



**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](https://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

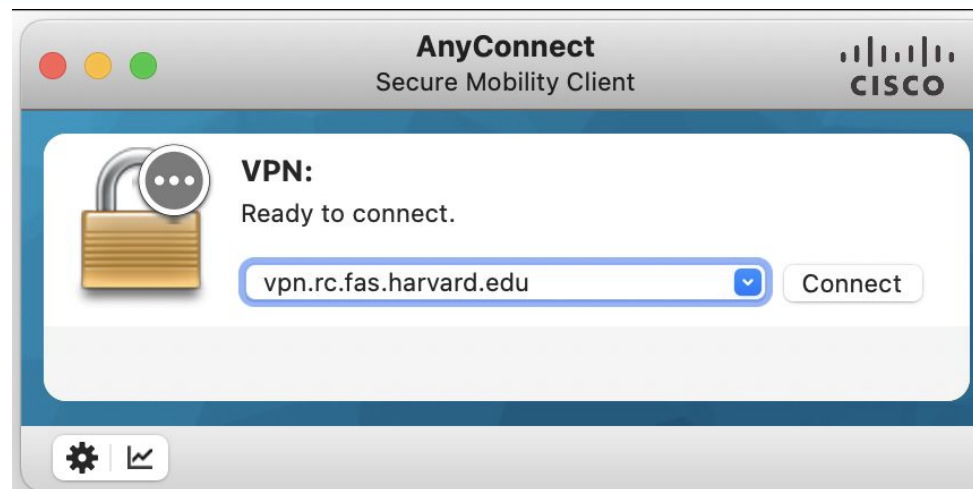





# How to access OOD on FASRC Clusters

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](https://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



Cisco AnyConnect | vpn.rc.fas.harvard.edu

 Please enter your RC username and password.

!!! IF YOU HAVE ISSUES UPGRADING YOUR VPN CLIENT:  
Please manually download and install by logging into <https://vpn.rc.fas.harvard.edu>

This system is for authorized users at Harvard University.  
No other use is permitted.


SUM1 VPN

Username:

Password:

Two-Step Verification Code:

Cisco AnyConnect | vpn.rc.fas.harvard.edu

 Please enter your RC username and password.

!!! IF YOU HAVE ISSUES UPGRADING YOUR VPN CLIENT:  
Please manually download and install by logging into <https://vpn.rc.fas.harvard.edu>

This system is for authorized users at Harvard University.  
No other use is permitted.

SUM1 VPN

Username:

Password:

Two-Step Verification Code:

# Signing in to the OOD Dashboard

When you load the site

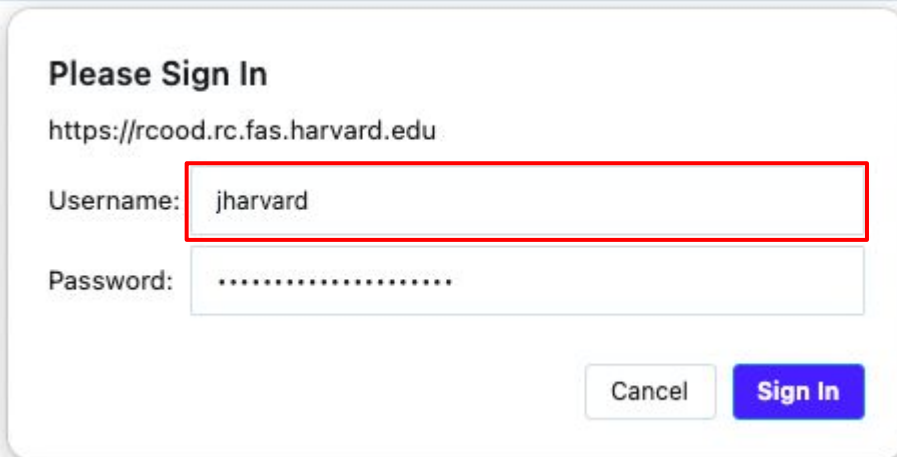
<https://rcood.rc.fas.harvard.edu>

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

A screenshot of a web form titled "Please Sign In". The form is for the URL "https://rcood.rc.fas.harvard.edu". It contains two input fields: "Username:" with the value "jharvard" and "Password:" with masked characters ".....". The "Username:" field is highlighted with a red border. At the bottom right, there are two buttons: "Cancel" and "Sign In".

Please Sign In

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

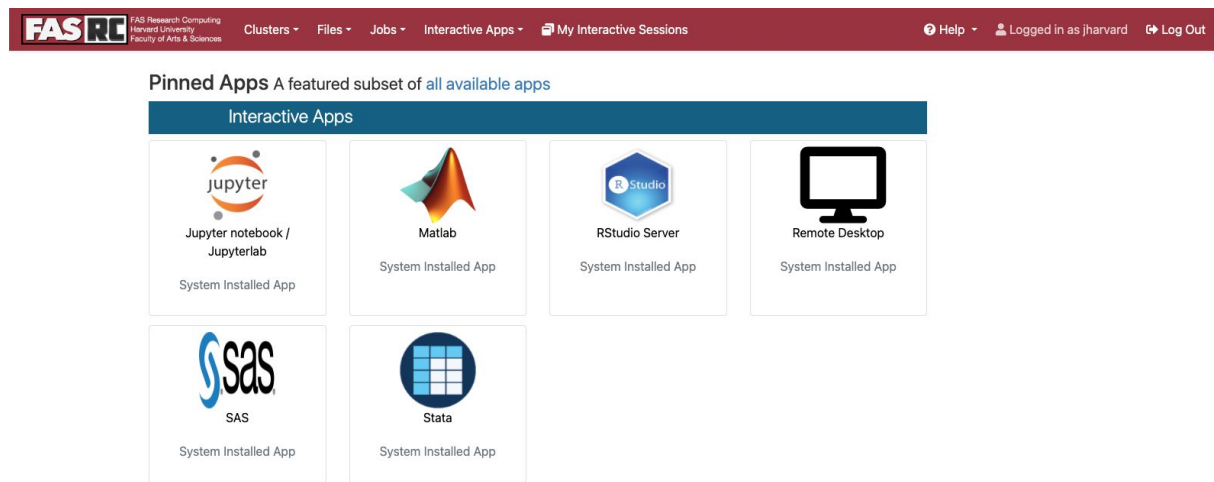
Username: jharvard

Password: .....

Cancel Sign In

# OOD dashboard on Cannon and FASSE

## Cannon



The screenshot shows the Cannon OOD dashboard. At the top is a navigation bar with the FAS RC logo, user information (Logged in as jharvard), and links for Clusters, Files, Jobs, Interactive Apps, and My Interactive Sessions. Below the navigation bar, a section titled "Pinned Apps A featured subset of all available apps" contains a grid of app tiles. The tiles are: Jupyter (Jupyter notebook / Jupyterlab), Matlab, RStudio Server, Remote Desktop, SAS, and Stata. Each tile includes the app's logo, name, and a note that it is a "System Installed App".



### Welcome to FAS-RC Cluster

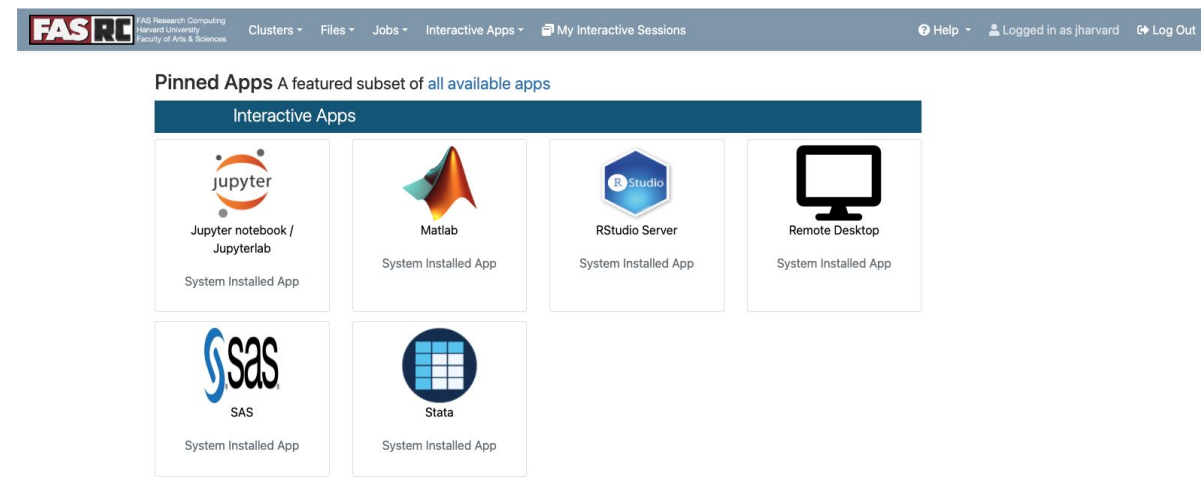
The Computing Cluster is a resource for the research community, hosted by Research Computing at Harvard University's Faculty of Arts and Sciences.

To apply for an account please refer to [this webpage](#).

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

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

## FASSE



The screenshot shows the FASSE OOD dashboard. It has a similar layout to the Cannon dashboard, with a navigation bar at the top and a "Pinned Apps" section below. The app tiles are identical: Jupyter, Matlab, RStudio Server, Remote Desktop, SAS, and Stata, each labeled as a "System Installed App".



### Welcome to FASSE

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](#).

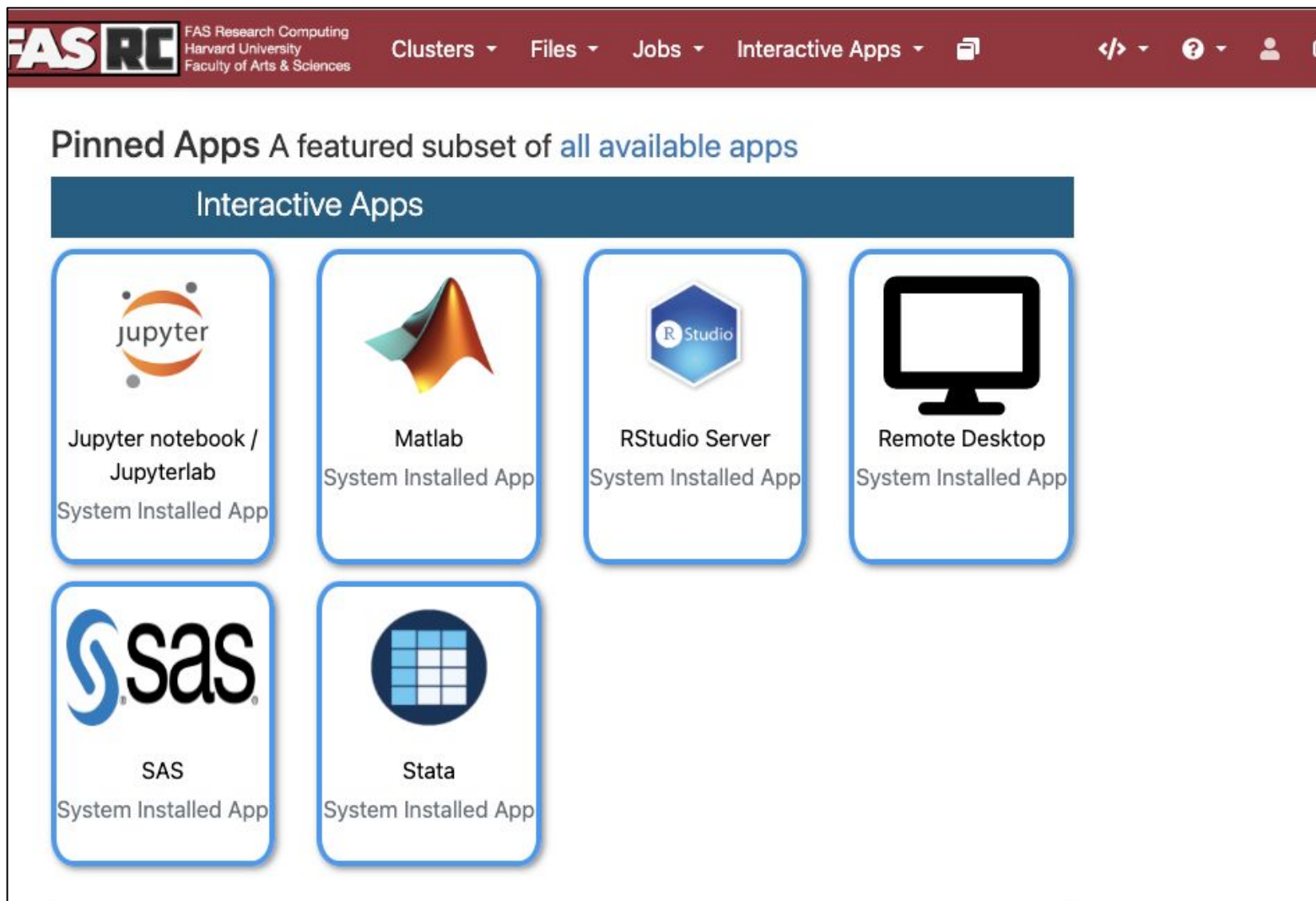
From this web service you can submit your jobs, check running jobs, and open interactive graphical sessions to run your favorite applications.

These are some examples of the things you will be able to do :







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



# Launching an app from the Dashboard



The screenshot displays the FAS RC Dashboard interface. At the top, a dark red navigation bar contains the FAS RC logo, the text "FAS Research Computing Harvard University Faculty of Arts & Sciences", and a menu with "Clusters", "Files", "Jobs", and "Interactive Apps". To the right of the menu are icons for code editing, help, user profile, and a refresh button. Below the navigation bar, the main content area is titled "Pinned Apps A featured subset of all available apps". A blue header bar labeled "Interactive Apps" is positioned above a grid of six app tiles. Each tile features an icon, the app name, and the status "System Installed App".

Interactive Apps					
					
Jupyter notebook / Jupyterlab	Matlab	RStudio Server	Remote Desktop		
System Installed App	System Installed App	System Installed App	System Installed App		
					
SAS	Stata				
System Installed App	System Installed App				

# Beginning of a form

## RStudio Server

This app will launch an [RStudio Server](#) instance on a FAS RC compute node. This app provides a common software environment for FAS Informatics workshops and general-purpose single-node RStudio Server jobs.

See [RStudio Server OOD app](#) for more information.

- User-installed R libraries will be installed in `~/R/ifxrstudio/<IMAGE_TAG>`.

### Partition

`sbatch -p, --partition=<partition_names>`

[Slurm partition](#) name (e.g., **shared** ), or comma-separated list of partition names (e.g., **shared,test** )

### Memory Allocation in GB

`sbatch --mem=<size>G`



[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`

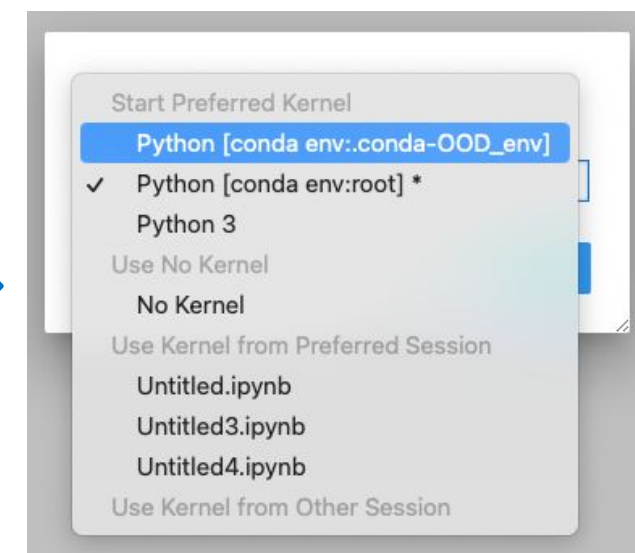
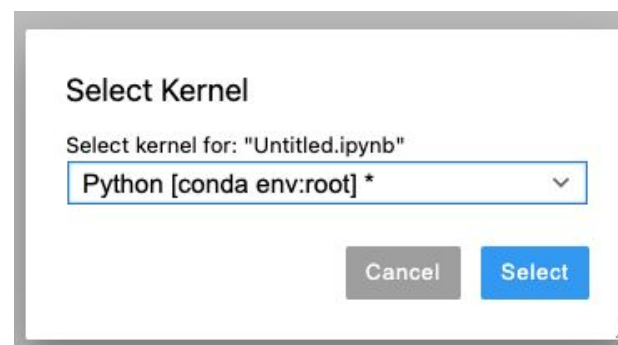
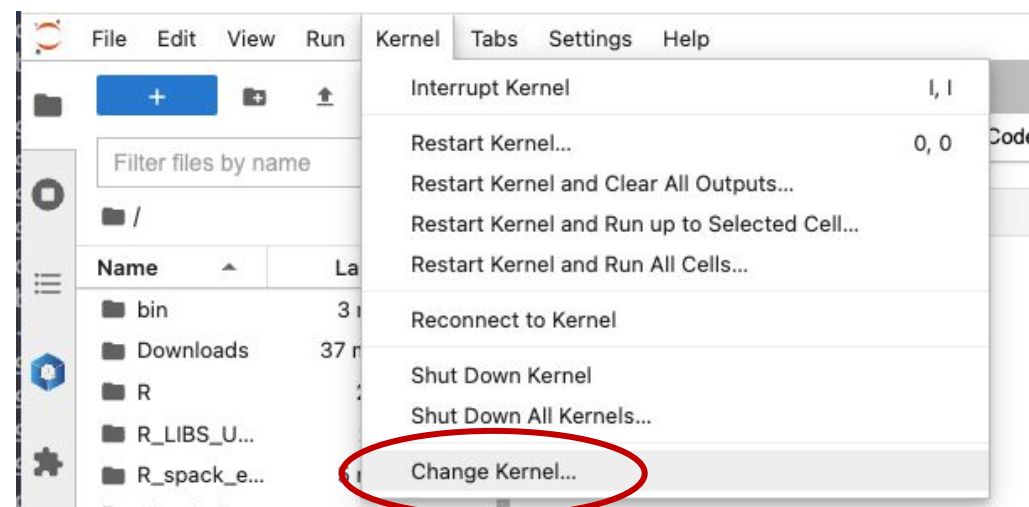
```
[jharvard@holly7c02111 ~]$ module load python  
[jharvard@holly7c02111 ~]$ mamba create -n OOD_env python=3.11 pip wheel numpy  
[jharvard@holly7c02111 ~]$ source activate OOD_env  
(OOD_env) [jharvard@holly7c02111 ~]$ mamba install ipykernel
```

[https://docs.rc.fas.harvard.edu/kb/python-package-installation/#Use\\_mamba\\_environment\\_in\\_Jupyter\\_Notebooks](https://docs.rc.fas.harvard.edu/kb/python-package-installation/#Use_mamba_environment_in_Jupyter_Notebooks)



## Jupyter Notebook (2)

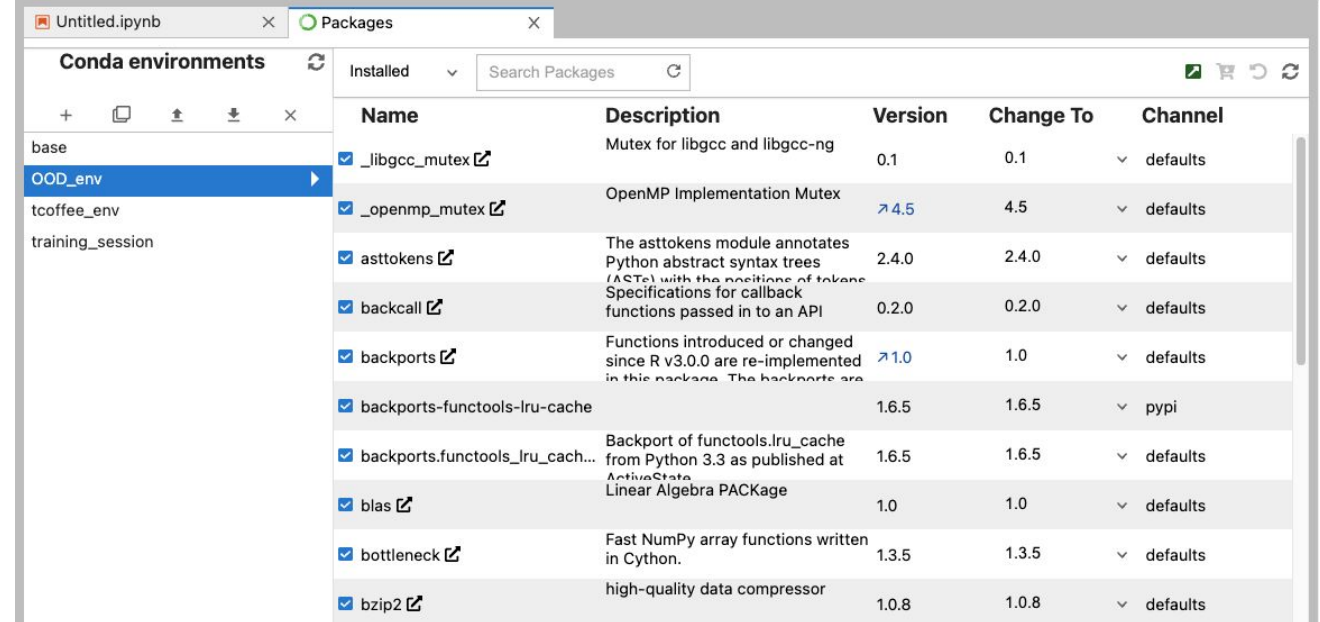
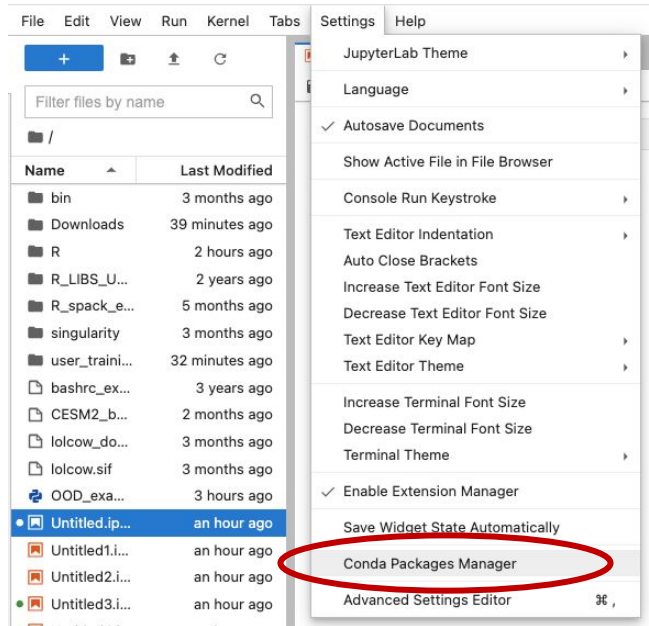
3. Launch **new** Jupyter Notebook session (existing session will not work!)
4. Select newly created mamba environment as the kernel
  - a. Open a notebook
  - b. On the top menu, click Kernel -> Select Kernel -> Click on OOD\_env



# Jupyter Notebook (3)

## 5. Managing (install, uninstall, update) packages

- We recommend using the command line
- 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

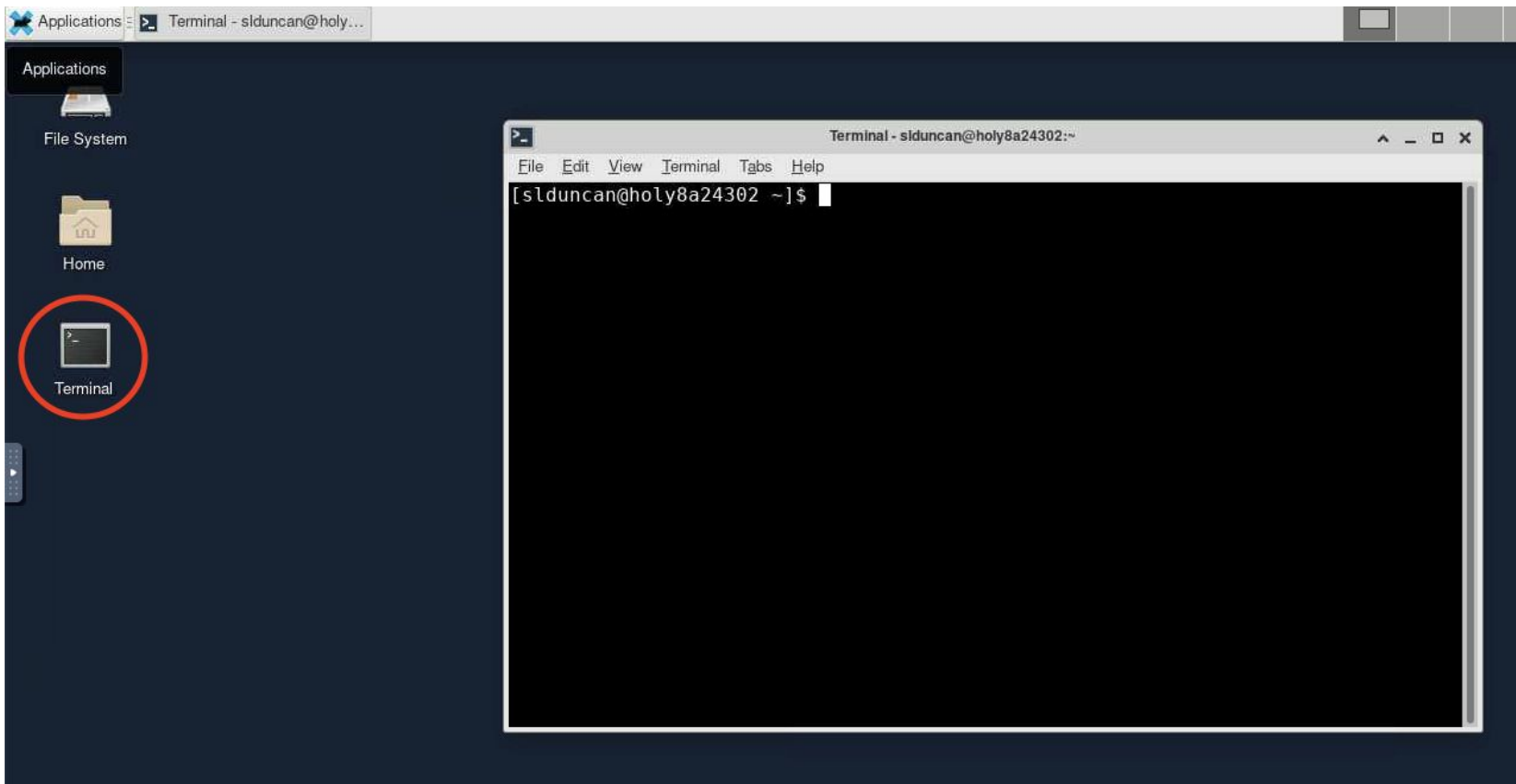
- Not as necessary as it used to be
- Terminal
- **For running long Jupyter Notebook sessions**
- Can also be used to open multiple applications in a single window
- Choose the defaults for resolution

Resolution

width	1024	px	height	768	px
-------	------	----	--------	-----	----

# 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](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@holly7c02111 ~]$ module load matlab
[jharvard@holly7c02111 ~]$ matlab -desktop -softwareopengl &

#PyCharm
[jharvard@holly7c02111 ~]$ module load python
[jharvard@holly7c02111 ~]$ module load pycharm-community
[jharvard@holly7c02111 ~]$ pycharm.sh
```

Applications: MATLAB R2022b - acad... Welcome to PyCharm Terminal - slduncan@holy...

Thu 12 Sep, 15:14

HOME PLOTS APPS

New Script New Live Script New Open Find Files Compare Import Data

FILE

Current Folder

/ n home\_rc slduncan

Name Downloads Temp slduncan.bashrc

Details

Workspace

Name	Value

PyCharm 2023.1

Projects

Customize

Plugins

Learn

Welcome

Create a new project

Open existing project

New Project

Take

New to PyCharm

Start Tour

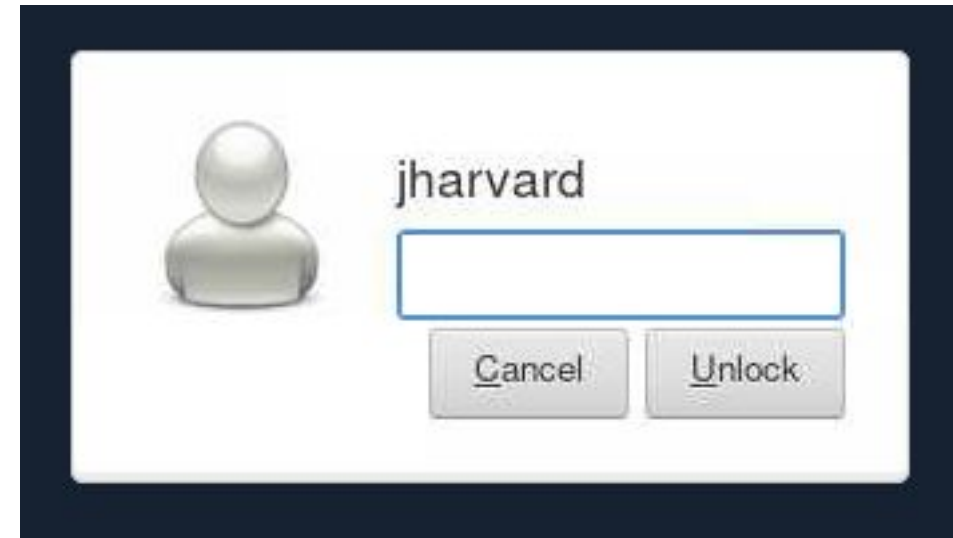
Terminal - slduncan@holy8a24301:~

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  $\geq 1$ , 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  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

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.

Delete




## 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	Delete
> 2474168	.fasrcood/sys/dashboard/sys/Jupyter	jharvard	jharvard_lab	00:15:45	test	Running	Cannon Cluster	Delete

# 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

RStudio Server (2464856)
Completed

Created at: 2023-09-18 12:42:03 EDT
Delete

Session ID: 743455f6-39e6-40db-85ab-4fcc9b903117

For debugging purposes, this card will be retained for 6 more days

```
[jharvard@boslogin01 ~]$ sacct -j 2464856
```

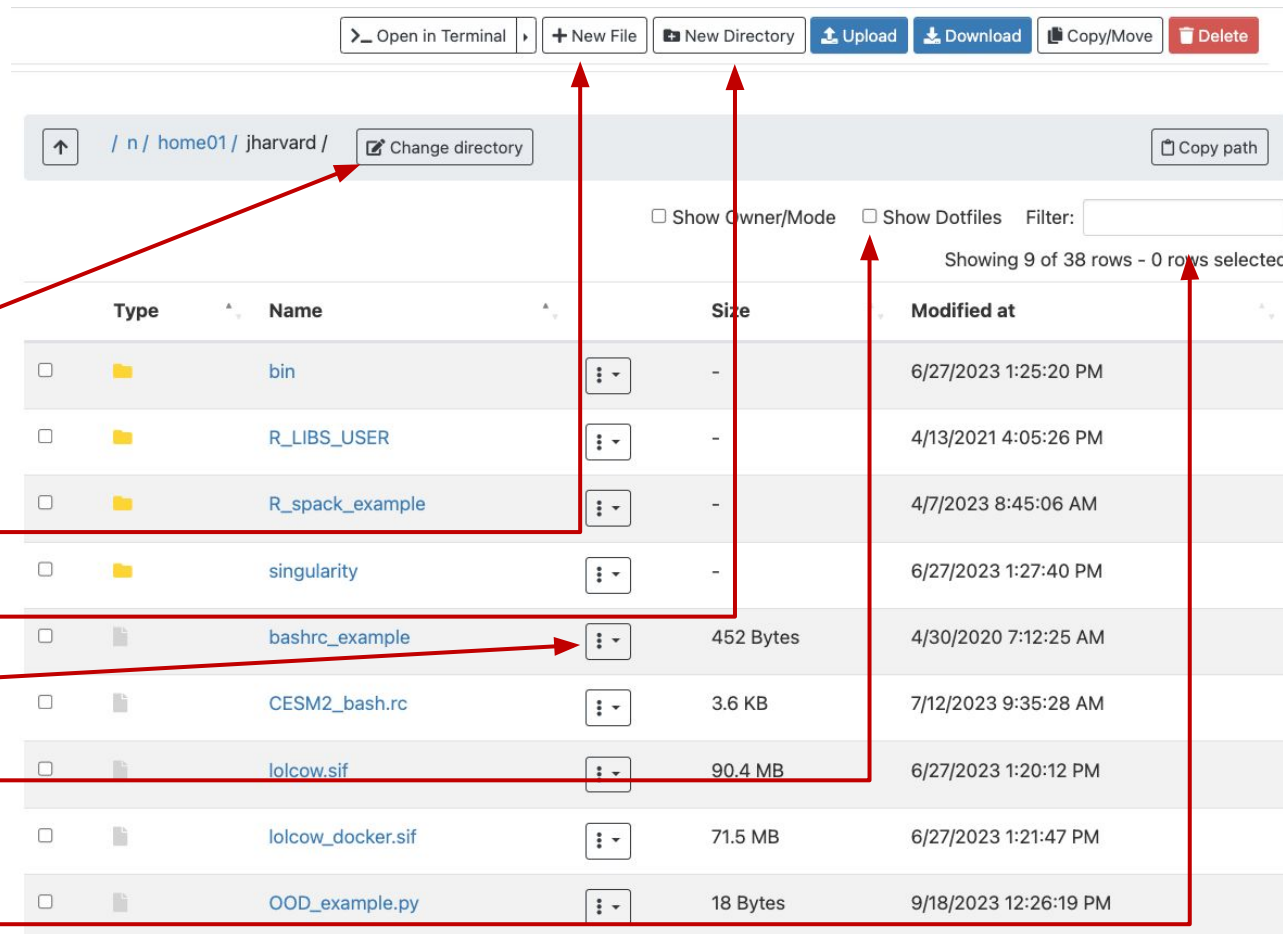
JobID	JobName	Partition	Account	AllocCPUS	State	ExitCode
2464856	.fasrcood+	test	jharvard_+	2	TIMEOUT	0:0
2464856.bat+	batch		jharvard_+	2	CANCELLED	0:15
2464856.ext+	extern		jharvard_+	2	COMPLETED	0:0

```
[jharvard@holly7c02111 ~]$ 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



The screenshot shows the FAS Research Computing Files tab interface. Red arrows point to the following features:

- Change directory:** A button in the top navigation bar that allows users to navigate to a different directory.
- New File:** A button in the top navigation bar that allows users to create a new file.
- New Directory:** A button in the top navigation bar that allows users to create a new directory.
- Upload:** A button in the top navigation bar that allows users to upload files.
- Download:** A button in the top navigation bar that allows users to download files.
- Copy/Move:** A button in the top navigation bar that allows users to copy or move files.
- Delete:** A button in the top navigation bar that allows users to delete files.
- Filter:** A text input field in the top right corner that allows users to filter files or directories.
- Show Dotfiles:** A checkbox in the top right corner that allows users to show hidden files.
- Three dots menu:** A menu icon (three dots) next to each file or directory entry in the table, which provides options for file management.

Type	Name	Size	Modified at
Folder	bin	-	6/27/2023 1:25:20 PM
Folder	R_LIBS_USER	-	4/13/2021 4:05:26 PM
Folder	R_spack_example	-	4/7/2023 8:45:06 AM
Folder	singularity	-	6/27/2023 1:27:40 PM
File	bashrc_example	452 Bytes	4/30/2020 7:12:25 AM
File	CESM2_bash.rc	3.6 KB	7/12/2023 9:35:28 AM
File	lolcow.sif	90.4 MB	6/27/2023 1:20:12 PM
File	lolcow_docker.sif	71.5 MB	6/27/2023 1:21:47 PM
File	OOD_example.py	18 Bytes	9/18/2023 12:26:19 PM

# 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](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/](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](http://portal.rc.fas.harvard.edu/rcrt/submit_ticket) (requires login)
    - Email: [rchelp@rc.fas.harvard.edu](mailto: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**