# Using

&

Studio®

# on Hyak Klone

# Using R & RStudio on Hyak Klone

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INFORMATION TECHNOLOGY
UNIVERSITY of WASHINGTON

# AGENDA

## Introduction

**UWIT Research Computing**

- Services
- User Support, documentation
- Student access

**Why use Hyak for R workflows?**

- Use cases
- Need-to-knows
  - EnvironSoftware policies
  - Open OnDemand
  - Containerized environments
  - Unsupervised execution of long running jobs

**Tutorial**

- Objectives
- Layout
- Hands-on option

# RESEARCH COMPUTING SERVICES


- **High Performance Computing**
  - Hyak– UW's Supercomputer
  - Tillicum – GPU cluster
- **Data storage**
  - Kopah Object Storage
  - Lolo Archive
- **Research Cloud Computing**
  - AWS, GCP, Azure
- **Secure Computing**
- **Research Computing Consulting**

# HYAK KLONE


- **UW's Supercomputer**
  - **HPC Cluster**
  - **Condo Model**
  - **Storage**
  - **Community Idle Resources**

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

# TILLICUM

**LAUNCHED**
**Oct 15**
**2025**

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** Campuses
**11** Colleges & Schools
**33** Departments
**77** Research Groups
**542** Users

**Proven Demand & Impact**

**94,000** GPU Hours Consumed

## SUPPORTING ALL DOMAINS

- Engineering
- Math
- Computer Science
- Physical & Life Sciences
- Quantum
- Teaching & Learning
- AI
- Medicine

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NVIDIA

DELL

[re]DESIGN

# USER SUPPORT

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eScience Institute

## Helpdesk

**help@uw.edu**

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

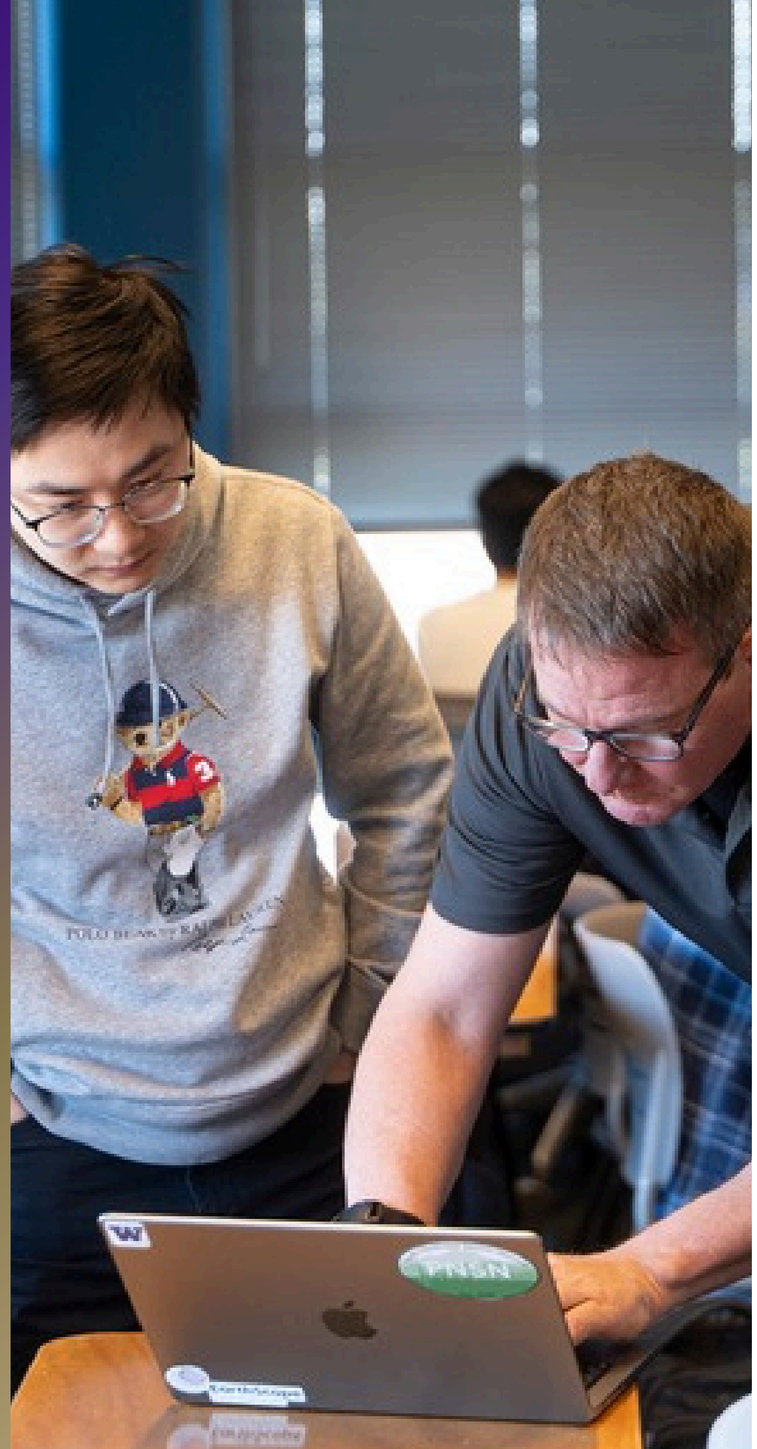
## Office Hours

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

## Regular Training Opportunities

- Managing Python Environments with Conda and Jupyter Thursday March 5 1-3pm
- Recorded
- Events Calendar
- We have a mailing list.

**Everything underlined is a link**



# 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**

# RESEARCH COMPUTING CLUB

STF | Student Technology Fee Committee

## Hyak Computing Resources

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

## Cloud Credits Program

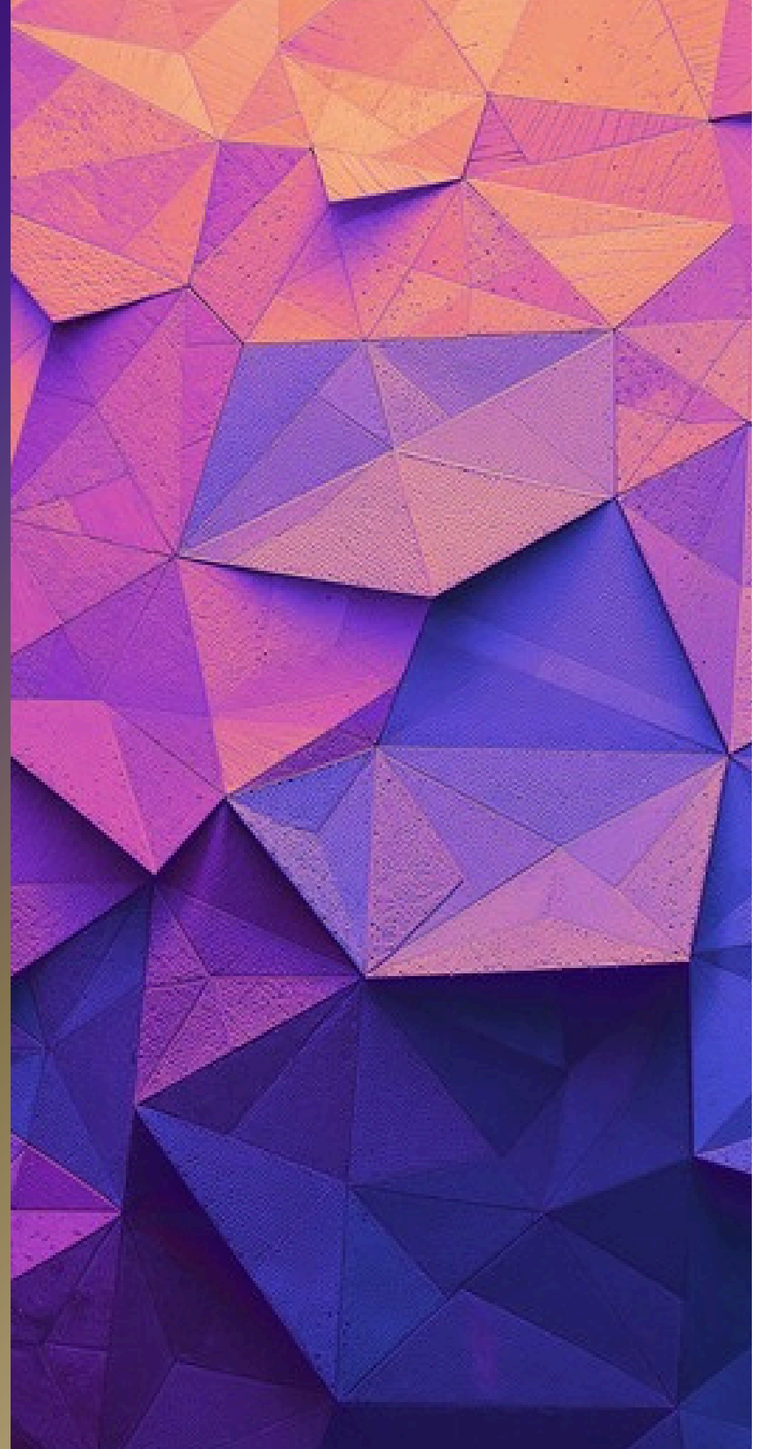
- Apply for $500 in AWS credits
- Guidance and troubleshooting

## Slack Community

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

## Special Events

- Hackathon
- AWS GameDay



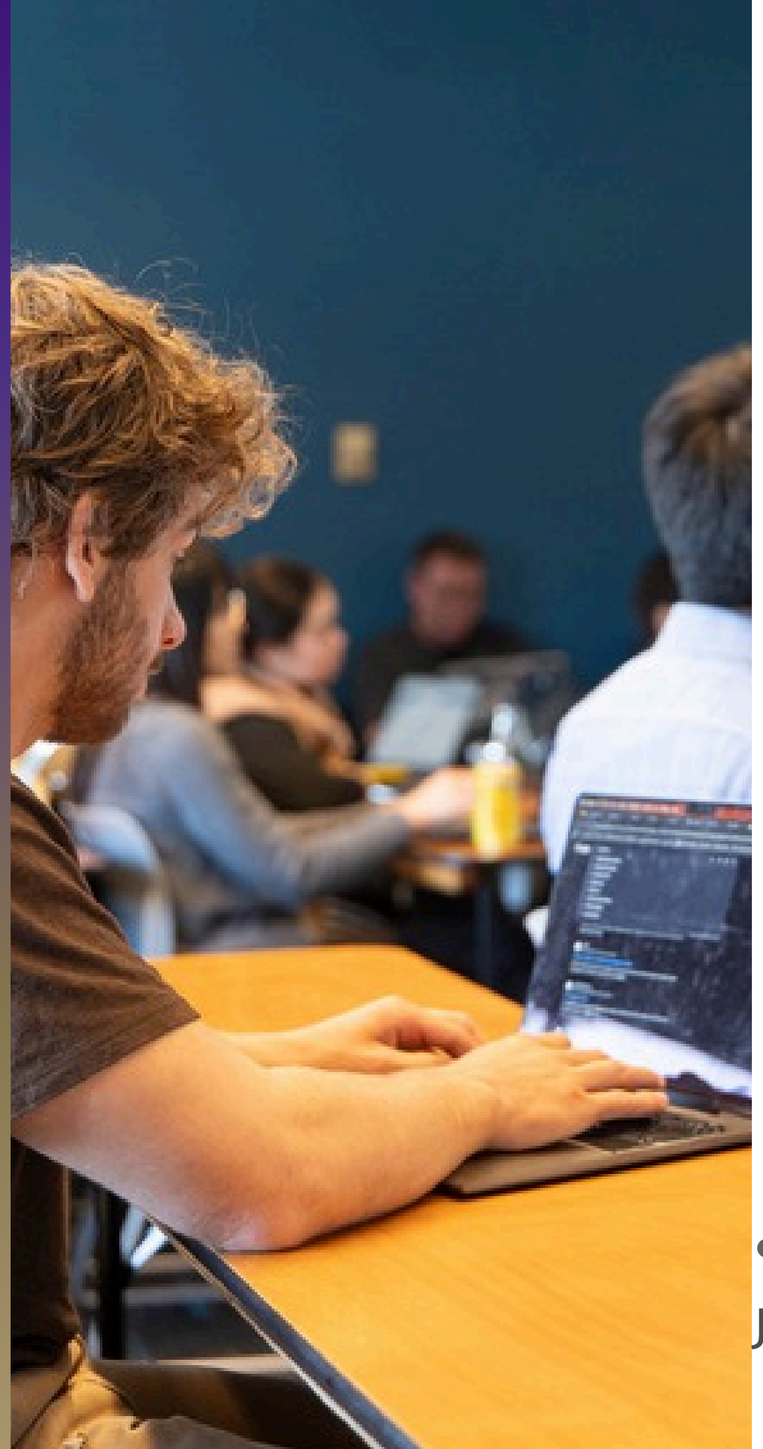
# WHY USE R & RSTUDIO ON HYAK KLONE?

## R jobs are:

- Long running
- Computationally intensive
- Require larger storage and/or memory

## Reclaim your workstation (and time)

- Powerful computing resources
- Job scheduler
- Unsupervised job execution

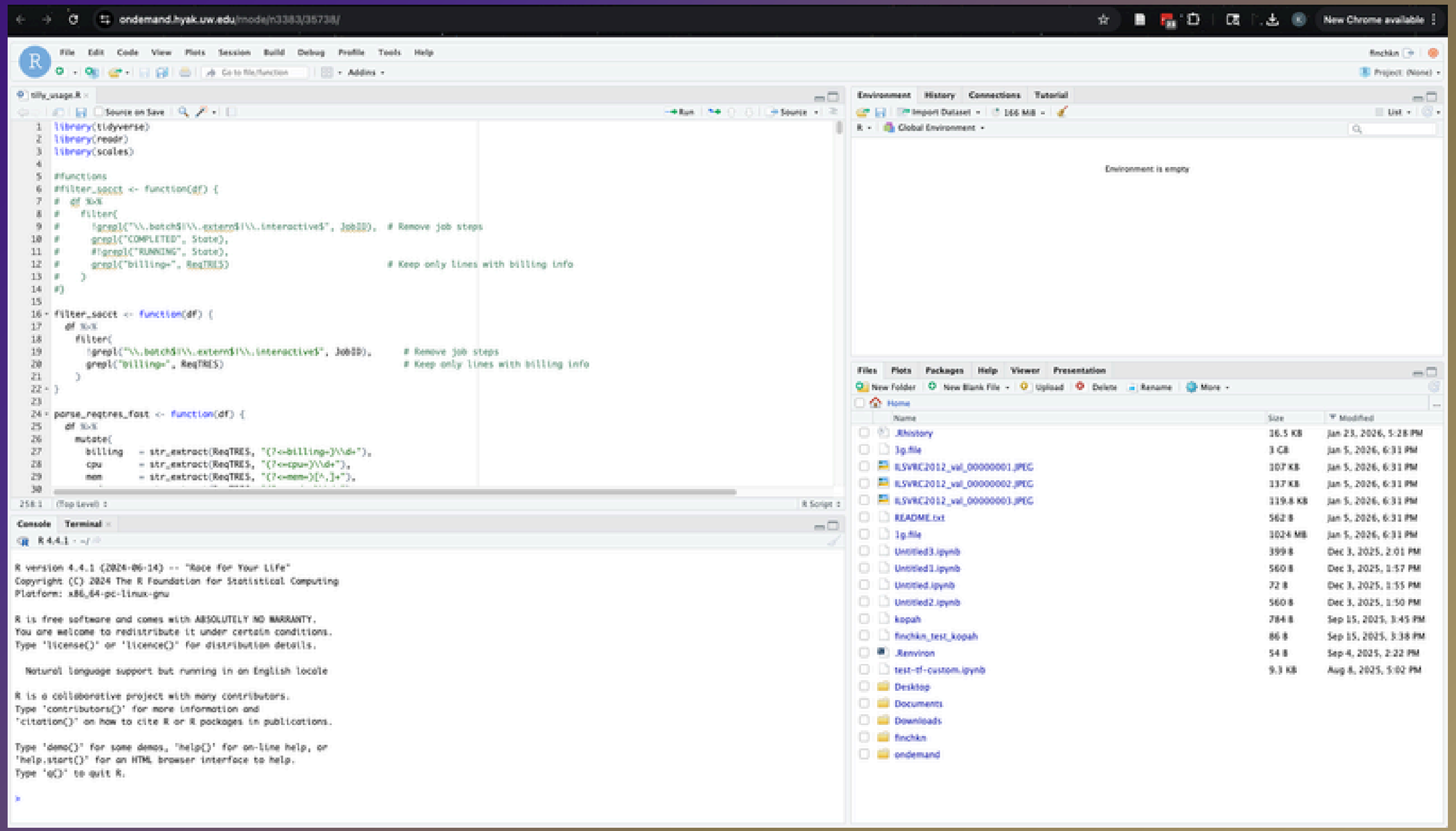


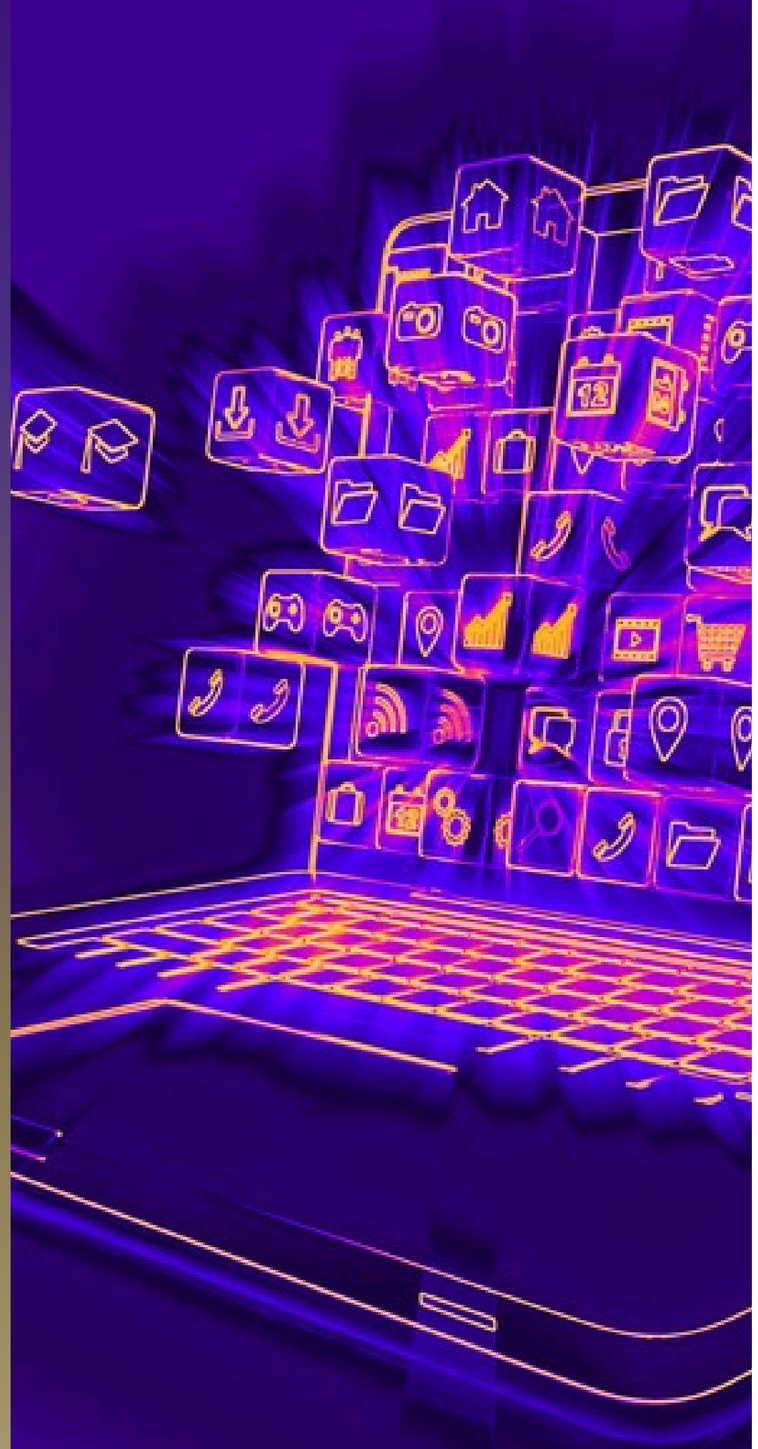
# NEED TO KNOW

## Environment – Rocky Linux + Slurm

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

# OPEN ONDEMAND PLATFORM



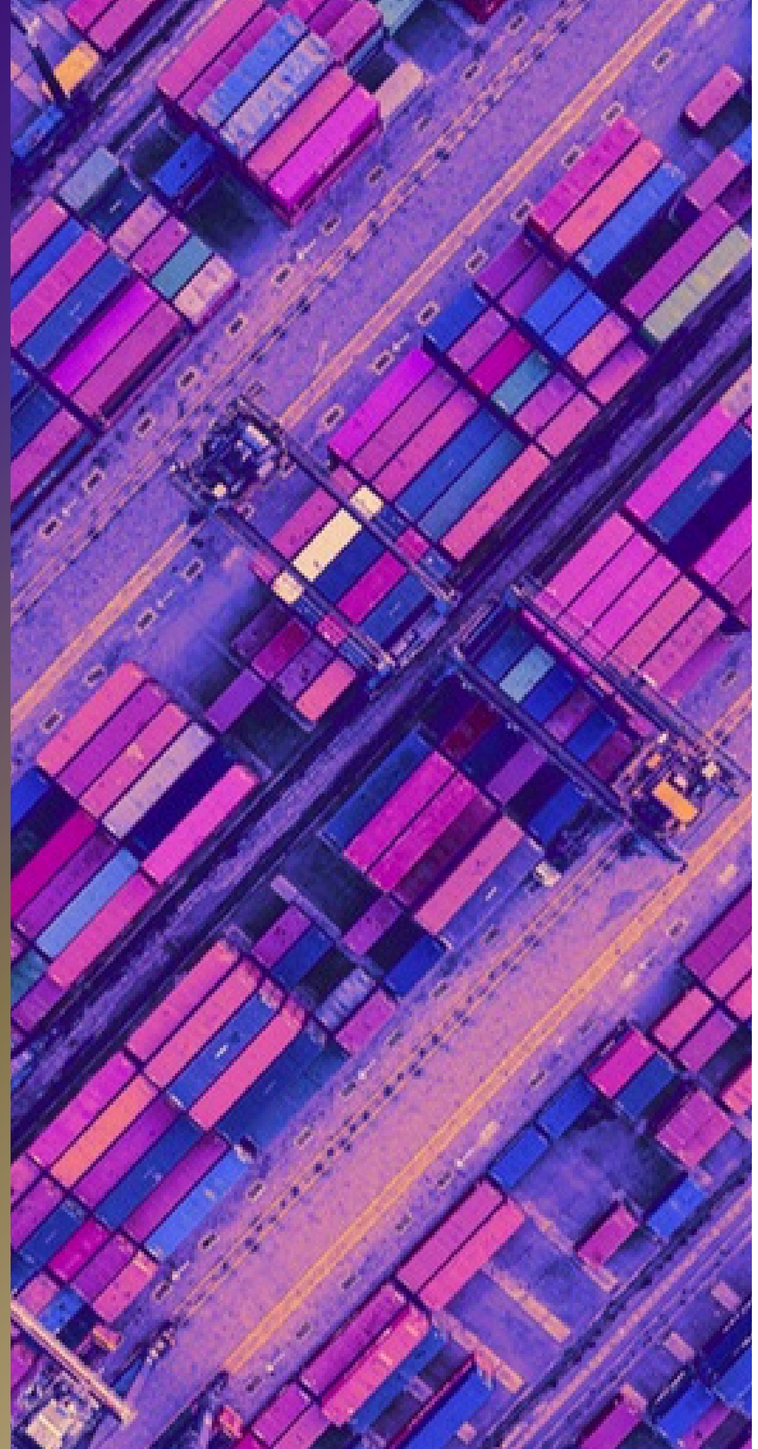


# NEED TO KNOW

## Software Policies

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

***On Hyak Klone, R and RStudio are provided exclusively through containerized environments.***



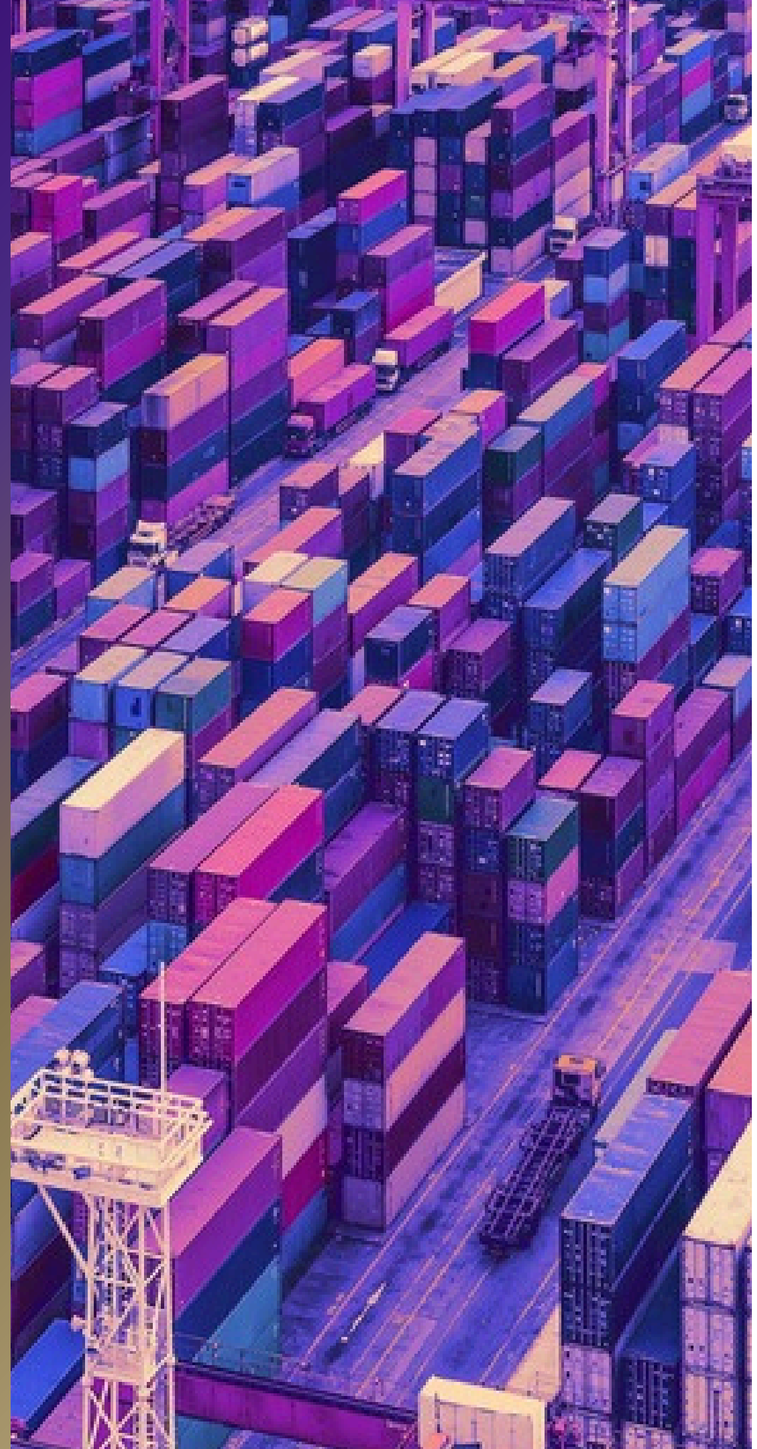
# CONTAINERS

## What is a container?

- Containers are lightweight, isolated software environments that encapsulate an application along with its dependencies and runtime settings.

## What does that mean in practice?

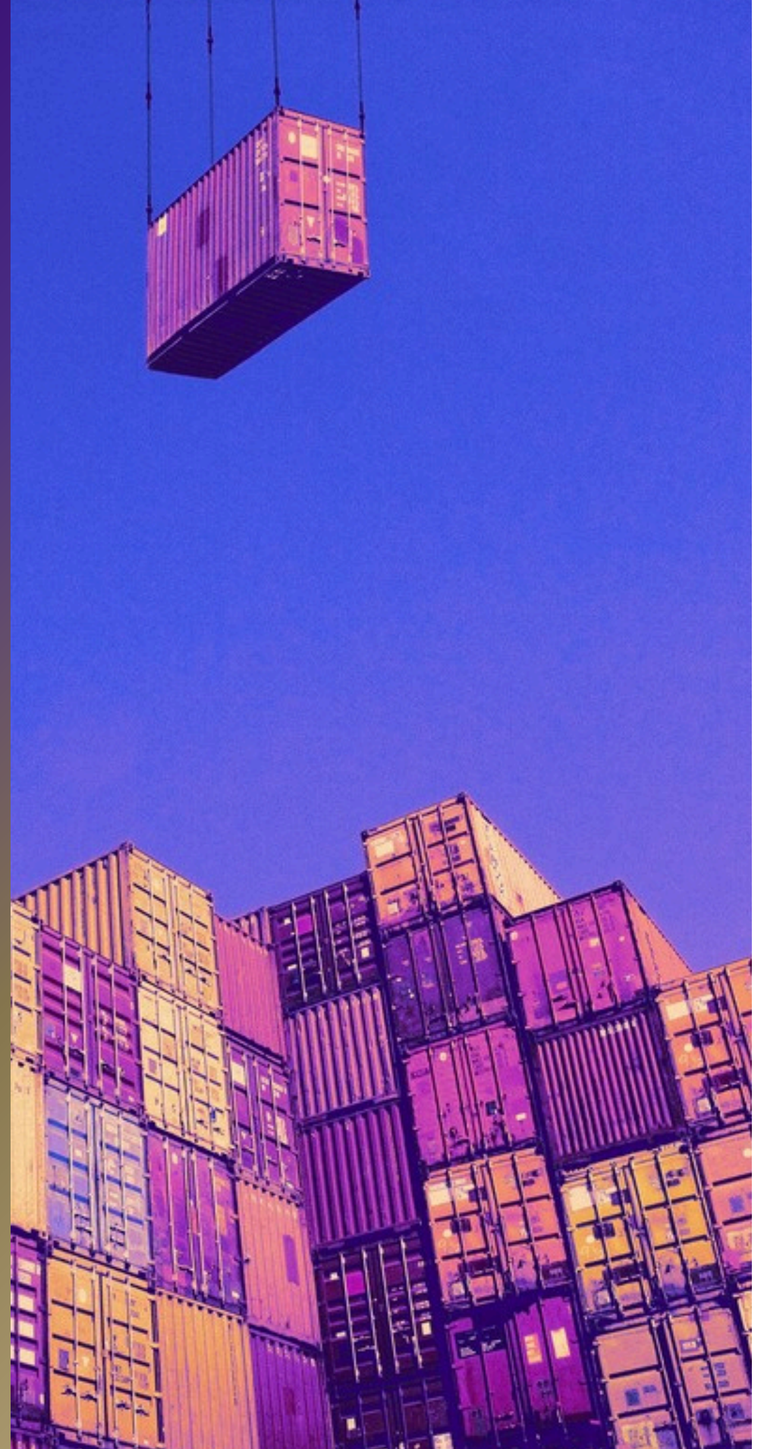
- Containers give you control and consistency without needing admin access.



# CONTAINERS

## Why containers on Hyak?

- Consistent and reproducible way to package, distribute, and run software across different computing environments.
- A single file, improving storage usage for individual users and lab groups.



# NEED TO KNOW

## Installing R packages in containers

- Packages install into your **personal R library**
  - *Storage management is key*
- The container itself remains unchanged
- Interactive installs (install.packages()) work for many packages
  - Some packages require system libraries or OS-level dependencies.

# CUSTOMIZATION

## Failed package install, what's next?

- Rebuild the container and install packages and dependencies at build time.

## Are they hard to build?

- **Many ready-made containers exist** – you can start from trusted images and customize as needed.
  - Rocker Project
- **Definition files make builds repeatable** – once written, they simplify future rebuilds or sharing.

# UNSUPERVISED

## The Rscript function

- Execute a single R expression
- Run an entire .R script from the command line

***When combined with a container and Slurm, Rscript enables long-running or resource-intensive analyses to run unattended on compute nodes.***


# LEARNING OBJECTIVES

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

- Launch RStudio Server on Hyak Klone using Open OnDemand
- Manage R package storage using .Renviron
- Use prebuilt R/RStudio containers on Hyak Klone
- Build custom R containers when additional packages or dependencies are needed
- Run long-running R jobs with Rscript and Slurm

**Training Materials Repo:**

**https://github.com/UWrc/r_rstudio_tutorial.git**

**Feedback Survey:**

**Everything underlined is a link**


# 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 2/9**) you will have priority access via UWIT
- Use the slurm account "**uwit**"
- This tutorial is designed as introductory concepts and practice followed by a "**task**" that brings together multiple skills.

**Training Materials Repo:**

**https://github.com/UWrc/r_rstudio_tutorial.git**

**Feedback Survey:**

**Everything underlined is a link**

# 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