Dataset Information	
Number	60
Name	top80_german_cities.csv
Created	Wednesday Jul 3rd 10:14:25 2024 GMT+2
Filesize	5.1 KB
Dbkey	?
Format	tabular
File contents	contents
History Content API ID	565c740ffddbfb86
History API ID	254eebb01a3f69b9
UUID	593f5f73-69e8-46c2-973e-5fdb861c348a

```
inputs>
<param format="tabular" name="input" type="data" label="Sort Dataset"/>
<param name="column" label="on column" type="data_column" data_ref="input">
<param name="style" type="select" label="with flavor">
  <option value="num">
    Numerical sort
  </option>
  <option value="gennum">
    General numeric sort
  </option>
  <option value="alpha">
    Alphabetical sort
  </option>
</param>
<param name="order" type="select" label="everything in">
  <option value="DESC">
    Descending order
  </option>
  <option value="ASC">
    Ascending order
  </option>
</param>
```

Possible states of jobs: pending, queued, running, ok, ...

Life demo on [test.galaxyproject.org](https://test.galaxyproject.org)

## Mapping of java sub processes to HTTP requests

```
POST /api/tools?key=cdfdc5cbbce3273c1786fc8002b80f9 HTTP/1.1
Content-Type: multipart/form-data; boundary=Boundary_1_63390_171995719734
MIME-Version: 1.0
User-Agent: Java/17.0.10
Host: localhost:8000
Accept: text/html, image/gif, image/jpeg, *; q=.2, */*; q=.2
Connection: keep-alive
Content-Length: 6144

--Boundary_1_63390_171995719734
Content-Type: application/json
Content-Disposition: form-data; name="inputs"

{"file_type":"auto","files_0|NAME":"top80_german_cities.csv","dbkey":"?"}
--Boundary_1_63390_171995719734
Content-Type: application/json
Content-Disposition: form-data; name="tool_id"

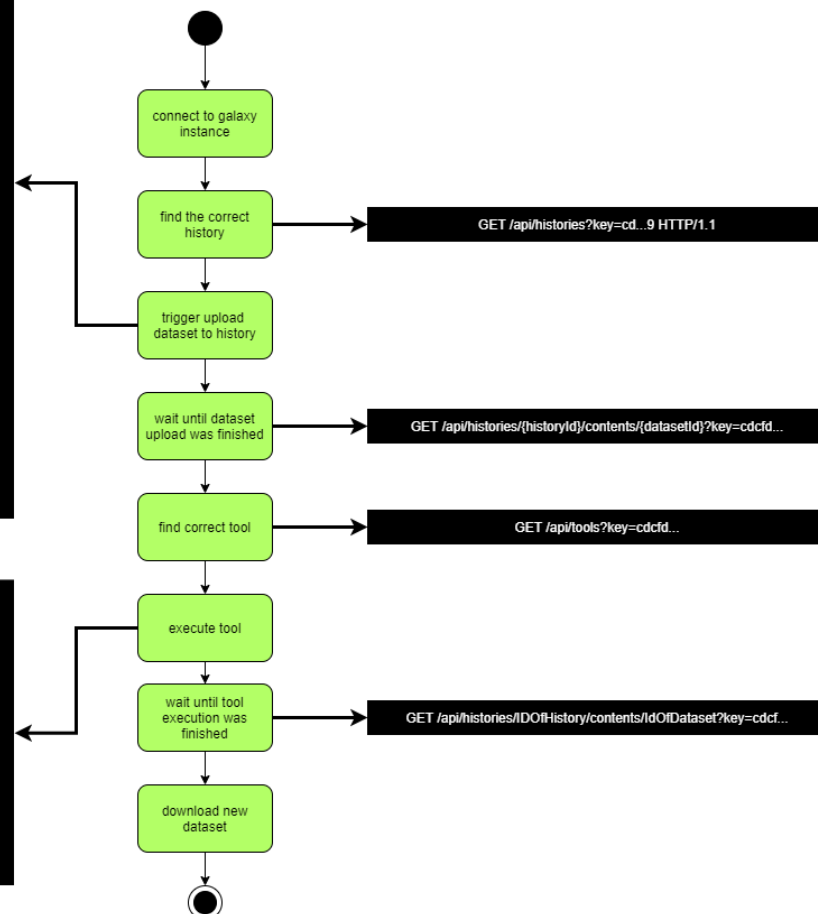
upload1
--Boundary_1_63390_171995719734
Content-Type: application/json
Content-Disposition: form-data; name="history_id"

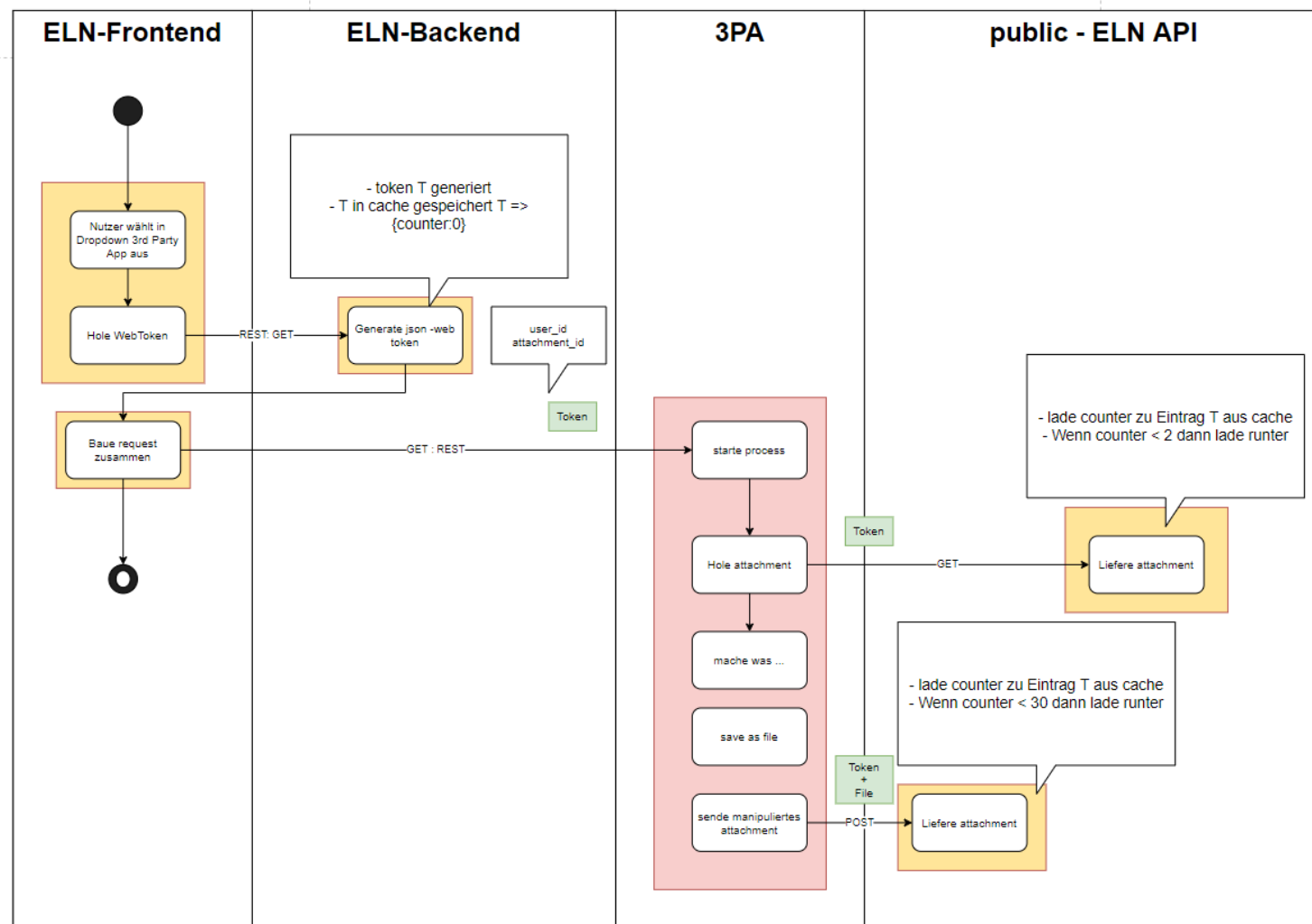
1
--Boundary_1_63390_171995719734
Content-Type: application/json
Content-Disposition: form-data; name="type"

upload_dataset
--Boundary_1_63390_171995719734
Content-Type: application/octet-stream
Content-Disposition: form-data; filename="top80_german_cities.csv"; modification
time_data
```

```
POST /api/tools?key=cdfdc5cbbce3273c1786fc8002b80f9 HTTP/1.1
Content-type: application/json
Accept: application/json
User-Agent: Java/17.0.10
Host: localhost:8000
Connection: keep-alive
Content-Length: 70

{"inputs":{"input1":"HistoryId"},"tool_id":"ToolId","history_id":null}
```





3PA needs to pull and push

3PA needs to have an ELN token of user

Communication based on ELN IDs



Supporting also workflows

How to handle the quota of a user

Chemotion eln: create an own Galaxy Connector Third-party-app ?



Available tools	Tool parameter		
<input type="button" value="Sort"/>	<table border="1"><tr><td>Column</td><td>1</td></tr></table>	Column	1
Column	1		
<input type="button" value="ChEMBL Search"/>	<table border="1"><tr><td>Mode</td><td>Ascending</td></tr></table>	Mode	Ascending
Mode	Ascending		
<input type="button" value="Plotting"/>	<table border="1"><tr><td>Header</td><td>0</td></tr></table>	Header	0
Header	0		
<input type="button" value="..."/>	<table border="1"><tr><td>...</td><td>...</td></tr></table>	...	...
...	...		
Selected dataset	process status		
<input type="button" value="example.csv"/>	<div>Dataset upload started Dataset upload finished Tool process started Tool process finished Result dataset sent to ELN Have a happy day !!!</div> <div><input type="button" value="Start"/> <input type="button" value="Back to ELN"/></div>		

<https://training.galaxyproject.org/training-material/topics/dev/tutorials/bioblend-api/slides.html>

<https://galaxyproject.org/>

<https://bioblend.readthedocs.io/en/latest/>

<https://github.com/FabianMauz/ipb-talk-galaxy-api-20240704>

<https://github.com/galaxyproject/blend4j>