ACES: Introduction to Julia

HPRC Training

29 October 2024

High Performance
Research Computing
DIVISION OF RESEARCH

Introduction to Julia: Outline

Part I: A brief overview of Julia

Julia is a high-level general-purpose dynamic programming language primarily designed for **high-performance numerical analysis and computational science**.

- Born in MIT's Computer Science and Artificial Intelligence Lab in 2009
- Combined the best features of Ruby, MatLab, C, Python, R, and others
- First release in 2012
- Latest stable release v1.10.2 as of Mar 31, 2024
- https://julialang.org/
- customized for "greedy, unreasonable, demanding programmers"
- Julia Computing established in 2015 to provide commercial support

Major features of **Julia:**

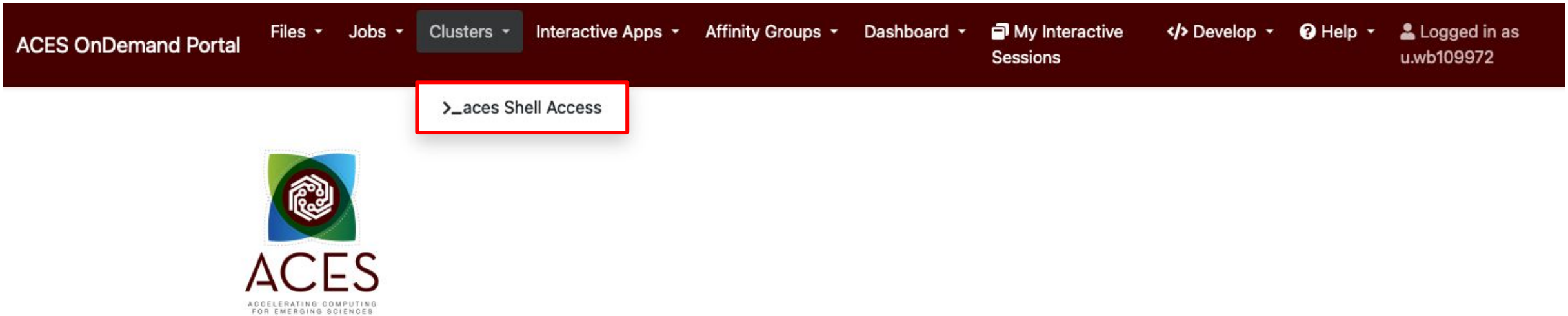
- **Fast**: designed for high performance
- **General**: supports different programming patterns
- **Dynamic**: dynamically-typed with good support for interactive use
- **Technical**: efficient numerical computing with a mathematics-friendly syntax
- **Optionally typed**: a rich language of descriptive data types
- **Composable**: Julia's packages naturally work well together

"Julia is as programmable as Python while it is as fast as Fortran for number crunching. It is like ***Python on steroids****."*

--an anonymous Julia user on the first impression of Julia.

Where to Run Julia

- Juno IDE - developed for the Julia language (no longer under development)
- VSCode - extensions for Julia are actively being managed
- Jupyter Notebook
- Julia REPL
  - Run, Evaluate, Print, Loop
  - Interactive
  - Searchable history, tab-completion, keybindings, dedicated help and shell modes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ACES Maintenance Status, October 10
The planned maintenance for the PCIe Gen5 composability fabrics has been completed. The PVCs in two Gen5 fabrics will remain unavailable until replacement components arrive tomorrow or next week.
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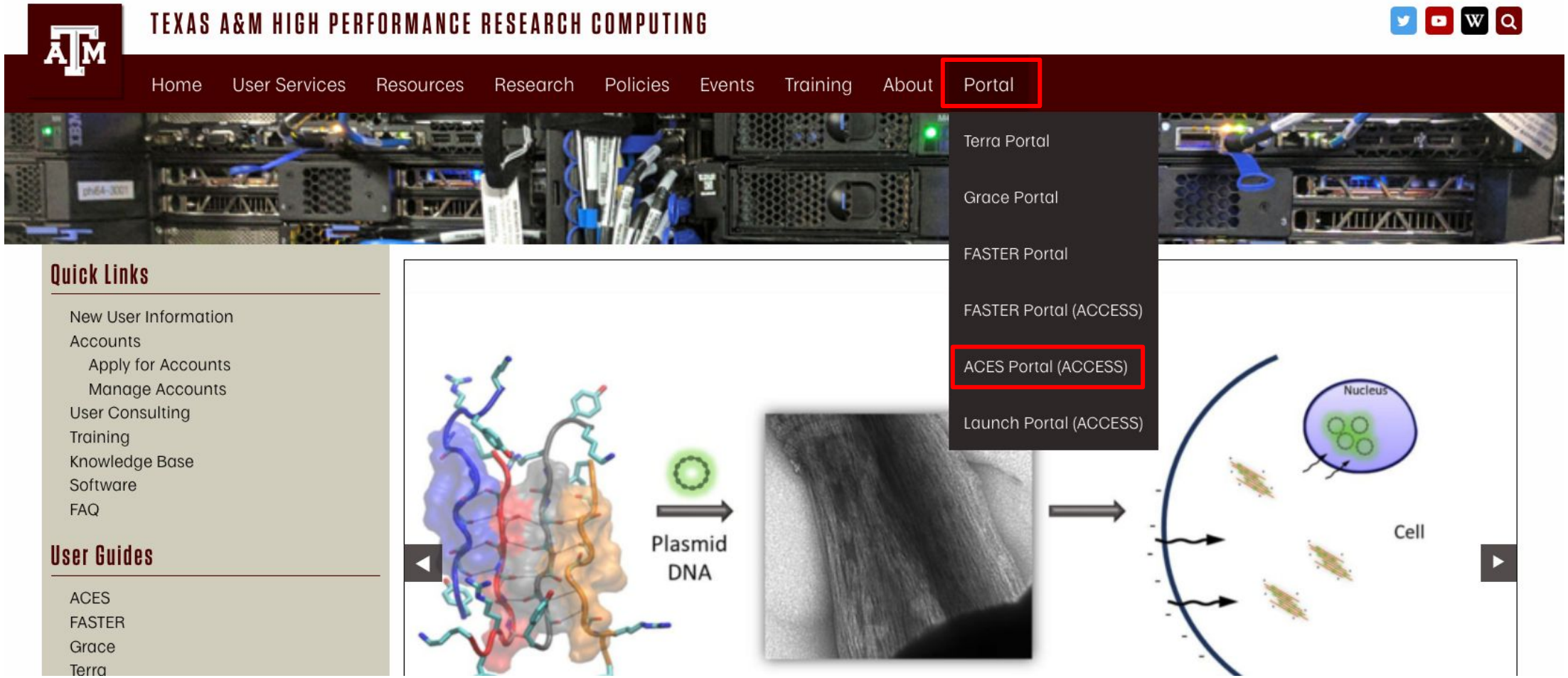
!! WARNING: THERE ARE ONLY NIGHTLY BACKUPS OF USER HOME DIRECTORIES. !!

Run the following commands to install the necessary packages:

```
$ mkdir $SCRATCH/.julia
$ ln -s $SCRATCH/.julia
$ module load Julia/1.10.2-linux-x86_64
$ julia
julia> ]
(v1.10) pkg> add IJulia
(v1.10) pkg> add PrettyTables
(v1.10) pkg> add Plots
(v1.10) pkg> add CSV
(v1.10) pkg> add XLSX
(v1.10) pkg> add DataFrames
(v1.10) pkg> add StatsPlots
```

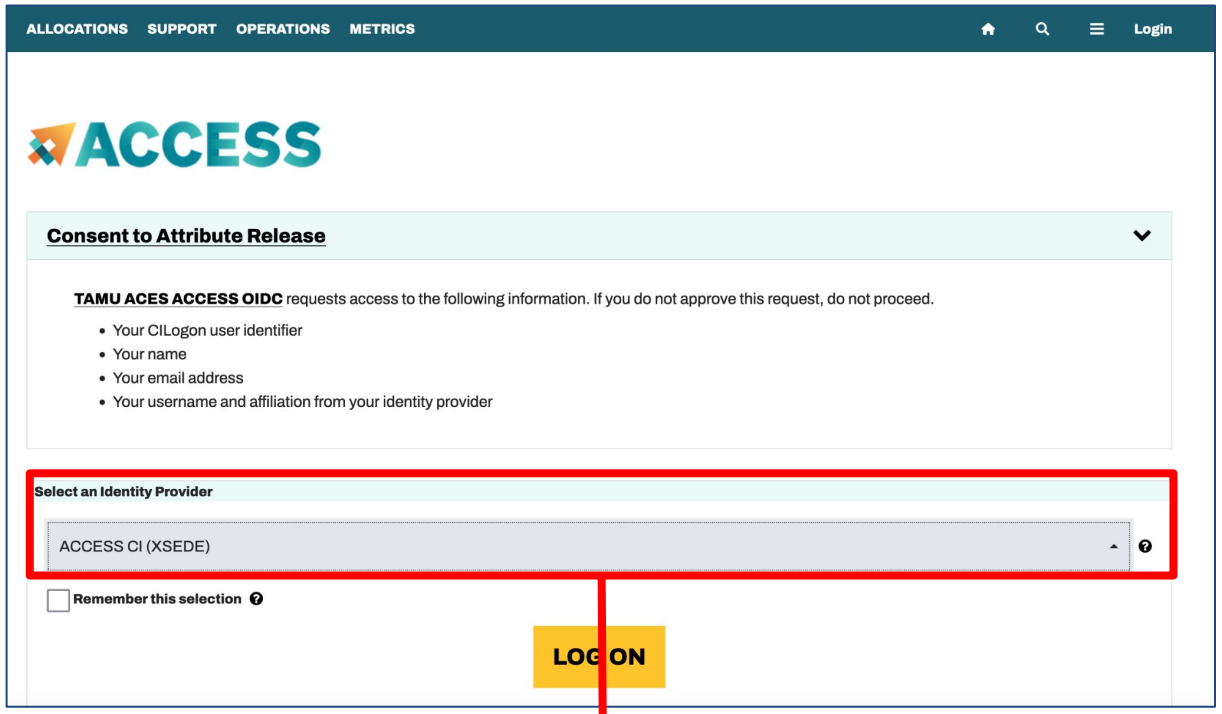
Press backspace to exit the pkg manager and type exit() to quit Julia

Accessing the HPRC ACES Portal



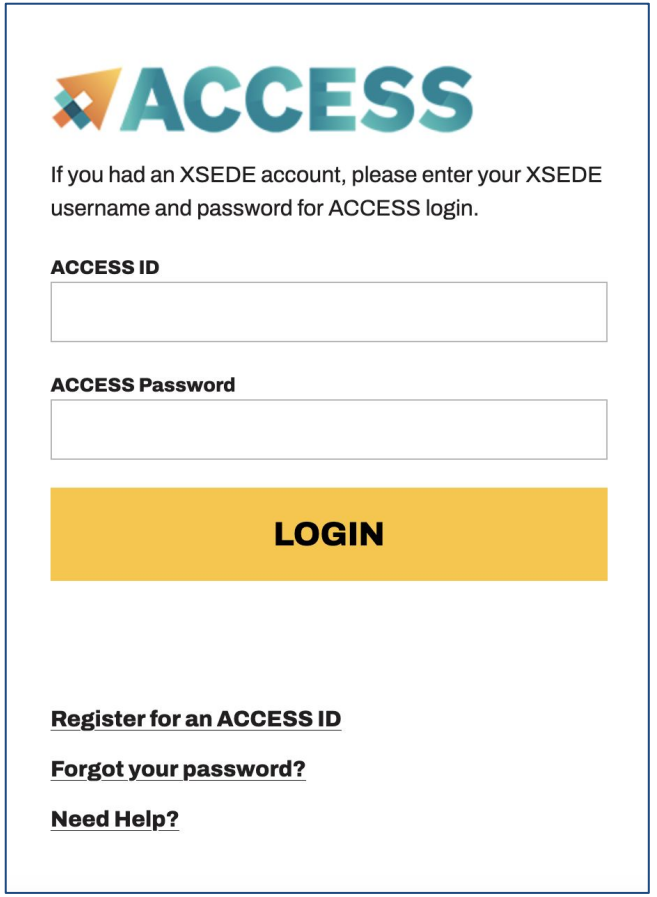
HPRC webpage: hprc.tamu.edu

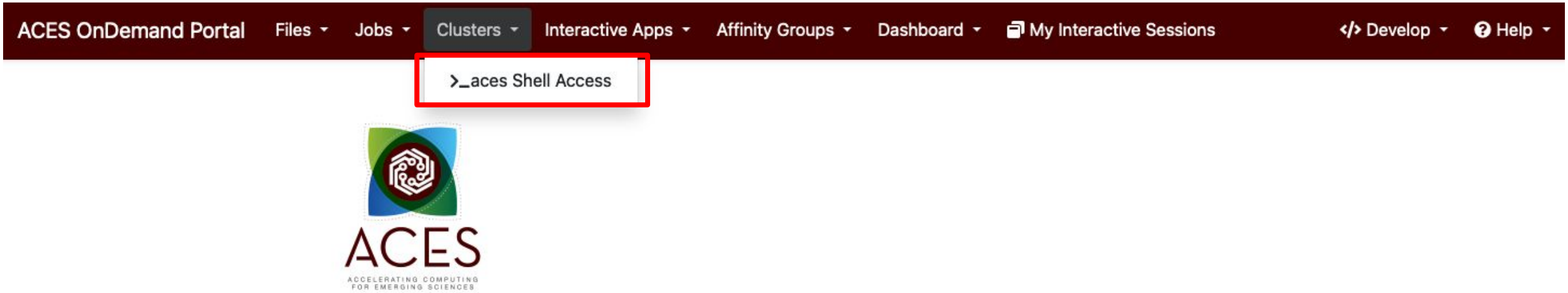
Accessing ACES via the Portal (ACCESS)



Select the Identity Provider appropriate for your account.

Log-in using your ACCESS credentials.

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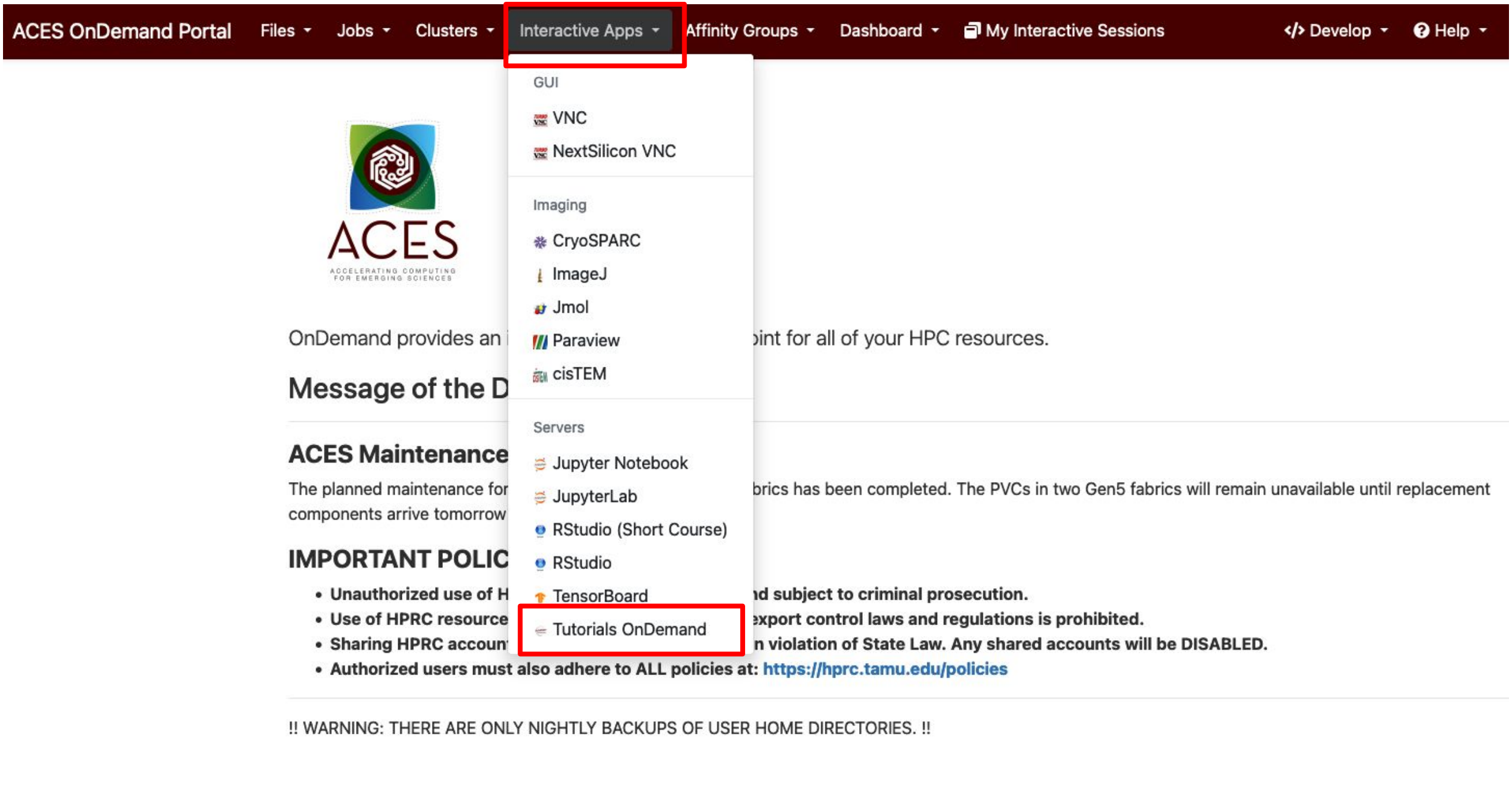
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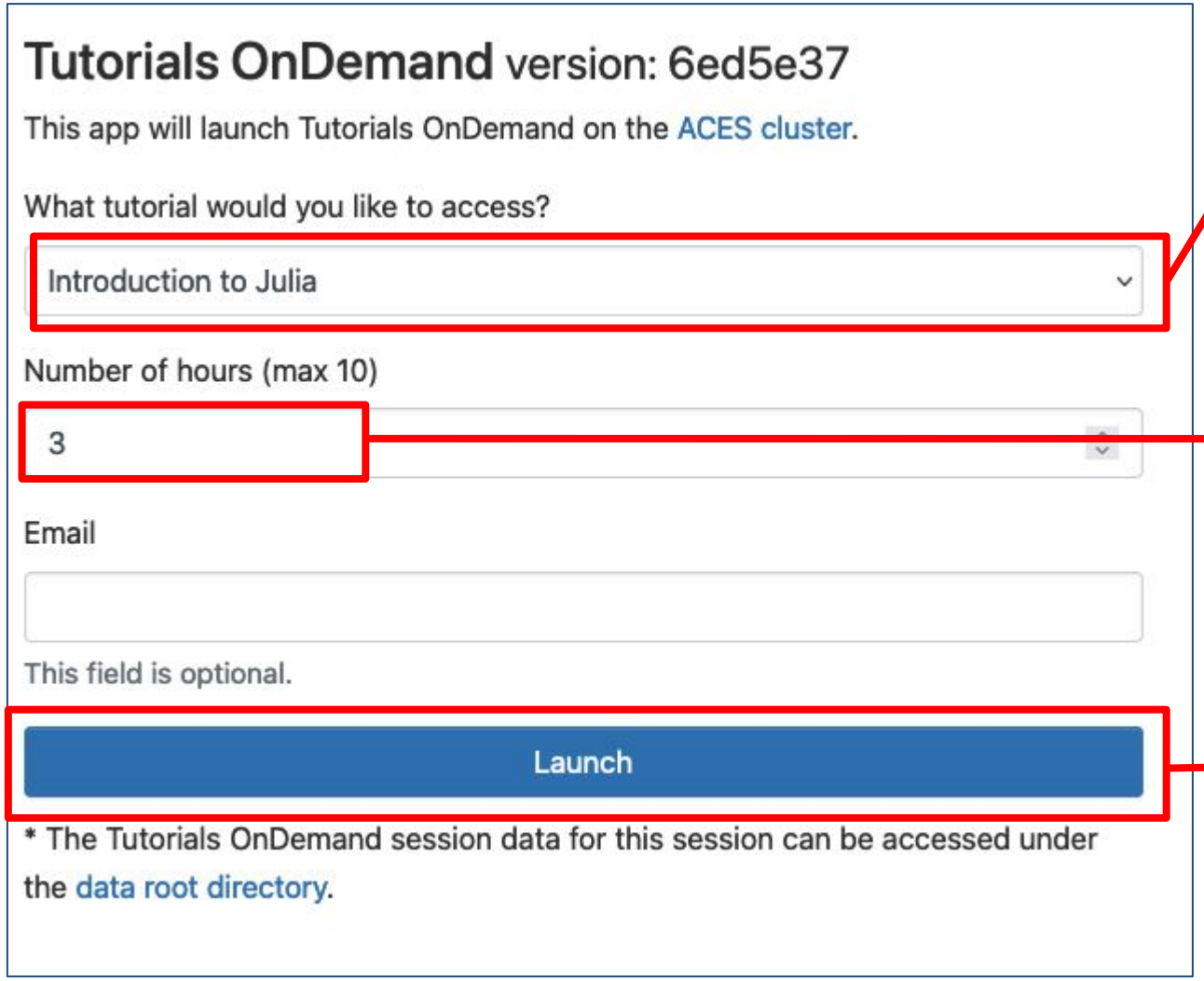

Select “Introduction to Julia” from the dropdown menu

Set number of hours to 3

Click “Launch”

Tutorials OnDemand (280791) 1 node | 2 cores | Running

Host: >_ac009

Delete

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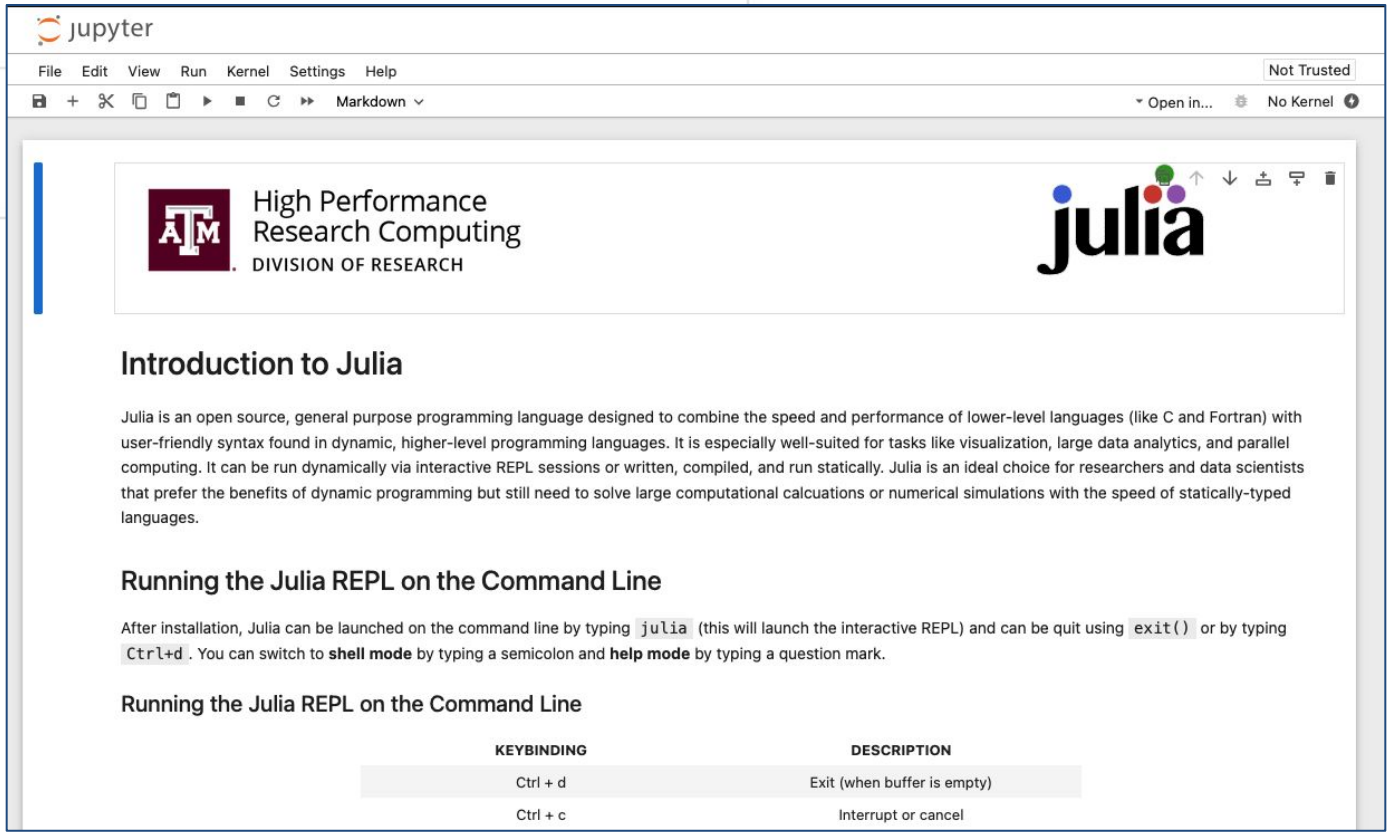
Session ID: bc632df9-70c2-43b8-a9a9-6fa03546a5fa

Connect to Tutorials OnDemand: Introduction to Julia



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Help us help you. Please include details in your request for support, such as, Cluster (Faster, Grace, ACES, Launch), NetID (UserID), Job information (Job id(s), Location of your jobfile, input/output files, Application, Module(s) loaded, Error messages, etc), and Steps you have taken, so we can reproduce the problem.