Getting Started on the FASRC clusters with Open OnDemand

Learning objectives

- What is Open OnDemand (OOD)?
- Accessing OOD
- Launching apps
- Files tab
- Jobs tab
- Remote Desktop
- FASSE proxy
- RStudio Server
- Jupyter Notebook
  - Create conda environment (i.e., jupyter kernel)

Some definitions

- **OOD**: Open On Demand
- **FASRC**: Faculty of Arts and Sciences Research Computing
- **Cluster**: large group of servers with lots of memory and processors
- **Cannon**: cluster that handles level 2 data. Named after the 19th century Harvard astronomer Annie Jump Cannon.
- **FASSE**: cluster that handles level 3 data. FAS Secure Enclave.

Glossary of these terms: docs.rc.fas.harvard.edu/kb/glossary

What is Open OnDemand (OOD)?

- Open-source web portal to access clusters
- Web-based
  - Uses modern browser like Google Chrome, Mozilla Firefox, or Microsoft Edge. OOD does not work in Safari
  - No software other than a browser needs be installed on your local laptop/desktop
- Easy to learn and use
- Very similar to desktop applications
- The easiest way to run graphical applications remotely on a cluster

OPEN OnDemand

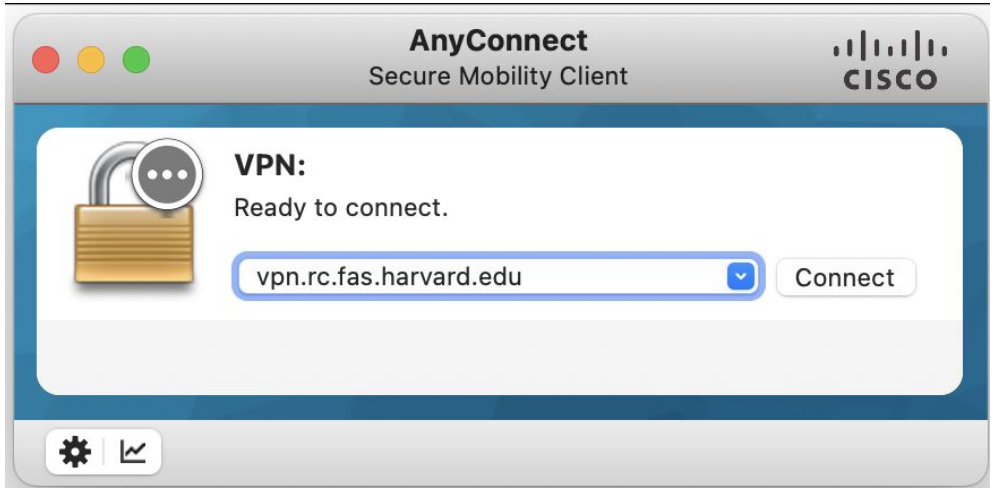
How to access OOD on FASRC Clusters

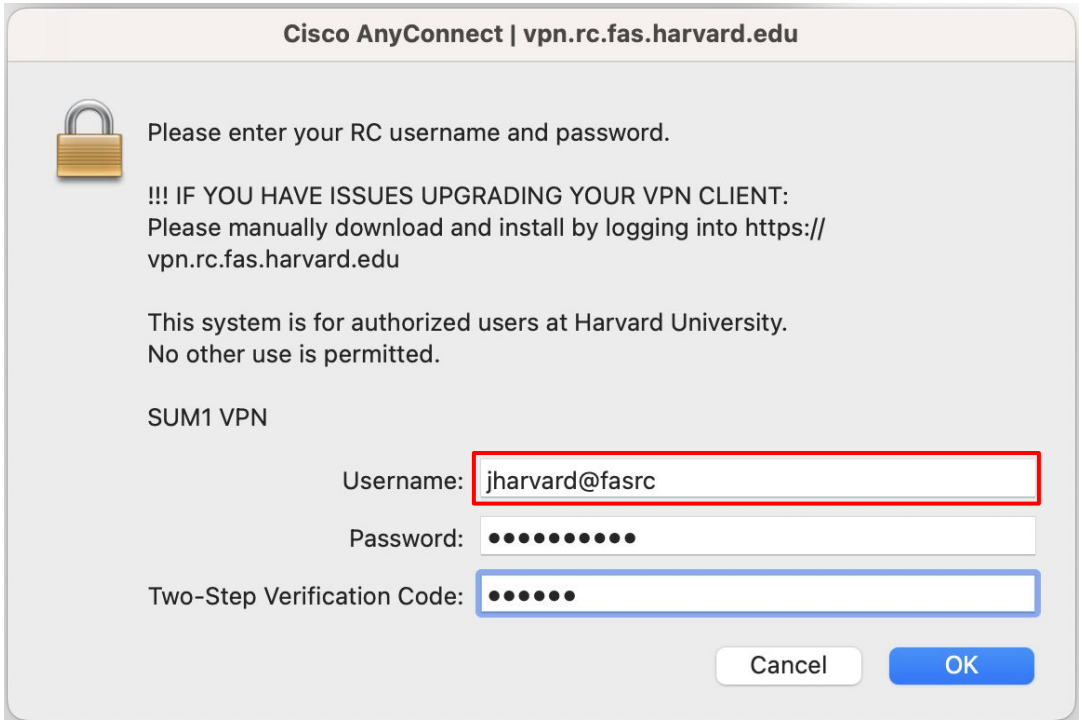
1. Get an account
    - You can choose a username. The default is first initial, last name. I'll use jharvard as an example
    - This is NOT necessarily the same as your HarvardKey username.
2. Log onto the FASRC VPN. This is NOT the generic Harvard VPN.
    - vpn.rc.fas.harvard.edu
    - username is
        - jharvard@fasrc (Cannon)
        - jharvard@fasse (FASSE)
3. Log into Open On Demand for your cluster
    - username is just jharvard, nothing else

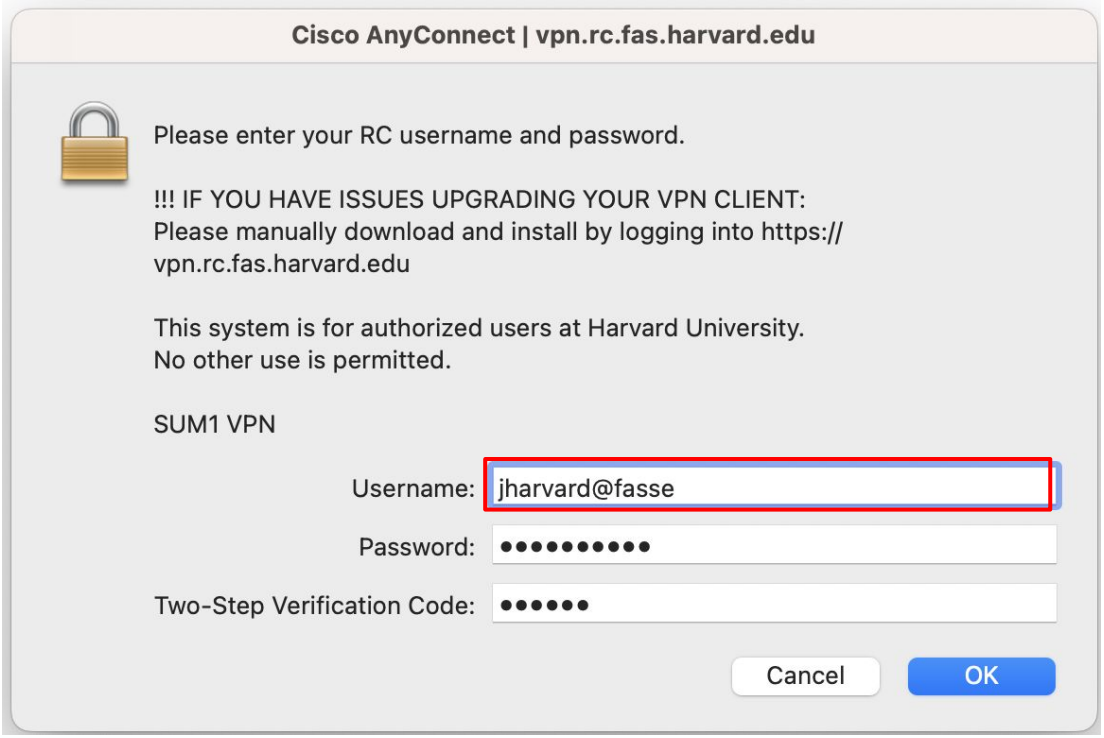
      Cannon link: https://rcood.rc.fas.harvard.edu

      FASSE link: https://fasseood.rc.fas.harvard.edu

Connecting to VPN







Signing in to the OOD Dashboard

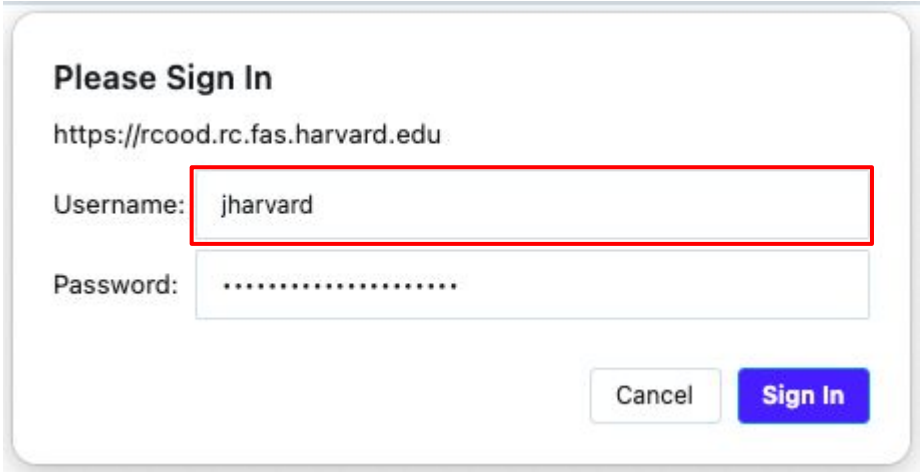
When you load the site

https://rcood.rc.fas.harvard.edu

or

https://fasseood.rc.fas.harvard.edu

You will be prompted to log in.

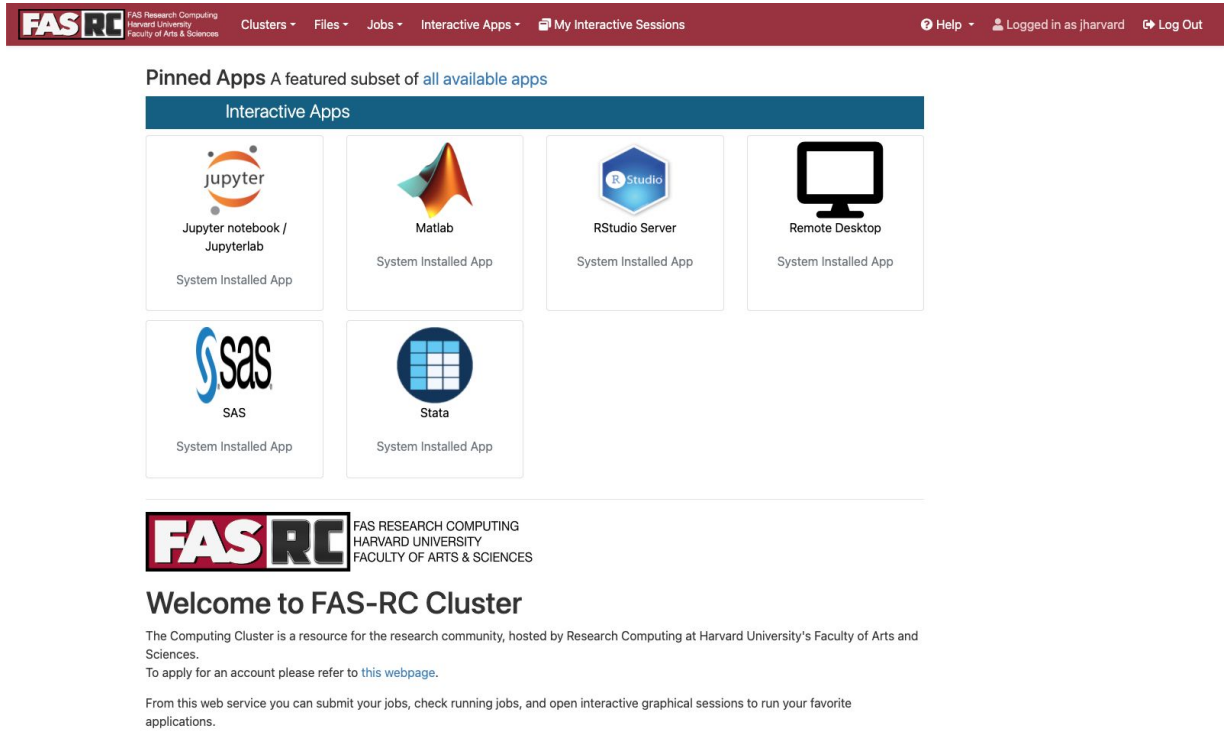


Unlike when you log in to the VPN, on the website you need to use

ONLY your username, NOT username@cluster

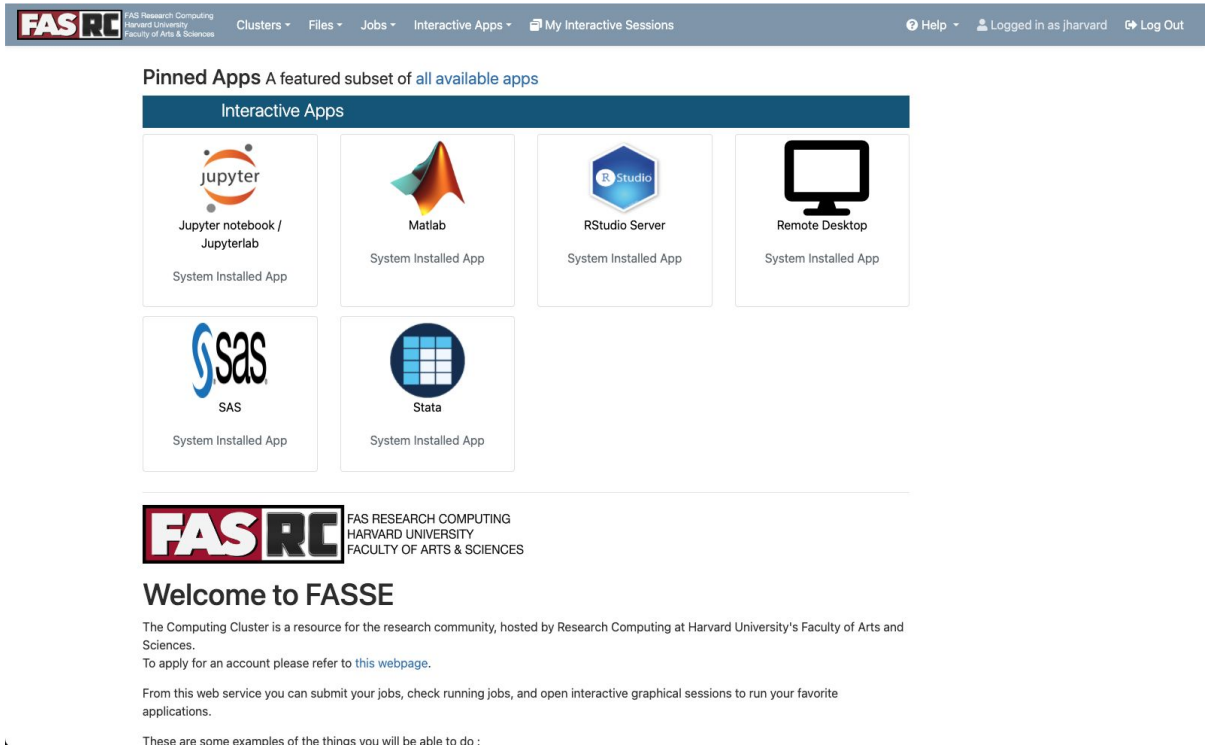
OOD dashboard on Cannon and FASSE

Cannon



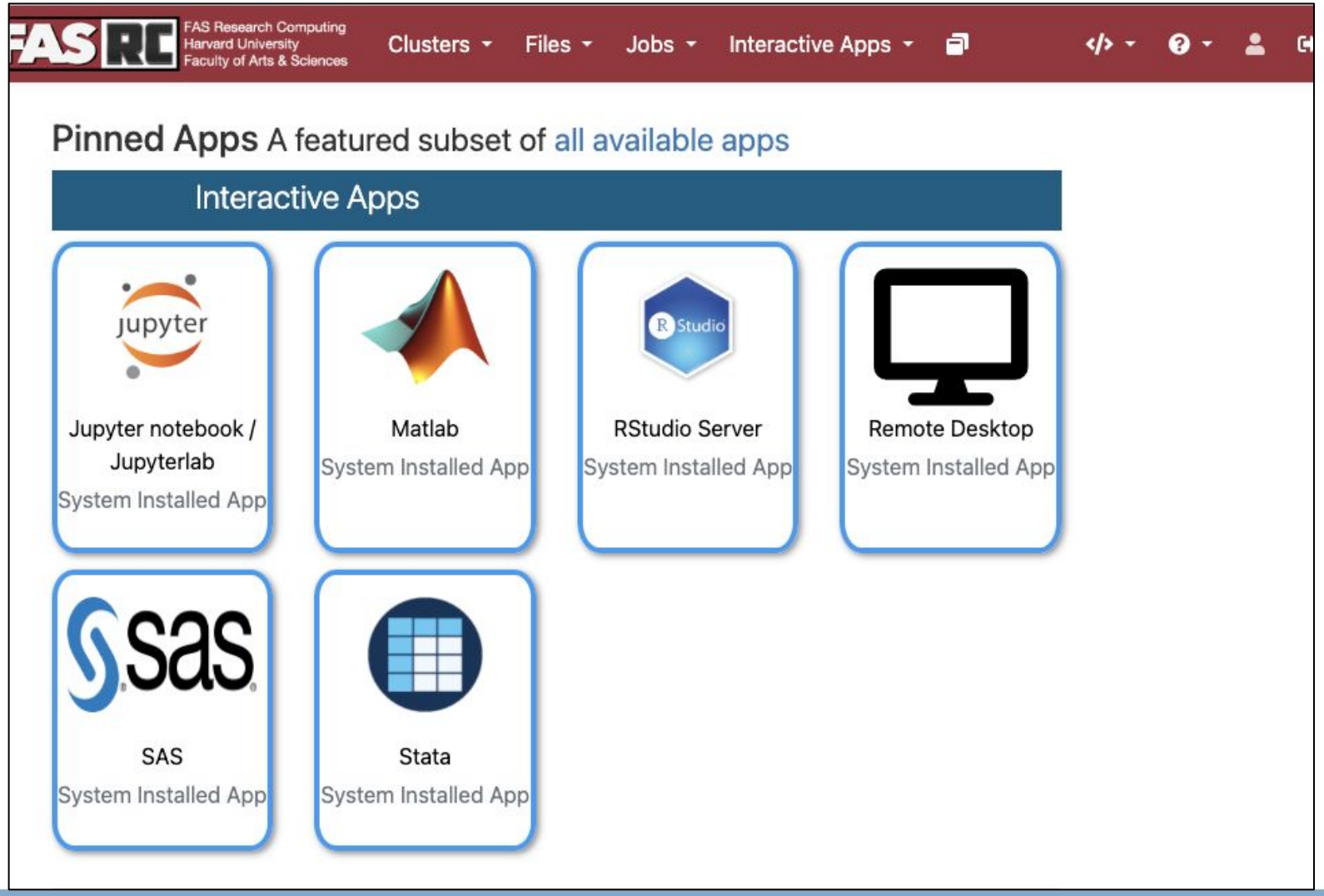
https://rcood.rc.fas.harvard.edu

FASSE

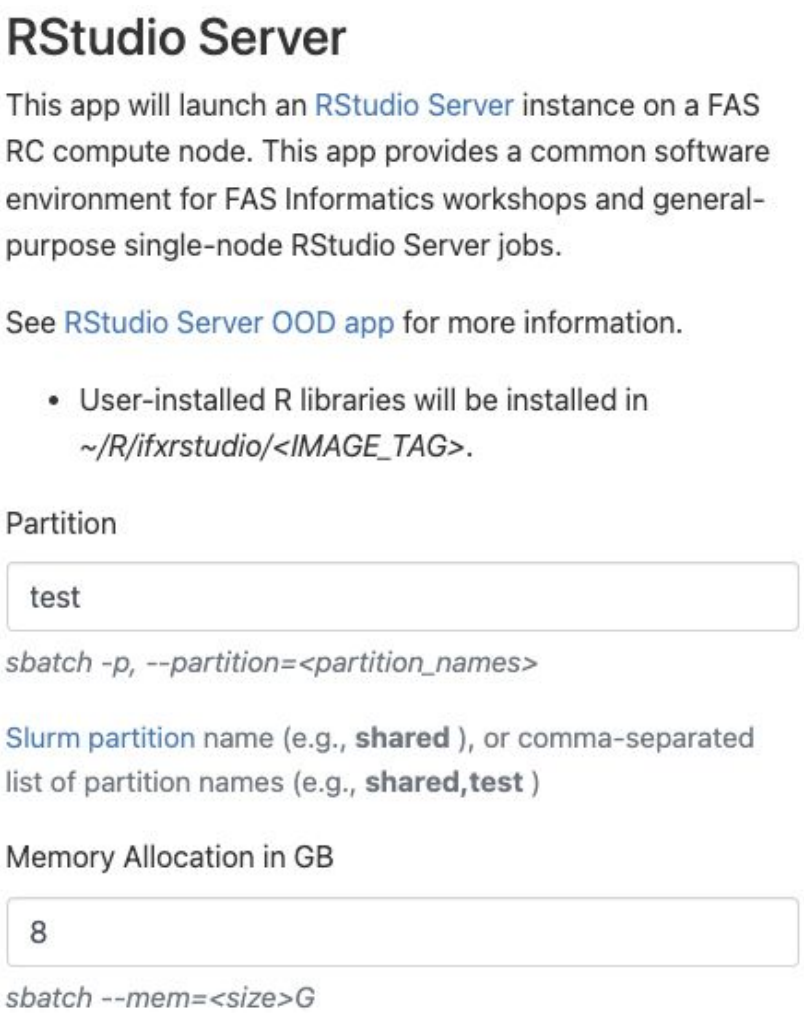


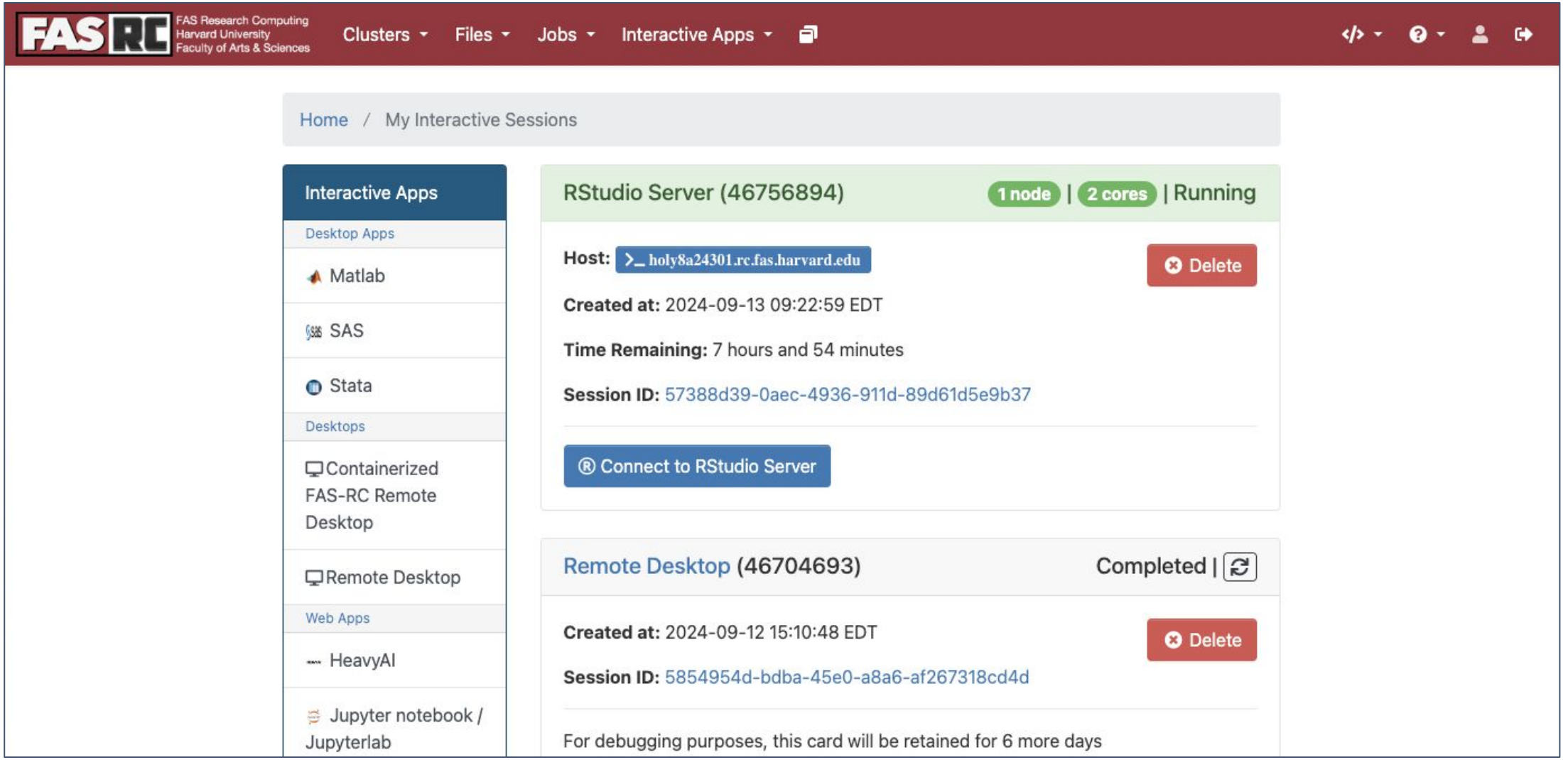
https://fasseood.rc.fas.harvard.edu

Launching an app from the Dashboard



Beginning of a form




FAS RC
FAS Research Computing
Harvard University
Faculty of Arts & Sciences
Clusters
Files
Jobs
Interactive Apps
Home / My Interactive Sessions
Interactive Apps
Desktop Apps
Matlab
SAS
Stata
Desktops
Containerized FAS-RC Remote Desktop
Remote Desktop
Web Apps
HeavyAI
Jupyter notebook / Jupyterlab
RStudio Server (46756894)
1 node | 2 cores | Running
Host: holy8a24301.rc.fas.harvard.edu
Delete
Created at: 2024-09-13 09:22:59 EDT
Time Remaining: 7 hours and 54 minutes
Session ID: 57388d39-0aec-4936-911d-89d61d5e9b37
Connect to RStudio Server
Remote Desktop (46704693)
Completed |
Created at: 2024-09-12 15:10:48 EDT
Delete
Session ID: 5854954d-bdba-45e0-a8a6-af267318cd4d
For debugging purposes, this card will be retained for 6 more days

Jupyter Notebook (1)

- You can create your own kernels, but some command line needed
- Note: a kernel is the same as a conda, python, or mamba environment

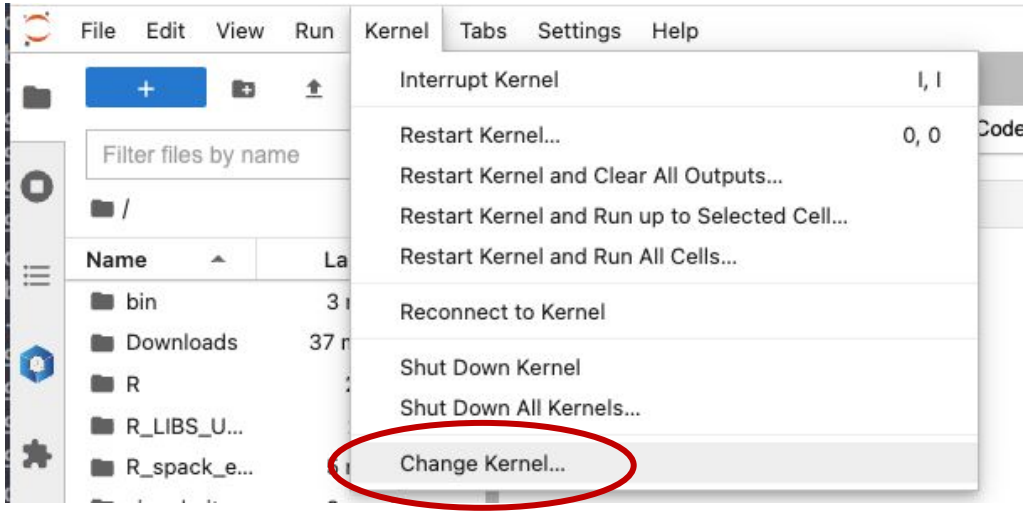
1. Open a terminal in the ”Remote Desktop” app
   ⇒Don’t create mamba environments inside Jupyter Notebook/Lab!!
2. Create mamba environment and install package `ipykernel`

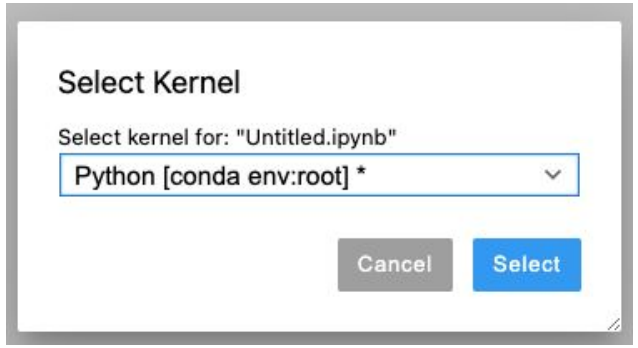
```
[jharvard@holy7c02111 ~]$ module load python
[jharvard@holy7c02111 ~]$ mamba create -n OOD_env python=3.11 pip wheel numpy
[jharvard@holy7c02111 ~]$ source activate OOD_env
(OOD_env)[jharvard@holy7c02111 ~]$ mamba install ipykernel
```

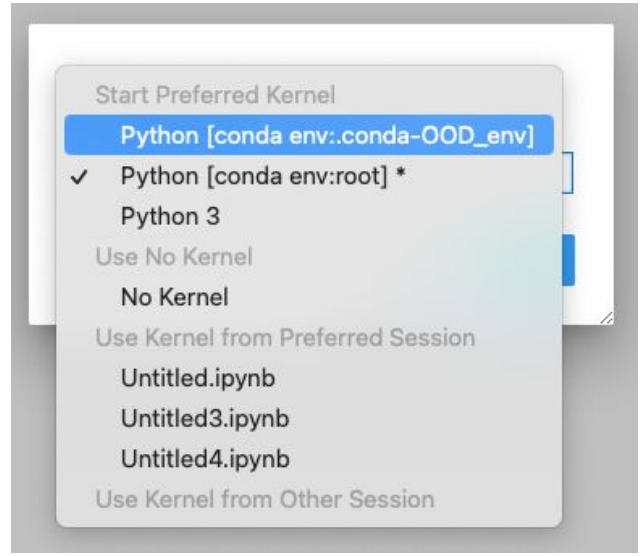
https://docs.rc.fas.harvard.edu/kb/python-package-installation/#Use_mamba_environment_in_Jupyter_Notebooks

Jupyter Notebook (2)

3. Launch **new** Jupyter Notebook session (existing session will not work!)
4. Select newly created mamba environment as the kernel
   a. Open a notebook
   b. On the top menu, click Kernel -> Select Kernel -> Click on OOD_env

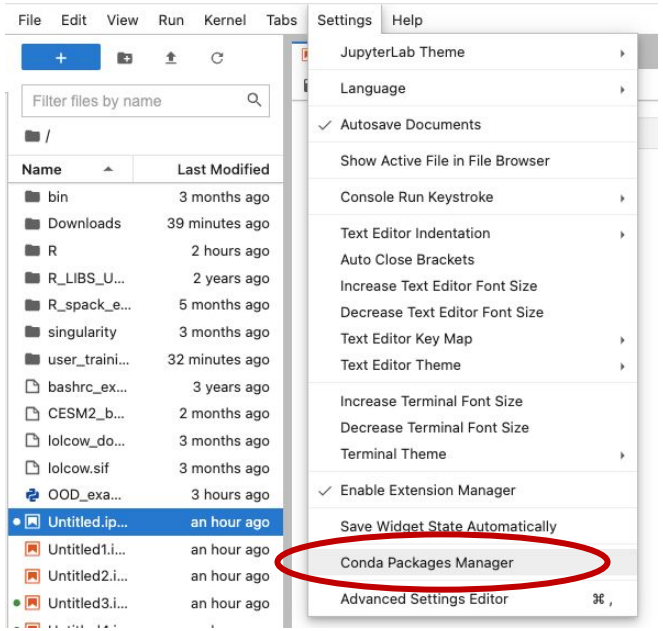


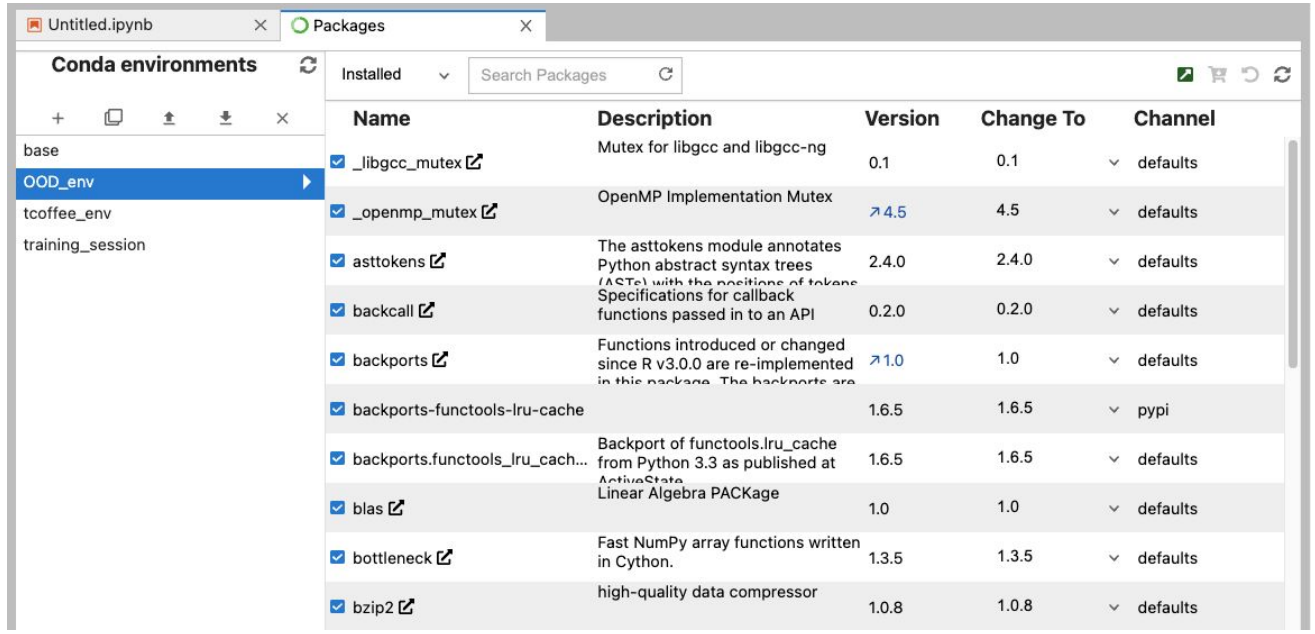




Jupyter Notebook (3)

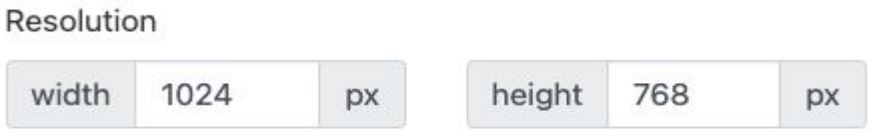
5. Managing (install, uninstall, update) packages
   a. We recommend using the command line
   b. You can also use the conda package manager, which is the same thing as a mamba package manager: On the top menu, click Settings -> Conda Package Manager -> OOD_env





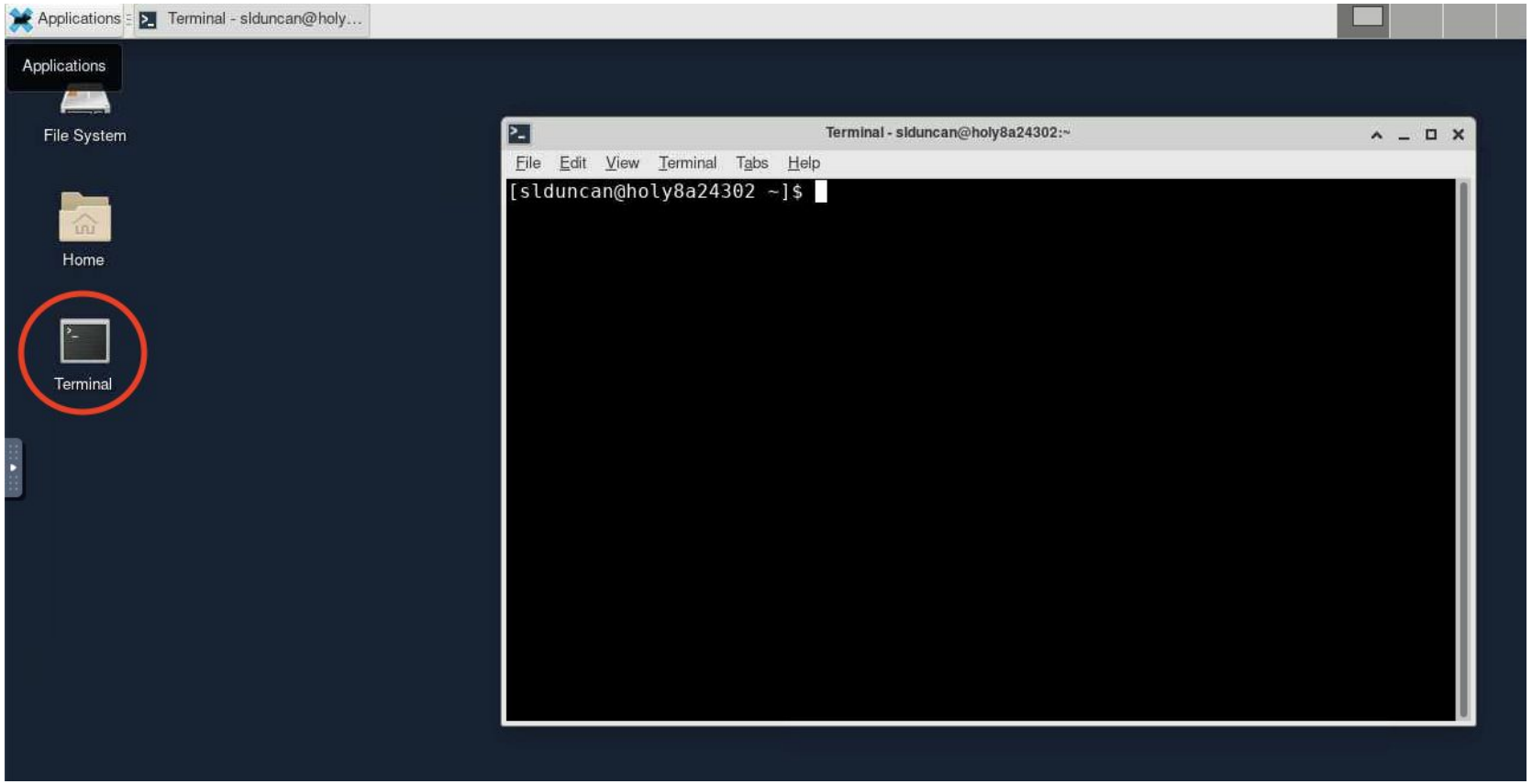
Remote Desktop

- Not as necessary as it used to be
- Terminal
- **For running long Jupyter Notebook sessions**
- Can also be used to open multiple applications in a single window
- Choose the defaults for resolution



Starting a terminal

- Double click on the icon that looks like a computer screen
- From there you can type in any commands you want to



Running Jupyter Notebook in Remote Desktop

- Very important: Jupyter Notebook will not continue to run if you close the Jupyter notebook page! The cell that is running will lose the data and output files will not be written

1. Solution: run Remote Desktop app and launch Jupyter Notebook from within Remote Desktop
2. Documentation: https://docs.rc.fas.harvard.edu/kb/ood-remote-desktop-how-to-open-software/#Jupyter_Notebook

```
#Jupyter Notebook
[jharvard@holy7c02111 ~]$ module load python
[jharvard@holy7c02111 ~]$ source activate OOD_env
[jharvard@holy7c02111 ~]$ jupyter notebook
```

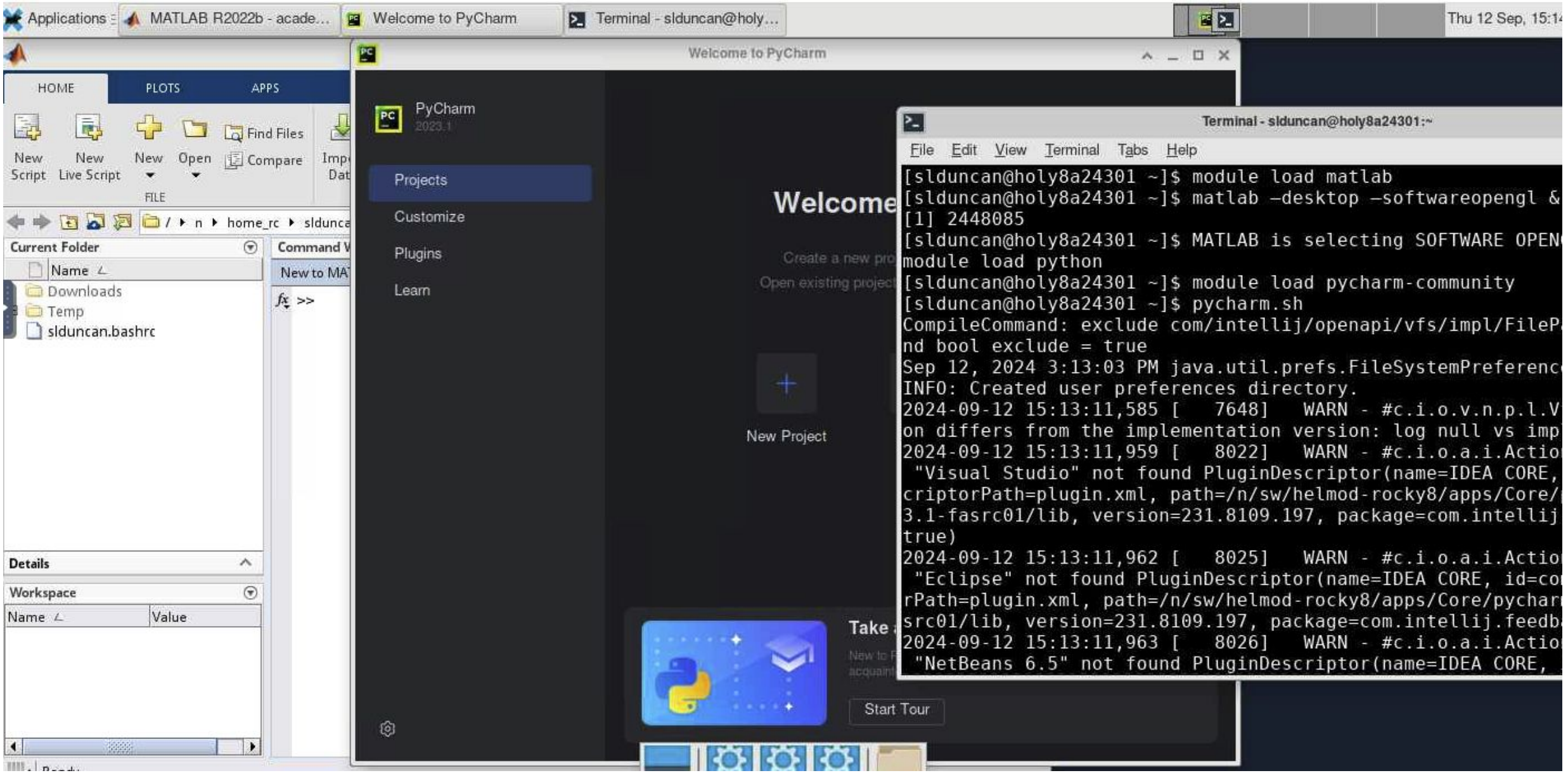
Opening Multiple Applications in Remote Desktop

Documentation: https://docs.rc.fas.harvard.edu/kb/ood-remote-desktop-how-to-open-software/

- It can be used to launch most GUI applications
  1. Load module
  2. Set environmental variables (if needed)
  3. Launch software
- You can have multiple applications open

```
# Matlab
[jharvard@holy7c02111 ~]$ module load matlab
[jharvard@holy7c02111 ~]$ matlab -desktop -softwareopengl &

#PyCharm
[jharvard@holy7c02111 ~]$ module load python
[jharvard@holy7c02111 ~]$ module load pycharm-community
[jharvard@holy7c02111 ~]$ pycharm.sh
```


Applications
MATLAB R2022b - acade...
Welcome to PyCharm
Terminal - slduncan@holy...
Thu 12 Sep, 15:14
HOME
PLOTS
APPS
New Script
New Live Script
New
Open
Find Files
Compare
FILE
Current Folder
Name
Downloads
Temp
slduncan.bashrc
Details
Workspace
Name
Value
Welcome to PyCharm
PyCharm
2023.1
Projects
Customize
Plugins
Learn
Welcome
New Project
Start Tour
Terminal - slduncan@holy8a24301:~
File Edit View Terminal Tabs Help
[slduncan@holy8a24301 ~]$ module load matlab
[slduncan@holy8a24301 ~]$ matlab -desktop -softwareopengl &
[1] 2448085
[slduncan@holy8a24301 ~]$ MATLAB is selecting SOFTWARE OPEN
module load python
[slduncan@holy8a24301 ~]$ module load pycharm-community
[slduncan@holy8a24301 ~]$ pycharm.sh
CompileCommand: exclude com/intellij/openapi/vfs/impl/FileP
nd bool exclude = true
Sep 12, 2024 3:13:03 PM java.util.prefs.FileSystemPreferenc
INFO: Created user preferences directory.
2024-09-12 15:13:11,585 [7648] WARN - #c.i.o.v.n.p.l.V
on differs from the implementation version: log null vs imp
2024-09-12 15:13:11,959 [8022] WARN - #c.i.o.a.i.Actio
"Visual Studio" not found PluginDescriptor(name=IDEA CORE,
criptorPath=plugin.xml, path=/n/sw/helmod-rocky8/apps/Core/
3.1-fasrc01/lib, version=231.8109.197, package=com.intellij
true)
2024-09-12 15:13:11,962 [8025] WARN - #c.i.o.a.i.Actio
"Eclipse" not found PluginDescriptor(name=IDEA CORE, id=co
rPath=plugin.xml, path=/n/sw/helmod-rocky8/apps/Core/pychar
src01/lib, version=231.8109.197, package=com.intellij.feedb
2024-09-12 15:13:11,963 [8026] WARN - #c.i.o.a.i.Actio
"NetBeans 6.5" not found PluginDescriptor(name=IDEA CORE,

Inactivity lock out

- It may lock out due to inactivity
- Use your FASRC password to unlock

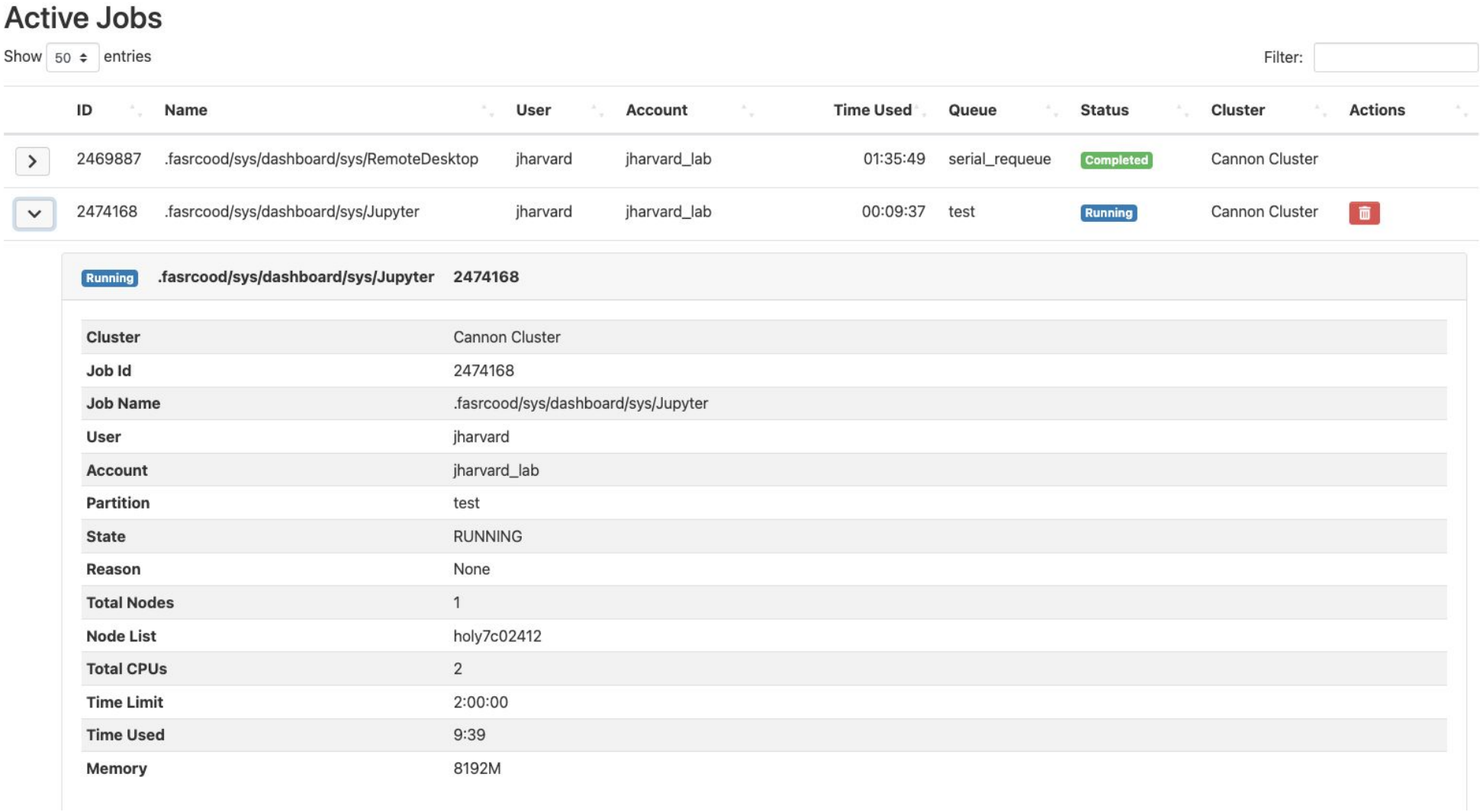
Filling out a form to launch an app

- Request the resources that you need
  (If you don't know for a first trial run, use similar resources as your laptop/desktop)
  - Partition (Name): depends on Cannon vs FASSE
  - Memory (RAM): amount of memory in GB
  - Number of cores: recommended at least 2
  - Number of GPUs: if >= 1, make sure you **select** a gpu partition
  - Allocated time: time you would like your session to run.

  } the minimum and/or maximum values of each field depends on the selected partition

  - Email for status notification: to know when job starts, ends
  - Reservation: if you have a special reservation (this requires approval from FASRC)
  - Account: use this if you have more than one PI_lab affiliation

Jobs tab (1)


Active Jobs
Show 50 entries
Filter:
ID
Name
User
Account
Time Used
Queue
Status
Cluster
Actions
2469887
.fasrcood/sys/dashboard/sys/RemoteDesktop
jharvard
jharvard_lab
01:35:49
serial_requeue
Completed
Cannon Cluster
2474168
.fasrcood/sys/dashboard/sys/Jupyter
jharvard
jharvard_lab
00:09:37
test
Running
Cannon Cluster
Running
.fasrcood/sys/dashboard/sys/Jupyter
2474168
Cluster
Cannon Cluster
Job Id
2474168
Job Name
.fasrcood/sys/dashboard/sys/Jupyter
User
jharvard
Account
jharvard_lab
Partition
test
State
RUNNING
Reason
None
Total Nodes
1
Node List
holy7c02412
Total CPUs
2
Time Limit
2:00:00
Time Used
9:39
Memory
8192M

Jobs tab (2)

Matlab (2474322) Undetermined

Created at: 2023-09-18 15:28:06 EDT

Delete

Time Requested: 1 hour

Session ID: 0847d7b8-1d3f-4a61-877d-582272b74ec0

Your session has entered a bad state. Feel free to contact support for further information.

Active Jobs

Show 50 entries

Filter:

	ID	Name	User	Account	Time Used	Queue	Status	Cluster	Actions
>	2469887	.fasrcood/sys/dashboard/sys/RemoteDesktop	jharvard	jharvard_lab	01:35:49	serial_requeue	Completed	Cannon Cluster	
>	2474322	.fasrcood/sys/dashboard/sys/Matlab	jharvard	jharvard_lab	00:02:27	test	Undetermined	Cannon Cluster	
>	2474168	.fasrcood/sys/dashboard/sys/Jupyter	jharvard	jharvard_lab	00:15:45	test	Running	Cannon Cluster	

Jobs tab (3)

⌄	2474322	.fasrcood/sys/dashboard/sys/Matlab	jharvard	jharvard_lab	00:02:27	test	Undetermined	Cannon Cluster

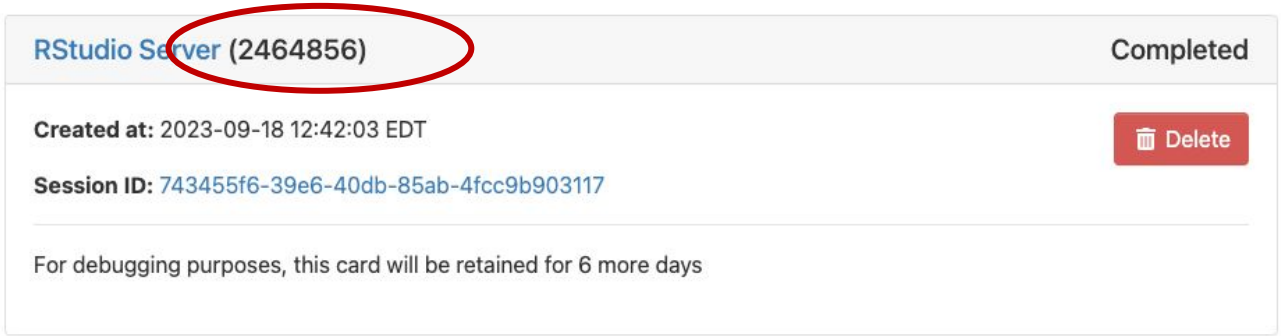
Undetermined .fasrcood/sys/dashboard/sys/Matlab 2474322

Cluster	Cannon Cluster
Job Id	2474322
Job Name	.fasrcood/sys/dashboard/sys/Matlab
User	jharvard
Account	jharvard_lab
Partition	test
State	OUT_OF_MEMORY
Reason	OutOfMemory
Total Nodes	1
Total CPUs	2
Time Limit	1:00:00
Time Used	2:27
Memory	4096M

Job tab (4)

If job no longer appears on “Active Jobs”, check job status from command line with slurm job ID

slurm job ID

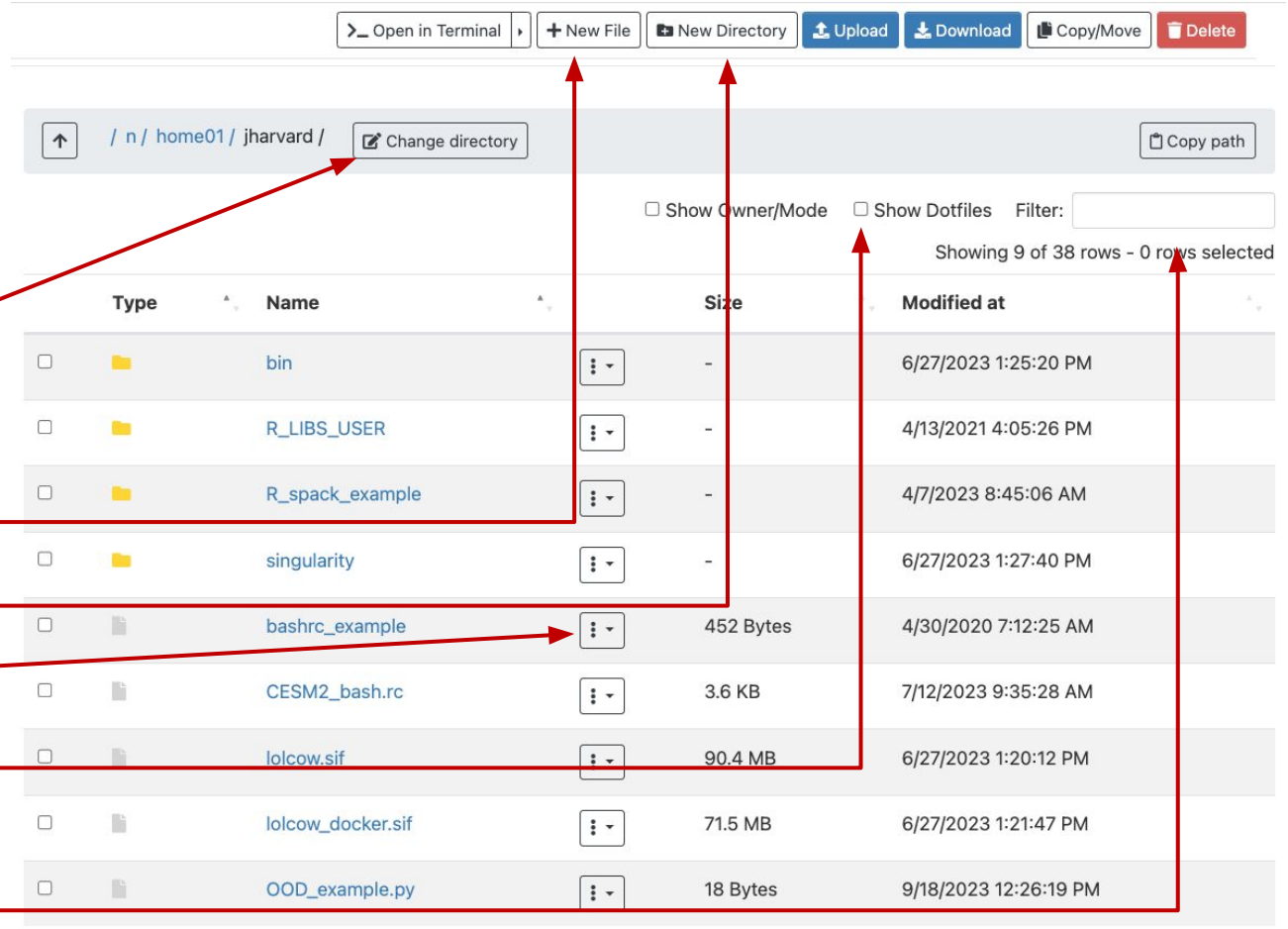



```
[jharvard@boslogin01 ~]$ sacct -j 2464856
JobID           JobName  Partition    Account  AllocCPUS      State ExitCode
------------ ---------- ---------- ---------- ---------- ---------- --------
2464856      .fasrcood+       test jharvard_+          2    TIMEOUT      0:0
2464856.bat+      batch            jharvard_+          2  CANCELLED     0:15
2464856.ext+     extern            jharvard_+          2  COMPLETED      0:0

[jharvard@holy7c02111 ~]$ sacct -j 2471535
JobID           JobName  Partition    Account  AllocCPUS      State ExitCode
------------ ---------- ---------- ---------- ---------- ---------- --------
2471535      .fasrcood+       test jharvard_+          2 OUT_OF_ME+    0:125
2471535.bat+      batch            jharvard_+          2 OUT_OF_ME+    0:125
2471535.ext+     extern            jharvard_+          2  COMPLETED      0:0
```

Files tab

- Default options: home directory and holyscratch
- Click on “Change directory” to go to a lab share
- Create new file
- Create new directory (i.e., folder)
- Click on three dots for options
- Check “Show Dotfiles” to see hidden files
- Filter to find files or directories in current directory



Closing running OOD windows/tabs

- In most OOD apps, you can close the browser tab while the code is running, and the code will continue to run on the background
- Jupyter Notebook will not! The cell that is running will lose the data and output files will not be written
  - Solution: run Remote Desktop app and launch Jupyter Notebook from within Remote Desktop
  - Documentation: https://docs.rc.fas.harvard.edu/kb/ood-remote-desktop-how-to-open-software/#Jupyter_Notebook
- Because closing tabs does not end the application, it is important to delete your job when you are done using it. Otherwise it will be charged to your lab's fairshare.

FASSE proxy

Documentation: https://docs.rc.fas.harvard.edu/kb/proxy-settings/

- You may need to set FASSE proxy on
  - RStudio server if you are unable to reach cran and download R packages
  - Stata if you are unable to load libraries via http
  - Firefox (web browsing)
  - Jupyter Notebook
  - Access Github
  - (Basically, anything outside of FASSE)

Quickstart Guides for using the FASRC Clusters

- Cannon Quickstart Guide
  - https://docs.rc.fas.harvard.edu/kb/iqss-cannon-quickstart-guide
- FASSE Quickstart Guide
  - https://docs.rc.fas.harvard.edu/kb/iqss-fasse-quickstart-guide

- Quickstart guides have more than just information on OOD
  - how to do text based access
  - office hours, training, tickets

FASRC documentation

- FASRC docs: https://docs.rc.fas.harvard.edu/
- GitHub User_codes: https://github.com/fasrc/User_Codes/
- Getting help
  - Office hours: https://www.rc.fas.harvard.edu/training/office-hours/
  - Ticket
    - Portal: http://portal.rc.fas.harvard.edu/rcrt/submit_ticket (requires login)
    - Email: rchelp@rc.fas.harvard.edu

Upcoming trainings

Training calendar: https://www.rc.fas.harvard.edu/upcoming-training/

Getting started on the FASRC clusters with command line interface (CLI)

- Requirement: working FASRC account with cluster access
- Audience
  - Users familiar with command-line interface
  - New to Cannon and FASSE, but familiar with HPC systems
- Content
  - Submit interactive job with `salloc`
  - Submit batch job with `sbatch`
  - Monitor jobs
  - Cluster software overview (modules, spack)

Upcoming trainings

Training calendar: https://www.rc.fas.harvard.edu/upcoming-training/

Advanced Cluster Usage

This training would focus on users who are familiar with the command line interface and would like to improve job submission and management/monitoring.

Objectives:

- Submit interactive and batch jobs
- Request resources appropriate to job requirements
- Monitoring jobs, priority, when jobs will run
- Fairshare
- Scratch vs. home directory performance

Survey

Please, fill out our course survey. Your feedback is essential for us to improve our trainings!!

http://tinyurl.com/FASRCsurvey

Thank you :)

FAS Research Computing