Getting Started with OmniSci resources
on Harvard's Cannon Computation Cluster

Contents

Introduction

This work was funded by OmniSci Technologies and by NSF grants #1841403 and 2027540.

This is a guide for researchers interested in using OmniSci and PostGIS resources on Harvards' Cluster. Additional details are available here: https://github.com/cga-harvard/GIS_Apps_on_HPC/wiki.

These instructions are Windows oriented and use Putty. Linux users should not have trouble applying these.

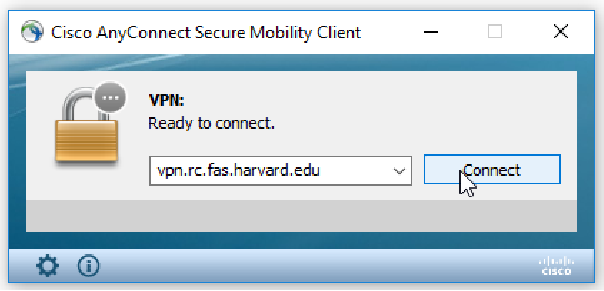
Note: In addition to the tools CGA has installed, OmniSci and PostGIS, the cluster has a wide range of powerful tools available: https://portal.rc.fas.harvard.edu/p3/build-reports/.

Getting started

You will need a Harvard account to start. Please follow instructions here for obtaining an FASRC account:
https://docs.rc.fas.harvard.edu/kb/how-do-i-get-a-research-computing-account/

Once you have a Harvard account (using Globus it may be possible to provide access without a Harvard account):

Open VPN connection to FASRC

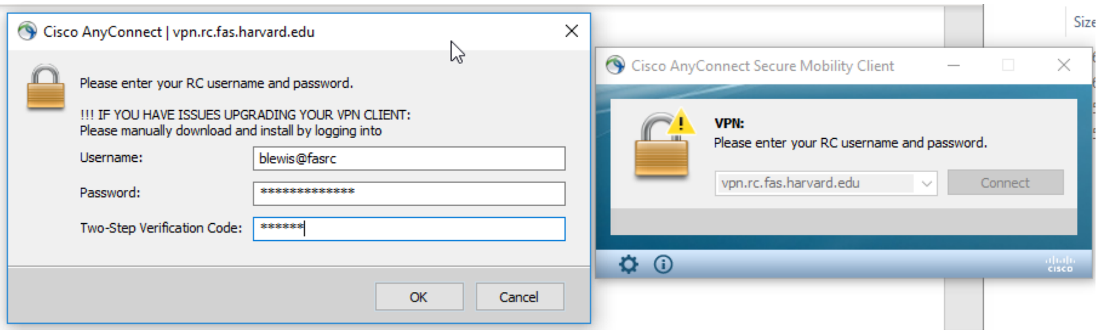


VPN:
Ready to connect.

vpn.rc.fas.harvard.edu

Use FASRC username, password, and two-step verification code.

Note user name is your-user-name@fasrc.


Cisco AnyConnect | vpn.rc.fas.harvard.edu
OK
Cancel
Cisco AnyConnect Secure Mobility Client
Connect
Size

Please enter your RC username and password.

!!! IF YOU HAVE ISSUES UPGRADING YOUR VPN CLIENT:
Please manually download and install by logging into

Username: blewis@fasrc

Password: **************

Two-Step Verification Code: ******

VPN:
Please enter your RC username and password.

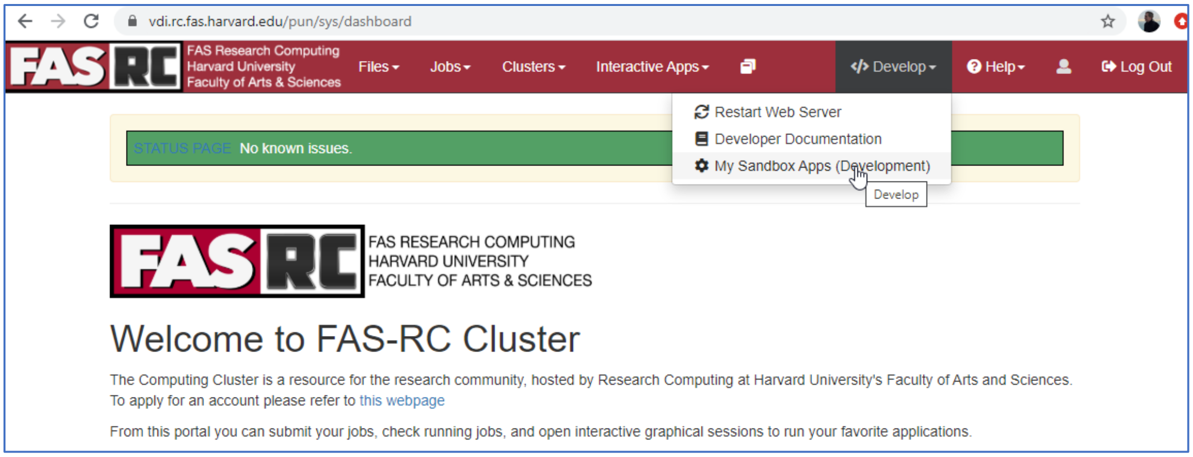
vpn.rc.fas.harvard.edu

Start OmniSci or PostGIS instance on FASRC

Enter this URL from your browser, rather than clicking on link.
https://vdi.rc.fas.harvard.edu/.

If you are prompted for a user name and password, use your base FASRC user name, in this example it would be “blewis” and enter the same password you used for making your VPN connection.

You will be redirected to this page. Go to “My Sandbox Apps”.



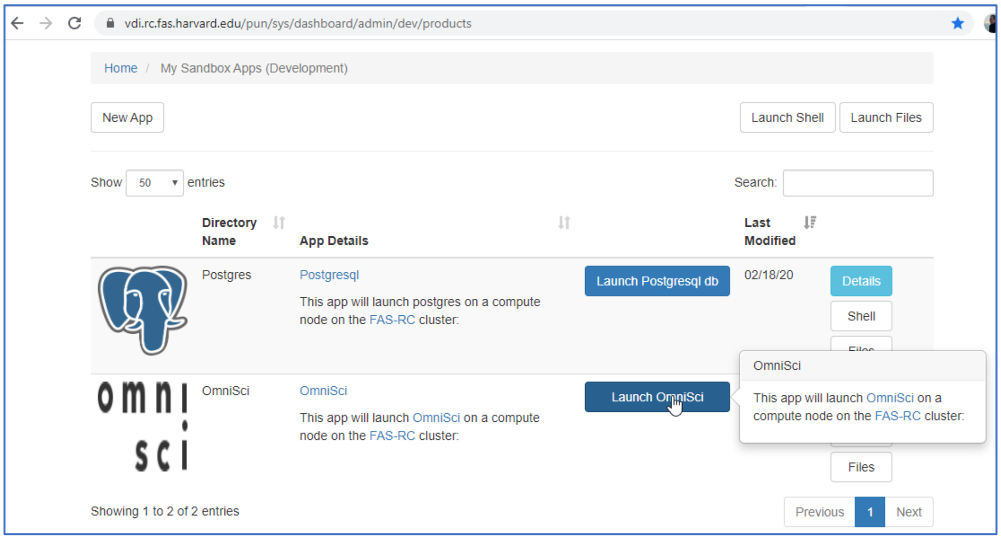
No known issues.

Welcome to FAS-RC Cluster

The Computing Cluster is a resource for the research community, hosted by Research Computing at Harvard University's Faculty of Arts and Sciences. To apply for an account please refer to this webpage

From this portal you can submit your jobs, check running jobs, and open interactive graphical sessions to run your favorite applications.

Which is this URL: https://vdi.rc.fas.harvard.edu/pun/sys/dashboard/admin/dev/products
Where you will see two options, Postres and OmniSci.


vdi.rc.fas.harvard.edu/pun/sys/dashboard/admin/dev/products
Home / My Sandbox Apps (Development)
New App
Launch Shell
Launch Files
Show 50 entries
Search:
Previous
1
Next

Directory Name	App Details		Last Modified	
Postgres	Postgresql This app will launch postgres on a compute node on the FAS-RC cluster.	Launch Postgresql db	02/18/20	Details Shell Files
OmniSci	OmniSci This app will launch OmniSci on a compute node on the FAS-RC cluster.	Launch OmniSci		Files

OmniSci
This app will launch OmniSci on a compute node on the FAS-RC cluster.

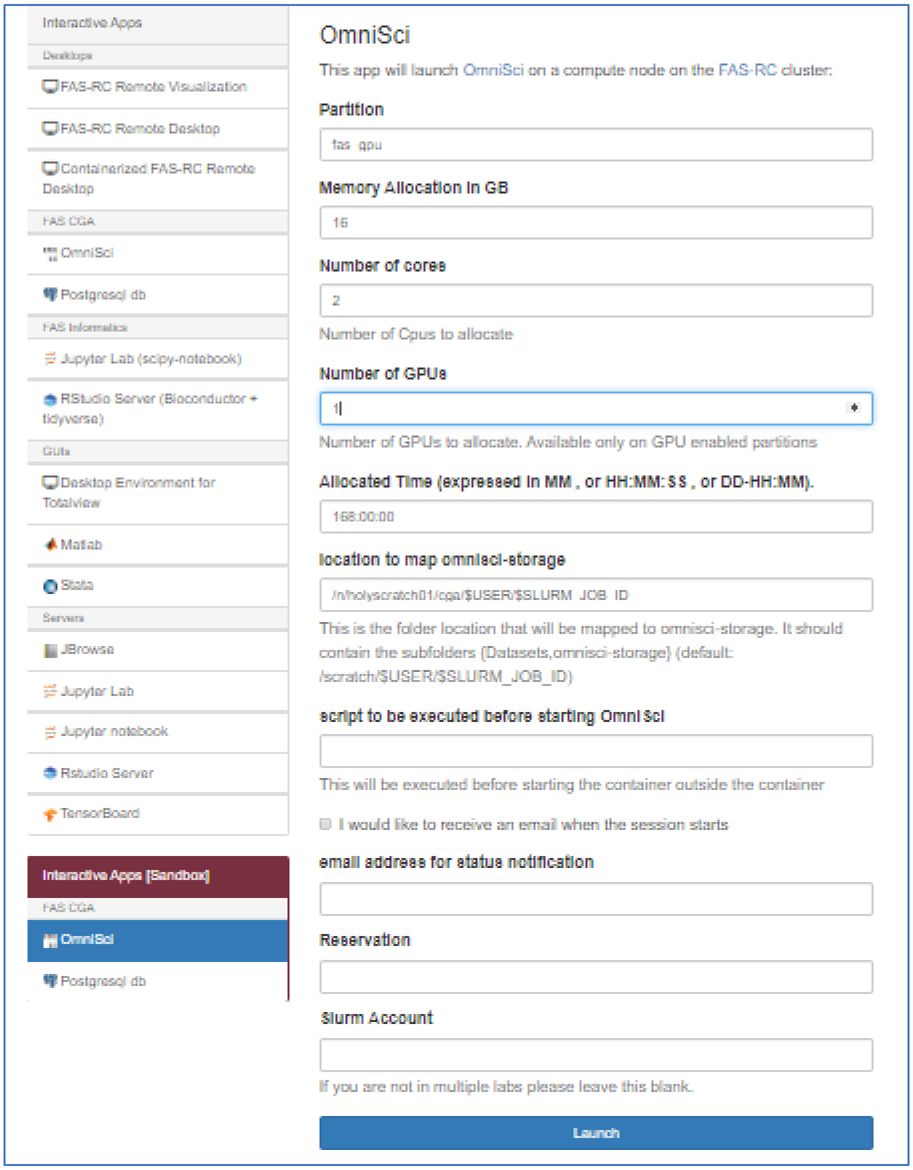
Showing 1 to 2 of 2 entries

To start an OmniSci instance, click “Launch OmniSci” to start new server running OmniSci.

Configure your OmniSci Instance using the following parameters. Based on our experience, to receive a server quickly, choose:

- For Partition choose “gpu”
- For Memory Allocation choose max of 256 GB
- For number of cores choose max of 2, 1 may be quicker.
- For Number of GPUs choose 1.
- For allocated time choose 1 week of hours.
- Leave rest of fields as they are.

Special requests can be made to FASRC.



OmniSci

This app will launch OmniSci on a compute node on the FAS-RC cluster:

Partition
fas_gpu

Memory Allocation in GB
16

Number of cores
2
Number of Cpus to allocate

Number of GPUs
1
Number of GPUs to allocate. Available only on GPU enabled partitions

Allocated Time (expressed in MM , or HH:MM:SS , or DD-HH:MM).
168:00:00

location to map omnisci-storage
/n/holyscratch01/cga/$USER/$SLURM_JOB_ID
This is the folder location that will be mapped to omnisci-storage. It should contain the subfolders {Datasets,omnisci-storage} (default: /scratch/$USER/$SLURM_JOB_ID)

script to be executed before starting OmniSci

This will be executed before starting the container outside the container

☐ I would like to receive an email when the session starts

email address for status notification

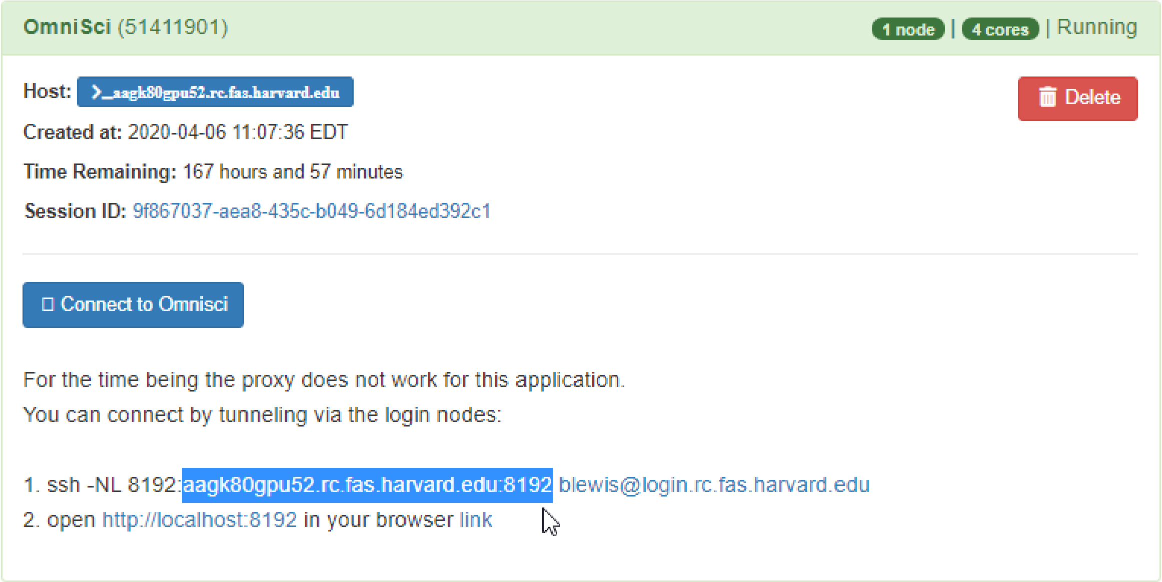
Reservation

Slurm Account

If you are not in multiple labs please leave this blank.

The instance generally takes a few minutes to launch. Once it is launched, go here to see your instance(s) running:

https://vdi.rc.fas.harvard.edu/pun/sys/dashboard/batch_connect/sessions



OmniSci (51411901) | Running

Host: >_aagk80gpu52.rc.fas.harvard.edu

Created at: 2020-04-06 11:07:36 EDT

Time Remaining: 167 hours and 57 minutes

Session ID: 9f867037-aea8-435c-b049-6d184ed392c1

For the time being the proxy does not work for this application.
You can connect by tunneling via the login nodes:

1. ssh -NL 8192:aagk80gpu52.rc.fas.harvard.edu:8192 blewis@login.rc.fas.harvard.edu
2. open http://localhost:8192 in your browser link

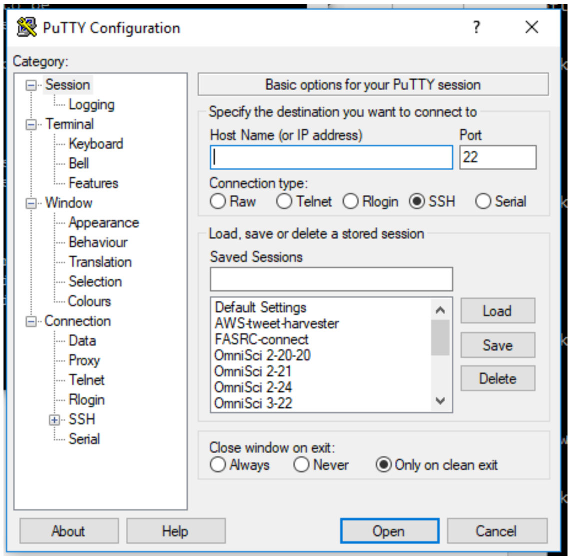
Note your instance name and port: **aagk80gpu52.rc.fas.harvard.edu:8192**.
You will use them to create a tunnel to access server running OmniSci Immerse via a browser.

Create VPN Tunnel to new Instance

You will use this information to create a tunnel using putty Windows (Putty) or Linux command line
ssh -NL aagk80gpu52.rc.fas.harvard.edu:8192blewis@login.rc.fas.harvard.edu

and this information to access Immerse once you have created the tunnel
open http://localhost:8192 your browser link

Creating tunnel using Putty
Open Putty:



Basic options for your PuTTY session

Specify the destination you want to connect to

Host Name (or IP address):

Port: 22

Connection type: ○ Raw ○ Telnet ○ Rlogin ● SSH ○ Serial

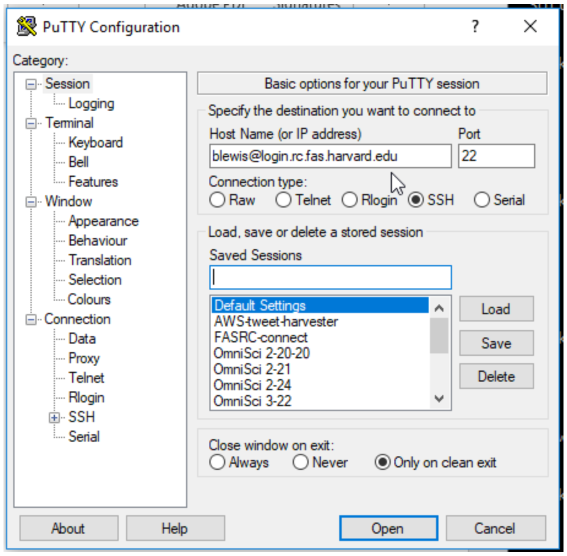
Load, save or delete a stored session

Saved Sessions

Default Settings
AWS-tweet-harvester
FASRC-connect
OmniSci 2-20-20
OmniSci 2-21
OmniSci 2-24
OmniSci 3-22

Close window on exit: ○ Always ○ Never ● Only on clean exit

Add user name/host name, and port:



Basic options for your PuTTY session

Specify the destination you want to connect to

Host Name (or IP address): blewis@login.rc.fas.harvard.edu

Port: 22

Connection type: ○ Raw ○ Telnet ○ Rlogin ● SSH ○ Serial

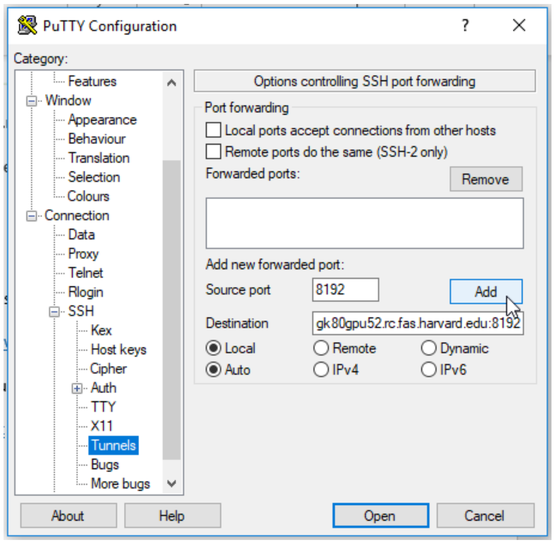
Load, save or delete a stored session

Saved Sessions

Default Settings
AWS-tweet-harvester
FASRC-connect
OmniSci 2-20-20
OmniSci 2-21
OmniSci 2-24
OmniSci 3-22

Close window on exit: ○ Always ○ Never ● Only on clean exit

Go to SSH, then Tunnel. Past in your instance name and port, click Add:



Port forwarding

□ Local ports accept connections from other hosts

□ Remote ports do the same (SSH-2 only)

Forwarded ports:

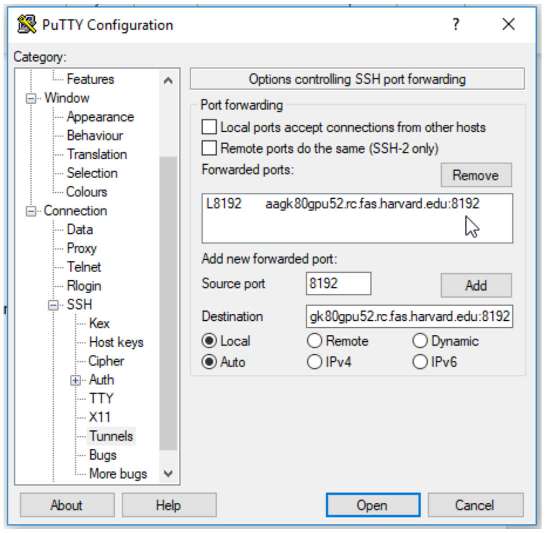
Add new forwarded port:

Source port 8192

Destination gk80gpu52.rc.fas.harvard.edu:8192

● Local ○ Remote ○ Dynamic

● Auto ○ IPv4 ○ IPv6



Port forwarding

□ Local ports accept connections from other hosts

□ Remote ports do the same (SSH-2 only)

Forwarded ports:

L8192 aagk80gpu52.rc.fas.harvard.edu:8192

Add new forwarded port:

Source port 8192

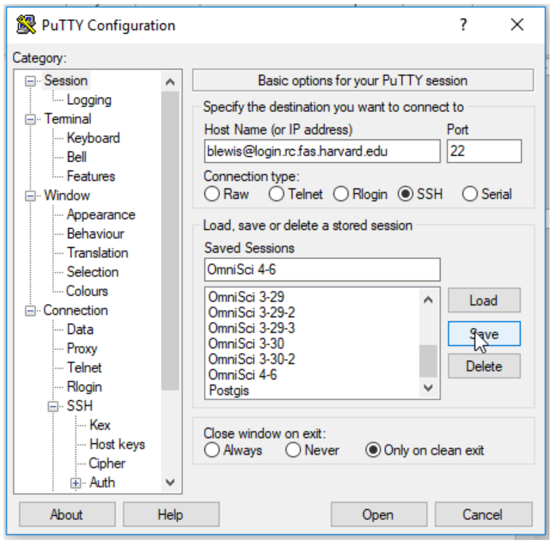
Destination gk80gpu52.rc.fas.harvard.edu:8192

● Local ○ Remote ○ Dynamic

● Auto ○ IPv4 ○ IPv6

Save your settings. Go to Sessions and give a name for the session, click Save.

As long as this instance exists, you can quickly create a tunnel to it using Putty and your saved setting.



Specify the destination you want to connect to

Host Name (or IP address): blewis@login.rc.fas.harvard.edu

Port: 22

Connection type: ○ Raw ○ Telnet ○ Rlogin ● SSH ○ Serial

Load, save or delete a stored session

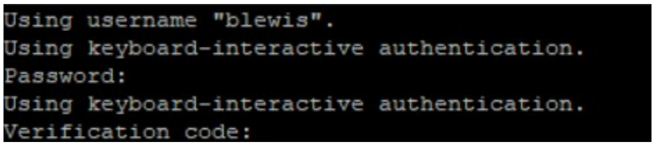
Saved Sessions: OmniSci 4-6

OmniSci 3-29
OmniSci 3-29-2
OmniSci 3-29-3
OmniSci 3-30
OmniSci 3-30-2
OmniSci 4-6
Postgis

Close window on exit: ○ Always ○ Never ● Only on clean exit

The default life of an instance is one week. It is possible to extend an instance for a longer period of time by making a request to FASRC admins. It also may be possible to request machines with more RAM and CPUs.

Clicking Open on your Putty configuration will open a terminal and you will be prompted for your Harvard PIN password. Then you will be prompted for your third party authentication code.



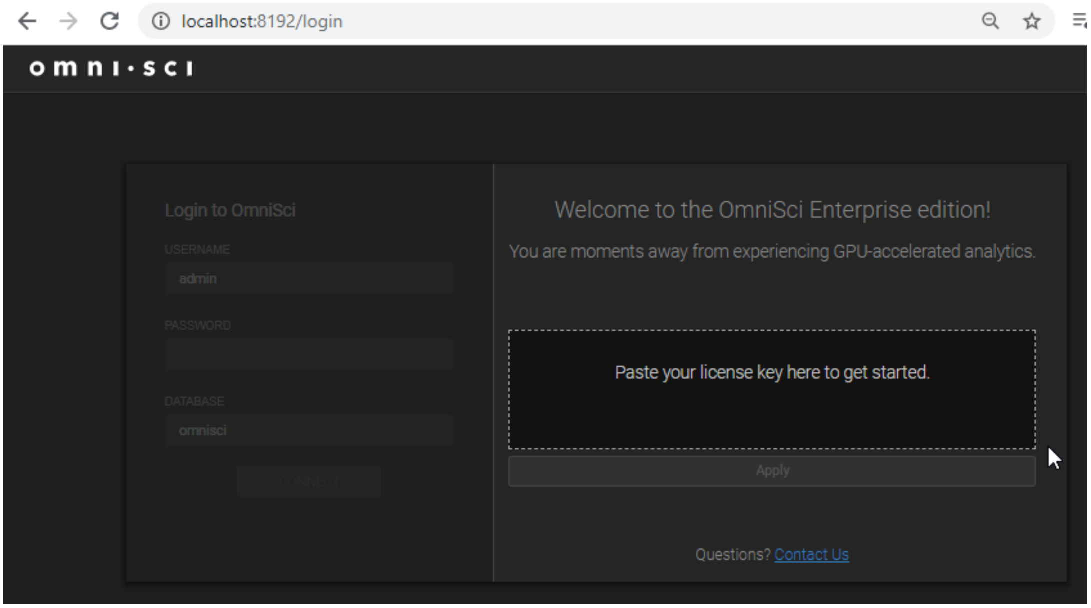
```
Using username "blewis".
Using keyboard-interactive authentication.
Password:
Using keyboard-interactive authentication.
Verification code:
```

Now you should be in.

NOTE: Do not perform computations on the home node you arrive on.

For any compute work you must SSH to the machine that you set up, i.e. aagk80gpu52.rc.fas.harvard.edu.

Accessing OmniSci Immerse from your browser via the tunnel



Login to OmniSci

USERNAME: admin

PASSWORD:

DATABASE: omnisci

Welcome to the OmniSci Enterprise edition!

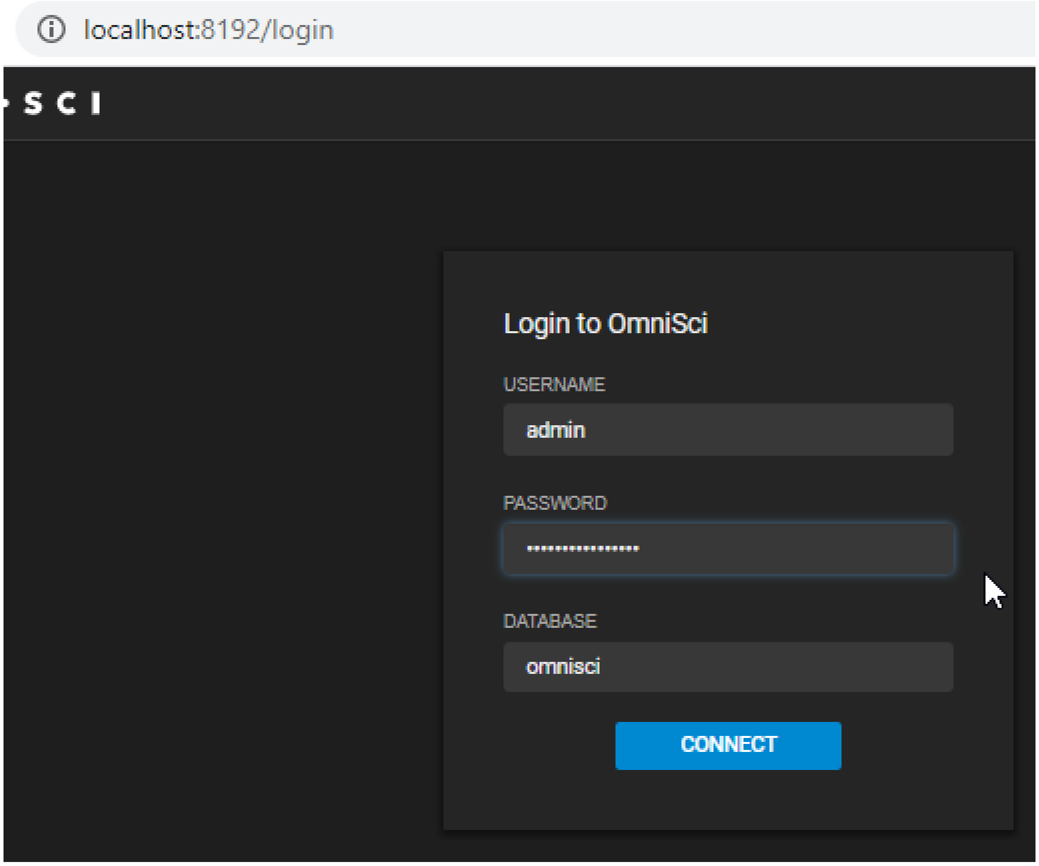
You are moments away from experiencing GPU-accelerated analytics.

Paste your license key here to get started.

Questions? Contact Us

Paste in License Key and click Apply.

Login using user name and password



localhost:8192/login

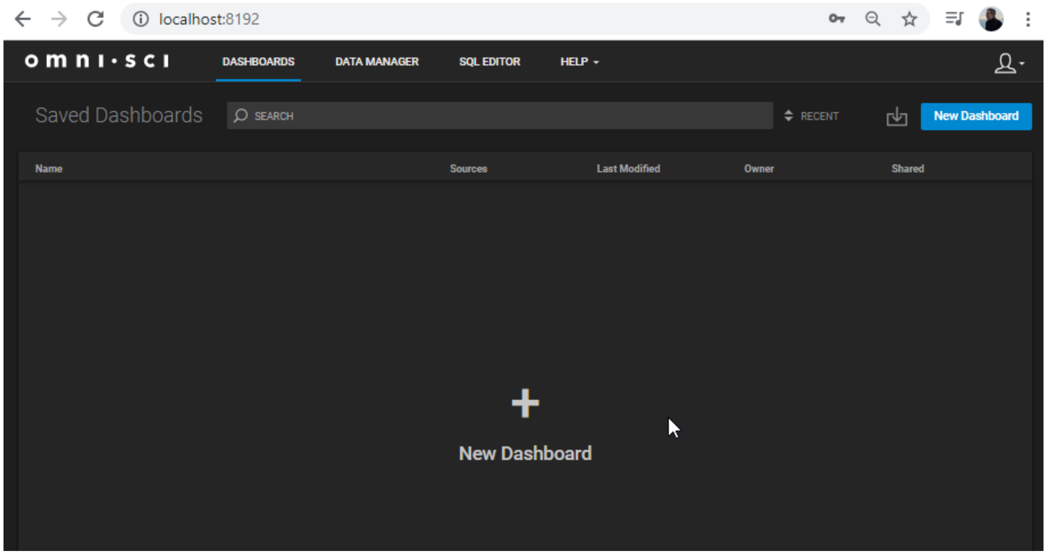
Login to OmniSci

USERNAME: admin

PASSWORD: ••••••••••••••••

DATABASE: omnisci

Now you can now start loading data and building dashboards



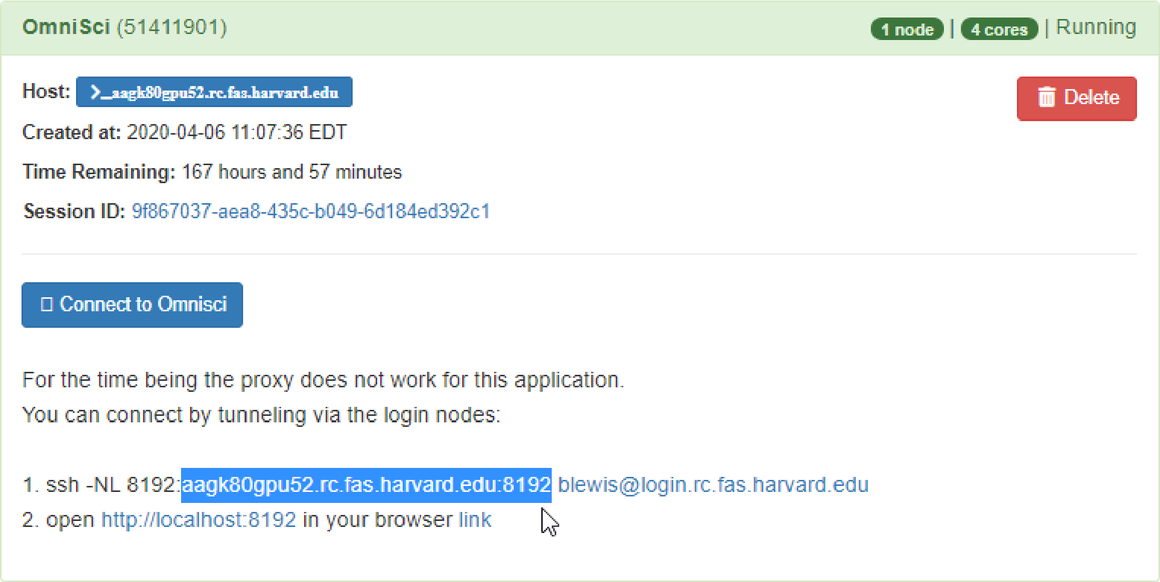
localhost:8192

Running scripts - general

Copy data you want to work with to /n/holyscratch01/cga/<use name>/data/

- NOTE: storage on /n/holyscratch01/ is a special advantage of FASRC. Data is guaranteed to remain here for 90 days after you load it and it may remain longer. Read/write is *much* faster here than working from the directory on the local node (/n/cga/data) for example.

For any script you run which accesses your omnisci instance you will need to update the correct port in the script to use to access the OmniSci backend for loading data. This backend TCP port you will obtain by clicking on the Session ID.



OmniSci (51411901)

Host: >_aagk80gpu52.rc.fas.harvard.edu

Created at: 2020-04-06 11:07:36 EDT

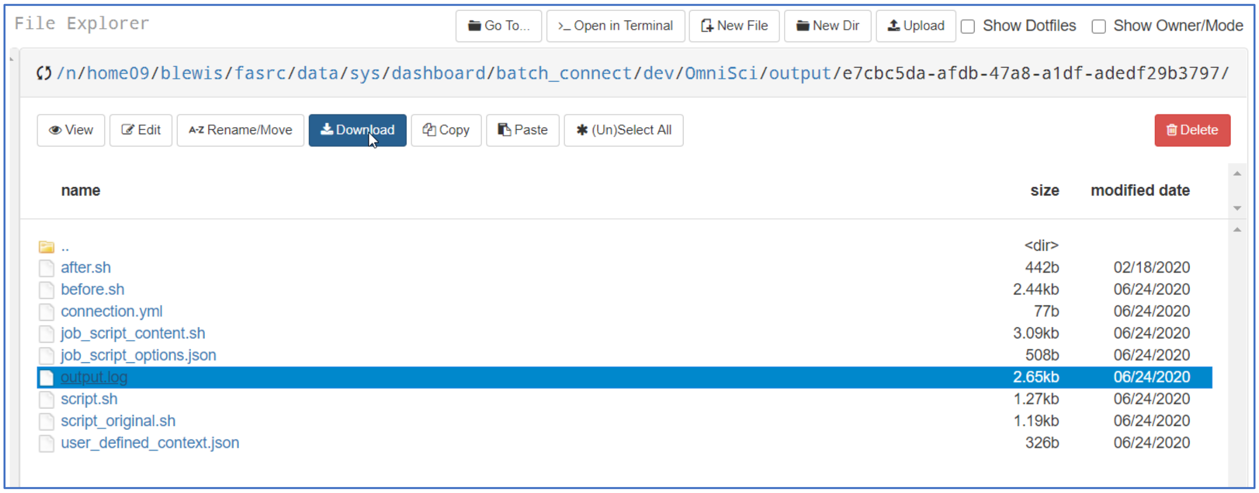
Time Remaining: 167 hours and 57 minutes

Session ID: 9f867037-aea8-435c-b049-6d184ed392c1

For the time being the proxy does not work for this application.
You can connect by tunneling via the login nodes:

1. ssh -NL 8192:aagk80gpu52.rc.fas.harvard.edu:8192 blewis@login.rc.fas.harvard.edu
2. open http://localhost:8192 in your browser link

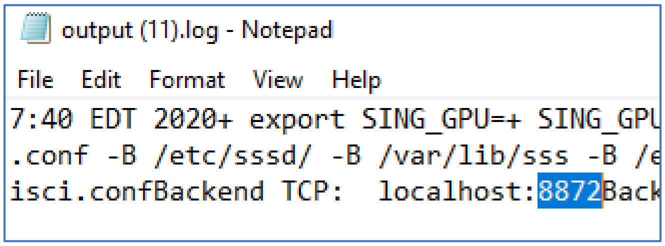
Which will take you to this page of information about the instance you just created. Click on "output.log" and click "Download". Open log file.



/n/home09/blewis/fasrc/data/sys/dashboard/batch_connect/dev/OmniSci/output/e7cbc5da-afdb-47a8-a1df-adedf29b3797/

name	size	modified date
..	<dir>	
after.sh	442b	02/18/2020
before.sh	2.44kb	06/24/2020
connection.yml	77b	06/24/2020
job_script_content.sh	3.09kb	06/24/2020
job_script_options.json	508b	06/24/2020
output.log	2.65kb	06/24/2020
script.sh	1.27kb	06/24/2020
script_original.sh	1.19kb	06/24/2020
user_defined_context.json	326b	06/24/2020

Scroll to bottom and you will find the Backend TCP. In this case it is 8872.

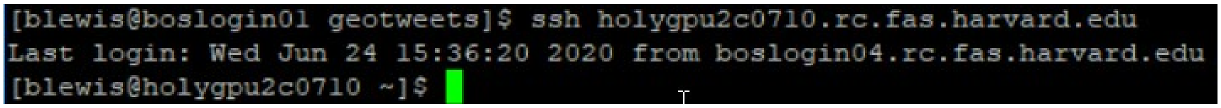


```
7:40 EDT 2020+ export SING_GPU=+ SING_GPU
.conf -B /etc/sssd/ -B /var/lib/sss -B /e
isci.confBackend TCP:  localhost:8872Back
```

Again, before running processes you must ssh to your GPU instance after logging in to FASRC. Example:

```
ssh aagk80gpu46.rc.fas.harvard.edu
```

Or another example from the actual command line:



```
[blewis@boslogin01 geotweets]$ ssh holygpu2c0710.rc.fas.harvard.edu
Last login: Wed Jun 24 15:36:20 2020 from boslogin04.rc.fas.harvard.edu
[blewis@holygpu2c0710 ~]$ 
```

- Connect to your compute node
- For scripts involving OmniSci, PostGIS, and geotweets, Load Conda

```
module load Anaconda3/5.0.1-fasrc02
```

- Create environment, activate env and install libraries

```
conda create -n geotweets python=3.6
source activate geotweets
pip install pandas
pip install geopandas
pip install numpy
pip install shapely
pip install pymapd
```

- Change the input file name to your CSV and run the script

```
python3 /n/holyscratch01/cga/dkakkar/scripts/geotweets.py
```

- For more details please see Wiki https://github.com/cga-harvard/GIS_Apps_on_HPC/wiki.

Loading Hourly CGA-SBG Geotweet CSVs to OmniSci

- Move latest geotweets from cga-geotweets.rc.fas.harvard.edu to Archive at /n/cga/data/geo-tweets/cga-sbg/2020/

- Copy tweets you want to work with to /n/holyscratch01/cga/<use name>/data/geotweets/
    - NOTE: storage on /n/holyscratch01/ is a special advantage of FASRC. Data is guaranteed to remain here for 90 days after you load it and it may remain longer. Read/write is *much* faster here than working from the directory on the local node (/n/cga/data) for example.
- Edit your script to point to the Backend TCP port (see above for how to find it)
- Edit your script to point to your data source at /n/holyscratch01/cga/dkakkar/data/geotweets/
- Activate screen

```
screen
```

- Ssh to Omnisci compute node
- Load Conda

```
module load Anaconda3/5.0.1-fasrc02
source activate geotweets
```

- Edit the script to include your file path and omnisci port just like gdelt script
- Run the script (example)

```
python3 /n/holyscratch01/cga/dkakkar/scripts/geotweets_omnisci_geom.py
(EXAMPLE)
```

Filter geotweets on country:

- First, upload the geotweets tables (see above)
- Run the country script by changing name of country and table name

```
screen
module load Anaconda3/5.0.1-fasrc02
source activate geotweets
```

- Example

```
python3
/n/holyscratch01/cga/dkakkar/scripts/geotweets_omnisci_countries.py
```

Useful Links

- Intro to the Cannon Cluster https://www.rc.fas.harvard.edu/wp-content/uploads/2019/12/Intro-to-Cannon.pdf
- FASRC Quick Start Guide https://docs.rc.fas.harvard.edu/kb/quickstart-guide/
- Create Account and Access FAQ https://docs.rc.fas.harvard.edu/kb/access-and-login/
- How to Run Jobs https://docs.rc.fas.harvard.edu/kb/running-jobs/
- SLURM Commands https://docs.rc.fas.harvard.edu/kb/convenient-slurm-commands/
- HUIT Security Policy https://security.harvard.edu/
- Research Data Security Policy https://vpr.harvard.edu/pages/harvard-research-data-security-policy