



THE OHIO STATE UNIVERSITY

Department of Physics

Using OSC

FALL, 2019

R. HUGHES



Step 1: Open “ondemand.osc.edu” in a browser

The screenshot shows a web browser window for "OSC OnDemand | Discovery" at <https://ondemand.osc.edu/>. The page title is "OSC OnDemand". Below it, a central section says "Login to OSC OnDemand" and provides instructions: "Log in with either your OSC Account or a third party account via CILogon. If you don't have an OSC Account, [register for one here](#)". Two main options are presented: "Log in with your OSC account" and "Log in with third party through CILogon". A large red arrow points from the text "Step 2: Click this" on the right towards the "Log in with third party through CILogon" button.

Log in with OSC Account

Log in with third party through CILogon

Step 1. Log in with your OSC account
Authenticate with OSC's Open ID Connect server.

Step 2. Map it to your OSC account (first login only)
If it is the first time logging in with this provider, you will need to associate it with your HPC account.

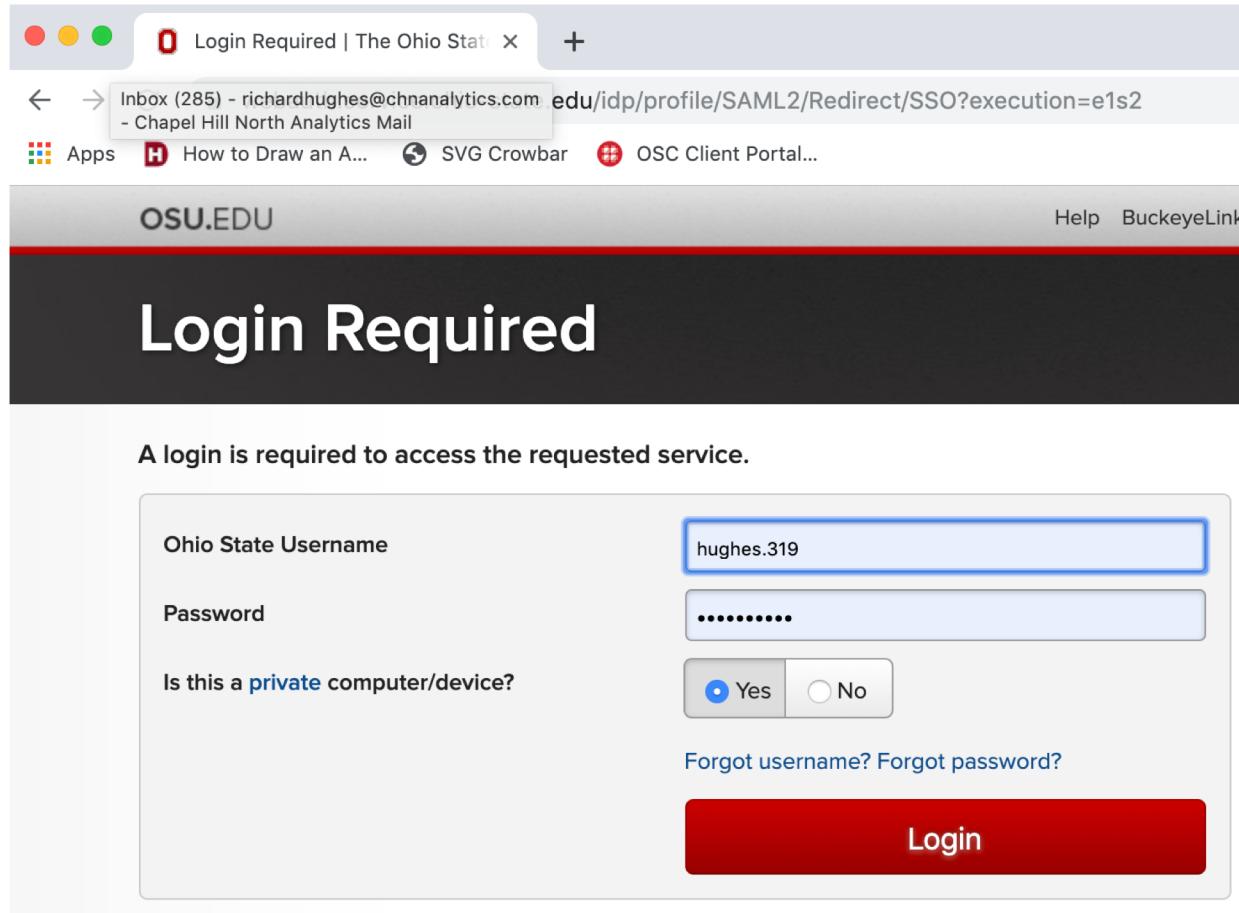
Step 1. Choose your identity provider
CILogon provides access to identity providers from many academic institutions across the state.

Step 2. Login via your provider
For example, here I've chosen Ohio State University as my provider and am presented OSU's login page.

Step 2:
Click this



Step 3: Log in using your OSU credentials





Step 4: Start a “terminal window” in the browser

The screenshot shows a web browser window with the title "Dashboard" and the URL "ondemand.osc.edu/pun/sys/dashboard". The browser toolbar includes standard icons for close, minimize, and maximize. Below the toolbar, the address bar shows the URL. The main content area is the OSC OnDemand dashboard. At the top of the dashboard, there is a blue navigation bar with several links: "OSC OnDemand", "Files", "Jobs", "Clusters", "Interactive Apps", "My Interactive Sessions", and "All Apps". An orange arrow points from the "Clusters" link towards the "Interactive Apps" link. To the right of the "Interactive Apps" link, a red box contains the text "Click this". Below the navigation bar, the Ohio Supercomputer Center logo is displayed, featuring a red circular icon with a white circuit board pattern and the text "Ohio Supercomputer Center" and "An OH-TECH Consortium Member". A message below the logo states: "OnDemand provides an integrated, single access point for all of your HPC resources." Further down the page, there is a section titled "Message of the Day" with the date "2019-07-29 - Negative Balance Policy Updates" and a link to the "proposed_osc_policies_for_public_comments" document.

Click this

OSC OnDemand Files▼ Jobs▼ Clusters▼ **Interactive Apps▼** My Interactive Sessions All Apps

Ohio Supercomputer Center
An OH-TECH Consortium Member

OnDemand provides an integrated, single access point for all of your HPC resources.

Message of the Day

2019-07-29 - Negative Balance Policy Updates

Updated negative balance policy to be implemented on October 1. Public comment period through August 31. Please see https://www.osc.edu/resources/technical_support/supercomputing-policies/proposed_osc_policies_for_public_comments.

Step 4: Start a “terminal window” in the browser

The screenshot shows a web browser window for the URL ondemand.osc.edu/pun/sys/dashboard. The browser title bar says "Dashboard". The page header includes links for "Reload this page", "Dashboard", "Apps", "How to Draw an A...", "SVG Crowbar", and "OSC Client Portal...". A blue navigation bar at the top has tabs for "OSC OnDemand", "Files", "Jobs", "Clusters", "Interactive Apps", "My Interactive Sessions", and "All Apps". The "Clusters" tab is currently selected. A dropdown menu for "Clusters" is open, showing options: ">_Owens Shell Access" and ">_Pitzer Shell Access", with ">_System Status" also listed. An arrow points from the text "Then Select Pitzer Shell Access" to the ">_Pitzer Shell Access" option. Below the dropdown, the text "OnDemand provides an integrated, single access point for all of your HPC resources." is visible.

Then Select
Pitzer Shell
Access

Message of the Day

2019-07-29 - Negative Balance Policy Updates

Updated negative balance policy to be implemented on October 1. Public comment period through August 31. Please see https://www.osc.edu/resources/technical_support/supercomputing-policies/proposed_osc_policies_for_public_comments.



You should then see something like this: The terminal window

The screenshot shows a web browser window with the title bar 'osu7903@login04:~'. The address bar shows 'ondemand.osc.edu/pun/sys/shell/ssh/pitzer.osc.edu'. The page content is a terminal session. It displays several messages about security vulnerabilities, contact information for OSC Help, and a section titled 'Negative Balance Policy Updates'. At the bottom, it shows disk usage statistics for users osu7903, PAS1495, PAS1043, and PAS1383, followed by a prompt 'osu7903@login04 ~]\$'.

```
0.7.17 and 0.7.13, it is highly recommended that you immediately stop using these versions and instead use bwa/0.7.17-r1198 which contains a patch to mitigate this vulnerability.

Details on the vulnerability can be found in the following webpages:
https://nvd.nist.gov/vuln/detail/CVE-2019-10269?vulnCurrentDescriptionTitle
https://coreymudson.github.io/bwa_vulnerabilities/

Please contact OSC Help if you have any questions or concerns.

Toll Free: (800) 686-6472
Local: (614) 292-1800
Email: oschelp@osc.edu

*****
2019/07/29
--- Negative Balance Policy Updates

Updated negative balance policy to be implemented on October 1. Public
comment period through August 31. Please see
https://www.osc.edu/resources/technical_support/supercomputing-policies/proposed_osc_policies_for_public_comments.

*****
As of 2019-08-20T05:50:02.000000 userid osu7903 on /fs/project/PAS1495 used 0 GiB of quota 0 GiB and 1 files of quota 0 files
As of 2019-08-20T05:50:02.000000 userid osu7903 on /fs/scratch used 1 GiB of quota 0 GiB and 1598 files of quota 0 files
As of 2019-08-20T05:51:54.000000 userid osu7903 on /users/PAS1043 used 198.63 GiB of quota 500 GiB and 592223 files of quota 1000000 files
As of 2019-08-20T05:51:54.000000 userid osu7903 on /users/PAS1383 used 16.87 GiB of quota 500 GiB and 46867 files of quota 1000000 files

osu7903@login04 ~]$
```

Some useful shell commands

1. `pwd`: print working directory
2. `ls`: list contents of current directory
3. `cd`: go to home directory
4. `cd "dir"`: change current directory to "dir"
5. `"cd .."`: This goes "up" one directory
6. `mkdir "newdir"`: make a new directory named "newdir" (requires permission)
7. `nano`: a simple editor (cheatsheet: <https://www.nano-editor.org/dist/latest/cheatsheet.html>)
8. `emacs`: a more sophisticated terminal editor (cheatsheet: <https://courses.cs.washington.edu/courses/cs/e351/16wi/sections/1/Cheatsheet-emacs.pdf>)



Setup a work environment in your OSC account:

As the course goes on, you will become more comfortable with the “terminal”, but for the first few weeks, we will usually do the same basic things again and again.

But first, we need to set up our environment.

In the terminal window, type the following 3 commands (the \$ is the prompt, so don’t type that):

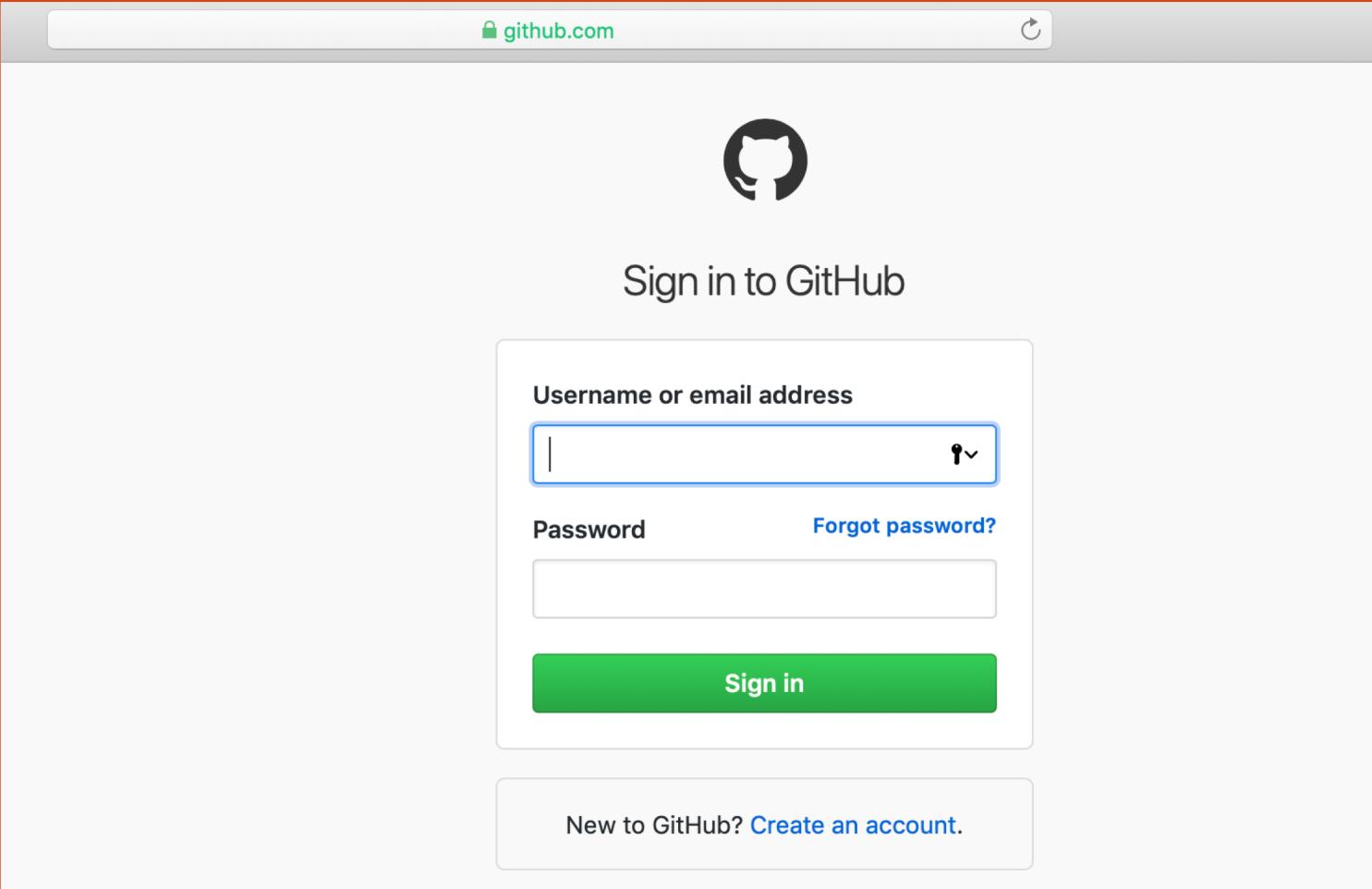
```
$ mkdir work  
$ cd work  
$ pwd
```

The next step is to “clone” your git repo. To do this we need to go to github.

Go to another browser window (and don’t close this terminal window!).



Step 5: Sign in to github



The image shows a screenshot of the GitHub sign-in page. At the top, there is a navigation bar with a lock icon and the text "github.com". Below the navigation bar is the GitHub logo (a black octocat icon). The main title "Sign in to GitHub" is centered above the sign-in form. The sign-in form is contained within a light gray box. It has two input fields: "Username or email address" and "Password". To the right of the password field is a "Forgot password?" link. Below the password field is a "Sign in" button with a green background and white text. At the bottom of the sign-in box, there is a link "New to GitHub? Create an account.".



After logging in to github, you should look for a repository named

“big-data-analytics-physics/bigdata-fall-2019-XXXXX”

Where XXXX is your github account name.

→ Click on that.

You should see a page like this:

bigdata-fall-2019-im2005im created by GitHub Classroom

2 commits 1 branch 0 releases 1 contributor

Branch: master New pull request Create new file Upload files Find File Clone or download

richardehughes adding new assignment assignment2_prep
assignment1 adding new assignment assignment1
assignment2_prep adding new assignment assignment2_prep

Latest commit cc9a655 2 days ago

Help people interested in this repository understand your project by adding a README. Add a README

© 2019 GitHub, Inc. Terms Privacy Security Status Help Contact GitHub Pricing API Training Blog About

Click on
this



After logging in to github, you should look for a repository named

"big-data-analytics-physics/bigdata-fall-2019-XXXXX"

Where XXXX is your github account name.

→ Click on that.

You should see a page like this:

The screenshot shows a GitHub repository page for 'bigdata-fall-2019-im2005im'. The repository was created by GitHub Classroom. It has 2 commits, 1 branch, 0 releases, and 1 contributor. The contributor is richardehughes. There are three commits listed: 'adding new assignment assignment2_prep', 'adding new assignment assignment1', and 'adding new assignment assignment2_prep'. Below the commits, there is a note: 'Help people interested in this repository understand your project by adding a README.' At the bottom right of the page, there is a 'Clone or download' button with a dropdown menu open. The menu contains 'Clone with HTTPS' and a URL: <https://github.com/big-data-analytics/bigdata-fall-2019-im2005im>. There are also 'Open in Desktop' and 'Download ZIP' options. A red arrow points from the text 'Click on this to copy the link for cloning.' to the URL in the dropdown menu.

Click on this to copy the link for cloning.

Then go back to your OSC terminal window.



In the terminal window (you should be “in” the “work” directory – check with `pwd`)

```
$ git clone https://github.com/big-data-analytics-physics/bigdata-fall-2019-xxxx.git
```

```
Cloning into 'bigdata-fall-2019-xxxx'...
```

```
Username for 'https://github.com':
```

```
Password for 'https://xxxx@github.com':
```

```
remote: Enumerating objects: 10, done. remote: Counting objects: 100% (10/10), done.
```

```
remote: Compressing objects: 100% (9/9), done.
```

```
remote: Total 10 (delta 1), reused 9 (delta 0), pack-reused 0
```

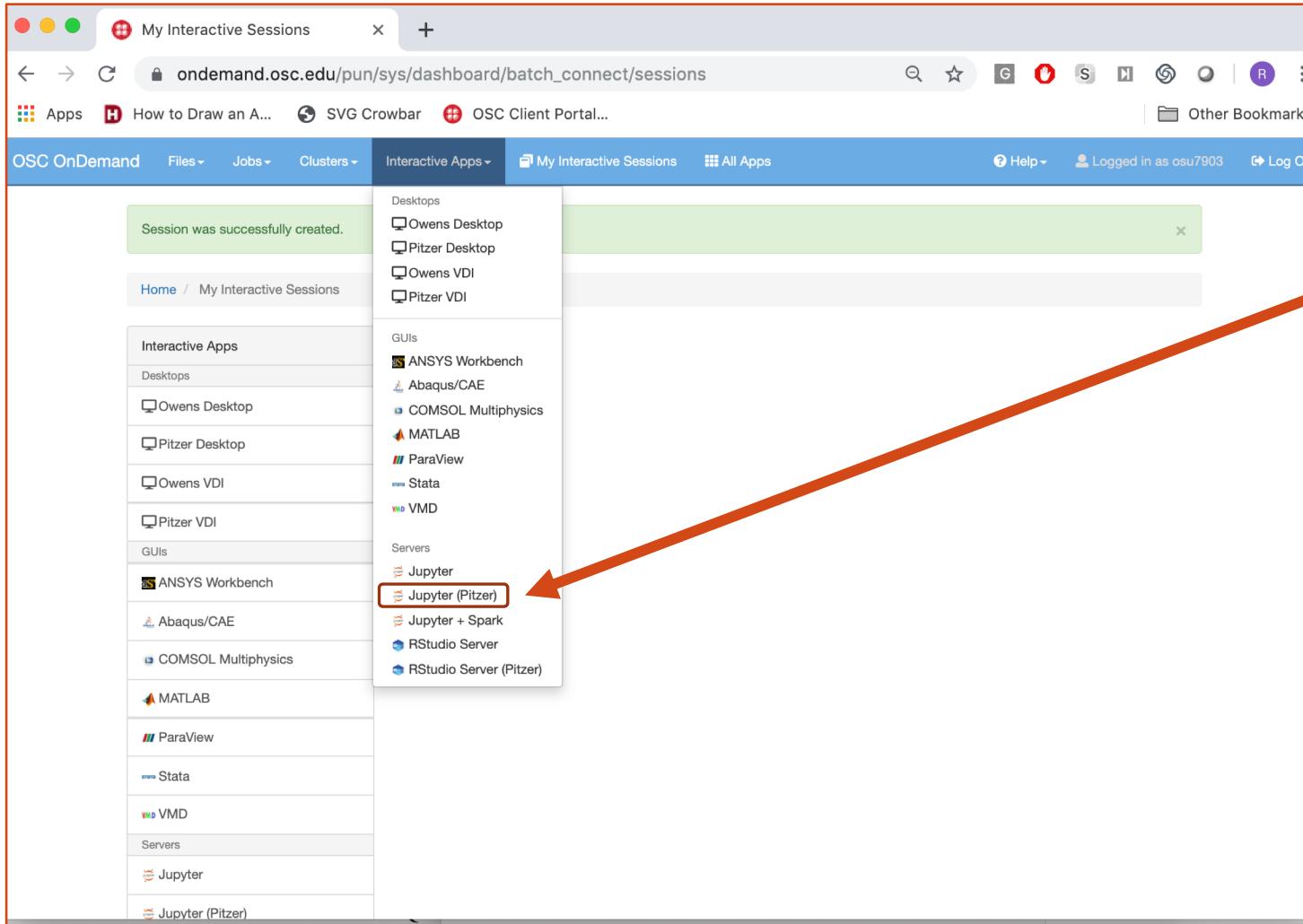
```
Unpacking objects: 100% (10/10), done.!
```

```
$ cd bigdata-fall-2019-xxxx
```

```
$ ls
```

Now you are ready to do some coding! Go back the OSC Ondemand dashboard (and don't close this window).

Step 6: Start a Jupyter session on Pitzer



Click this:
Jupyter (Pitzer)

Step 7: Set options for the session

For now:

- Project: PAS1585
- Hours: 3
- Node type: any
- Cores: 2

Then launch.
Might take a minute to start

The screenshot shows the OSC OnDemand interface. At the top, there are navigation links: OSC OnDemand, Files, Jobs, Clusters, Interactive Apps, My Interactive Sessions, All Apps, Help, and Log Out. The user is logged in as osu7903.

The main content area shows the "Interactive Apps" sidebar on the left, listing various options like Desktops, GUIs, ANSYS Workbench, Abaqus/CAE, COMSOL Multiphysics, MATLAB, ParaView, Stata, VMD, Servers, Jupyter, Jupyter (Pitzer), Jupyter + Spark, RStudio Server, and RStudio Server (Pitzer). The "Jupyter (Pitzer)" option is selected and highlighted in blue.

The right side of the screen displays the configuration for launching a Jupyter session on the Pitzer cluster. It includes fields for "Project" (set to PAS1585), "Number of hours" (set to 3), "Node type" (set to "any"), "Number of cores" (set to 2), and a checkbox for "I would like to receive an email when the session starts". A large blue "Launch" button is at the bottom.

Patience required... usually need to wait about 1 minute

The screenshot shows the OSC OnDemand web interface. At the top, there is a navigation bar with links for OSC OnDemand, Files, Jobs, Clusters, Interactive Apps, My Interactive Sessions, All Apps, Help, and a user account. A green success message box at the top left says "Session was successfully created." Below the navigation bar, the main content area has a breadcrumb trail: Home / My Interactive Sessions. To the left is a sidebar titled "Interactive Apps" with a list of available applications: Desktops (Owens Desktop, Pitzer Desktop), VDI (Owens VDI, Pitzer VDI), GUIs (ANSYS Workbench, Abaqus/CAE, COMSOL Multiphysics, MATLAB, ParaView, Stata), Servers (VMD, Jupyter, Jupyter (Pitzer), Jupyter + Spark, RStudio Server, RStudio Server (Pitzer)). To the right, a detailed view of a "Jupyter (Pitzer)" session is shown. The session is in a "Queued" state, created at 2019-08-20 10:34:33 EDT, requested for 3 hours, and has a Session ID of aefc525a-fcc1-4e54-9ce4-560803462094. A note below states: "Please be patient as your job currently sits in queue. The wait time depends on the number of cores as well as time requested." A red "Delete" button is visible next to the session details.



The screenshot shows the OSC OnDemand interface with a red border around the main content area. At the top, there is a navigation bar with links for OSC OnDemand, Files, Jobs, Clusters, Interactive Apps, My Interactive Sessions, All Apps, Help, and a user logged in as osu7903.

A green success message box at the top left of the main area says "Session was successfully created." Below it, the "My Interactive Sessions" section shows a list of sessions. One session is highlighted with a green background:

Jupyter (Pitzer) (778456.pitzer-batch.ten.osc.edu) 1 node | 2 cores | Running

Host: [_p0068.ten.osc.edu](#) [Delete](#)

Created at: 2019-08-20 10:34:33 EDT

Time Remaining: 3 hours

Session ID: [aefc525a-fcc1-4e54-9ce4-560803462094](#)

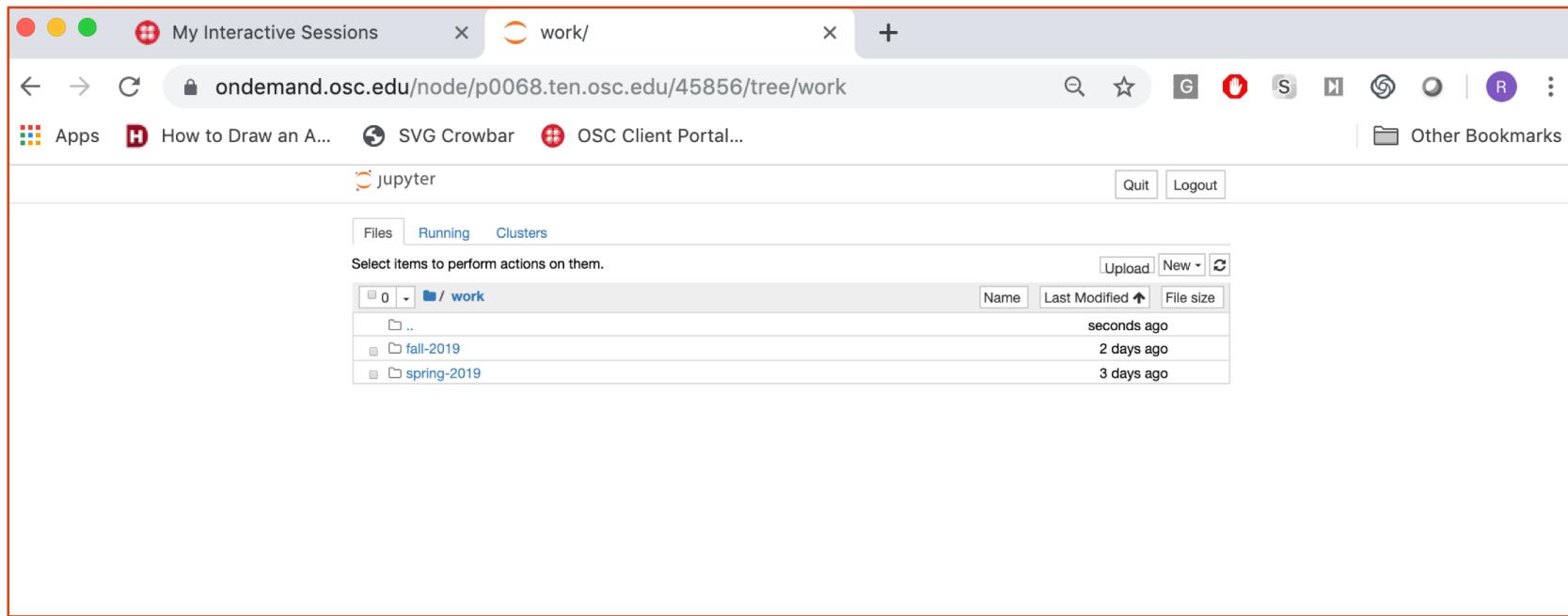
Below the session details is a blue button with a gear icon and the text "Connect to Jupyter".

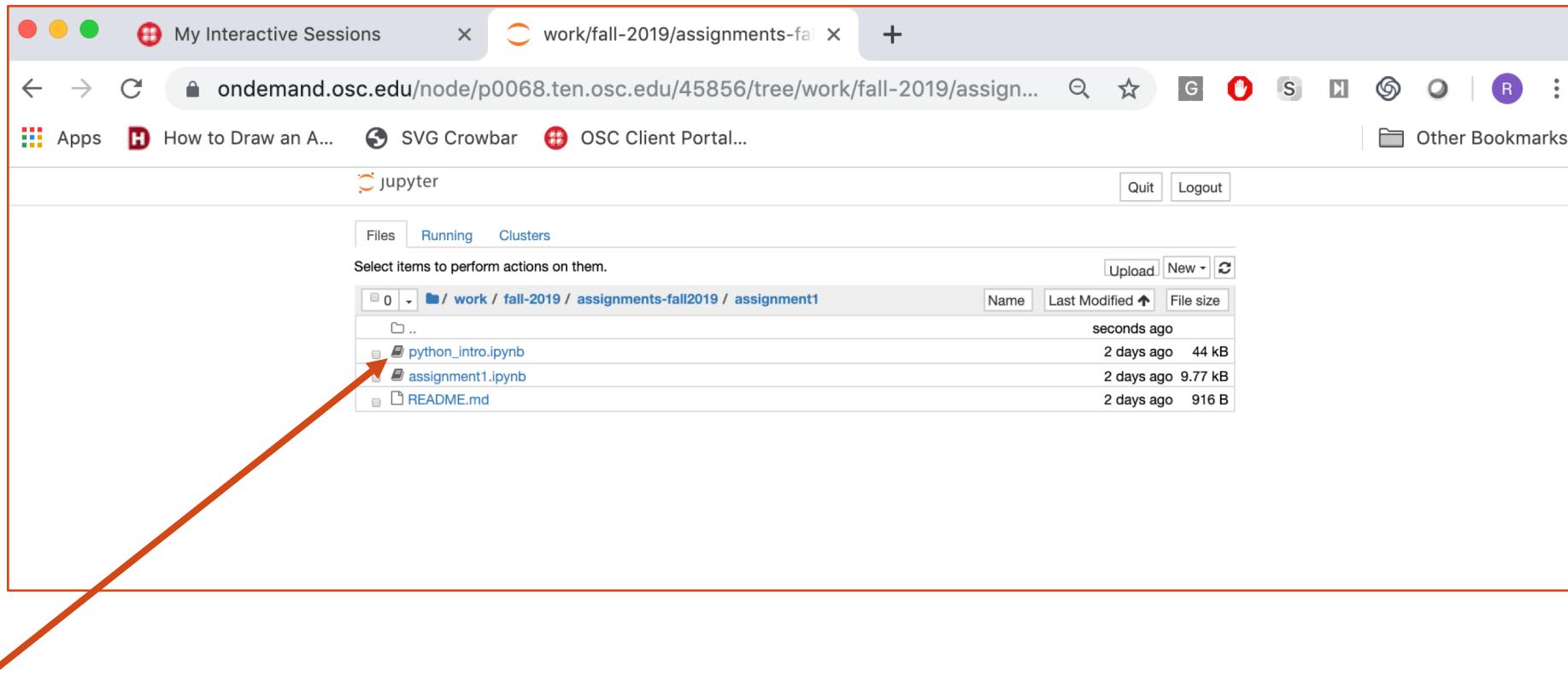
To the left of the session list is a sidebar titled "Interactive Apps" containing a list of available applications:

- Desktops
- Owens Desktop
- Pitzer Desktop
- Owens VDI
- Pitzer VDI
- GUIs
- ANSYS Workbench
- Abaqus/CAE
- COMSOL Multiphysics
- MATLAB
- ParaView
- Stata
- VMD
- Servers
- Jupyter
- Jupyter (Pitzer)
- Jupyter + Spark
- RStudio Server
- RStudio Server (Pitzer)

A large orange arrow points from the text "Click to start your session" in the bottom-left corner towards the "Connect to Jupyter" button.

Now you have a Jupyter session: navigate to the repo, and then to the file you want to open: in our case, `python_intro.ipynb`.





Click on the python_intro.ipynb



Now you can work your way through this notebook

The screenshot shows a Jupyter Notebook interface running in a web browser. The title bar indicates the session is titled "python_intro". The main content area displays a notebook titled "Scientific Python Basics". The notebook includes a header with authorship information and a section titled "1. Individual things" with associated tips and code examples.

Scientific Python Basics

Prepared by: Cindee Madison, Thomas Kluyver (Any errors are our own)
Thanks to: Justin Kitzes, Matt Davis

1. Individual things

The most basic component of any programming language are "things", also called variables or (in special cases) objects.

The most common basic "things" in Python are integers, floats, strings, booleans, and some special objects of various types. We'll meet many of these as we go through the lesson.

TIP: To run the code in a cell quickly, press Ctrl-Enter.

TIP: To quickly create a new cell below an existing one, type Ctrl-m then b. Other shortcuts for making, deleting, and moving cells are in the menubar at the top of the screen.

```
In [ ]: 
```

```
In [1]: # A thing  
2
```

```
Out[1]: 2
```



When finished, and before you leave class!!

Go to your terminal window, and from your cloned repo:

```
$ git add -A
```

```
$ git commit -m "short message describing what you did"
```

```
$ git pull
```

```
$ git push
```