Julia for High-Performance Computing

Julia Tutorial at ICPP25
September 8th 2025

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Interactive Materials

github.com/JuliaParallel/julia-hpc-tutorial-icpp25

juliaornl.github.io/TutorialJuliaHPC

> Running Gray-Scott on Perlmutter/NERSC

juliaornl.github.io/TutorialJuliaHPC

github.com/JuliaParallel/julia-hpc-tutorial-icpp25

Please log into your NERSC account now

(if you've never used ssh before, please go to jupyter.nersc.gov)

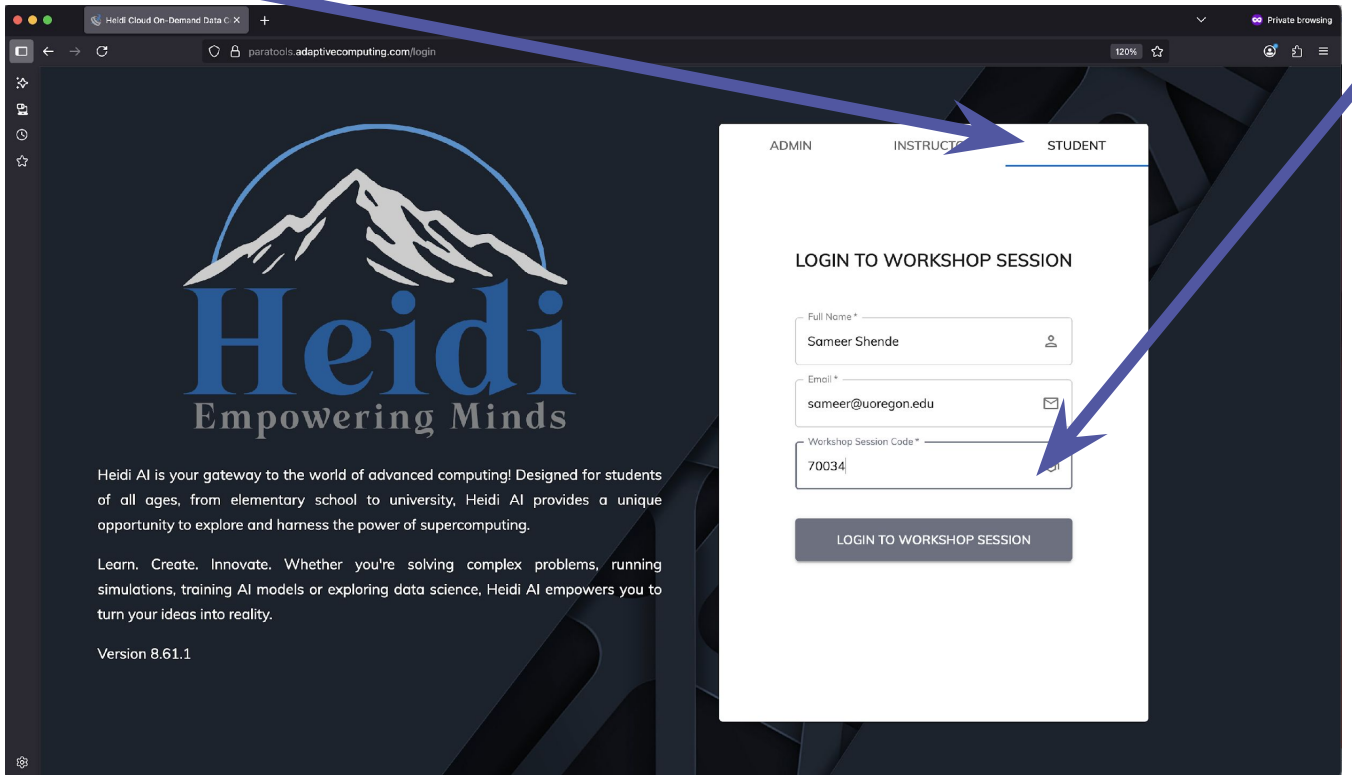
… or give Sameer's very slick AWS
(next slides)

Hands-On with AWS

Using ParaTools Pro for E4S™ image on AWS with Heidi

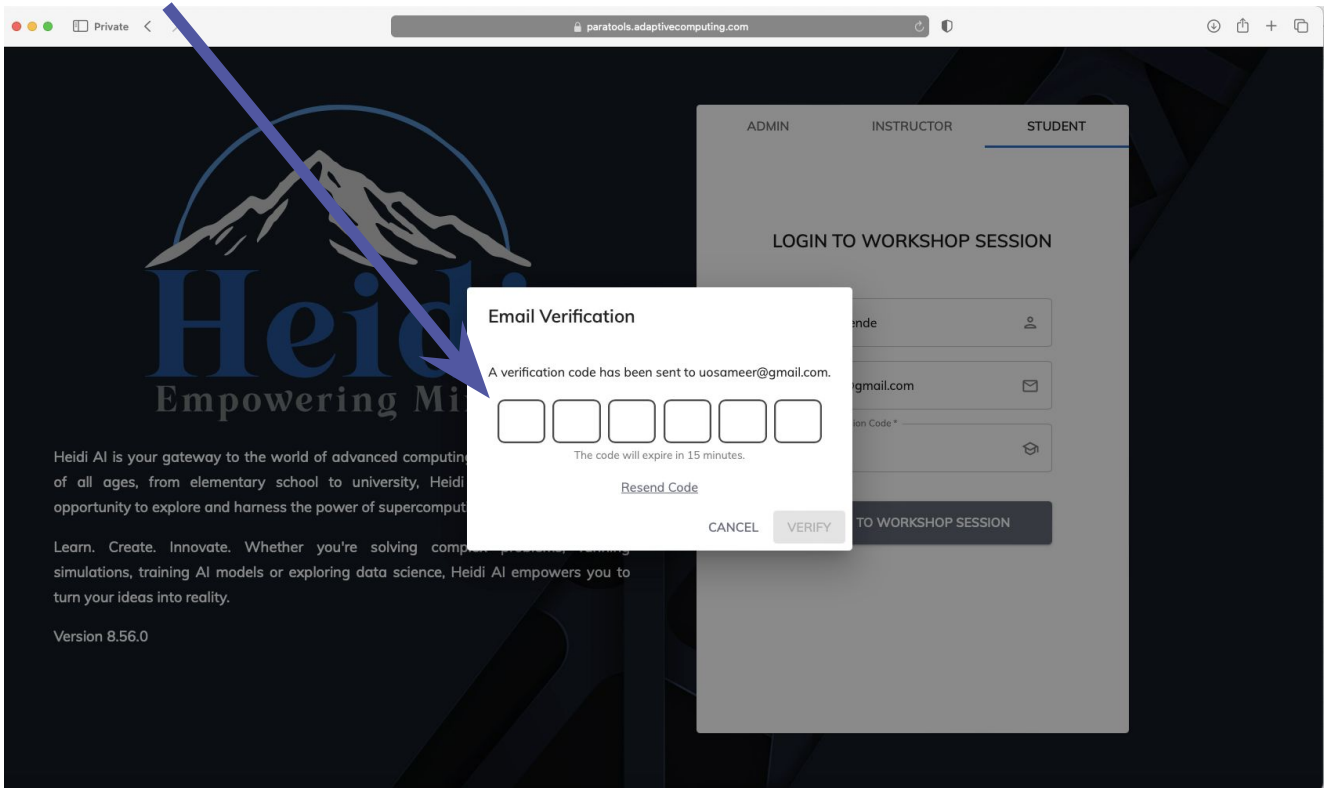
Login to:
https://paratools.adaptivecomputing.com
with the credentials. Firefox private window recommended.
Click on Student tab and use code: 70034

Connect to https://paratools.adaptivecomputing.com



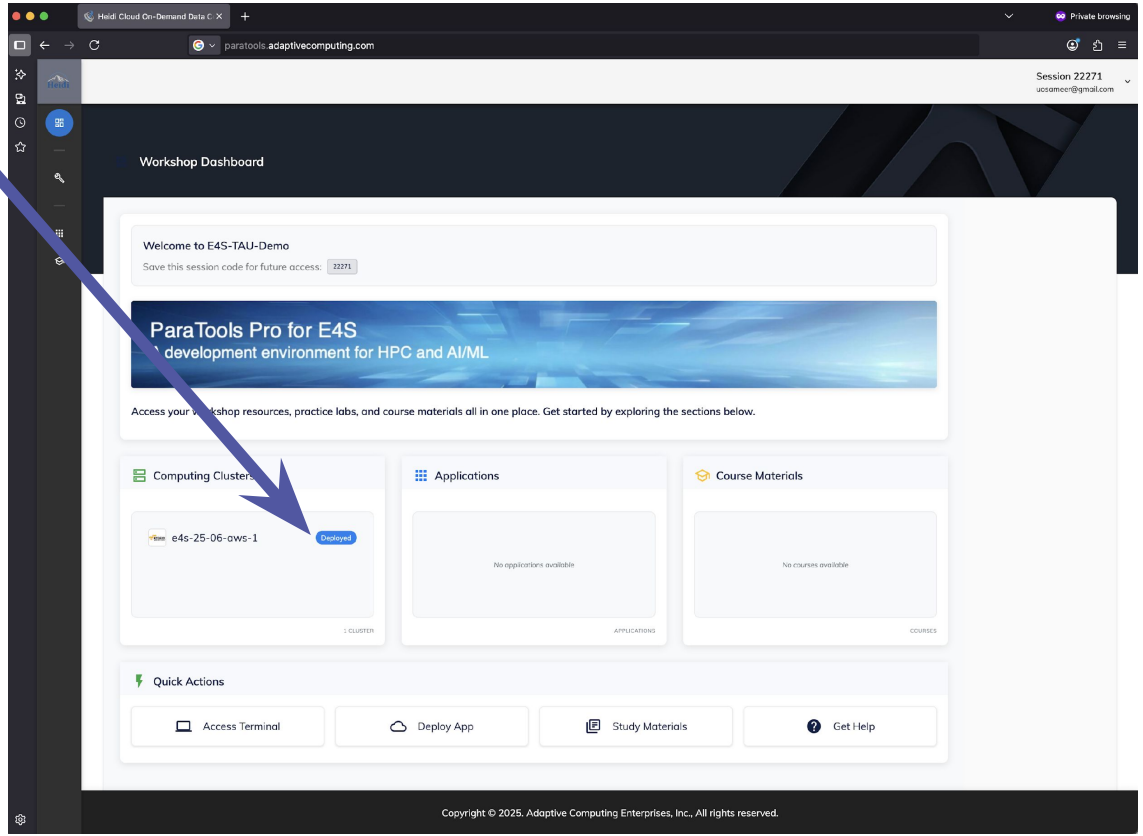
Connect to https://paratools.adaptivecomputing.com

- Check your email, enter verification code.



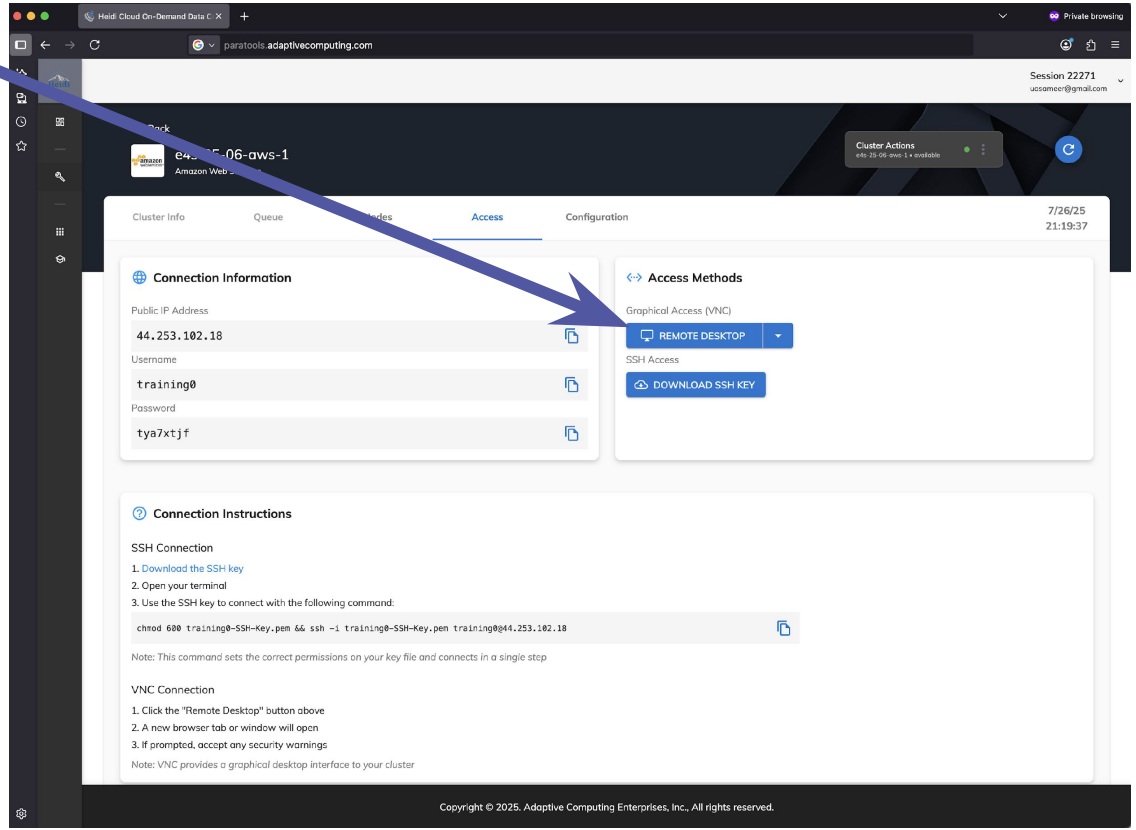
Connect to https://paratools.adaptivecomputing.com

- Click cluster



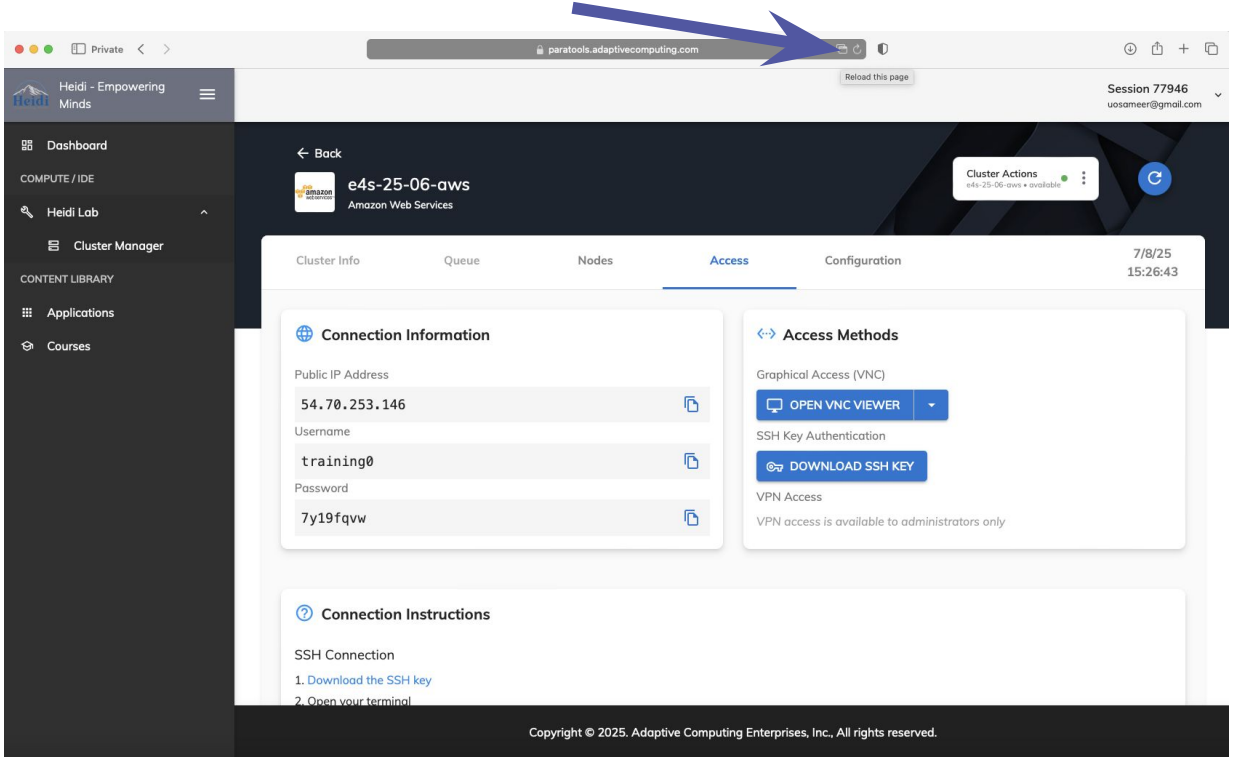
Connect to https://paratools.adaptivecomputing.com

- Click Remote Desktop



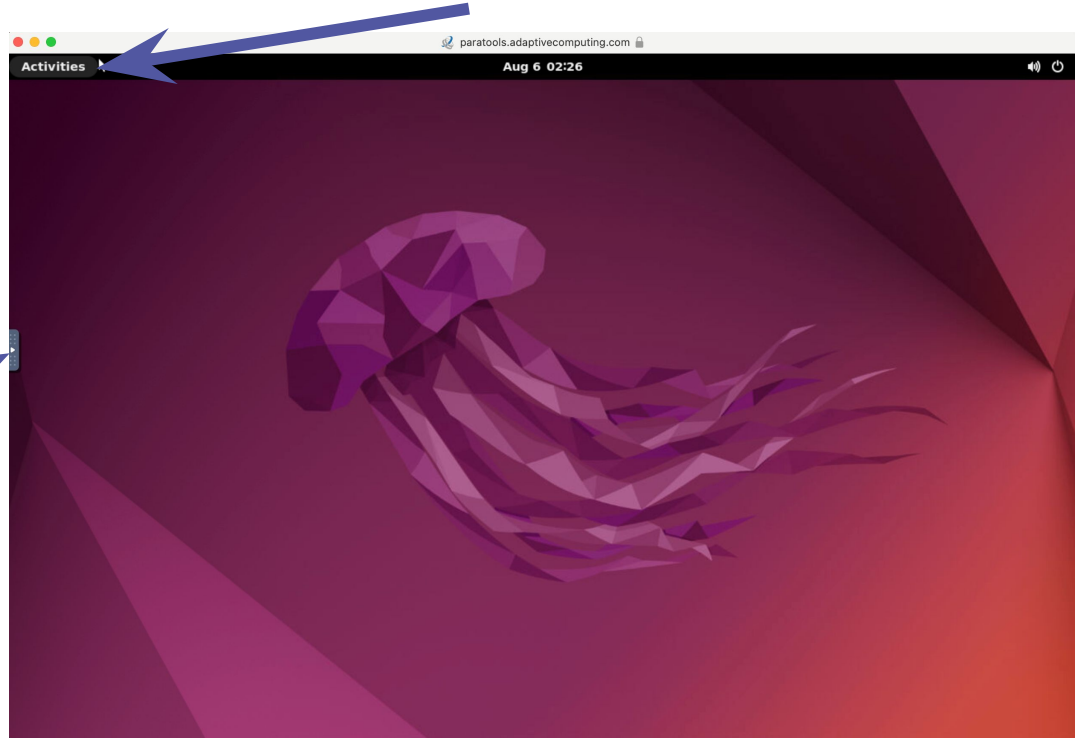
Connect to https://paratools.adaptivecomputing.com

- You may have to enable pop-up windows and accept



Connect to Students tab with code 70034 at https://paratools.adaptivecomputing.com

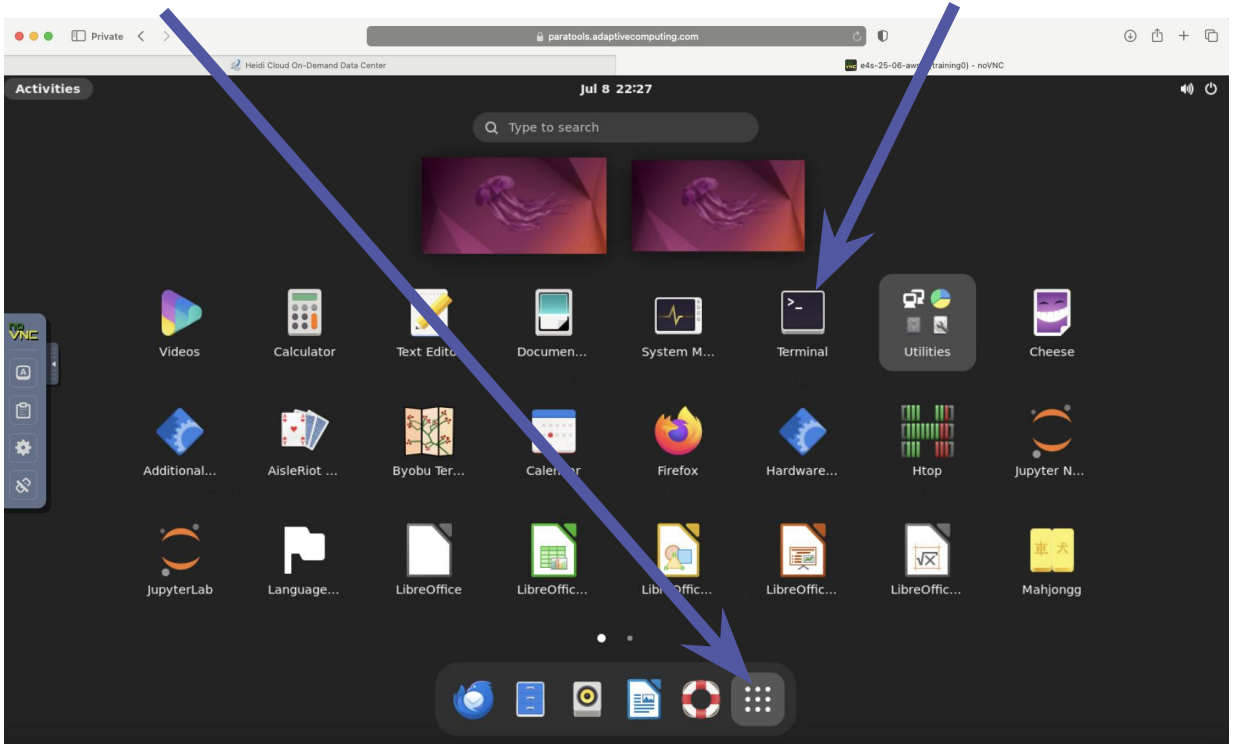
- You should see this jellyfish. Click on Activities.



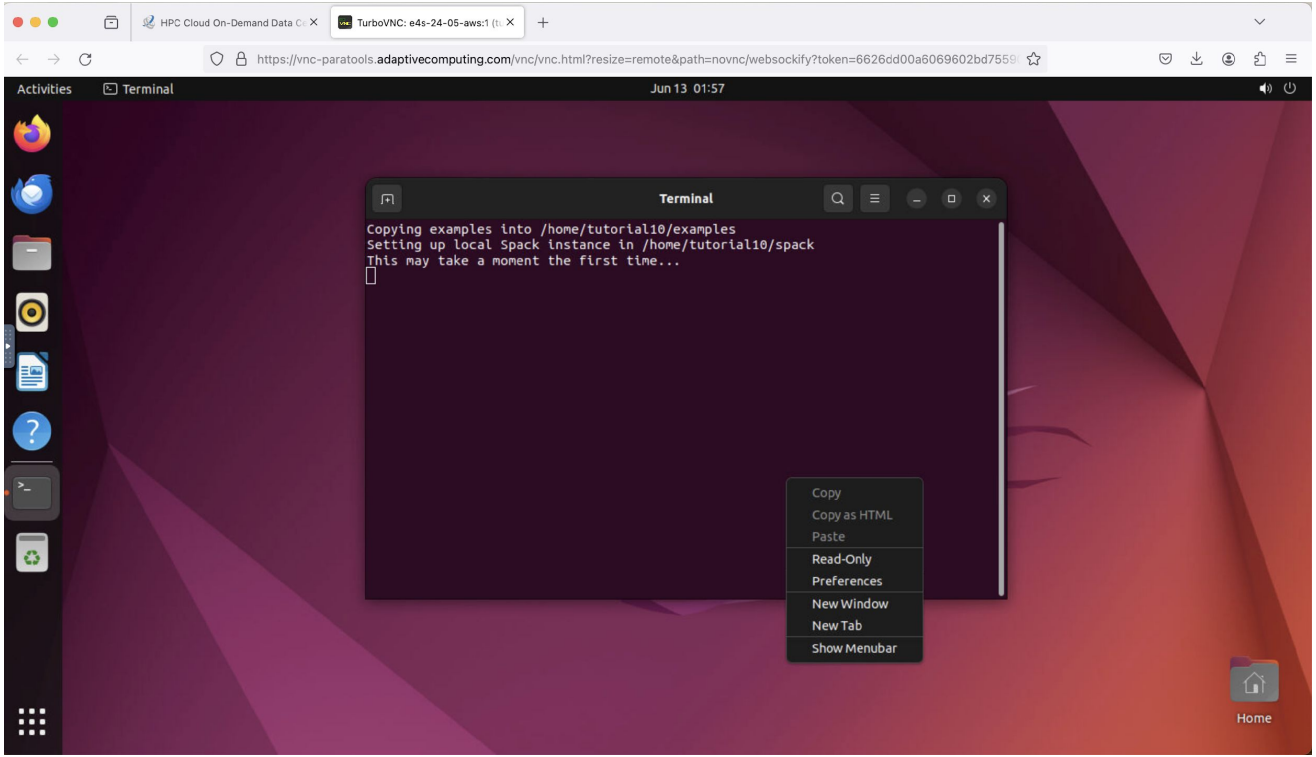
To copy text from other windows click on the this button to access the clipboard

Connect to https://paratools.adaptivecomputing.com

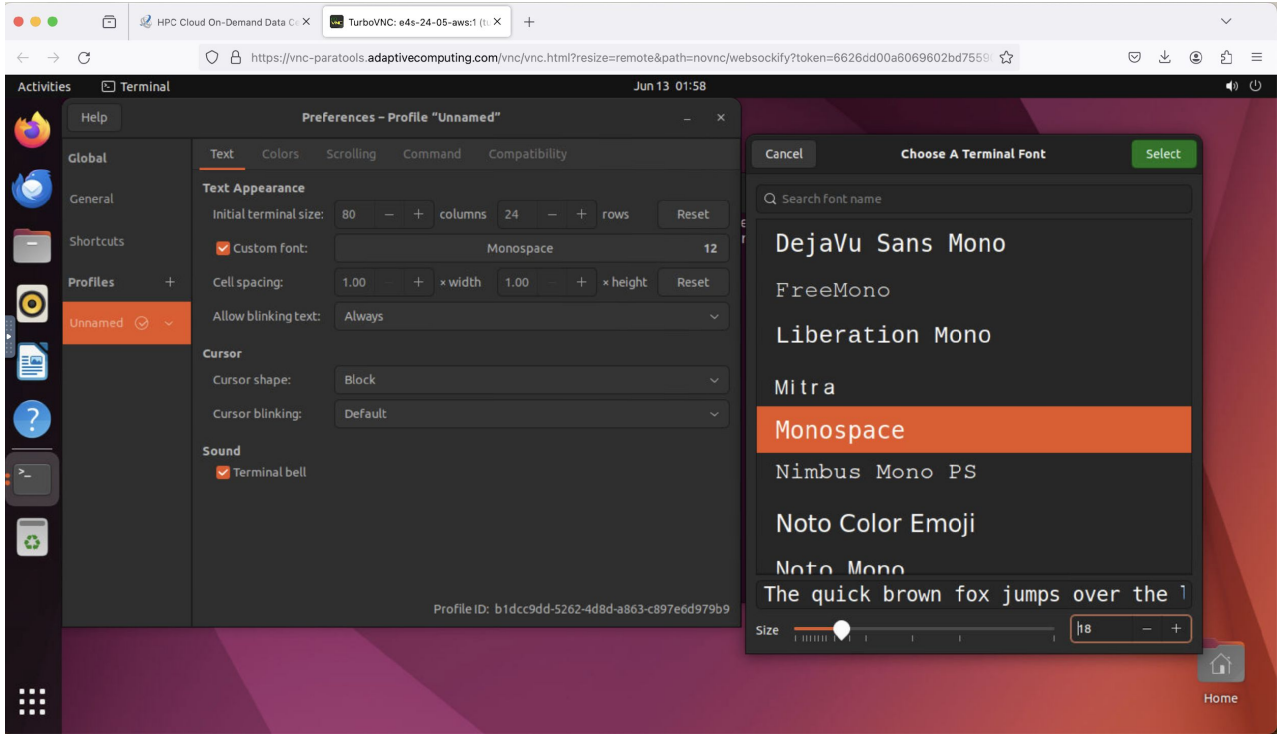
- Click on Activities, nine dots, and then select the Terminal application



To increase font size right click and choose preferences



Choose font size after clicking Custom Font for Terminal



Running your first MPI application on the allocated cluster

```
% cd ~/examples/mpi-procname
% ./compile.sh
% ./run-single-node.sh       # on the login node
% cat mpiprocname.qsub
% qsub mpiprocname.qsub
% qstat –u $USER
% cat mpiprocname.o*

% cd ~/examples/osu-benchmarks
% cat bw.qsub
% qsub bw.qsub
% cat bw.o*            # How close did you get to 50Gbps? At what message size? Multiply MB/s x 8 …
```

Running your first Julia application

```
% cd ~/examples/julia-mpi/hello-world;
% julia
Julia> import Pkg; Pkg.add(“MPI”)
Julia> Pkg.add(“CUDA”);
Julia>
% mpirun –np 4 julia hello-world.jl
% cd ~/examples/julia-cuda
% julia cuda-test.jl
```

Acknowledgment

- *This material is based upon work supported by the U.S. Department of Energy, Office of Science, Office of Advanced Scientific Computing Research, Next-Generation Scientific Software Technologies program, under contract number DE-AC02-06CH11357. DOE SBIR DE-SC0022502.*

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- https://science.osti.gov/ascr
- https://pesoproject.org
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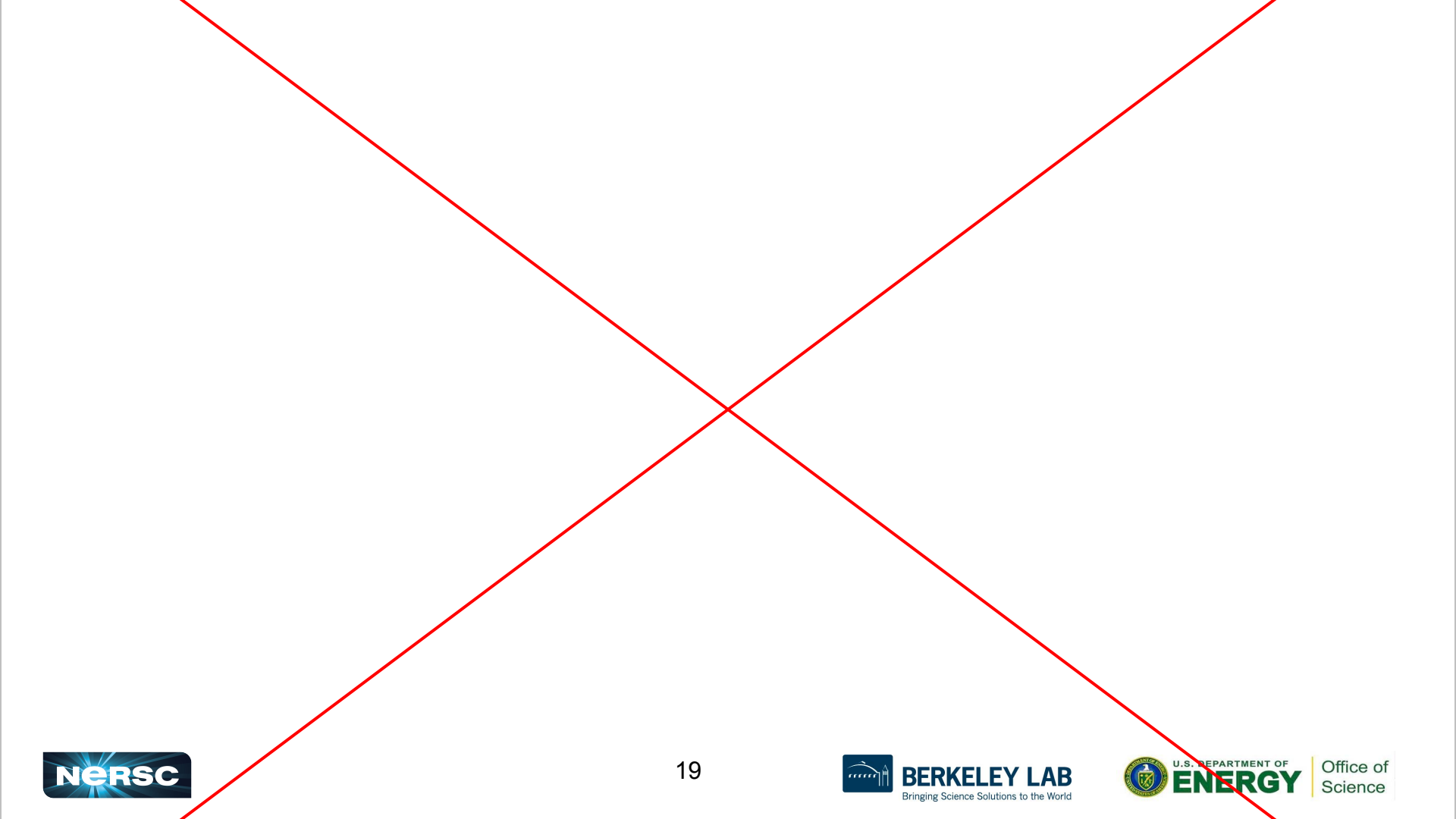
- https://hpsf.io
- https://www.energy.gov/technologytransitions/sbirsttr

PESO

STEP SOFTWARE TOOLS ECOSYSTEM PROJECT



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