SBG-CGC: global architecture

Tiffany Delhomme

IARC course - analysing TCGA data in the cloud

28 feb 2018

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Summary

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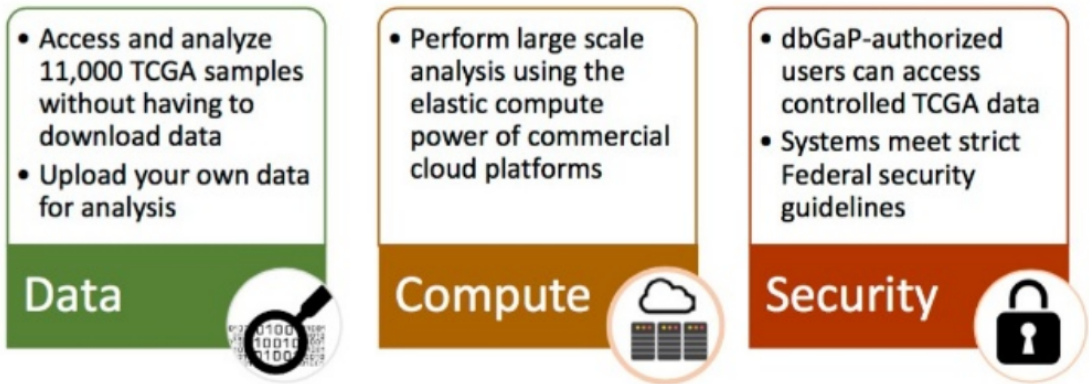
NCI cloud pilots

Data, Computing and Security

Aim: providing big data ressources to accelerate cancer research

- in 2016, NCI has launched 3 Cancer Genomics Cloud Pilots
  - FireCloud from the Broad Institute
  - Cancer Genomics Cloud from the Institute for Systems Biology
  - **SevenBridges Cancer Genomics Cloud (SBG-CGC)**
- concept: co-localized data and computing ressources



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Global overview

The Seven Bridges Plateform

The CancerGenomicsCloud provides a simple and powerful way to analyze large quantities of genomic data:

user(s)

Global overview

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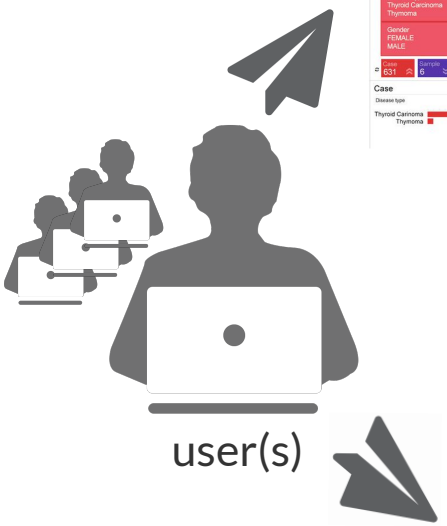
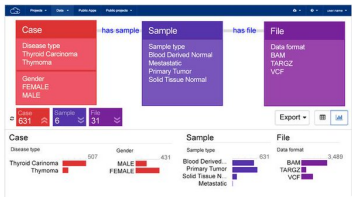
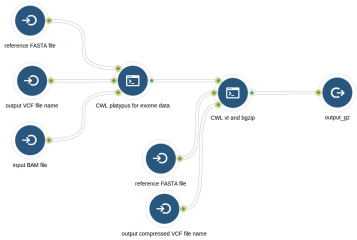


web interface





API (R, Python)

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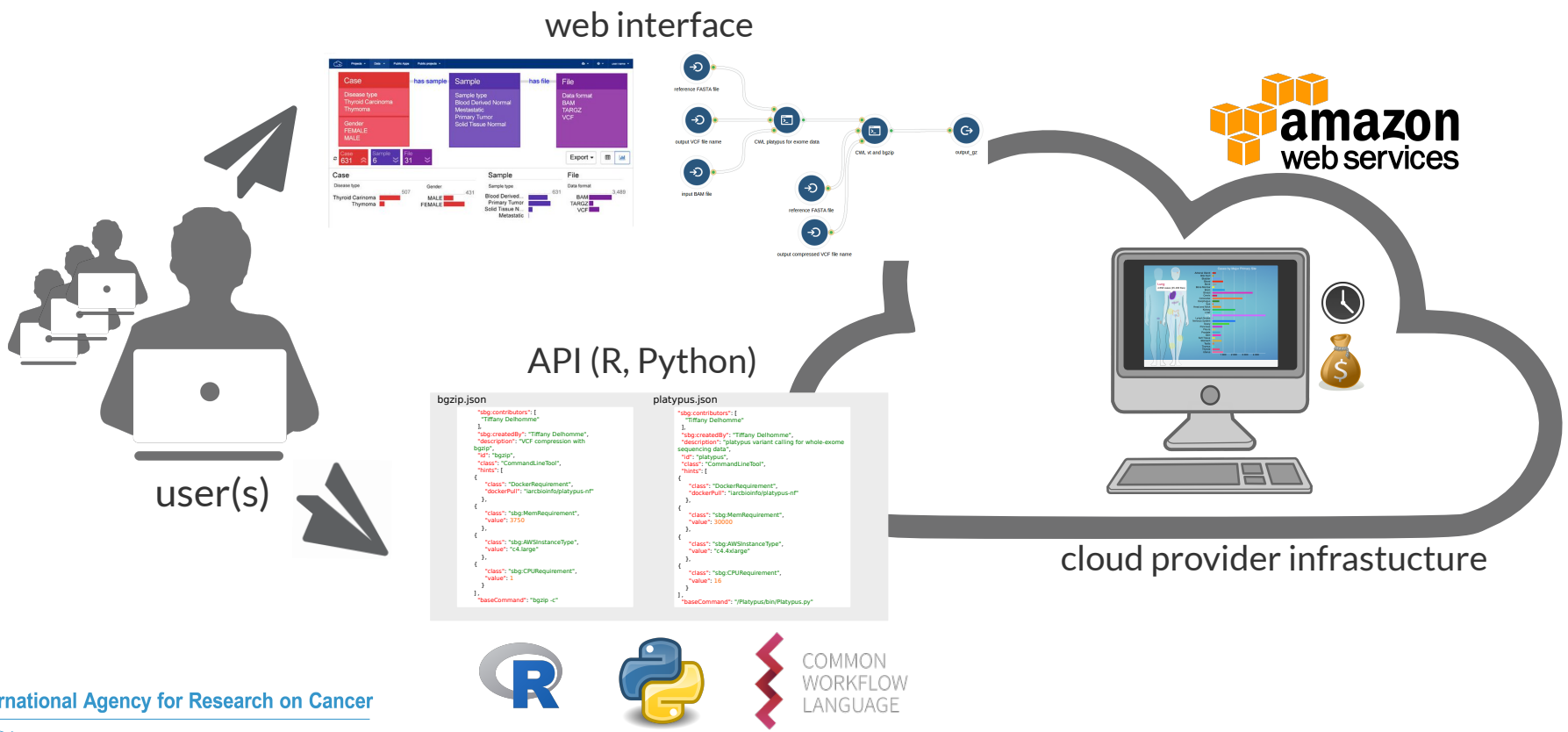

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Global overview

The Seven Bridges Plateform

Seven Bridges **User flow chart**:

ACCESS	Access via the **visual interface**. and/or Access programmatically via our **API**.
PROJECT	Create a **workspace** for you and your team to store your data, perform analyses, and view results. Choose who has access to your project resources.
DATA	Bring and store your own **files**. and/or Use data from our public **genomics reference files**. and/or Easily query and use data from our large, publicly-hosted **genomics datasets**.
ANALYSIS	Bring and store your own **tools and workflows** to analyze your data. and/or Use our ready-to-run bioinformatic analysis tools and workflows
STORAGE and COMPUTE	Use customizable settings to **optimize and parallelize analyses**.
PRICING	We pass all charges from your cloud provider **without markup**.

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Global overview

Docker for the deployment

How efficiently deploy your tool in the cloud?

⇒ Docker to embed it in a virtual container that can run on **any machine**

modified from docs.docker.com

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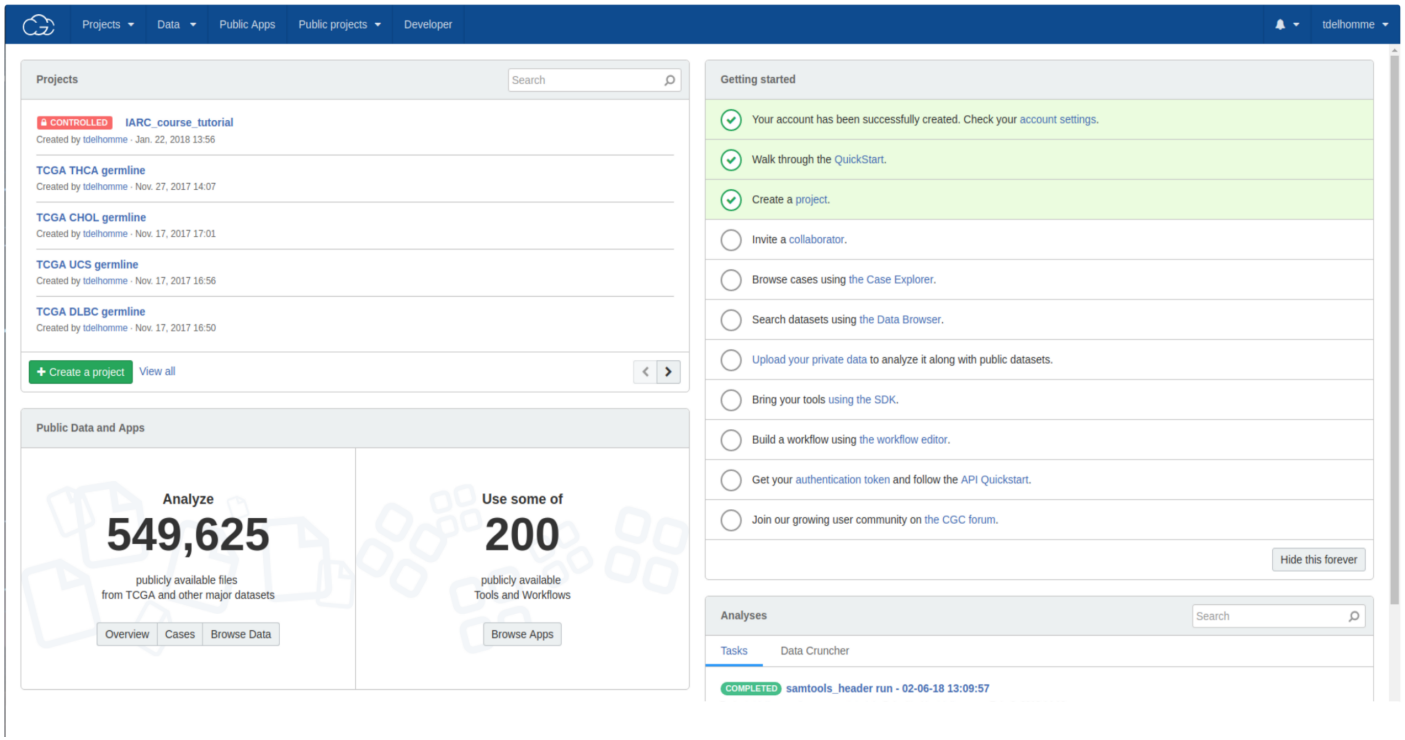
MATERIAL

Web interface to facilitate integration with the plateform

Use to get data in the course

Web interface features



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Web interface to facilitate integration with the plateform

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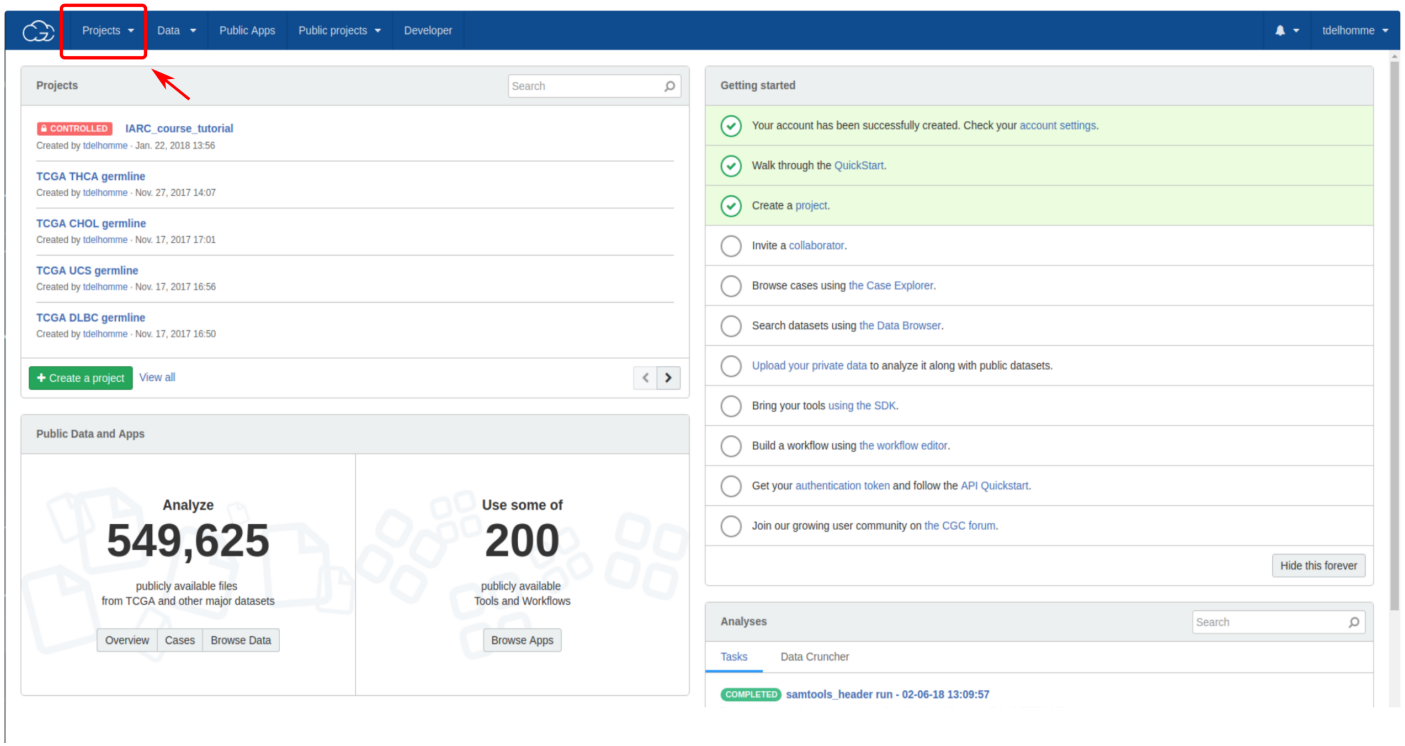
1. Manage your project



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Web interface to facilitate integration with the plateform

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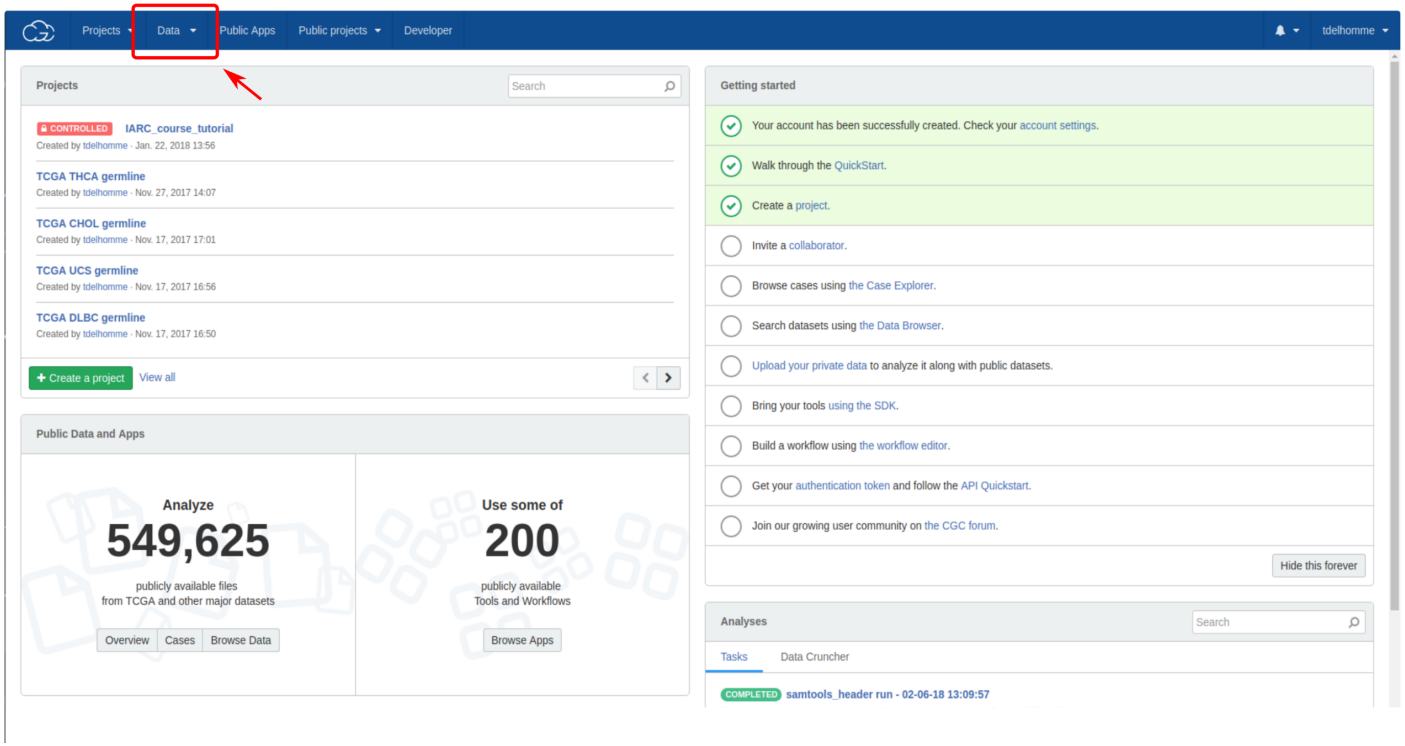
2. Explore available data



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Web interface to facilitate integration with the plateform

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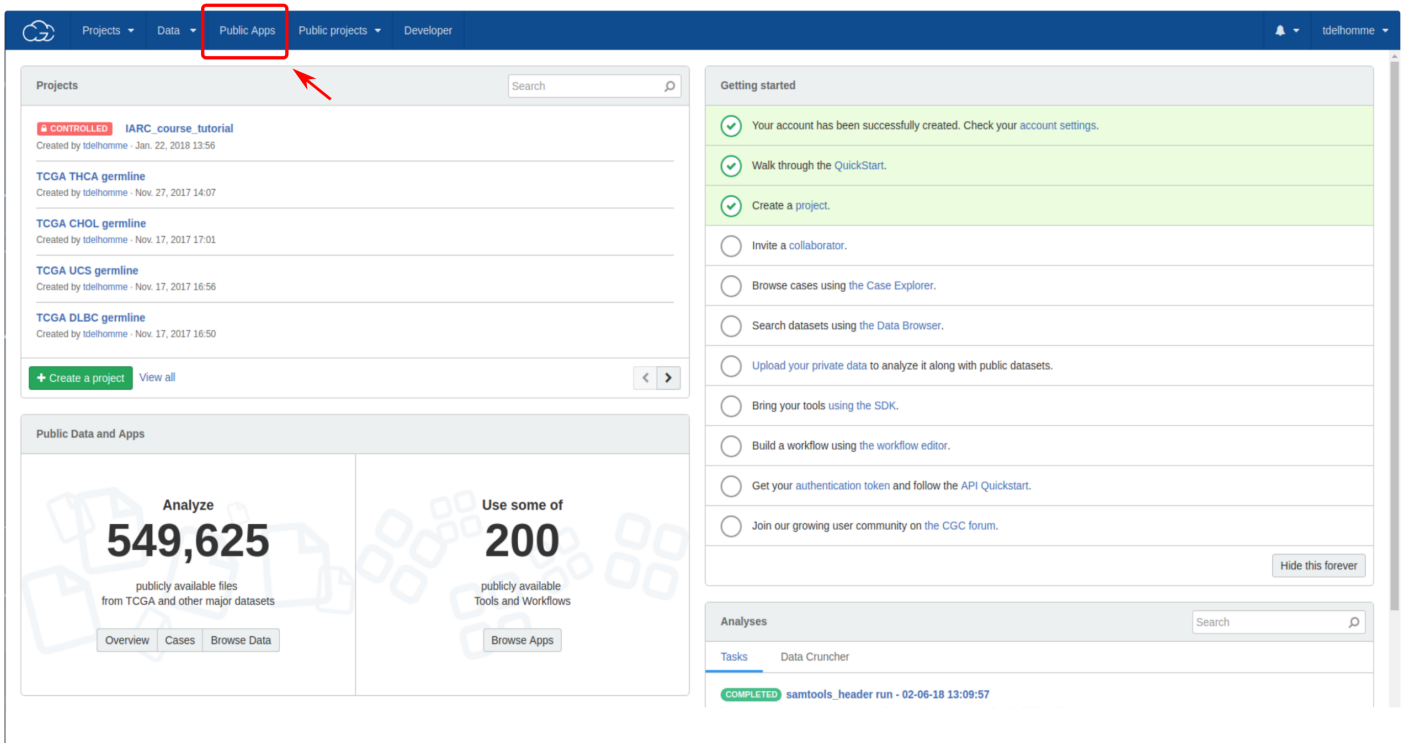
3. Explore public apps



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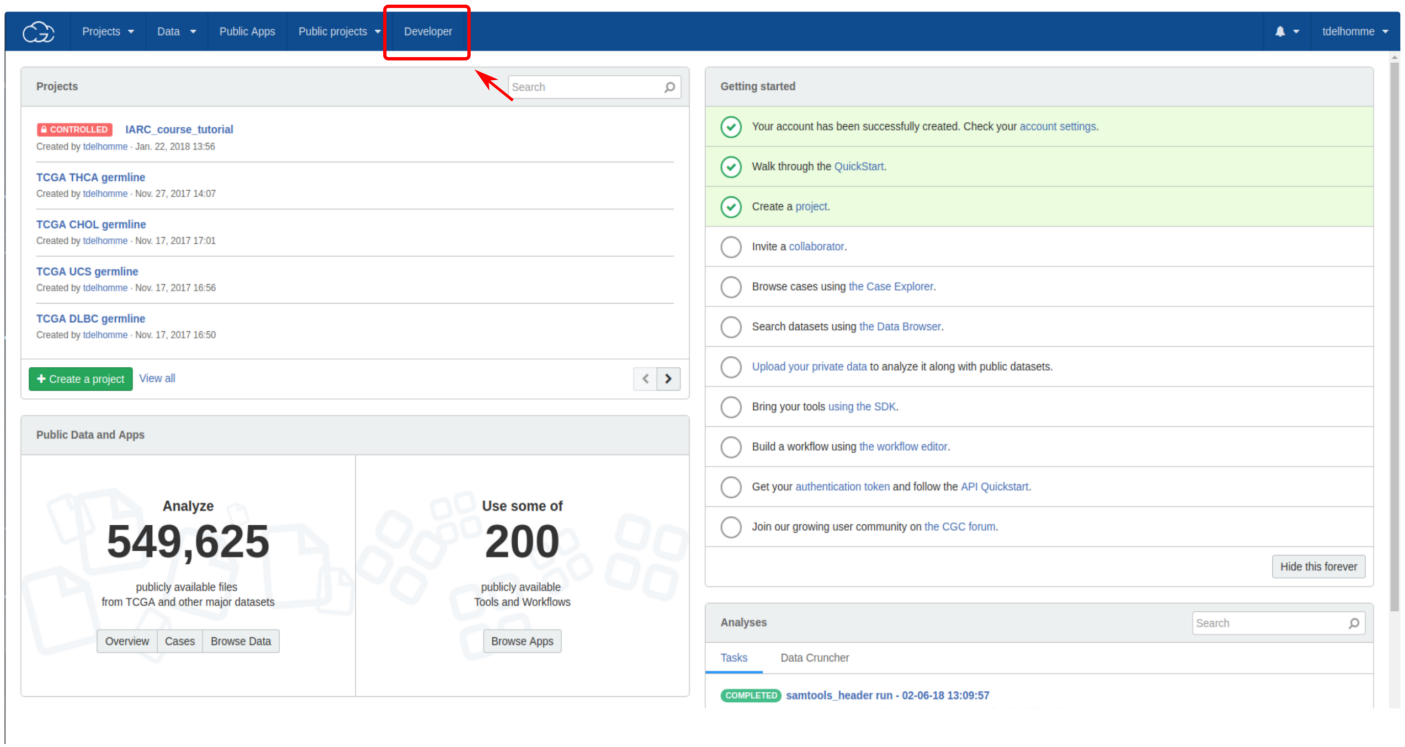
4. Get developer requests



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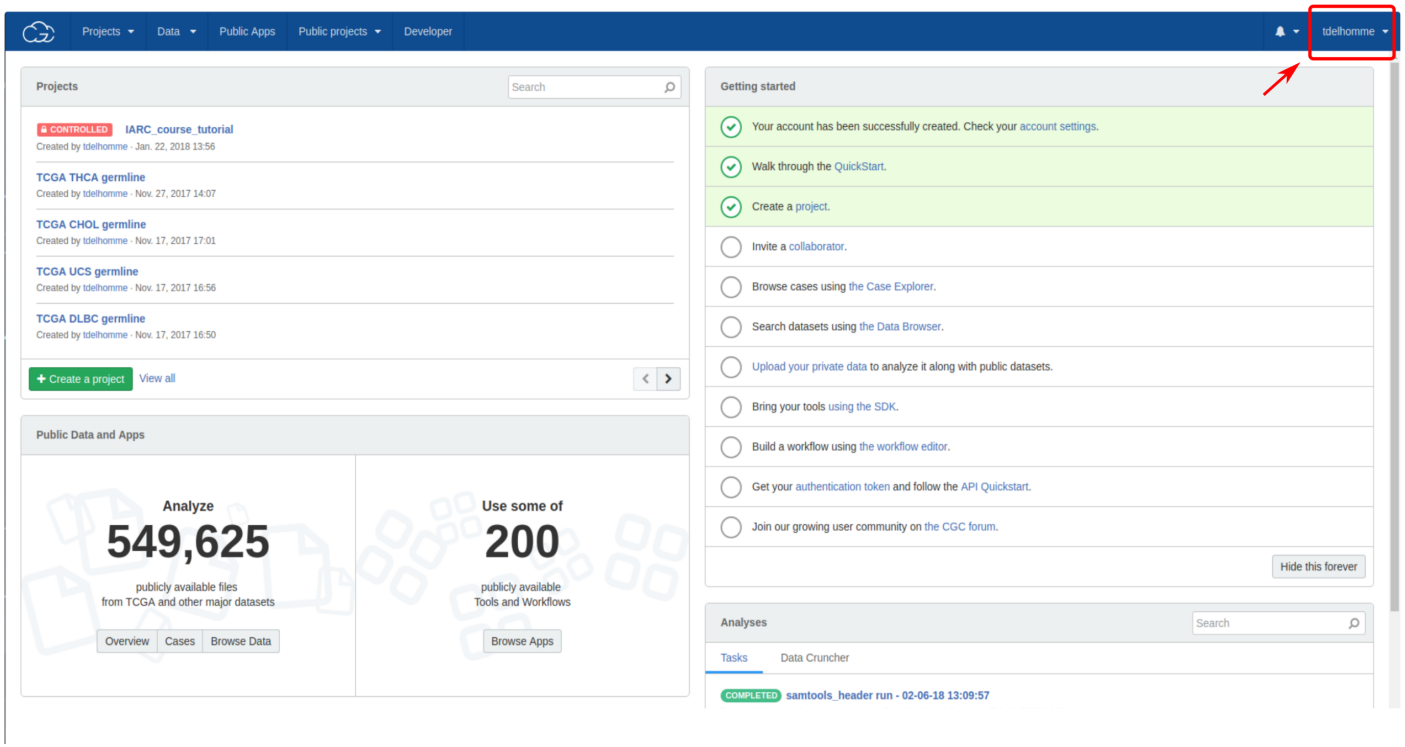
Web interface to facilitate integration with the plateform

Use to get data in the course

5. Get account details



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Multi-users projects to provide collaboration

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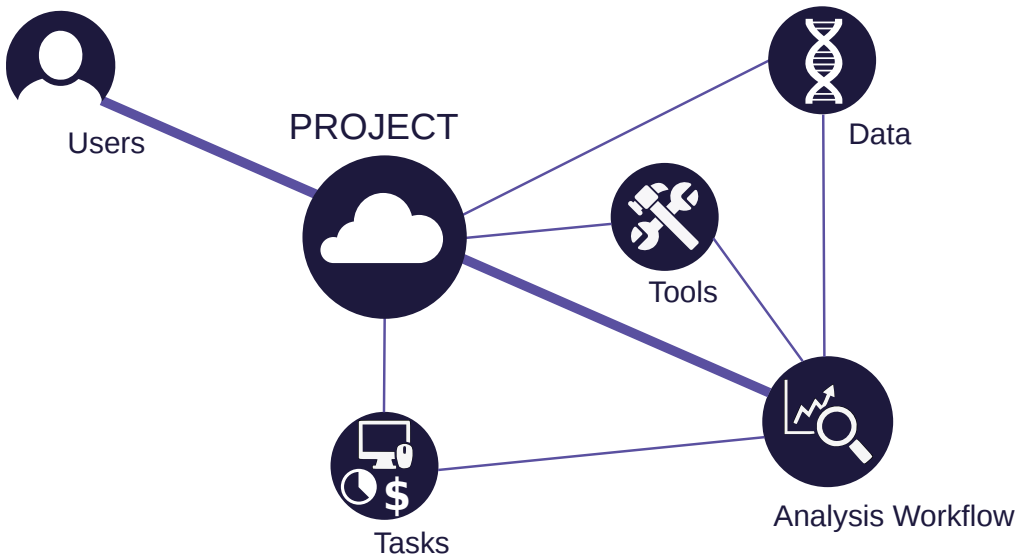

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Multi-users projects to provide collaboration

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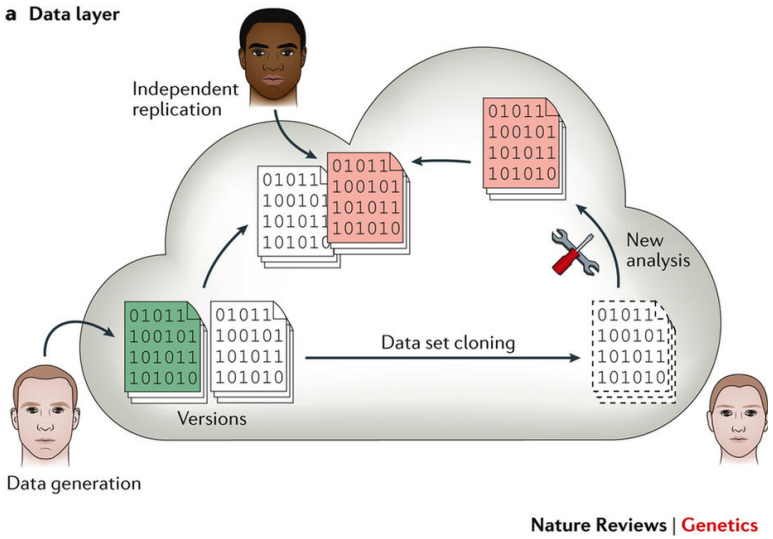
- project **members** are the collaborators (individual defined rights)



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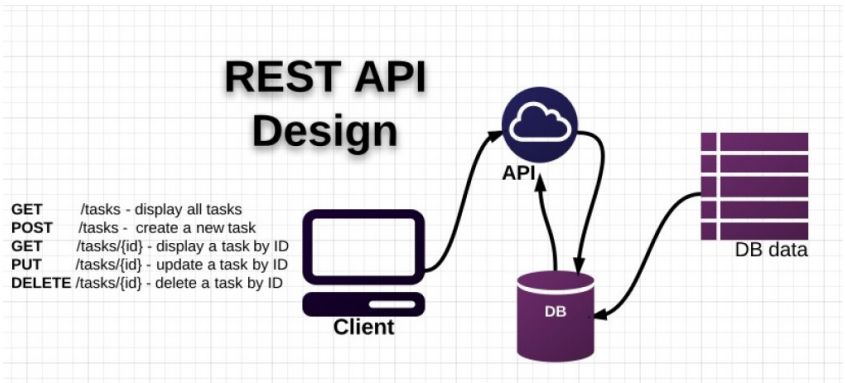
API to provide reproducibility

API: application programming interface

- API allows you to interact with the SBG-CGC as you would via the visual interface.
- SBG-CGC API is a set of RESTful web services intended for integration and automation



- the aim of this API is to read/write information on the platform, to automate analyses executions

API to provide reproducibility

Focus on R interface for the API in the course

R/Bioconductor package: sevenbridges-r

- Authentification via CGC token
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  - use CWL Tool interface or import JSON

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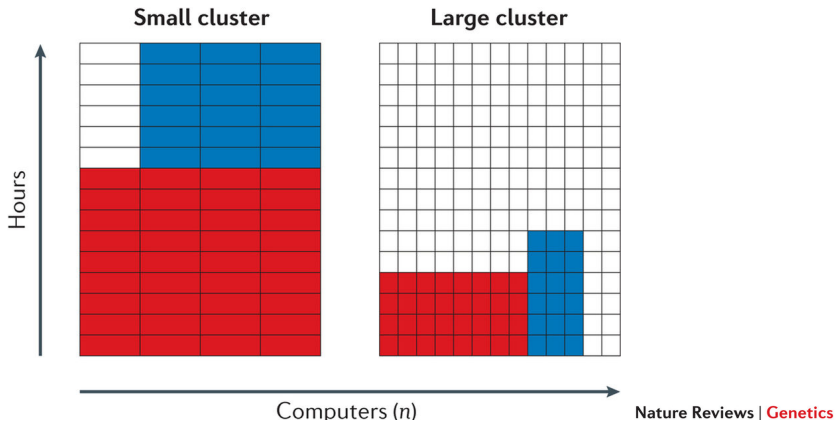
- Build tools and workflows
  - use CWL Tool interface or import JSON
- Run reproducible analyses
  - loop over files or run on batches

CGC provides elasticity

Amazon Web Services Instances



Each tool is executed on a computation instance in the cloud

- instances are virtual computers

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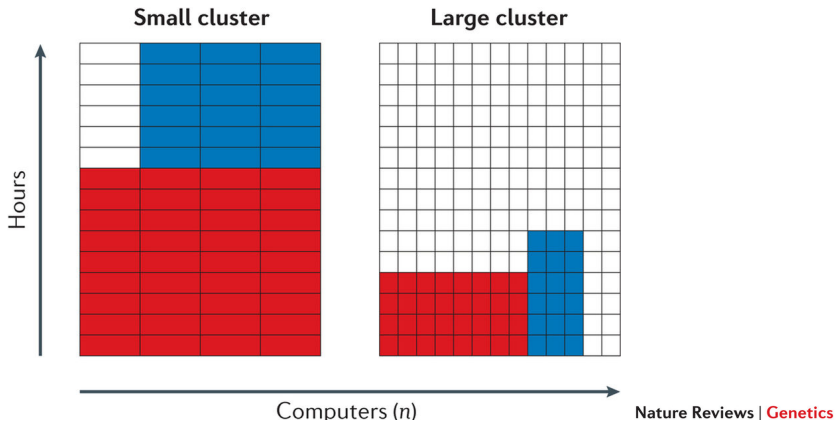
CGC provides elasticity

Amazon Web Services Instances



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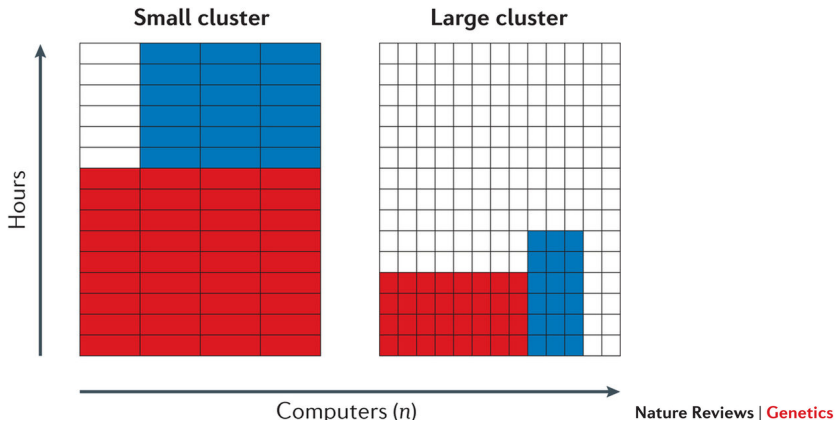

Each tool is executed on a computation instance in the cloud

- instances are virtual computers
- each instance type has a particular allocations of CPU and memory
- pay-as-you-go (PAYG) pricing principles
- available instances are named and catalogued

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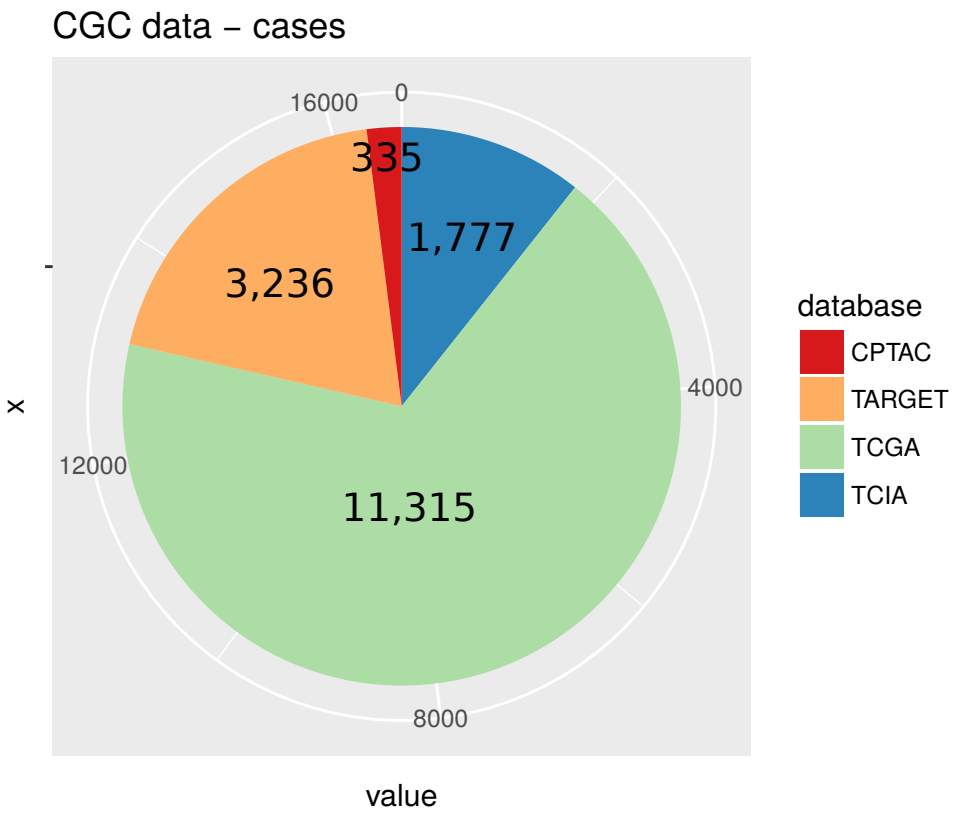
Available data in the CGC cloud

Public databases + private data



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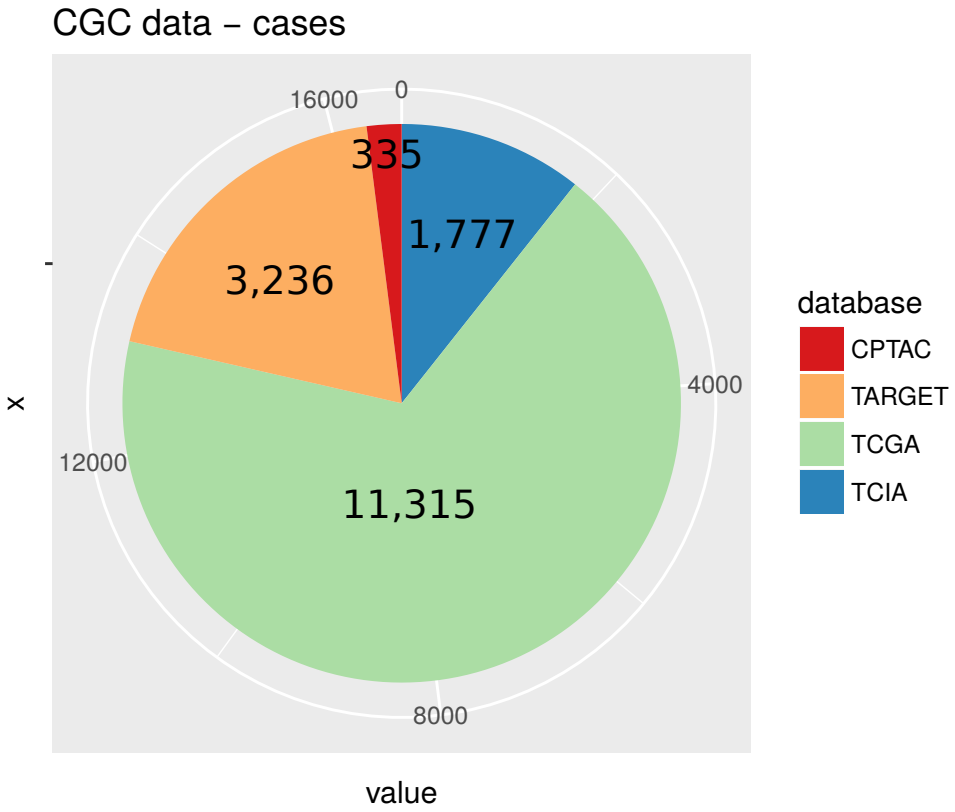
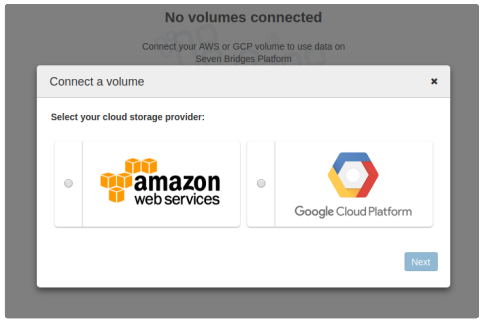


+ AWS or GCP cloud volumes



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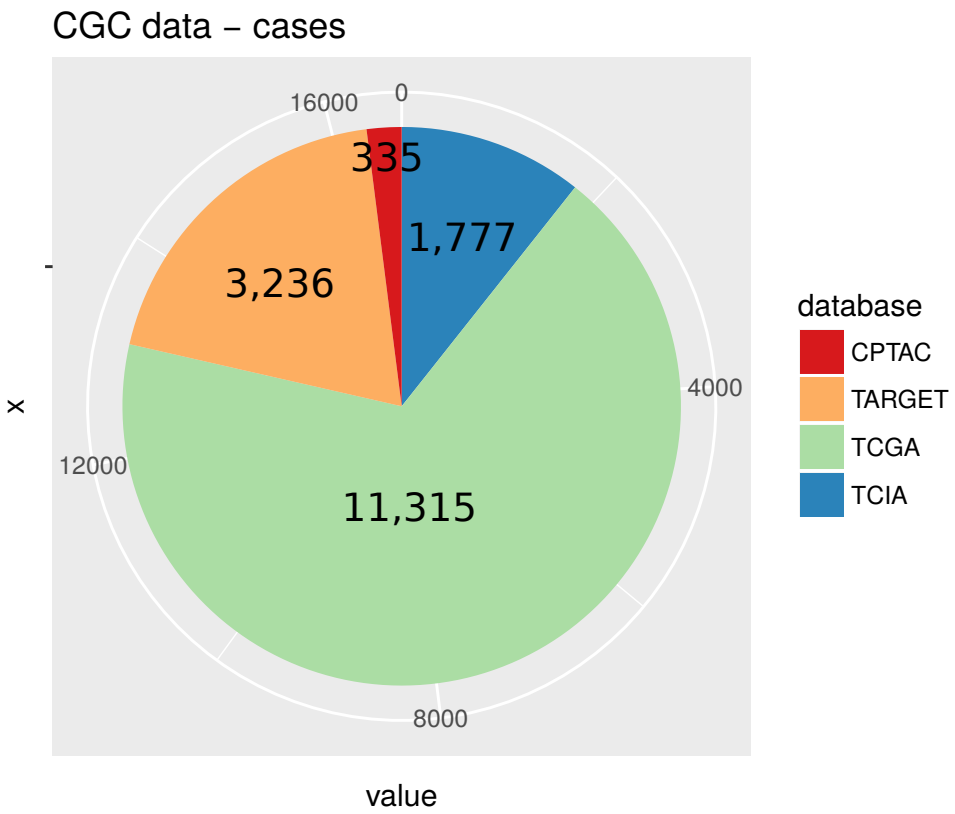
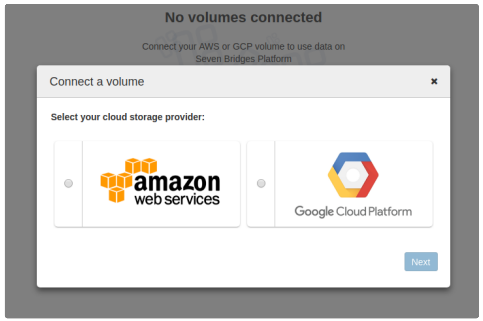


+ AWS or GCP cloud volumes



+ local data

- CGC web interface Uploader
- CGC command line uploader
- CGC APIs

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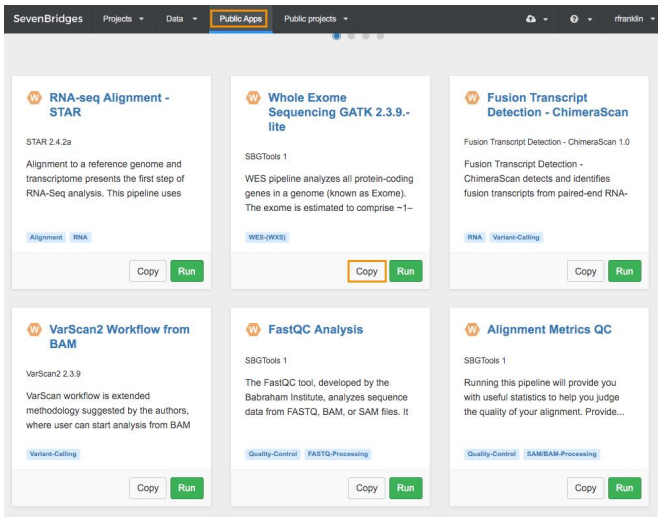
ANALYSES

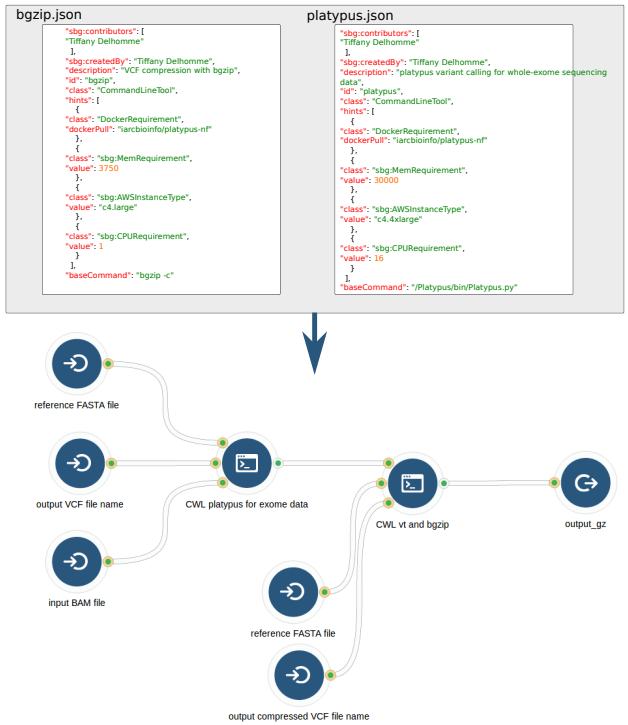
Public and private tools

- a **public app** can be used inside a project once copied, and then can be edited
- a **private app** should be defined in term of I/O
- a **workflow** is a chain of connected tools

PUBLIC TOOLS



PRIVATE TOOLS



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Analyses

Description of an analysis workflow

1. CWL tool description

bgzip.json


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    "class": "sbg:MemRequirement",
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platypus.json


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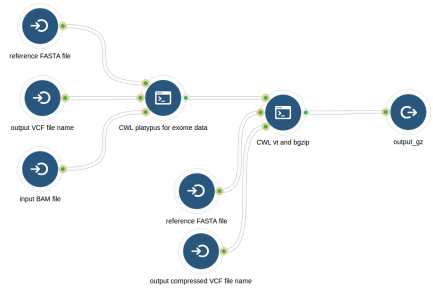
2. CGC workflow integration



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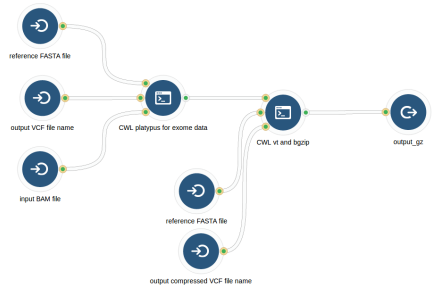
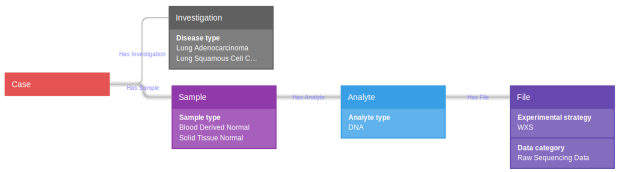


3. Querying data



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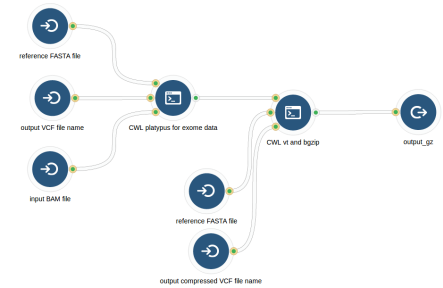
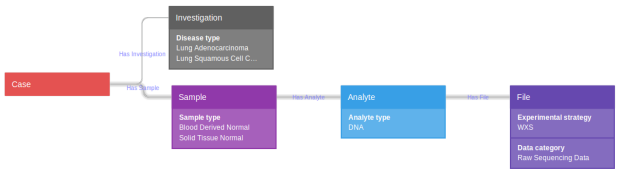
```

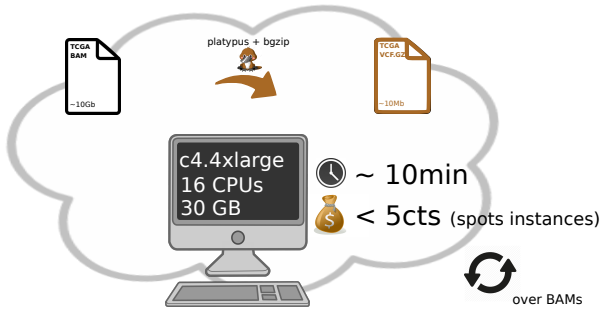

2. CGC workflow integration



3. Querying data



4. Running analyses

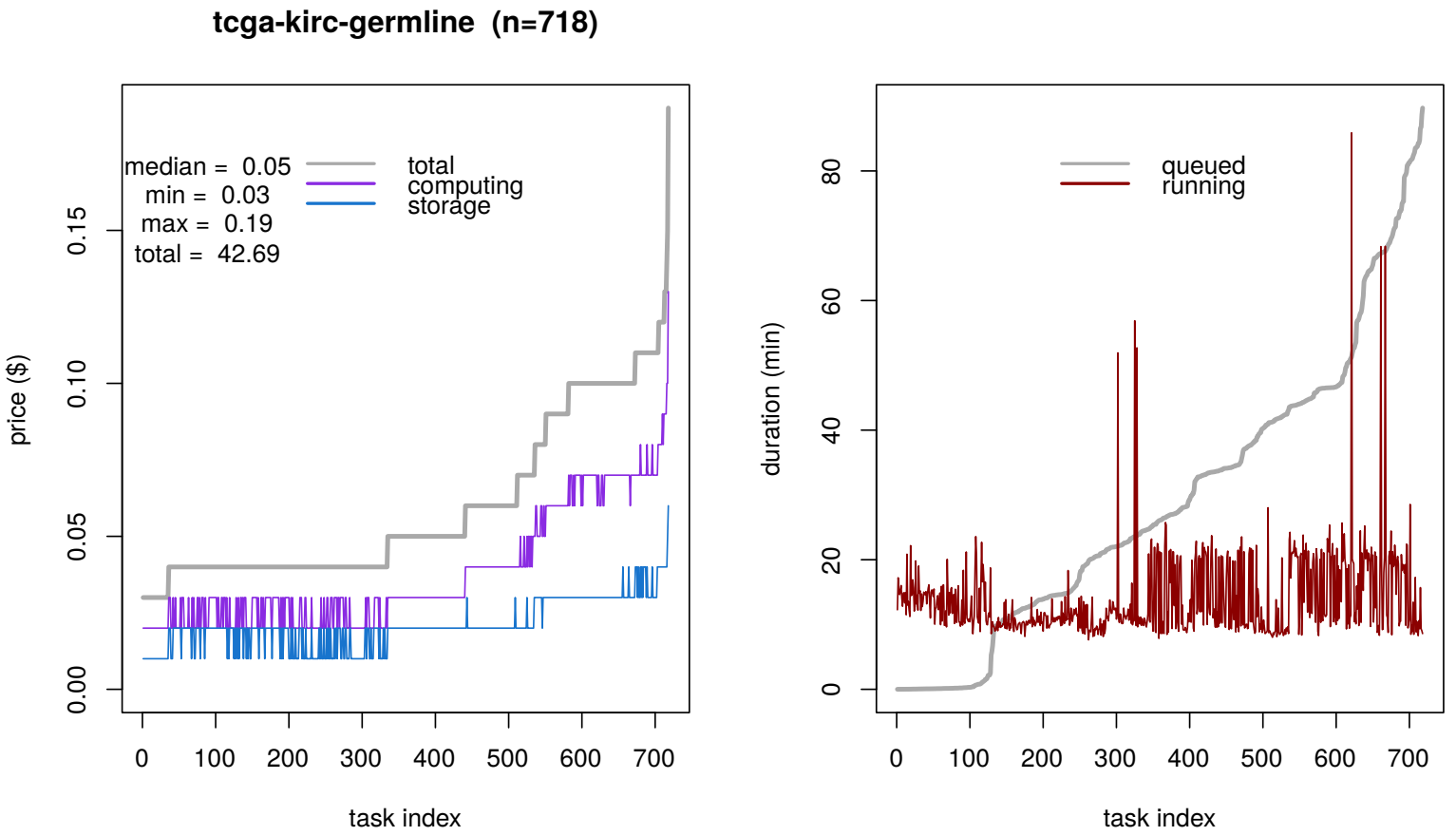


International Agency for Research on Cancer

World Health Organization

Analyses

example of task monitoring



International Agency for Research on Cancer

World Health Organization


Thank You