



Getting Started on the FASRC clusters with Open OnDemand

Learning objectives

- What is Open OnDemand (OOD)?
- How to access OOD?
- Understanding the form to launch apps
- RStudio Server
- Jupyter Notebook
 - Create conda environment (i.e., jupyter kernel)
- Remote Desktop
- FASSE proxy
- Files tab
- Jobs tab

What is Open OnDemand (OOD)?

- Open-source web portal to access clusters
- Web-based, no software needs be installed on your local laptop/desktop (except for a modern browser like Google Chrome, Mozilla Firefox)
- Easy to learn and simple to use
- Very similar to desktop applications
- The easiest way to run GUI applications remotely on a cluster
- Safari is not recommended for OOD

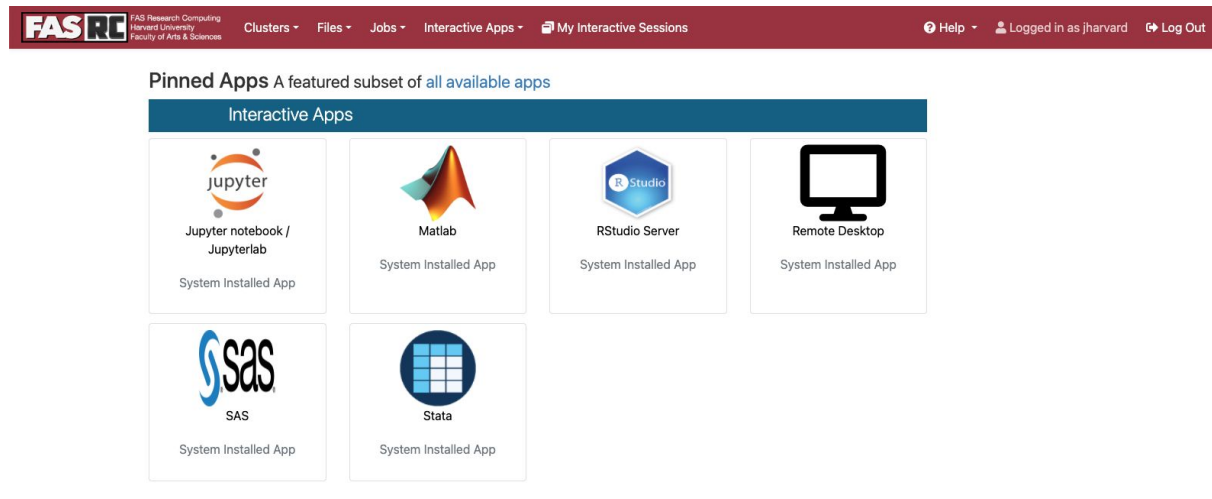


How to access OOD on FASRC Clusters

- FASRC clusters
 - Cannon & how to get an account - [IQSS Cannon Quickstart Guide – FASRC DOCS](#)
 - FASSE & how to get an account - [IQSS FASSE Quickstart Guide – FASRC DOCS](#)
- Accessing OOD from Cannon
 - Connect to FASRC VPN - [Virtual Desktop \(VDI\) through Open OnDemand – FASRC DOCS](#)
 - Then go to <https://rcood.rc.fas.harvard.edu>
- Accessing OOD from FASSE
 - Connect to FASSE VPN - [FASSE VDI Apps – FASRC DOCS](#)
 - Then go to <https://fasseood.rc.fas.harvard.edu>

OOD dashboard on Cannon and FASSE

Cannon



The screenshot shows the Cannon OOD dashboard. At the top is a dark red navigation bar with the FAS RC logo, navigation links (Clusters, Files, Jobs, Interactive Apps, My Interactive Sessions), and user information (Help, Logged in as jharvard, Log Out). Below the navigation bar is a section titled "Pinned Apps A featured subset of all available apps". Underneath this is a sub-section "Interactive Apps" containing six app tiles: Jupyter (Jupyter notebook / Jupyterlab), Matlab, RStudio Server, Remote Desktop, SAS, and Stata. Each tile includes the app's logo, name, and "System Installed App" status.



Welcome to FAS-RC Cluster

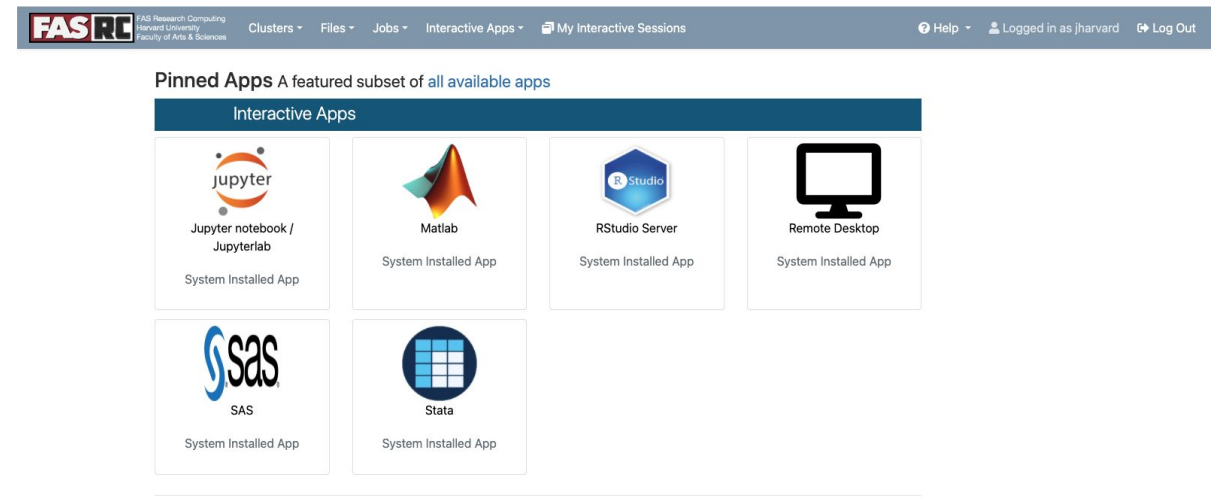
The Computing Cluster is a resource for the research community, hosted by Research Computing at Harvard University's Faculty of Arts and Sciences.

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 Cannon, with a dark grey navigation bar at the top. The "Pinned Apps" section is identical, featuring tiles for Jupyter, Matlab, RStudio Server, Remote Desktop, SAS, and Stata.



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>


Filling 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
- 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

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

RStudio Server vs. RStudio Desktop

RStudio Server

- Go-to RStudio application with easy-to-install packages (pre-compiled)
- Cannot set `R_LIBS_USER` (location where packages are saved)
- `R_LIBS_USER` is set to `~/R/ifxrstudio/\`
- Cannot use `module load`
- Cannot use slurm commands (e.g. `sbatch`)

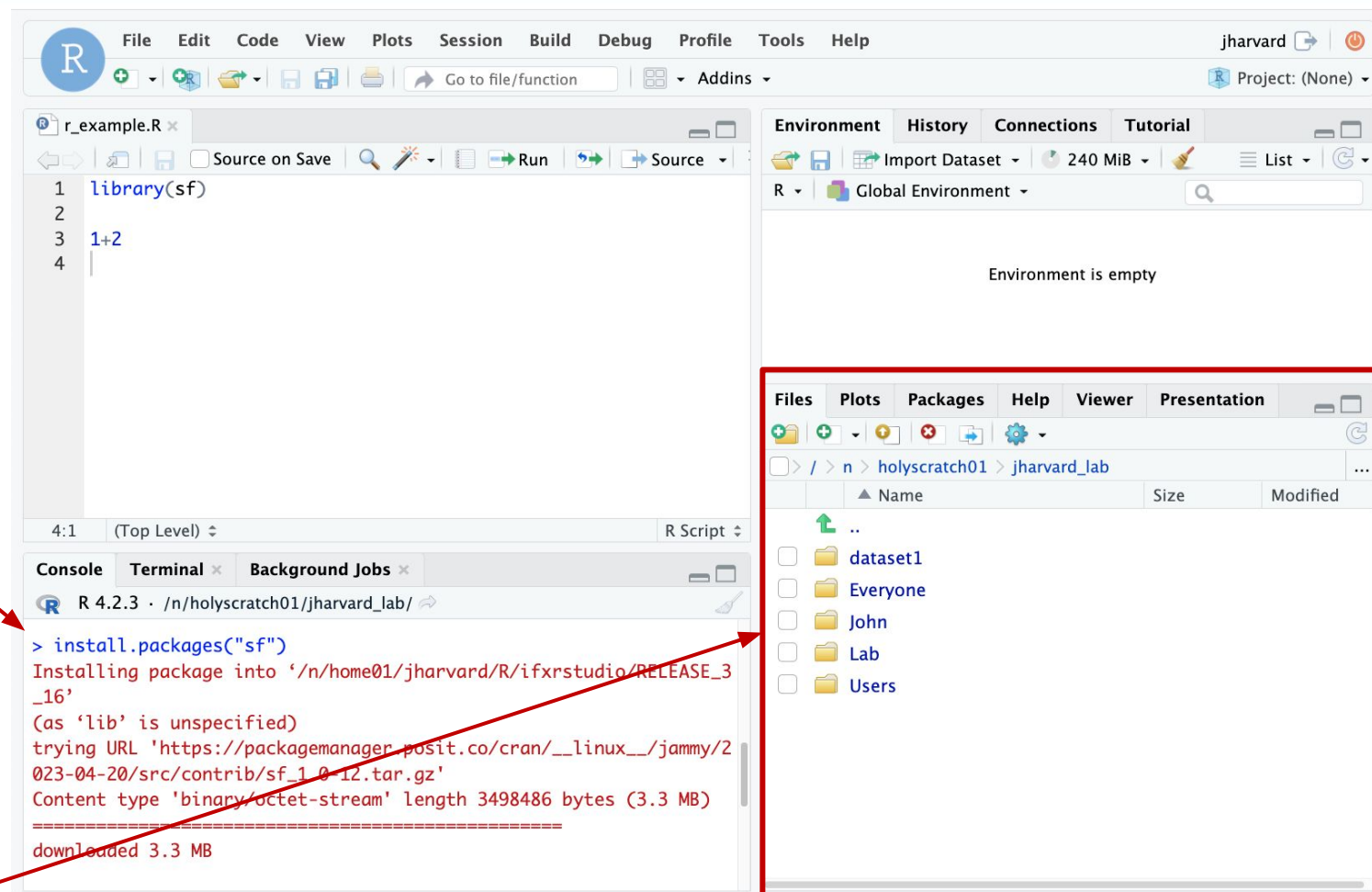
R via Remote Desktop

- Highly customized environment
- Can set `R_LIBS_USER`
- Can use `module load` → you can set specific compilers (e.g. `openmpi`, `gcc`)
- Can use slurm commands (e.g. `sbatch`)

See [RStudio Server vs. RStudio Desktop OOD apps – FASRC DOCS](#)

RStudio Server

- Package install
- Change directory



The screenshot shows the RStudio Server interface. The main editor window displays a script named `r_example.R` with the following code:

```
1 library(sf)
2
3 1+2
4
```

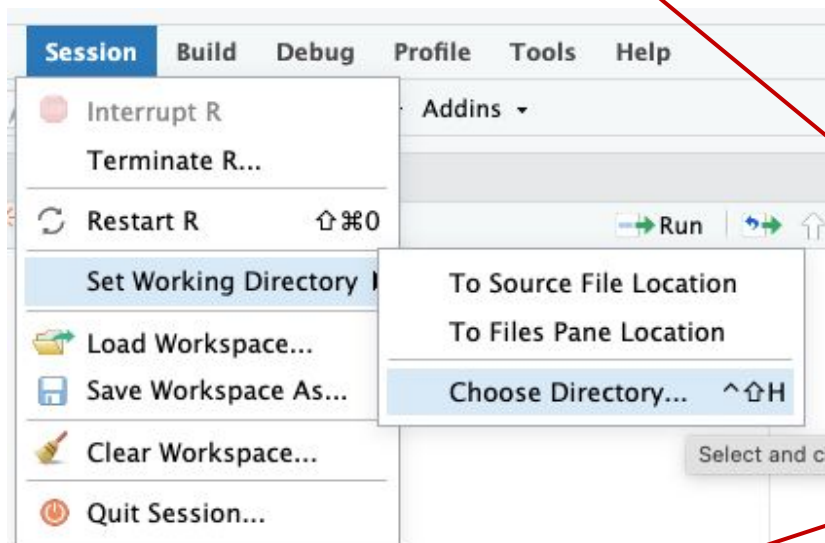
The console window shows the output of the `install.packages("sf")` command:

```
> install.packages("sf")
Installing package into '/n/home01/jharvard/R/ifxrstudio/RELEASE_3_16'
(as 'lib' is unspecified)
trying URL 'https://packagemanager.posit.co/cran/_linux_/jammy/2023-04-20/src/contrib/sf_1.0-12.tar.gz'
Content type 'binary/octet-stream' length 3498486 bytes (3.3 MB)
=====
downloaded 3.3 MB
```

The file explorer on the right shows the current directory structure:

```
/ > / > n > holyscratch01 > jharvard_lab
```

Name	Size	Modified
..		
dataset1		
Everyone		
John		
Lab		
Users		



The screenshot shows the 'Session' menu in RStudio Server. The 'Set Working Directory' option is highlighted, and a sub-menu is open showing 'Choose Directory...' as the selected option.

- Open file

Jupyter Notebook (1)

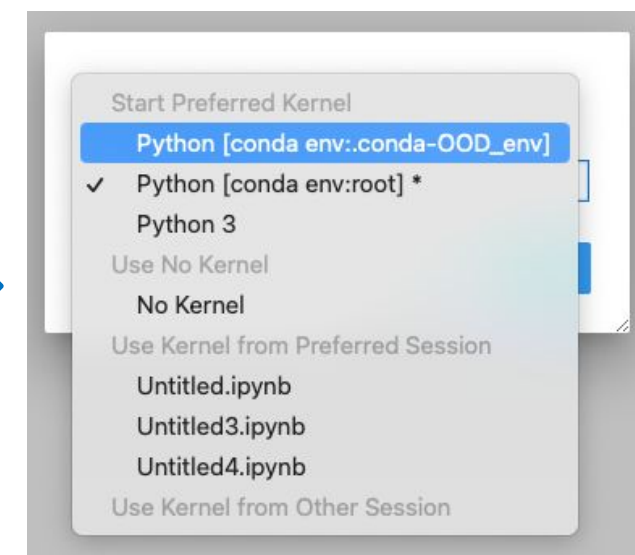
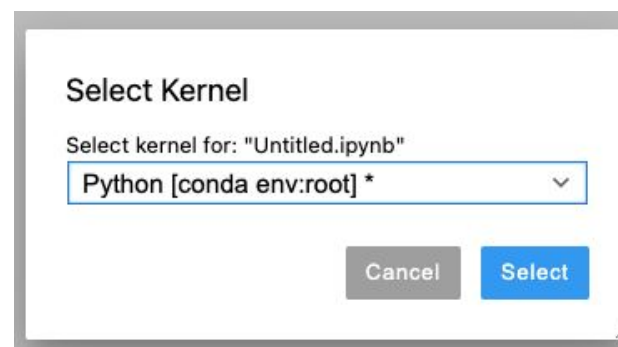
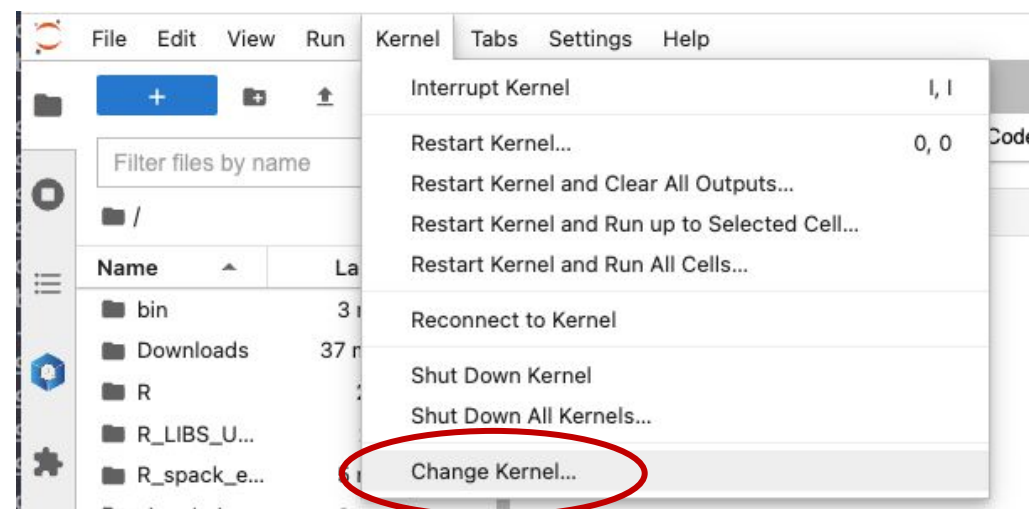
- You can create your own kernels, but some command line needed
 - Note: kernels is the same as conda, python, mamba environment
1. Launch "Remote Desktop" app
⇒ Don't create conda environments inside Jupyter Notebook/Lab!!
 2. Create conda environment and install package `ipykernel`

```
[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/#Mamba>

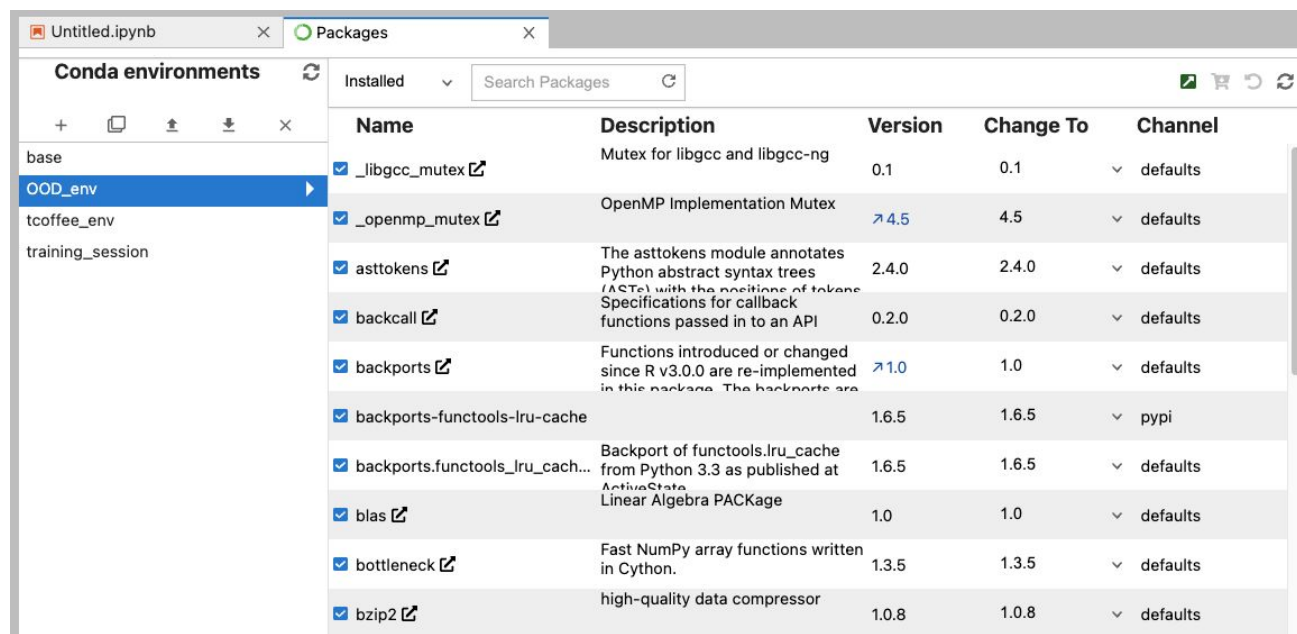
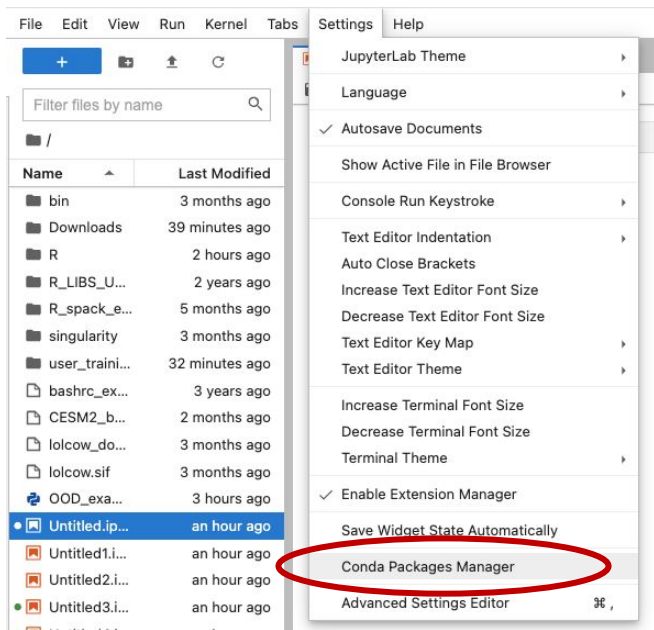
Jupyter Notebook (2)

3. Launch **new** Jupyter Notebook session (existing session will not work!)
4. Select newly created conda 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
<https://docs.rc.fas.harvard.edu/kb/python/#Mamba>
 - b. You can also use the conda package manager: On the top menu, click Settings -> Conda Package Manager -> OOD_env



Remote Desktop

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

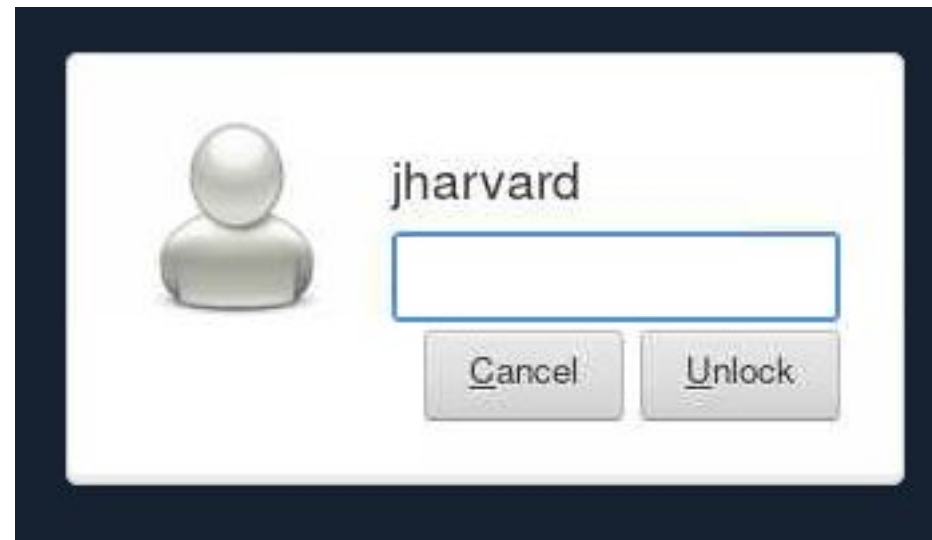
- It can be used to launch most GUI applications
- How?
 1. Load module
 2. Set environmental variables (if needed)
 3. Launch software
- You can have multiple applications open

```
# 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
```

Remote Desktop

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



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

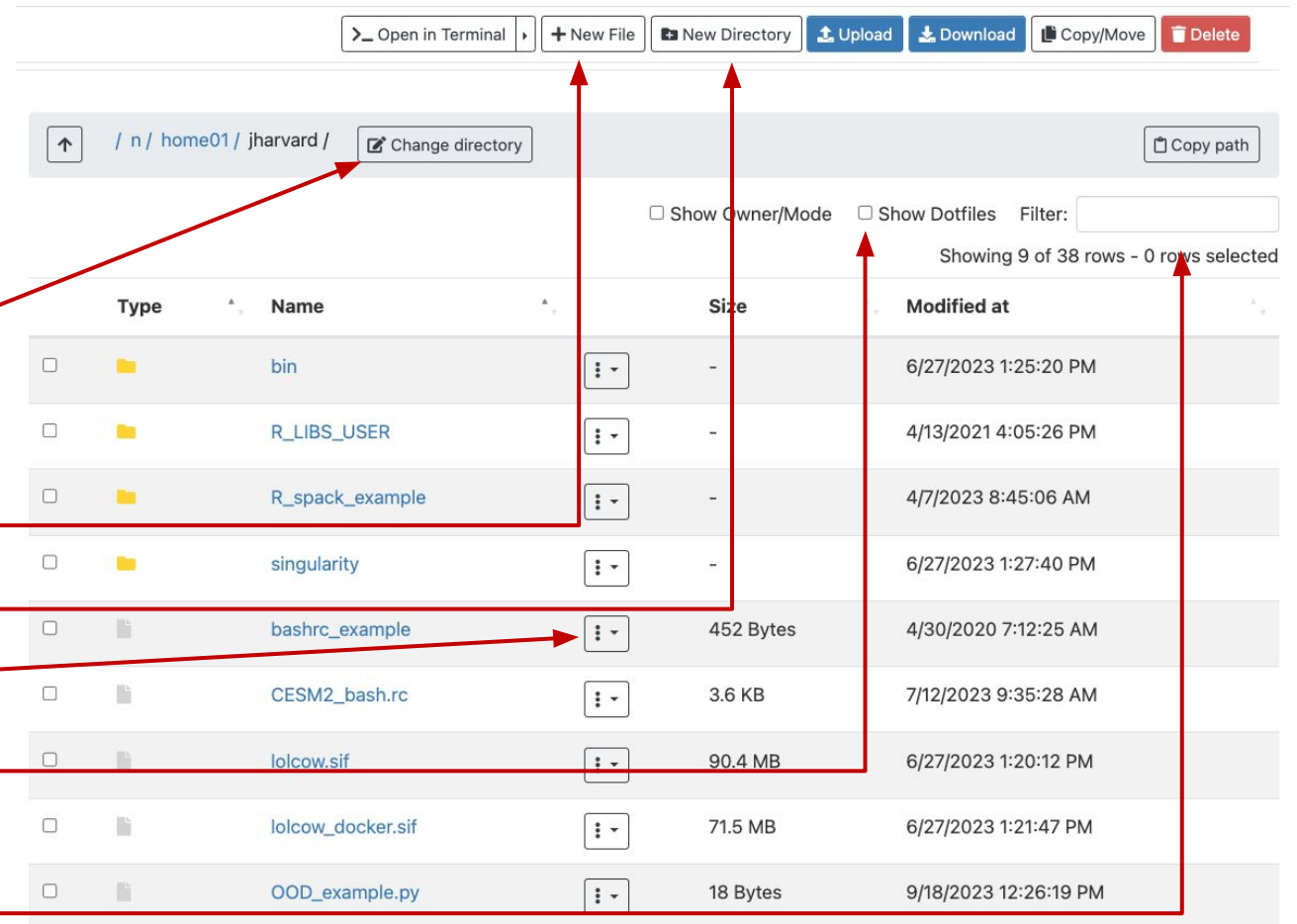
FASSE proxy

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)

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 Files tab interface with the following elements and annotations:

- Top Bar:** Contains buttons for “Open in Terminal”, “New File”, “New Directory”, “Upload”, “Download”, “Copy/Move”, and “Delete”.
- Current Directory:** Shows the path `/ n / home01 / jharvard /` and a “Change directory” button.
- File List Table:**


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
- Filters:** Includes checkboxes for “Show Owner/Mode” and “Show Dotfiles”, and a “Filter:” input field.
- Annotations:** Red arrows point from the list items to the corresponding instructions in the left sidebar:
 - From “Change directory” to the “Change directory” button.
 - From “Create new file” to the “New File” button.
 - From “Create new directory (i.e., folder)” to the “New Directory” button.
 - From “Click on three dots for options” to the three-dot menu icon for the `bashrc_example` file.
 - From “Check ‘Show Dotfiles’ to see hidden files” to the “Show Dotfiles” checkbox.
 - From “Filter to find files or directories in current directory” to the “Filter:” input field.

Jobs tab (1)

Active Jobs

 Show entries

 Filter:

ID	Name	User	Account	Time Used	Queue	Status	Cluster	Actions
>	2469887	.fasrcod/sys/dashboard/sys/RemoteDesktop	jharvard	jharvard_lab	01:35:49	serial_requeue	Completed	Cannon Cluster
▼	2474168	.fasrcod/sys/dashboard/sys/Jupyter	jharvard	jharvard_lab	00:09:37	test	Running	Cannon Cluster 

Running .fasrcod/sys/dashboard/sys/Jupyter 2474168

Cluster	Cannon Cluster
Job Id	2474168
Job Name	.fasrcod/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 entries

 Filter:

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

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@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

Survey

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

<http://tinyurl.com/FASRCsurvey>

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



Thank you :)
FAS Research Computing