ESCAPE-NET standard operating procedure (SOP) for user and data management in BC|INSIGHT on the secure cloud

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1 BC|INSIGHT data and research management platform

The BC|INSIGHT data platform provided by BC Platforms is used for data management and statistical analyses of the shared data resources of ESCAPE-NET. The shared database platform has been provided as a deliverable of WP3.

Both the WP2 and WP3 teams have been collaborated to build a secure data management and analysis platform where only authorized users of the ESCAPE-NET project are allowed to use data without risk of either unauthorized changes or unauthorized utilization of the shared data resources.

The ESCAPE-NET data and research management platform and the surrounding analysis environment (Jupyter Hub) is located on a private secure cloud hosted on Computerome, the Danish National Supercomputer for Life Sciences. The cloud is accessible via a jumphost (VMWare Horizon) with 2 factor authentication. The cloud is network isolated, meaning that data can only get in or out of the cloud by the help of the data manager and dedicated Computerome personnel. Data management functionalities are restricted inside the cloud. This means users are not able to download result files, graphs and metadata derived from research data without control of the database administrators.

This standard operating procedure (SOP) document is created to provide necessary information for the ESCAPE-NET researcher to access and analyze the shared resources in BC|INSIGHT.

In addition to this SOP, please familiarize yourself with the user manual for BC|INSIGHT

- BCINSIGHT-Manual.pdf

found at https://escape-net.github.io/docs/documents/documents.html

Please visit https://escape-net.github.io/ for more information concerning the ESCAPE-NET data and research management platform.

2 User accounts

For the ESCAPE-NET data platform, users need to have user accounts for both Horizon (Secure Cloud) provided by Computerome and for BC|INSIGHT.

2.1 User profiles

In the ESCAPE-NET project three different user profiles are available (Table 2): Each BC|INSIGHT database needs to have a database owner for managing both user accounts and user permissions to datasets. The database owner account password is managed by BC support, but the account has been assigned to data manager of ESCAPE-NET. Both profiles of database administrator and researcher can be used for daily data management and analysis tasks, but database administrator can create new research user account and monitor system logs.

Table 2. ESCAPE-NET user profiles used in BC|INSIGHT.

User Profiles in in the ESCAPE-NET project	Description
Database owner	User management, dataset permissions
Database administrator	Tool for user account creations, monitoring the logs, data management and analysis tools
Researcher	Data management and analysis tools

2.2 Applying for the user account for both the secure cloud and BC|INSIGHT

1. When you apply for a user account with a profile of "researcher" send an email to:
   1.1. The database team (escapenet.rigshospitalet@regionh.dk)
   1.2. cc Jacob Tfelt (jacob.tfelt@regionh.dk) and Hanno Tan (h.l.tan@amc.uva.nl)
   1.3. with information of your:
      1.3.1. Full name
      1.3.2. Affiliation as specified in the ESCAPE-NET proposal
      1.3.3. E-mail
      1.3.4. Mobile phone number with the country code
      1.3.5. cc your PI assigned with the ESCAPE-NET project
2. When your user request has been approved, you will receive two welcome emails with your credentials:
   2.1. one from the Computerome team <computerome@dtu.dk> and
   2.2. one from the ESCAPE-NET database team.

2.3 Login to Computerome's secure cloud desktop and BC|INSIGHT

In order to get access to the cloud you have to login to an environment called Horizon.

Here's the instructions on how to access BC|INSIGHT on Computerome's Secure Cloud CLD032 desktop:

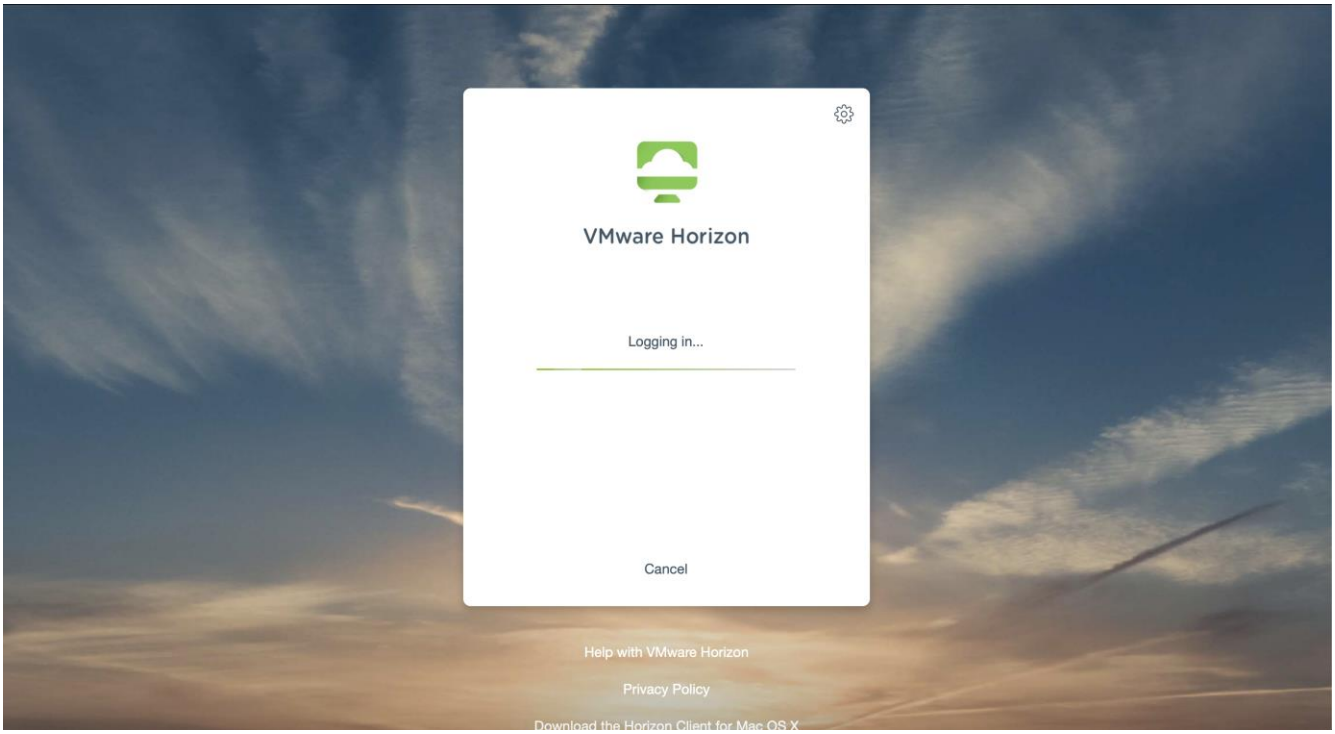
2.3.1 Login to Computerome's secure cloud desktop (Horizon)

Computerome 2.0 requires two-factor authentication for access:

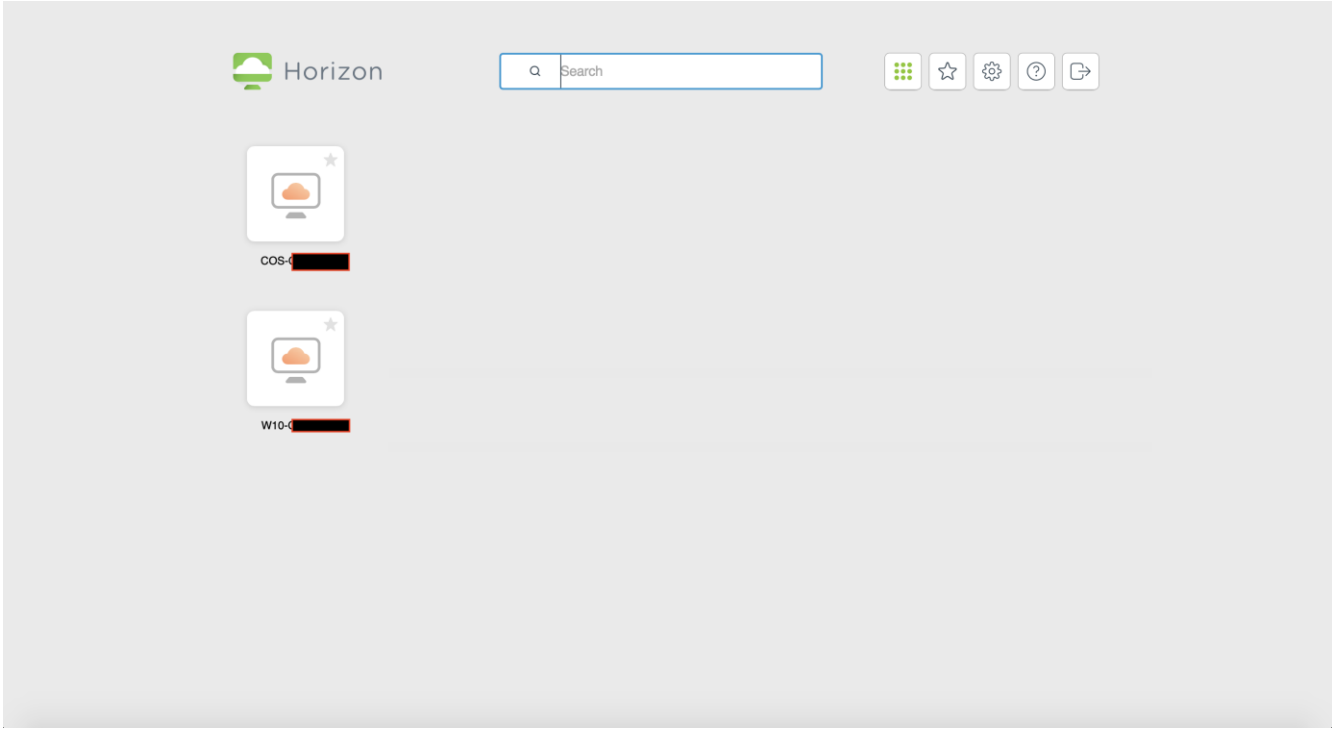
- User name is sent to you in email from <computerome@dtu.dk>.
- For first factor authentication, use the temporary password sent to you in SMS. Change it at first login
- For second factor authentication, use:
  - Either the passcode sent to you in SMS (the default option)
  - Or install the Entrust IdentityGuard soft token on your mobile.

1. For the latter option, set up the Entrust IdentityGuard soft token as described here! https://www.computerome.dk/display/C2W/Two-factor+authentication
2. Navigate to https://spc.computerome.dk
3. Type your username and password sent by the Computerome team

4. If you have Entrust activated on your smart phone, after entering your username and password you will see the page below. You will receive a push notification on your Entrust application on your smart phone and if you confirm it in less than 30 seconds you will see our Virtual Desktops, otherwise you will have to login again.



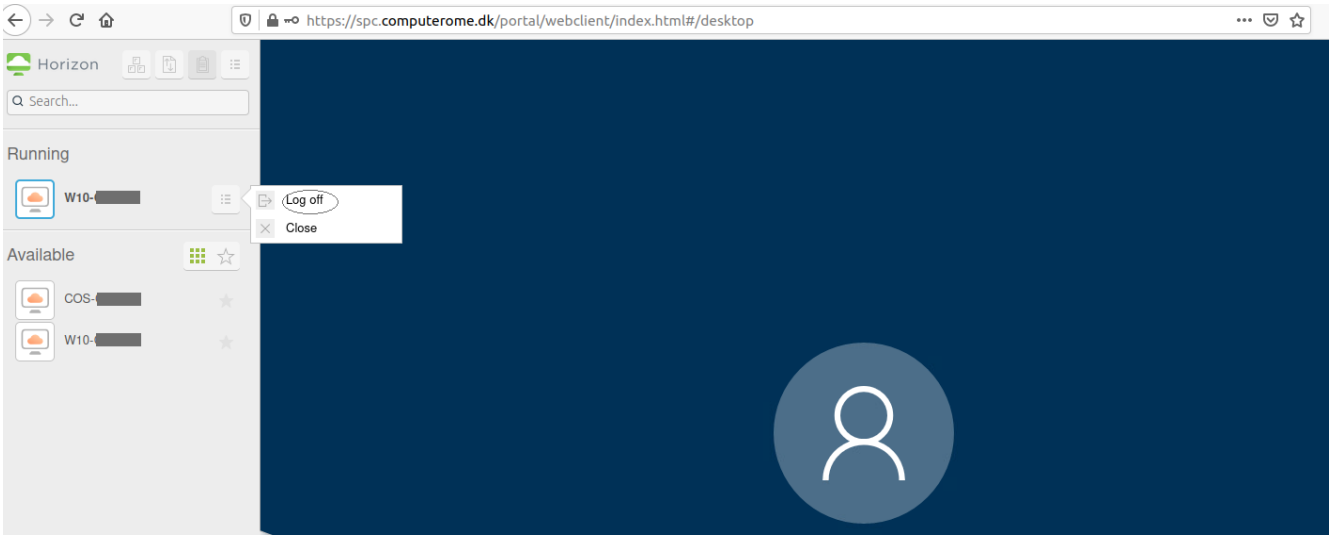
5. After approving your credentials by the 2 factor authentication you will see the below page which shows our 2 Virtual Desktops, one of them is COS-<cloud number> and another one is W10-<cloud number>, COS is a CentOS virtual desktop and W10 is Windows 10 virtual desktop and you will have the same access from both of them.



6. Double click on the preferred virtual desktop and you will be redirected into your virtual desktop.

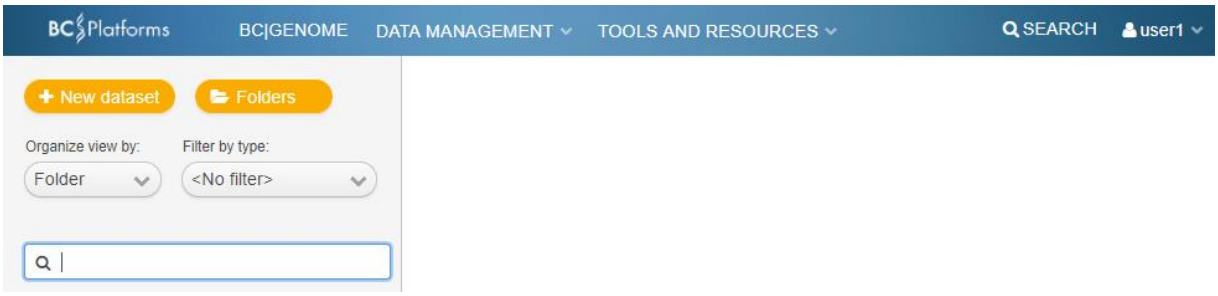
2.3.2 Log out of Computerome's secure cloud desktop

Currently there is a possibility of having 10 concurrent sessions on our virtual desktops at the same time. This means if there are 10 users connected to Horizon, the 11th person should wait until one of the other users log out. You can close the Horizon in two ways – "log off" or "close". When you "close" you are actually not closing your session and if you open your session again before 2 weeks you will get into the same session that you had with all your windows open. In order to ensure that new sessions can be established, please "log off" when you are finishing a session:



2.3.3 Login to BC|INSIGHT and changing your password

1. On the virtual Desktop open the Firefox Web browser
2. Type URL: https://escape-net/bcapp/
3. Type your username and password provided by the database team, and click Log In
4. You will enter the BC|INSIGHT dataset navigator.
5. Go to <userID> / Administration on the top right of your browser page



6. On the Profile page click the Edit button to change your password
   6.1. Password must have 7 - 32 characters in a combination of upper (A-Z) and lower case letters (a-z) and numbers 0-9 (obs! special characters are not supported)
7. Press Save

3 Working in BC|INSIGHT

BC|INSIGHT is a data and research management platform.

When user opens the BC|INSIGHT application, the landing page is organized into roughly three parts. The top contains the application menus for navigating between different apps, and to access user manuals and other resources. The left-hand side serves as the main navigation area, with tree structure for datasets or other data objects, search and filtering tools. The largest area provides various views into the BC|INSIGHT Data Warehouse, depending on what kind of navigation mode is being used, and what user has selected. The core of BC|INSIGHT is the data navigator that can be used to search for datasets you have permissions to (either read or read/write). In addition, each user with either the database administrator or researcher profile can create their own datasets and subsets. In our Secure Cloud all data exports have been restricted inside the secure cloud desktop thus you need to ask for data transfer service from the database team (escapenet.rigshospitalet@regionh.dk), for more information, please see chapter 4.2.

3.1 BC|INSIGHT user guide

Table 3 below refers to BC|INSIGHTS's PDF documentation that provides information about the basic usage of the BC|INSIGHT tools. All users are recommended to refer to the BC|INSIGTH document entitled BCINSIGHT Manual.pdf for introduction.

Table 3. Key functionalities in BC|INSIGHT and reference to BCINSIGHT Manual.pdf

Functions in BC|INSIGHT	Chapter in the user guide
Dataset navigator	2.2. Data Navigator
Dataset creation	3.4. Creating a dataset
Filtering and joining data	3.5 Creating subsets
Data upload	3.6. Uploading data
Result folder	4.4. Analysis results
Plink Analysis	6.3 PLINK analysis

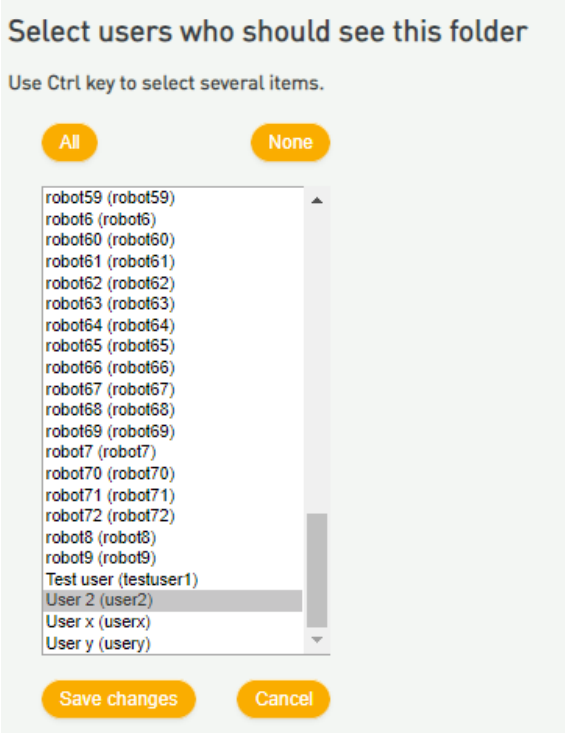
3.2 Downloading results from the secure cloud

Due to the secure cloud environment users of BC|INSIGHT and Jupyter are not able to transfer any analysis results, metadata information or charts from the server without authorization from the WP2 team. Please confer to the *Instructions for export of analysis results from the ESCAPE-NET server*, found at https://escape-net.github.io/docs/documents/documents.html

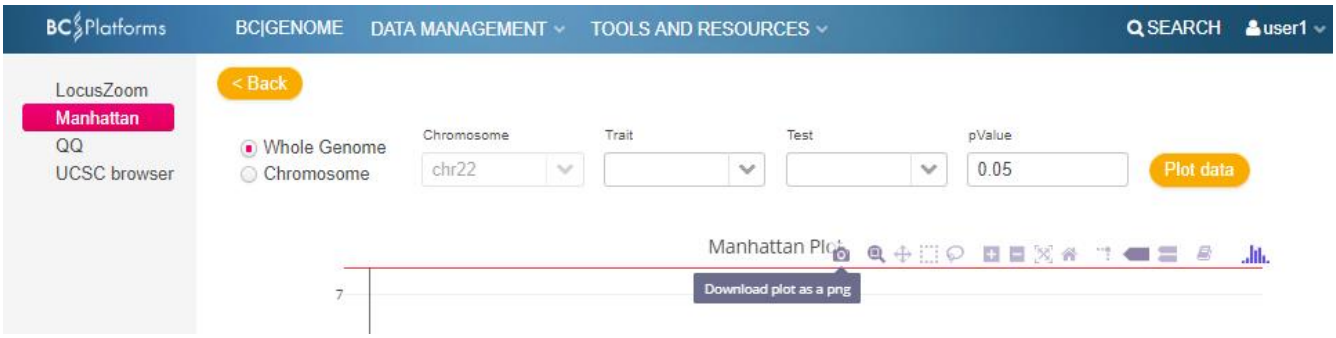
3.2.1 Instructions for researchers working in BC|INSIGHT

Here are the instructions for sharing your result and chart files to be downloaded from BC|INSIGHT by data manager of the ESCAPE-NET project. The instructions can also be applied for sharing results and graphs inside BC|INSIGHT with your colleagues.

1. Sharing a result file
   1.1. Navigate to DATA MANAGEMENT > RESULT ARCHIVE and identify your job folder
   1.2. Click the small green dot next to your result file line found in the Share column
   1.3. Select the data manager's user account and press Save changes



   1.4. After sharing your file(s) you can see the shared icon on your result file row
   1.5. Contact database team (escapenet.rigshospitalet@regionh.dk) with your user name and jobID information so that they know to ship the files to you.
2. Sharing chart files:
   2.1. Either in the a) job folder of DATA MANAGEMENT > RESULT ARCHIVE, or using the b) Charts tools in the DATA tab for your association result dataset (see the screenshot below), or in the c) VISUALIZATION tab you can export (download) charts and graphs

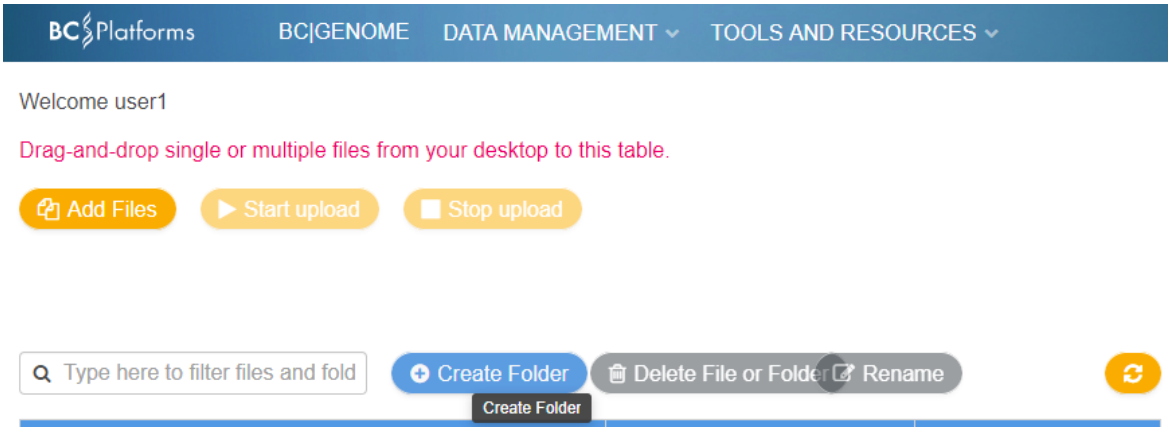


2.2. Download a file onto your Virtual Desktop. **Please be aware that files will be deleted from the virtual desktop on a regular basis and you should not store any results here**.

2.3. Navigate to TOOLS AND RESOURCES > FILE TRANSFER

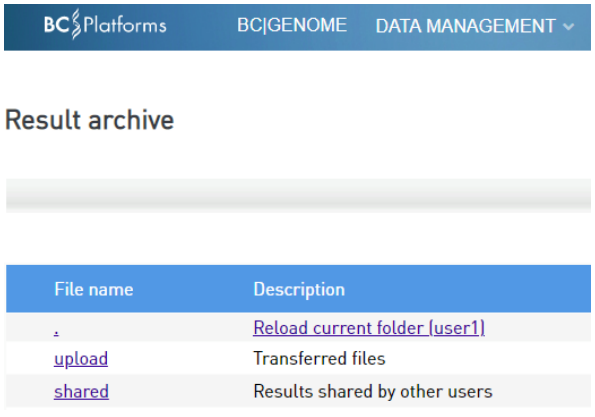
2.4. Use the Create Folder button for creating a folder with a descriptive name and date information as shown below

2.5. Click the newly created folder active before using the Add Files button (or Drag and drop files)

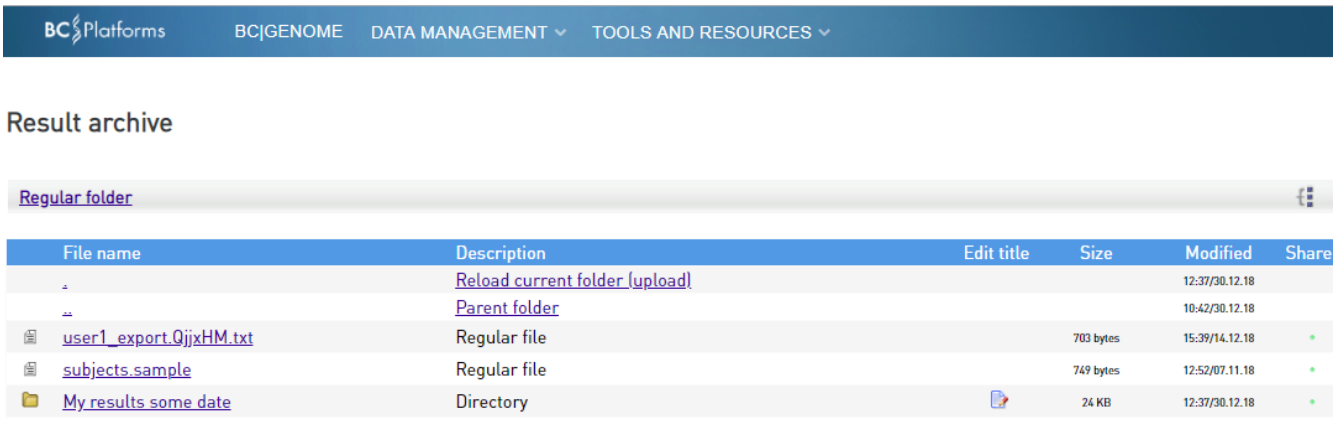


2.6. Navigate to DATA MANAGEMENT > RESULT ARCHIVE for sharing the folder with the data manager

2.6.1. Click the Upload folder open



2.6.2. In the upload folder click the share icon to share the folder with your data manager (skonig) and press the Save changes button



2.6.3. After sharing your file(s) you can see a shared icon in your folder

2.6.4. Contact database team (escapenet.rigshospitalet@regionh.dk) with your user name and folder information.

3.2.2 Instructions for researchers working in Jupyter Notebooks or RStudio

Please confer to the Instructions for export of analysis results from the ESCAPE-NET server, found at https://escape-net.github.io/docs/documents/documents.html before requesting export.

1. Contact database team (escapenet.rigshospitalet@regionh.dk) with names of the file(s) that you would like to be exported.

4 Jupyter Hub application

Jupyter Notebook is an operating environment for running blocks of scripts in a web-based graphical user interface, embedded with Markdown cells to create a live document.

Jupyter Notebook is a very popular tool amongst Data Scientists, Bioinformaticians and Statisticians, as it provides an interactive environment for organizing script-based workflows and work, and allows the authors to include user-friendly HTML commentary, mathematical formulae, etc.

For an overview of the notebook document structure and use, please see https://jupyter-notebook.readthedocs.io/en/stable/notebook.html#notebook-user-interface.

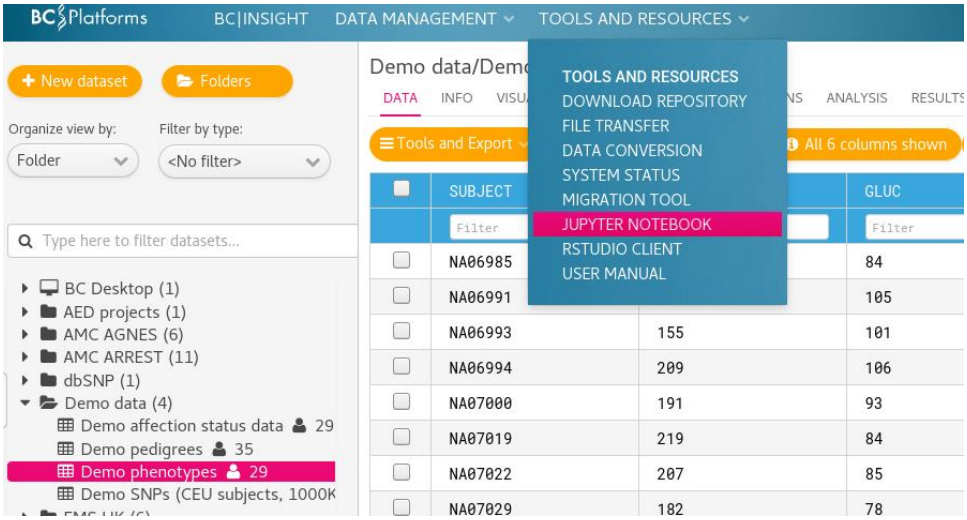
4.1 Integration to BC|INSIGHT

Jupyter Hub is a service that authenticates and authorizes users to use Jupyter Notebooks on the BC|INSIGHT platform. The Hub coordinates generation and management of user notebook servers, each of which lives in their own Docker instance. The Docker instances provide references to user's own files on the BC|INSIGHT

filesystem, like uploaded files, and results from analyses. The Docker space protects the BC|INSIGHT application server from accidental misuse and runaway scripts.

4.2 Accessing the Jupyter Application

1. Login to BC|INSIGHT as described in 3.3.3
2. Click on TOOLS AND RESOURCES and choose JUPYTER NOTEBOOK



3. To create a new notebook, click on the “new” menu in the top right and select you preferred language (e.g., R or SAS)

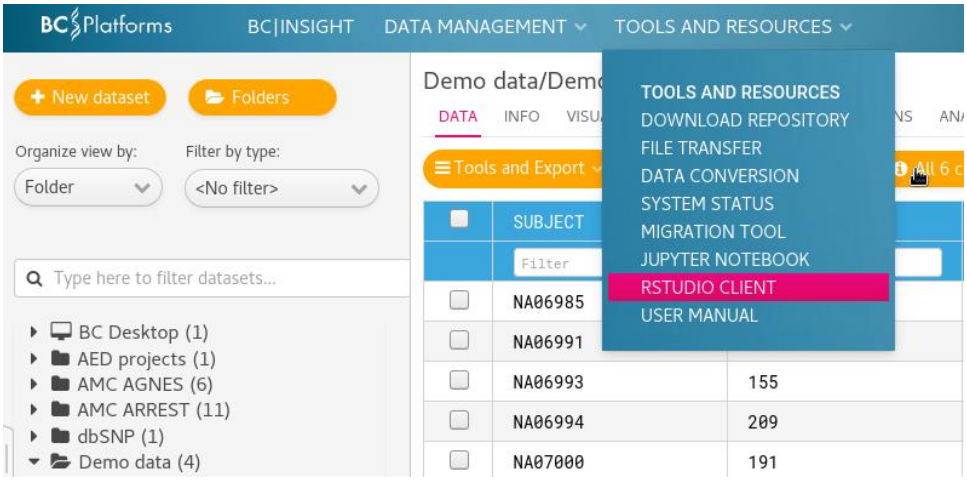
5 RStudio Client

RStudio is an integrated development environment for R, with a console, syntax-highlighting editor that supports direct code execution, and tools for plotting, history, debugging and workspace management.

The RSstudio sessions are coordinated by Jupyter Hub, meaning that authentication and authorization follows the same principles as for the Jupyter Notebooks.

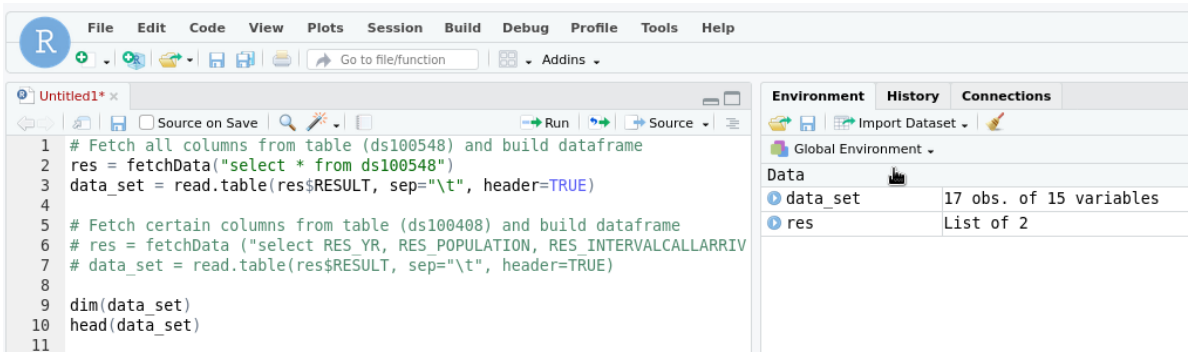
5.1 Accessing the RStudio Client

1. Login to BC|INSIGHT as described in 3.3.3
2. Click on TOOLS AND RESOURCES and choose RSTUDIO CLIENT



From the RStudio Client, user's can access their own files on the BC|INSIGHT filesystem, like uploaded files, and results from analyses (bcos_results folder).

To import data tables from the database, use the r package 'bcjupyterimport'. Only datasets that you have been granted access to, can be imported. See https://escape-net.github.io/docs/jupyter/importing_r.html



Revision history

- Draft Dec 31, 2018, PTK
- Version Jan 21, 2019, PTK
- Version Jan 29, 2019, SK
- Version Oct 18, 2019, SK
- Version April 27, 2020 SK
- Version March, 2021 SK
- Version April, 2021 SK

- Version December, 2021 SK