

Navigating the CAIR internal environment – Command Line Method

The following guide describes how to open the Terminal window and log in to Sched1, login1 and login2 to navigate CAIR's file management system (LSF) using a command line interface. The instructions are broken down by Operating System (Linux, Mac or Windows).

Logging in - Windows Operating System

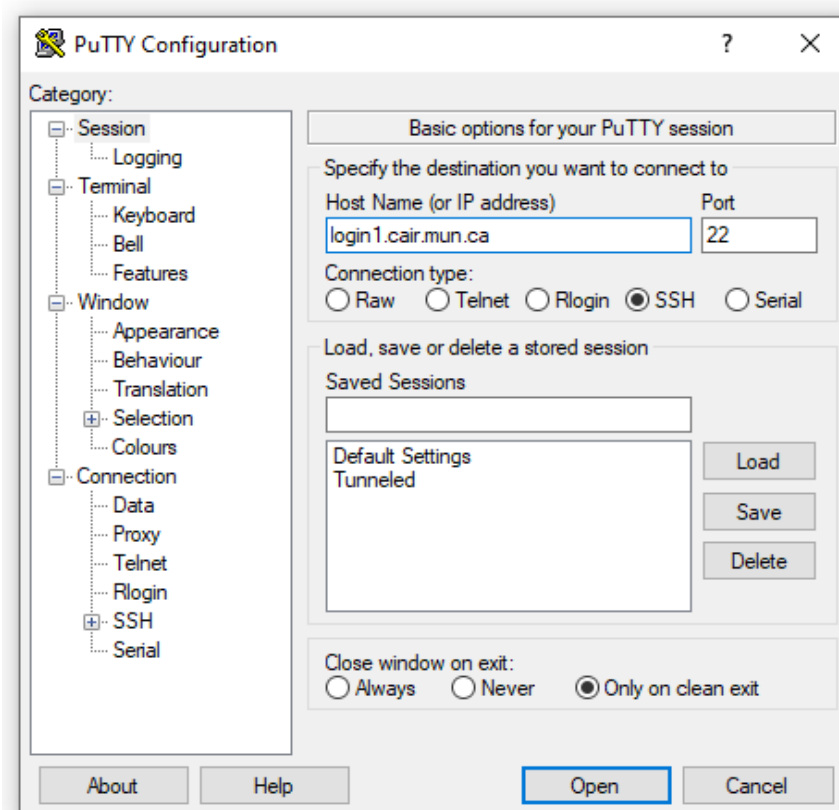
Please note: To login to the CAIR computing environment using the command line, an Open SSH client is required if you do not already have one. One such program is called PuTTY:

[Download PuTTY - a free SSH and telnet client for Windows](#)

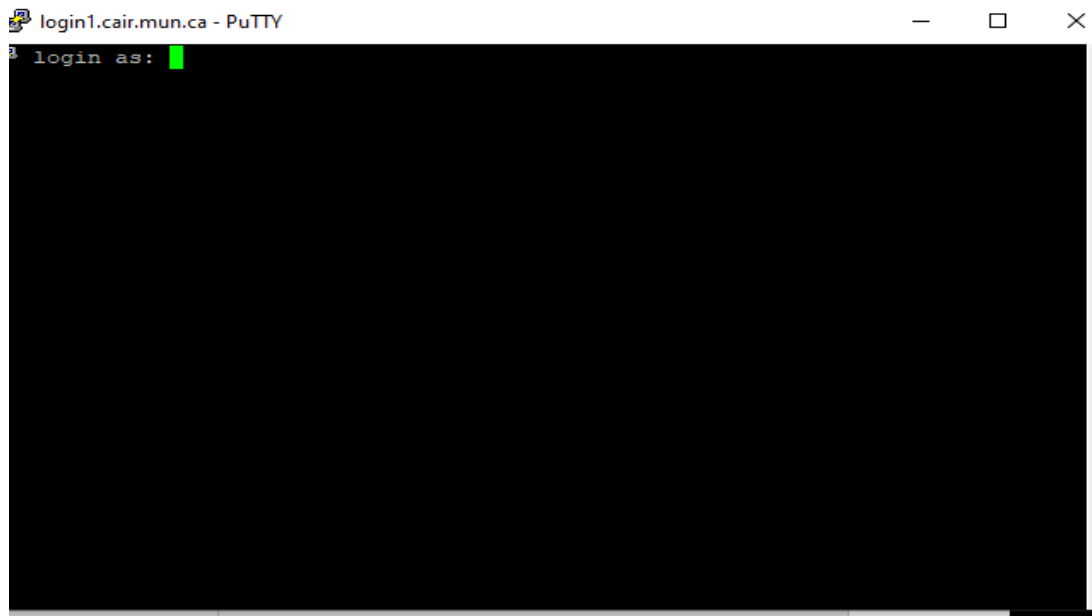
Please be sure to download the latest version, which is normally the first link listed under "For Windows on Intel x86"

Click on putty.exe. Click "Save File". PuTTY is now found in your Downloads.

1. Open PuTTY and type login1.cair.mun.ca or login2.cair.mun.ca for Host Name (or IP Address) of the resource you want to use. Enter 22 under Port to begin ssh session. In the below example we are logging into login1.cair.mun.ca



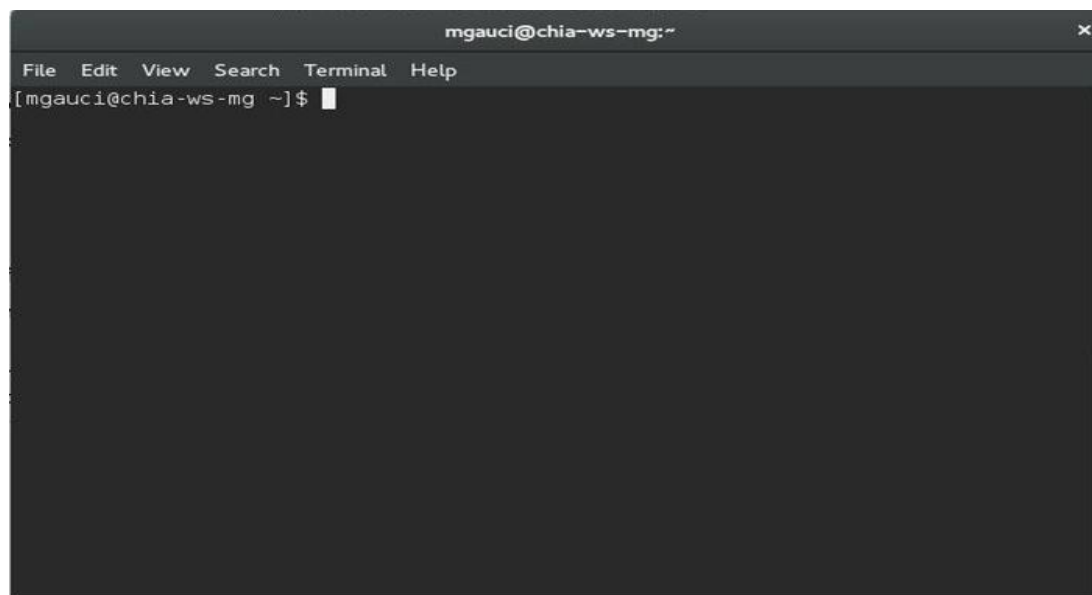
2. Click open. You should now see this screen:



3. Enter your Username at the login and hit Enter. Then type your password and Enter (your password may not appear on screen as you type but if entered correctly will still work).
4. You should now be logged in to login1 and can type in your desired commands.
5. To end your ssh session, type logout at the prompt and hit enter.

Logging in – Linux or MAC OS

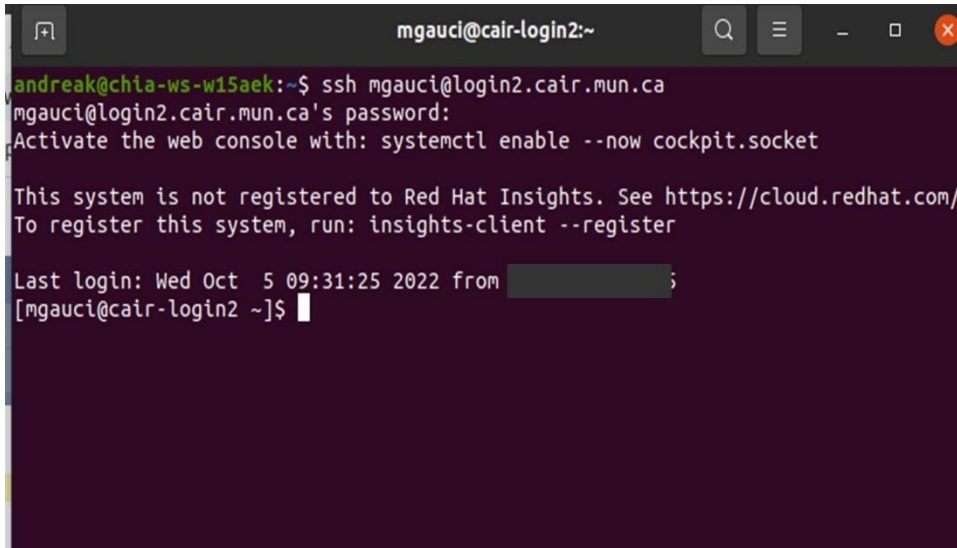
1. Open a terminal window



Type `ssh username@login1.cair.mun.ca` or `ssh username@login2.cair.mun.ca`

2. The user will be asked for their password.

3. Upon entering the correct password, the user's terminal window will show which node they are logged into. Below is an example of a login to login2.cair.mun.ca



```
mgauci@cair-login2:~  
andreak@ch1a-ws-w15aek:~$ ssh mgauci@login2.cair.mun.ca  
mgauci@login2.cair.mun.ca's password:  
Activate the web console with: systemctl enable --now cockpit.socket  
  
This system is not registered to Red Hat Insights. See https://cloud.redhat.com/  
To register this system, run: insights-client --register  
  
Last login: Wed Oct 5 09:31:25 2022 from [REDACTED]  
[mgauci@cair-login2 ~]$
```

Transferring a job to LSF – command line method

Before submitting a job to LSF, you must first upload the required file to your user directory. Using terminal window or PuTTY

1. Type `scp filepath/filename username@server`.
Example: `scp Documents/testdata.bash username@login1.cair.mun.ca:`
2. Enter your password when prompted

Submit Jobs and Navigate LSF – command line method

The following instructions describes how to submit jobs and navigate around to CAIR's file management system (LSF) using the Terminal Window or PuTTY.

1. Open terminal window
2. Type `ssh username@login1.cair.mun.ca` or `ssh username@login2.cair.mun.ca`
3. Enter your password as prompted
4. The following are the main job submission and control commands you need to know for using LSF in command:
 - `bsub [options] command [cmdargs]` (common `bsub` options are `-J` to name the job, `-q` to submit job to specified queue, `-n` for number of CPUs needed for the job, `-cwd dir-path` specifies the current working directory for the job, `-i filename` to use standard file as standard input for job, `-l` submits an interactive batch. *All options associated with `bsub` can be viewed by typing `man bsub` on the command line.*)
 - `bjobs [-a][-J jobname][-u usergroup|-u all][...] jobID`
 - `bhist [-a][-J jobname][-u usergroup|-u all][...] jobID`

- bbot/btop [jobID | "jobID[index_list]"] [position]
- bkill [-J jobname] [-m] [-u] [-q] [-s signalvalue]
- bmod [bsub_options] jobID
- bpeek [-f] jobID
- bstop/bresume jobID
- bswitch destination_queue jobID

5. The following example submits a job called 'jobname' to the normal queue using 4 CPUs in the current working directory of jobname. /my_job_launcher.sh:

```
bsub -J `jobname` -q normal -n 4 -cwd `jobname` ./my_job_launcher.sh
```

6. Once a job has been created you should see something like this:

- Job <4>, Job Name </gpfs/home/username/regression/chip1>, User <username>
Project <default>, Status <RUN>, Queue <normal>,
Command <./my_job_launcher.sh>
Thu Mar 1 17:48:43: Submitted from host <cair-sched1>,
CWD </gpfs/home/username/regression/chip1>;

```
Thu Mar 1 17:51:55: Started on <cair-cair->,  
Execution Home </home/username>,  
Execution CWD </gpfs/home/username/regression/chip1> ;  
Thu Mar 1 17:52:12: Resource usage collected.  
MEM: 2 Mbytes; SWAP: 5 Mbyt
```

7. To terminate a job type bkill. To terminate all jobs of the current user: bkill -b 0

8. The bjobs command displays information about pending, running and suspended jobs. To view all jobs use bjobs -a. To see pending jobs type bjobs -p. For running jobs use bsub -r. To see jobs for a specific use type bjobs -u *user_name*.

Further information on options for the bsub command can be viewed by typing man bjobs on command line interface.

9. An example of the type of information displayed from the command bjobs -u all -a:

JOBID	USER	STAT	QUEUE	FROM_HOST	EXEC_HOST	JOB_NAME	SUBMIT_TIME
1233	test1	DONE	normal	mac1	mainmac	testjob	Feb 27 10:00
1234	test1	RUN	priority	mac1	mainmac	logger	Feb 27 10:00
1235	test2	PEND	normal	win2		ranalysis	Feb 27 10:03
1236	test	PEND	night	win2		jobname	Feb 27 10:06
1237	test3	RUN	GPU	cair-sched1			

For more information on working with Jobs in LSF please refer to this document:

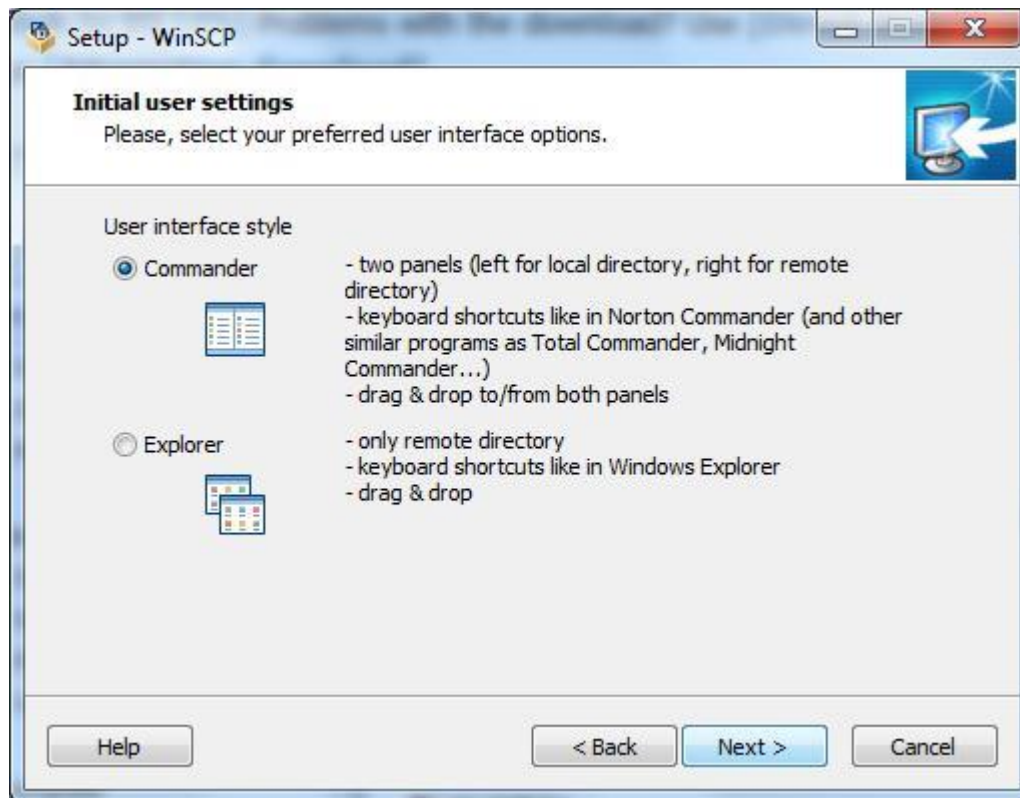
https://www.bsc.es/support/LSF/9.1.2/lfs_users_guide/index.htm?clusters_jobs_about.html~main

Uploading Files to the CAIR computing environment using transfer client

1. Download a sftp program such as WinSCP (download link: <https://winscp.net/eng/download.php#download2>)
2. Download the version nearest the top of the page.
3. Follow the Setup Wizard Instructions. Select "Typical installation."

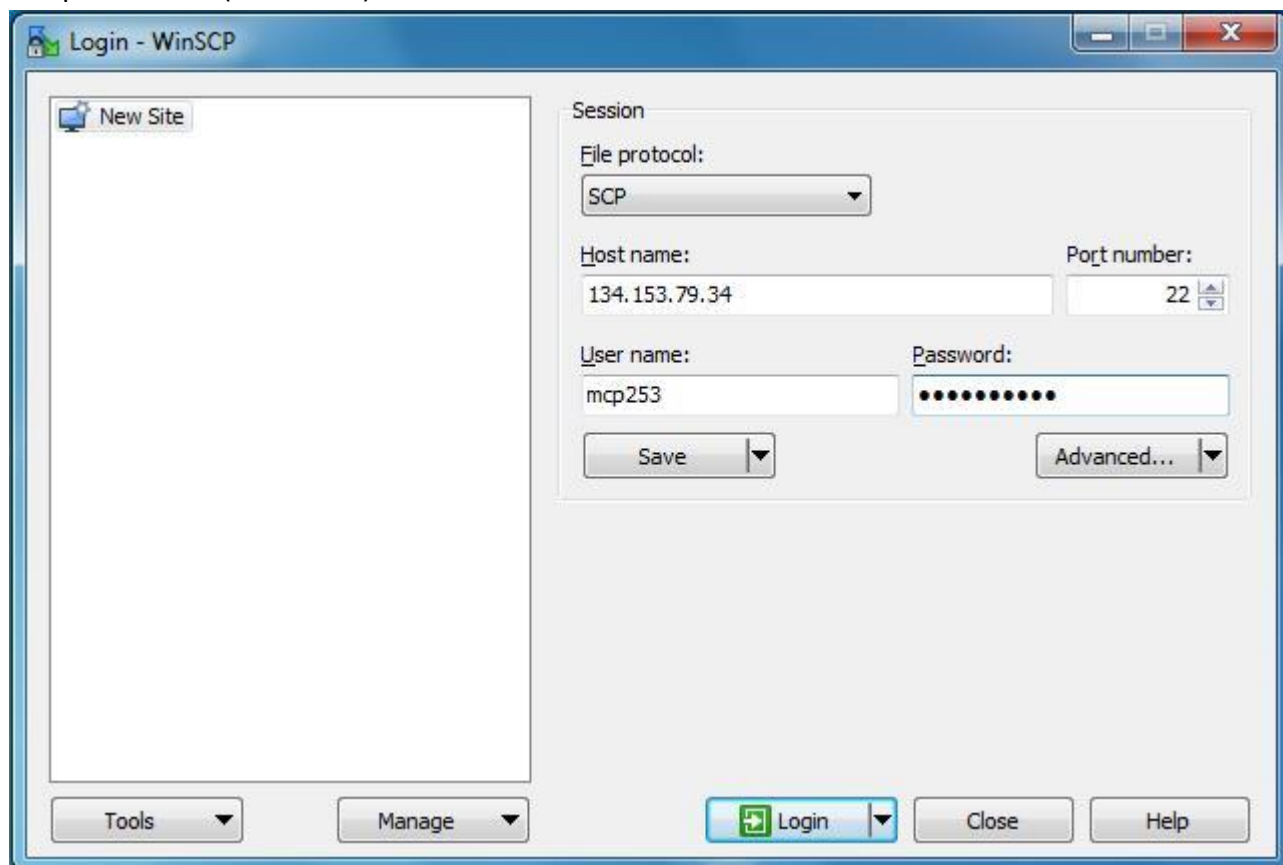


4. Select "Commander" for User interface style. Complete the installation



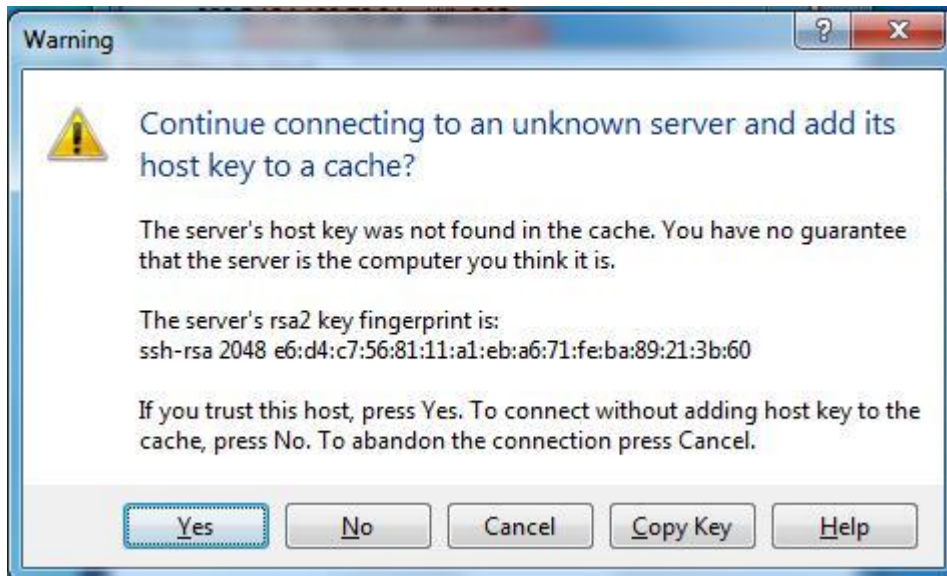
5. Open WinSCP

6. Click on New Site and enter Host name (134.153.79.34), user name and password. Choose SCP from the File protocol list (see below).

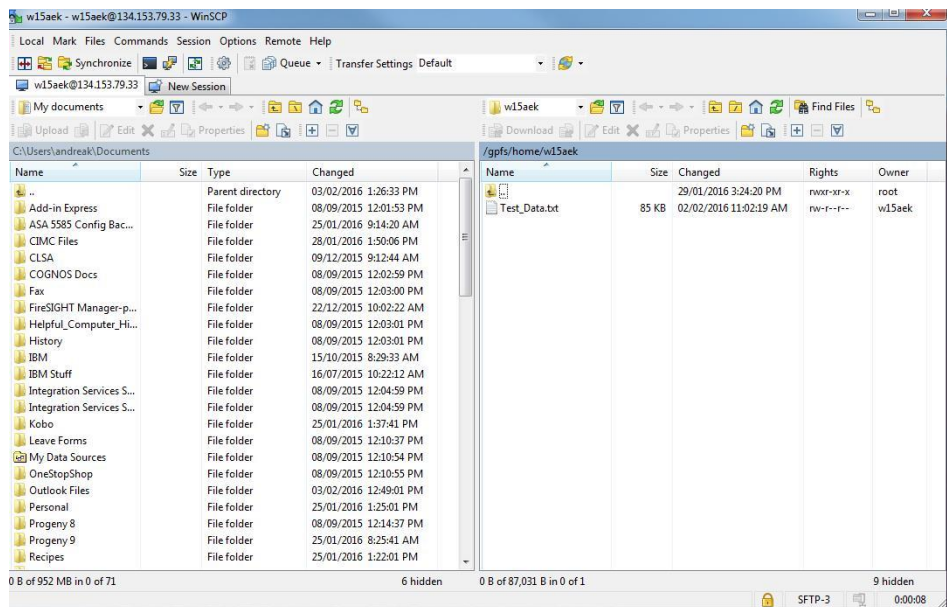


7. Click Login

You may see this warning message:



8. Click Yes. You should now see a screen similar to this:

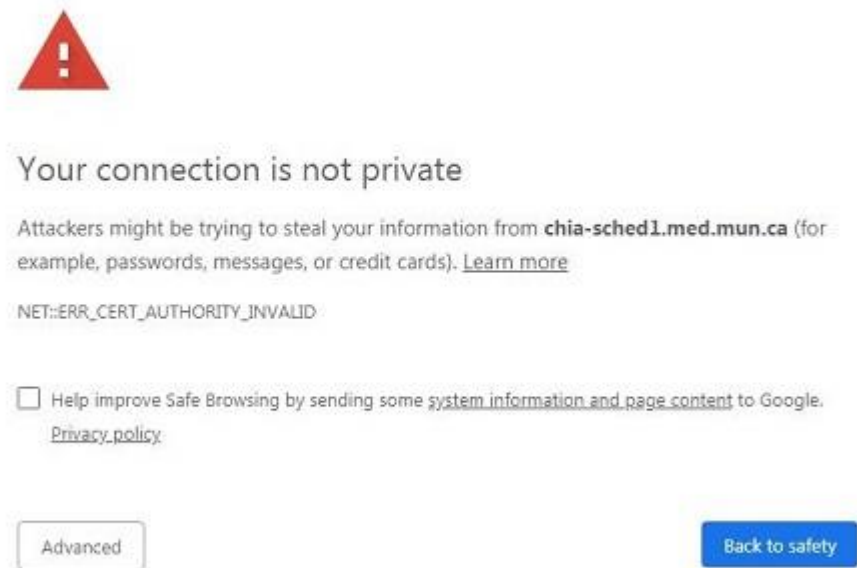


Find the file Size you need to upload on the left and drag it to your home directory on the right. This file should now appear in your /gfps/home/username directory

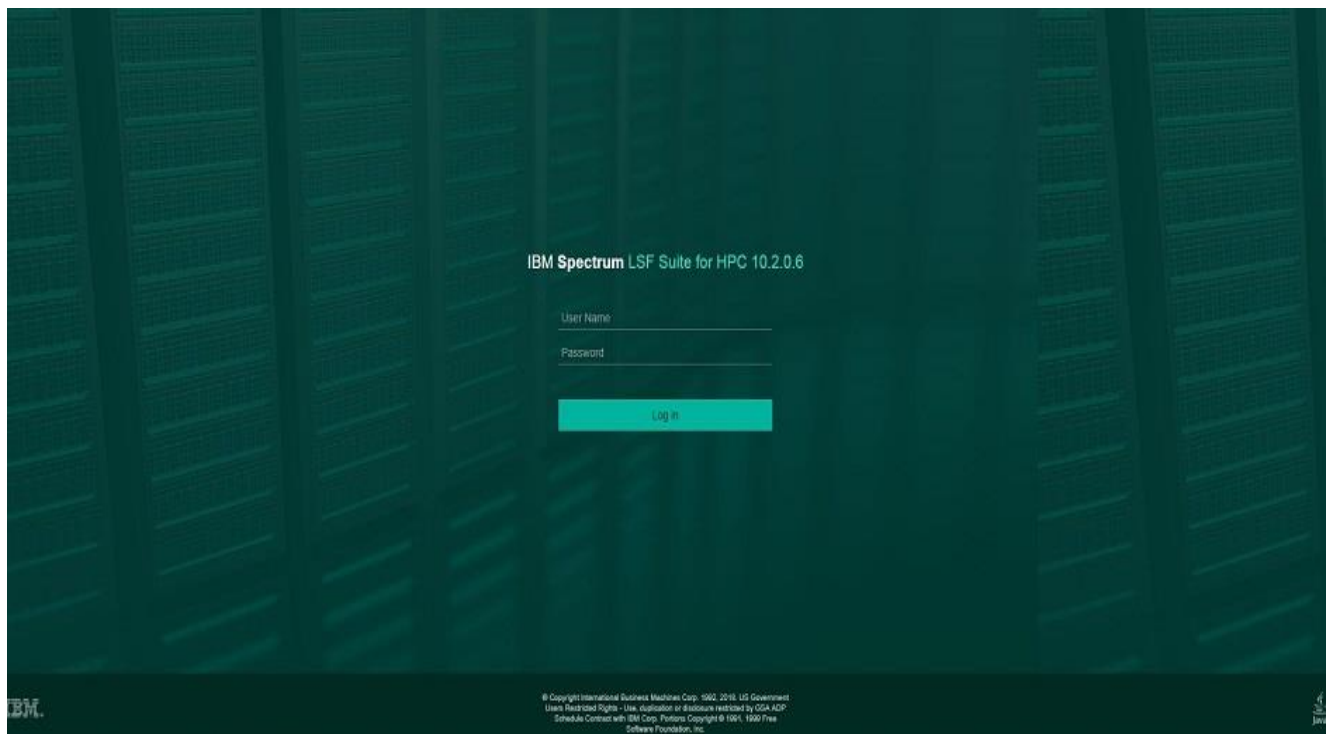
Navigating the CAIR internal environment – Web Method

The LSF web interface is an alternative way to submit jobs to the CAIR internal environment that does not require users to use the command line interface. This is the recommended interface for most users.

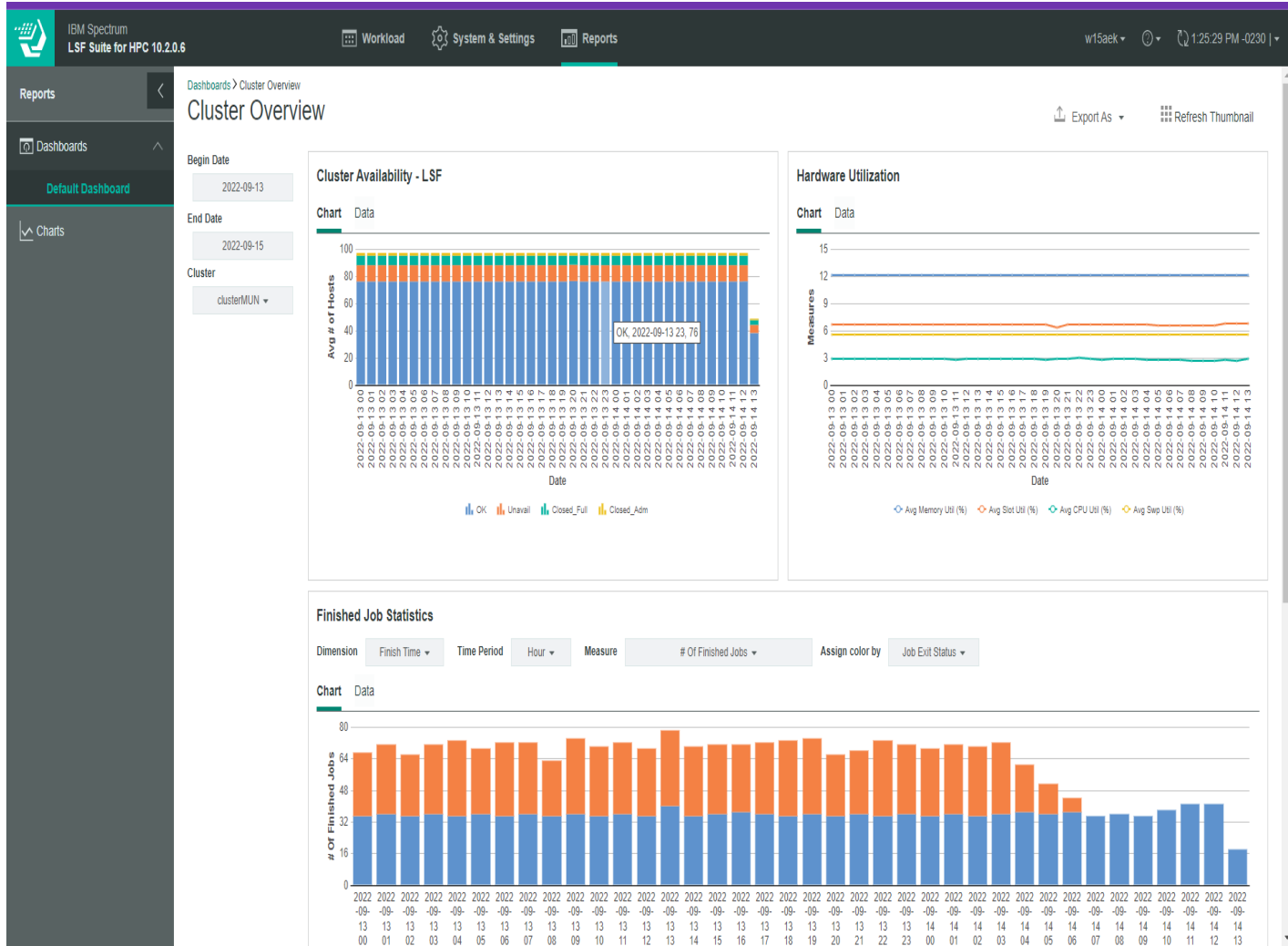
1. Open your browser and type in <https://sched1.cair.mun.ca>. If you get the following message (or something similar) please choose advanced tab and select the option to proceed to page or add exception, depending on browser used :



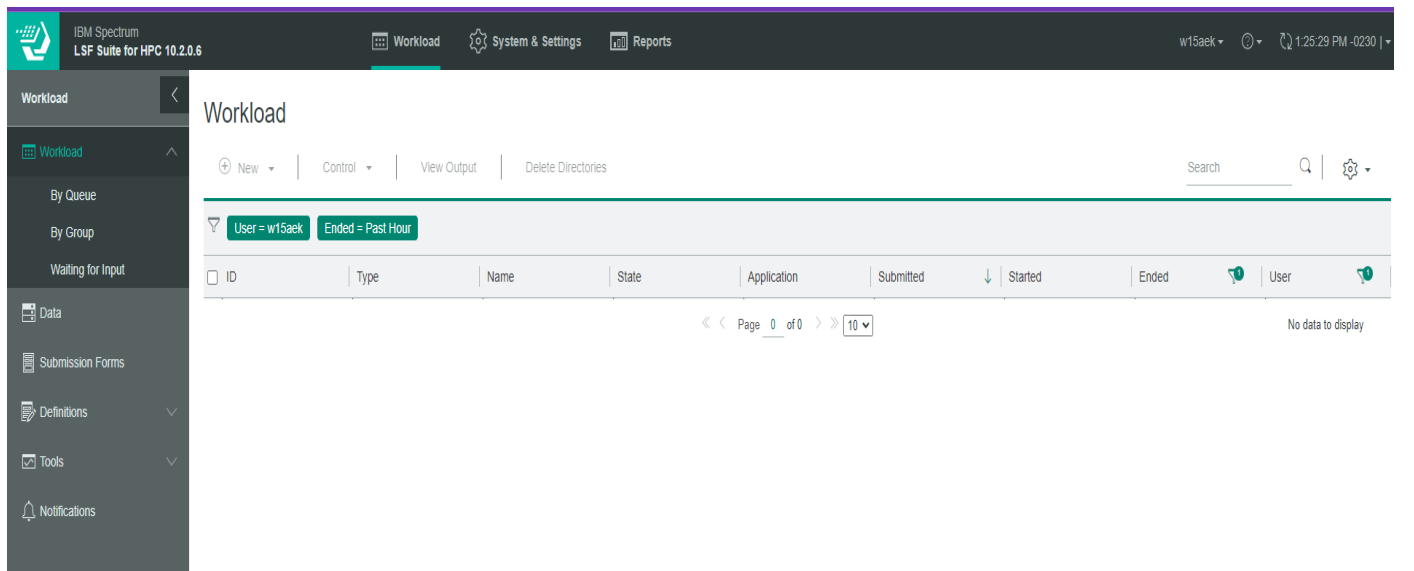
2. On the LSF login screen, enter your CAIR provided username and password and click Log In:



3. You should see a screen like this:



4. To view existing jobs, view data results, or to submit new data, please click the Workload icon at the top of the screen. The resulting screen will look like this:



5. The navigation menu on the left allows you to view existing submission under the Workload section, view any existing data on the cluster under the Data section, submit new data to the cluster using Submission Forms, etc.

IBM Spectrum
LSF Suite for HPC 10.2.0.6

Workload

Workload

By Queue
By Group
Waiting for Input

Data
Submission Forms
Definitions
Flow Definitions
Tools
Applications
Remote Consoles
Notifications

Workload

+ New | Control | View Output

No columns are filtered. Create filters from the column headers

ID	Type	Name
22	Flow	22
21	Flow	21
20	Flow	20
19	Flow	19
18	Flow	18
17	Flow	17
16	Flow	16
15	Flow	15
14	Flow	14
13	Flow	13

To Submit new data:

1. Having clicked Workload from the top Menu, select Submission Forms from the left menu, and a list of available forms for submitting various jobs will appear:

Workload

- Workload
 - By Queue
 - By Group
 - Waiting for Input
- Data
- Submission Forms**
- Definitions
 - Flow Definitions
- Tools
- Notifications

Submission Forms

Delete

Search

Name	Application	Flow Definition	Description	Owner
GATK_HaplotypeCaller	EXCME_ALIGNMENT	-	-	gwoodand
GATK_HaplotypeCaller_nod...	GATK_HaplotypeCaller_nodbsnp	-	-	-
gene_counter	Counting Genes in Range	-	-	gwoodand
genetic	generic	-	-	-
MPILEUP	mpileup	-	-	gwoodand
NGS_FILTERING_A	NGS_FILTERING	-	-	aiden
R	R	-	-	lsadmin
SAMTOOLS_jgT01	SAMTOOLS	-	-	-
sas_submission	sas	-	-	owayne
SINGLE_VARIANT_ANNOT...	SINGLE_VARIANT_ANNOTATION	-	-	aiden
Trigger_aiden	BWA_MEM	-	-	-
TVC	TVC	-	-	lsadmin
Variant_quality_filtering	VARIANTS_FILTERING_AND_A...	-	-	gwoodand
VARIANTS_FILTERING_AN...	NGS_FILTERING_A	-	-	lsadmin
vcf_annotate_fiber	vcf_annotate_fiber	-	-	gwoodand
vcf_in_process_template	VARIANTS_FILTERING_AND_A...	-	-	gwoodand
vcf_process_script	vcf_processing	-	-	gwoodand

2. Select the desired submission type and a job submission form will appear. For example, to submit data for SAS analysis, choose sas_submission by clicking on it.

The screenshot shows the IBM Spectrum LSF Suite for HPC 10.2.0.6 interface. The top navigation bar includes 'Workload', 'System & Settings', and 'Reports'. The left sidebar shows 'Workload' selected, with sub-options: 'By Queue', 'By Group', 'Waiting for Input', 'Data', 'Submission Forms', 'Definitions', 'Tools', 'Applications', 'Remote Consoles', and 'Notifications'. The main content area is titled 'Submission Form: sas_submission' and contains the following sections:

- Submission Forms** > sas_submission
- Application Parameters** (dropdown arrow)
- Cluster Parameters** (dropdown arrow)
- Application Data Files** (dropdown arrow)
 - Input file ***: Add Local File, Add Server File
 - Data Input File**: Add Local File, Add Server File
- Notification** (dropdown arrow)
 - Specify when you want to be notified about your job. The notifications are displayed in IBM Spectrum LSF Application Center Desktop Client and IBM Spectrum LSF mobile client.
 - Notify me:

At the bottom of the form are 'Submit' and 'Revert' buttons.

Choose the data file you wish to analyse either from your local computer (click Add Local File and browse to data location) or from a folder inside the CAIR cluster (click Add Server File and locate data). Click on Submit to begin.

3. To check the status of your job, click Workload on the left menu. All jobs will be listed with their status

The screenshot shows the 'Workload' page in the IBM Spectrum LSF Suite for HPC 10.2.0.6. The left sidebar contains navigation options: Workload, By Queue, By Group, Waiting for Input, Data, Submission Forms, Definitions, Flow Definitions, Tools, Applications, Remote Consoles, and Notifications. The main content area displays a table of jobs. The table has the following columns: ID, Type, Name, State, Application, Submitted, Started, Ended, and User. The jobs listed are:

ID	Type	Name	State	Application	Submitted	Started	Ended	User
3	Flow	3 lsadmin test1	Running	-	2019-02-12 14:32:49	-	-	lsadmin
4	Flow	4 lsadmin test1	Running	-	2019-02-12 16:10:12	-	-	lsadmin
1	Flow	1 lsadmin R	Exited	-	2019-02-11 15:38:41	-	2019-02-11 15:38:44	lsadmin
2	Flow	2 lsadmin R	Exited	-	2019-02-12 10:00:46	-	2019-02-12 10:00:49	lsadmin
5	Flow	5 lsadmin R	Exited	-	2019-02-12 16:19:31	-	2019-02-12 16:19:33	lsadmin
6	Flow	6 lsadmin R	Exited	-	2019-02-12 16:23:23	-	2019-02-12 16:23:26	lsadmin
7	Flow	7 lsadmin R	Done	-	2019-02-12 16:08:24	-	2019-02-12 16:08:32	lsadmin
8	Flow	8 lsadmin R	Exited	-	2019-02-12 17:44:04	-	2019-02-12 17:44:00	lsadmin
9	Flow	9 lsadmin R	Exited	-	2019-02-12 17:51:57	-	2019-02-12 17:52:01	kevndps
10	Flow	10 lsadmin R	Exited	-	2019-02-12 17:52:31	-	2019-02-12 17:52:36	ljllingham

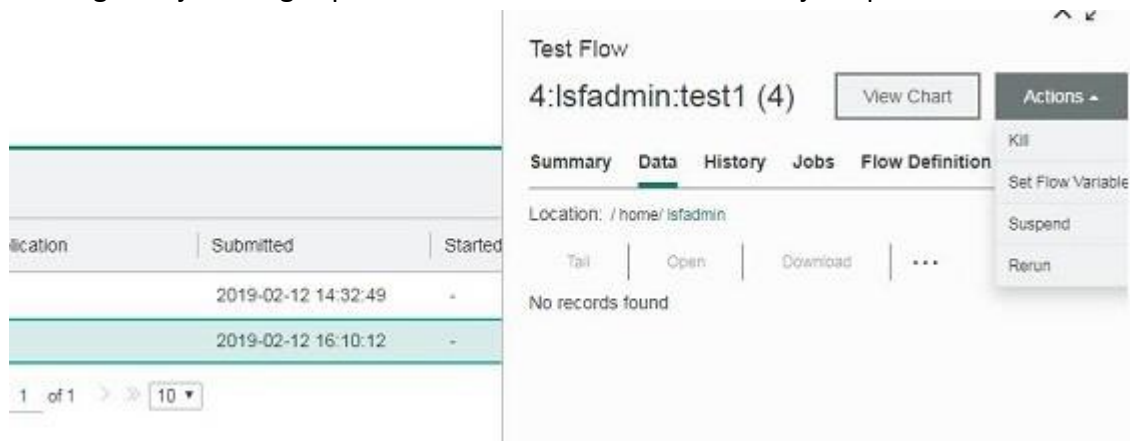
At the bottom of the table, there is a pagination control showing 'Page 1 of 2' and a dropdown menu set to '10'. The text 'Viewing 1 - 10 of 17' is visible at the bottom right.

4. If no jobs appear, try changing the Ended period to a larger time frame by clicking the filter icon on the Ended Column. The available options are Past Hour, Past 24 Hours, Past 7 days, Past 14 Days and Past 30 Days.

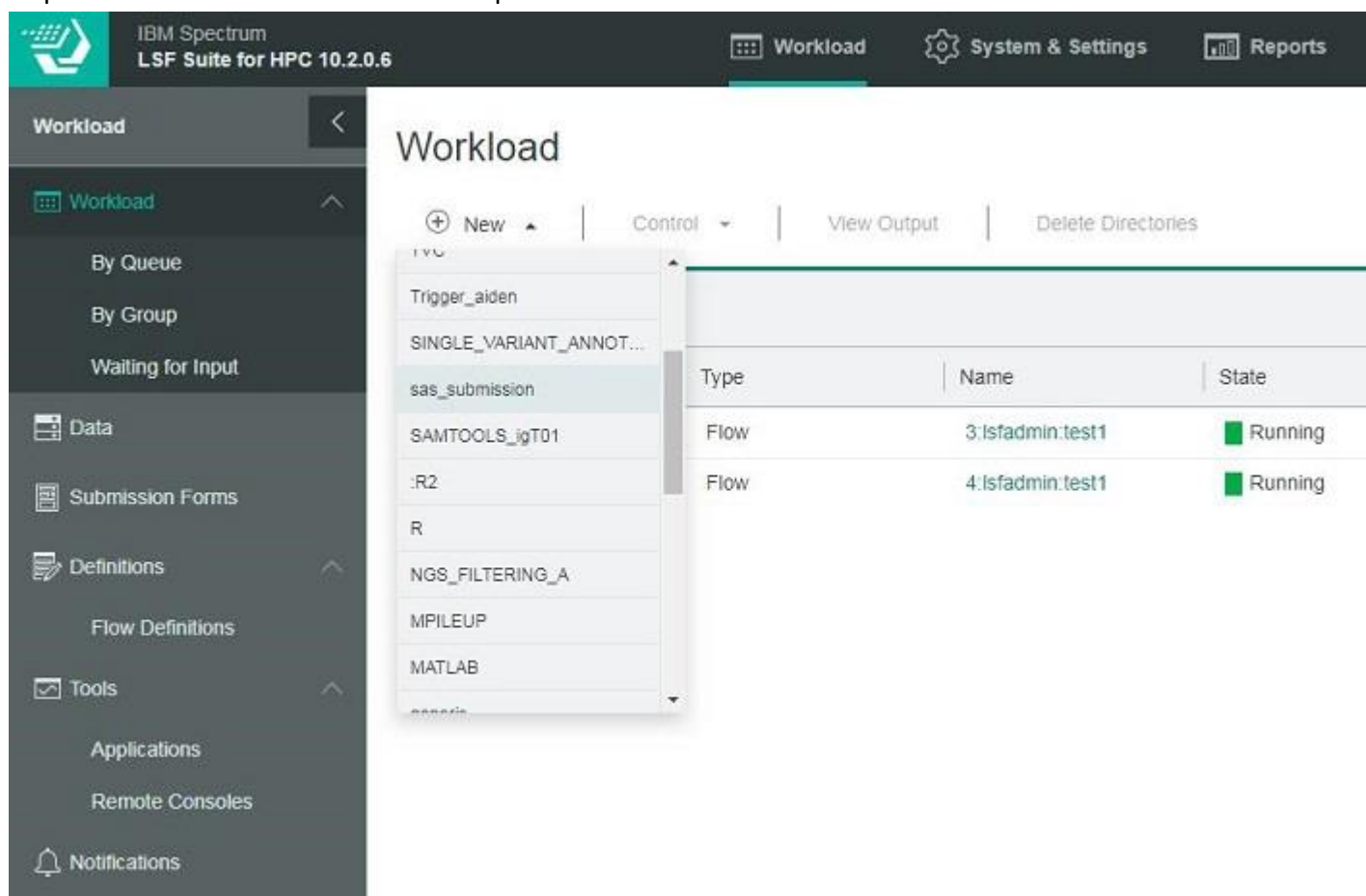
The screenshot shows a close-up of the 'Ended' column in the job list. A filter icon (a funnel with a plus sign) is visible next to the column header. A 'Column filter' dropdown menu is open, showing the following options: Past Hour, Past 24 Hours, Past 7 days, Past 14 days, and Past 30 days. The 'Past Hour' option is currently selected. The background shows the 'Submitted' and 'Started' columns for two jobs.

5. Clicking the left box at the beginning of a job record gives some additional control of the specified job - options to kill process, set flow variables, suspend job or rerun job.

6. Clicking on a job brings up a side menu with some additional job options



7. New jobs can be submitted from the Workload section as well by clicking New and choosing the required submission form from the dropdown list:



Submission screen will appear as in the above steps to Submit New Data.