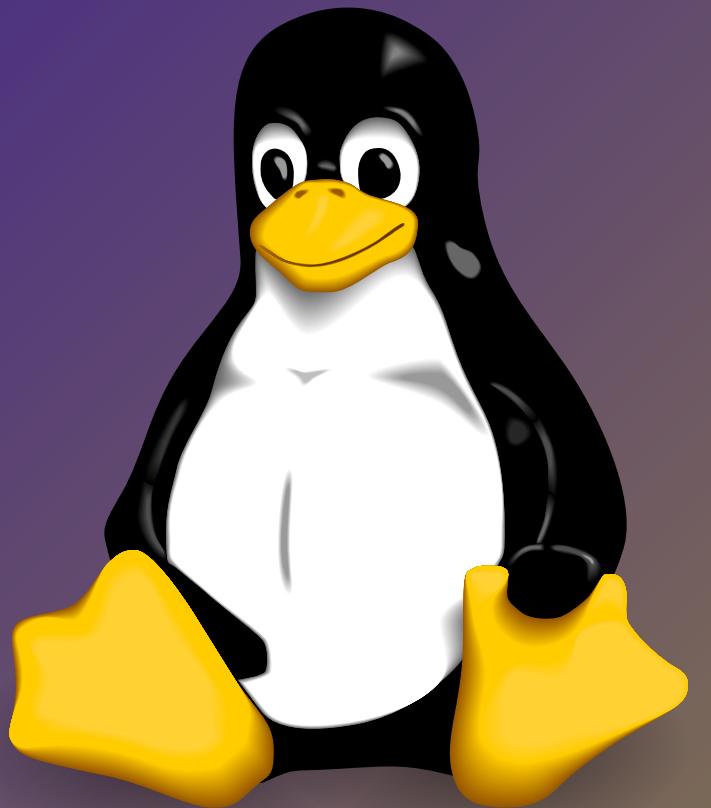


Linux Command Line Fundamentals



HYAK (KLONE & TILLICUM)

**Linux Command Line
Fundamentals Tutorial**

Kristen Finch

Director of Research Computing Solutions



INFORMATION TECHNOLOGY

UNIVERSITY *of* WASHINGTON

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AGENDA

Introduction

UWIT Research Computing

- Services
- What is Hyak?
- What is Tillicum?

New to Hyak?

- Need-to-knows
- Research Computing Club

Learning Resources

- Documentation
- Events

Tutorial

- Objectives
- Layout
- Hands-on option

W

RESEARCH COMPUTING SERVICES



High Performance Computing

- Hyak- UW's Supercomputer

Data storage

- Kopah Object Storage
- Lolo Archive

Research Cloud Computing

- AWS, GCP, Azure

Secure Computing

Research Computing Consulting

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HYAK KLONE



- **HPC Cluster**
- **Condo Model**
- **Storage**
- **Community Idle Resources**

- **37,076 compute cores**
- **864 GPUs**



TILLICUM

LAUNCHED
Oct 15
2025

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University of Washington's next-generation, GPU-accelerated computing platform designed to support cutting-edge research, teaching, and learning in AI, machine learning, data science, and scientific simulation.

WHERE PERFORMANCE MEETS SUSTAINABILITY

RANKED
#7
FASTEST
US HIGHER ED

RANKED
#185
FASTEST
WORLDWIDE

RANKED
#51
POWER
EFFICIENCY

WHY TILLICUM MATTERS

Broad Academic Access

3 **11** **33**

Campuses Colleges & Schools Departments

77 **542**

Research Groups Users

Proven Demand & Impact

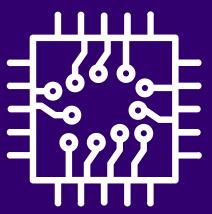
94,000

GPU Hours Consumed

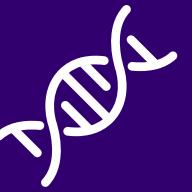


Engineering

Σ
Math

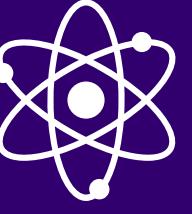


Computer Science



Physical & Life
Sciences

SUPPORTING
ALL
DOMAINS



Quantum



Teaching &
Learning



AI



Medicine



HARDWARE

GPU Cluster - Launch October 15 2025

- 24 Dell XE9680 Servers
 - 2TB RAM per node
- 192 NVIDIA H200 SXM GPUs (141GB RAM each)
- 1,536 CPU cores [Intel Emerald Rapids]
- NVLink™ 4.0 (900 GB/s)
- 400 Gbps InfiniBand
- 3 PB Flash Storage



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COMPUTING TASKS

Artificial Intelligence

- Train language and vision models
- Accelerate science with AI
- Tackle complex, real-world challenges



Interactive Workloads

- Browser-based user interface
- Lowering barriers of entry to compute
- Support learning and collaboration



GPU-Accelerated Simulations

- Speed up simulations
- Enable complex discoveries
- Scale-up to tackle bigger problems

Common Datasets

- Access shared research data
- Skip long downloads
- Work from same sources

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NEW TO HYAK?

Need-to-knows

- Hyak is a paid service and a community resource
- Hyak is run by a small but mighty team
 - We value our relationship with you

W



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↑ **Everything underlined is a link** ↗

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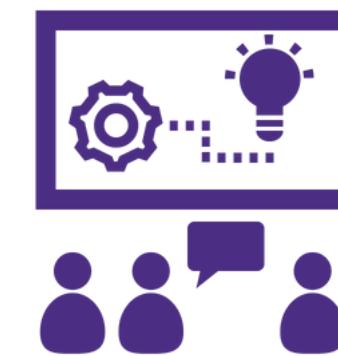
USER SUPPORT



Helpdesk

help@uw.edu

- Hyak, Tillicum, Kopah, Lolo, Cloud
- Research Computing Consulting
- Support Request form



Office Hours

- Drop-in or by Appointment
 - Calendar
- In-person and remote

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RESEARCH COMPUTING CLUB

STF

Student
Technology Fee
Committee

Hyak Computing Resources



- 26 nodes
- 24 GPUs
- Priority job scheduling
- Computing storage



Cloud Credits Program

- Apply for \$500 in AWS credits
- Guidance and troubleshooting



Slack Community

- Get help from your peers
- Get notified about events, jobs, and fellowships



Special Events

- Hackathon
- AWS GameDay

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NEED TO KNOW

Software Policies

- Shared Research Environment
- Baseline Computing Environment
- No Root/Sudo Access
- Researcher Responsibility
- Hyak Team - Support, Training, and Documentation

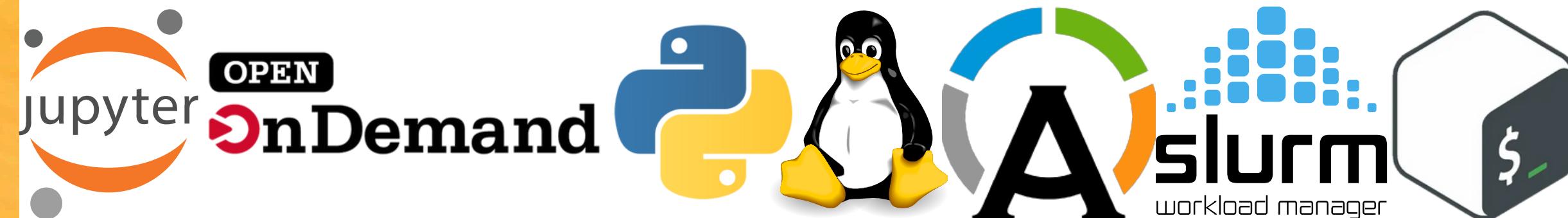
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NEED TO KNOW

Environment - Rocky Linux + Slurm

- Open OnDemand
 - Jupyter Notebooks
- Containerized environments (Apptainer runtime)
- LMOD modules - maintained and contributed modules
 - hierarchy
- Python environments (conda module)



SOFTWARE

Open OnDemand Platform

The screenshot shows a Jupyter Notebook interface with the following details:

- File Edit View Run Kernel Tabs Settings Help** - The top menu bar.
- Launcher** - The title bar of the active notebook tab.
- Code** - The tab selected in the top navigation bar.
- Notebook** - A tab in the top navigation bar.
- pytorch (apptainer)** - A tab in the top navigation bar.
- File Explorer** - A sidebar on the left showing a list of files and folders, with **test_jupyter_code.ipynb** selected.
- Code Cells**:
 - [1]:

```
import sys
```
 - [2]:

```
import numpy as np
```
 - [3]:

```
import site, sys
print(sys.prefix)
print(sys.executable)      # which Python is running (the kernel's Python)
print(sys.path)
print(site.getsitepackages()) # system install paths (likely read-only)
print(site.getusersitepackages()) # user install path
```
 - [4]:

```
/usr
/usr/bin/python3
['/usr/lib/python310.zip', '/usr/lib/python3.10', '/usr/lib/python3.10/lib-dynload', '', '/usr/local/lib/python3.10/dist-packages', '/usr/local/lib/python3.10/dist-packages/nvfuser-0.2.6ab+f73fflib-py3.10-linux-x86_64.egg', '/usr/local/lib/python3.10/dist-packages/lightning_thunder-0.2.0.dev0-py3.10.egg', '/usr/local/lib/python3.10/dist-packages/opt_einsum-3.3.0-py3.10.egg', '/usr/local/lib/python3.10/dist-packages/igraph-0.11.6-py3.10-linux-x86_64.egg', '/usr/local/lib/python3.10/dist-packages/lightning_utilities-0.11.3.post0-py3.10.egg', '/usr/local/lib/python3.10/dist-packages/looseversion-1.3.0-py3.10.egg', '/usr/local/lib/python3.10/dist-packages/texttable-1.7.0-py3.10.egg', '/usr/lib/python3/dist-packages']
```
 - [5]:

```
/gpfs/home/kczie/.local/lib/python3.10/site-packages
```
 - [6]:

```
import torch
```
 - [7]:

```
print(torch.cuda.is_available())
print(torch.cuda.device_count())
print(torch.cuda.current_device())
print(torch.cuda.device(0))
print(torch.cuda.get_device_name(0))
```
 - [8]:

```
True
1
0
<torch.cuda.device object at 0x14bd0005030>
NVIDIA H200
```
 - [9]:

```
devices = [d for d in range(torch.cuda.device_count())]
device_names = [torch.cuda.get_device_name(d) for d in devices]
```
 - [10]:

```
[nvidia_h20]
```
- Status Bar**: Shows "Mode: Command" and the current cell index "In 1, Col 1".

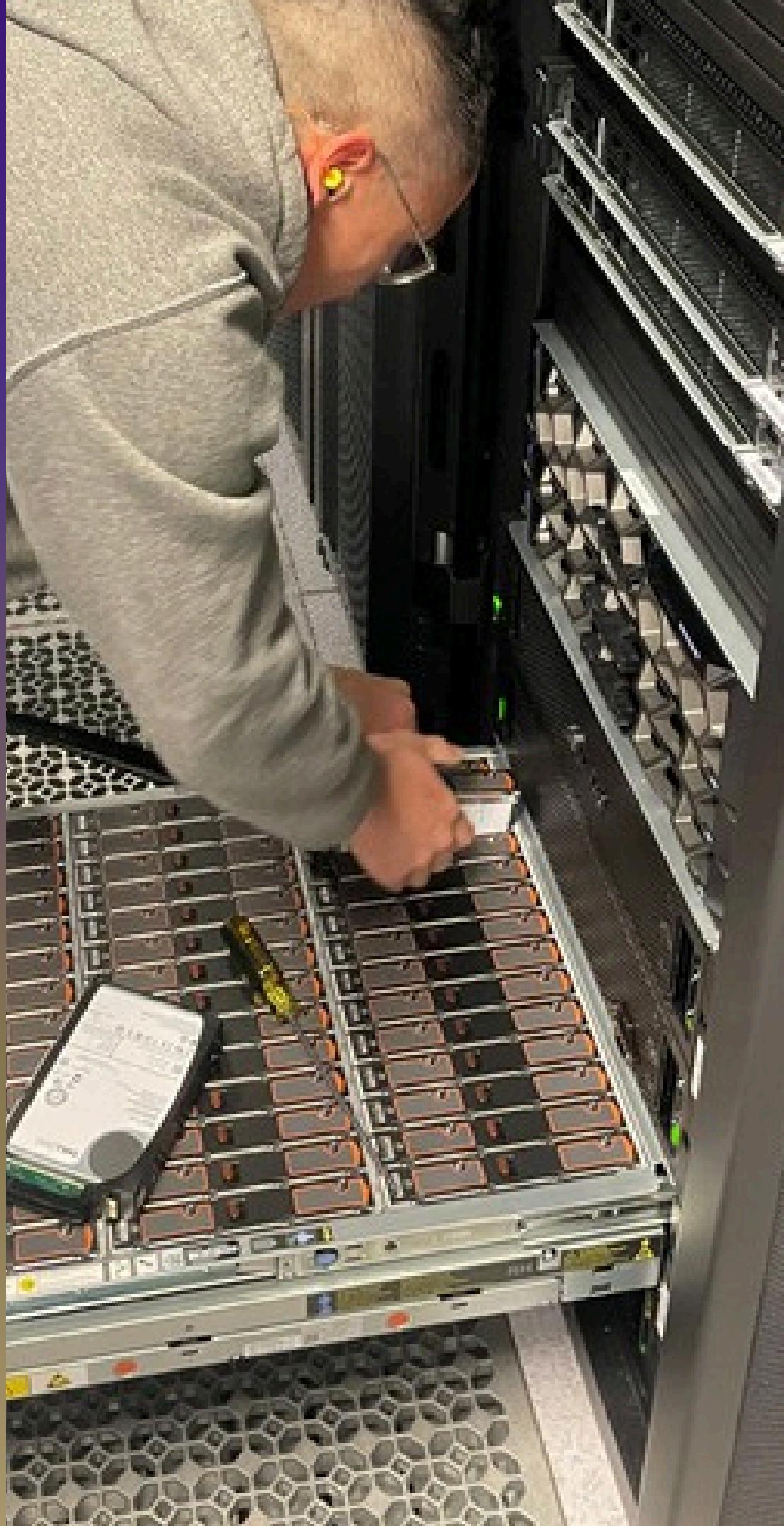
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- We have a [mailing list](#).
- **Demonstration accounts** are available!
- Students are eligible for a [FREE priority access account](#) to use resources funded by the Student Technology Fee via the Research Computing Club!
- Storage management is key!



STORAGE

Flash Storage - GPFS

- Per user:
 - **10GB Home directory**
- Dedicated project storage
- Community, temporary “scrubbed” storage

Globus endpoint
Easy transfers!





HOW DO I GET STARTED?



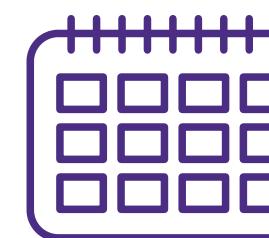
Regular Training Opportunities

- Recorded
- Events Calendar
- RCC Slack Community



Winter Workshops

- [Linux Command Line Fundamentals Workshop](#)
Thursday January 22 10am-12pm
- [Using R and RStudio on Hyak Klone Workshop](#)
Thursday February 5 10am-12pm
- [Managing Python Environments with Conda and Jupyter](#) Thursday March 5 1-3pm



eScience Workshops

- Software Carpentry
- Pixel Proficiency - deep learning with images
- Python - your research assistant
- + weekly Seminars!
- Sign up for the Newsletter

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DOCUMENTATION

www.hyak.uw.edu/

- Step by step guides to tools and software
- Monthly blog posts with updates
- Links to support and services

LEARNING RESOURCES

www.hyak.uw.edu/learn

- Short How-to videos
- Full length tutorials

Everything underlined is a link 

TUTORIAL

LEARNING OBJECTIVES

By completing this tutorial, you'll learn how to:

- Understand the role of the CLI in HPC environments
- Log in to Hyak systems securely
- Navigate the Linux filesystem using core commands
- Understand your Home directory and storage
- Use Open OnDemand's file explorer
- Transfer files to and from Hyak using `scp` and Globus
- Use essential Linux commands for inspecting and manipulating files
- Combine multiple skills to complete a short, hands-on task

Training Materials Repo:

<https://github.com/UWrc/linux-fundamentals.git>

Feedback Survey:



↑ **Everything underlined is a link** 

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TUTORIAL

NEED TO KNOW'S

Hyak Klone training access period:

- You will be able to complete whenever you want with your demonstration account (or other)
- Over the next ~3 days (**ending Monday morning 1/26**) you will have priority access via UWIT
- Use the slurm account “**uwit**”
- Tutorial is designed as introductory concepts and practice followed by a “**task**” that brings together multiple skills.

Training Materials Repo:

<https://github.com/UWrc/linux-fundamentals.git>

Feedback Survey:



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Learn more – everything underlined is a link

UWIT - <https://it.uw.edu/>

[Research Computing Services](#)

- [Tillicum: GPU-Accelerated Research Computing Platform](#)
 - [Intake Form](#)
- [Hyak: High-Performance Supercomputing Research Cluster](#)
 - [Pricing and Eligibility](#)
 - [Documentation](#)
- [Data Storage Services](#)
 - [Kopah S3 Object Storage](#)
 - [Pricing and Eligibility \(cost calculator\)](#)
 - [Documentation](#)
 - [Lolo Data Archive](#)
 - [Pricing and Eligibility](#)
 - [Documentation](#)
- [Cloud Computing](#)
- [Computing for Restricted Access Data](#)
- [Research Computing Consulting](#)

Training and Events

- [Hyak mailing list](#)
- [Hyak Blog](#)
- [UWIT Research Computing Calendar](#)
- [Office Hours](#)
- [eScience Newsletter \(scroll for sign up\)](#)
- [eScience Data Science and AI Accelerator](#)
- [Office of Research Calendar](#)

Past Trainings

- [Research Computing Tutorials & Video Library](#)
- [eScience YouTube Channel](#)

New Hyak Users

- [Free Demonstration Account](#)
- [Hyak Basics Tutorial](#)
- [Limitations of demonstration accounts](#)
- [Using free resources \(Checkpoint\)](#)

Students

- [Research Computing Club](#)
- [Student Hyak account](#)
- [Cloud Credits](#)
- [Student Technology Fee](#)

Other Resources

- [Join the UW AI Community of Practice](#) on MS Teams to get updates from UW-IT's AI team about events and join the discussion around AI in the news, society, and culture.
- [UW Seattle Events Calendar](#)

Special thanks to

- [UW Office of Research](#)
- [eScience Institute](#)