OpenOnDemand: a Web portal for HPC systems

UM Fall HPC/Cloud Workshop

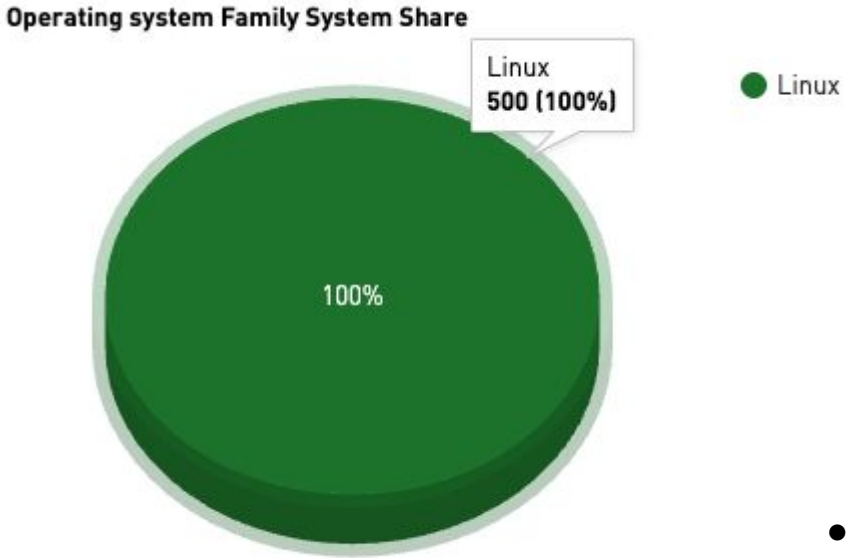
Grigory Shamov, October 21, 2026

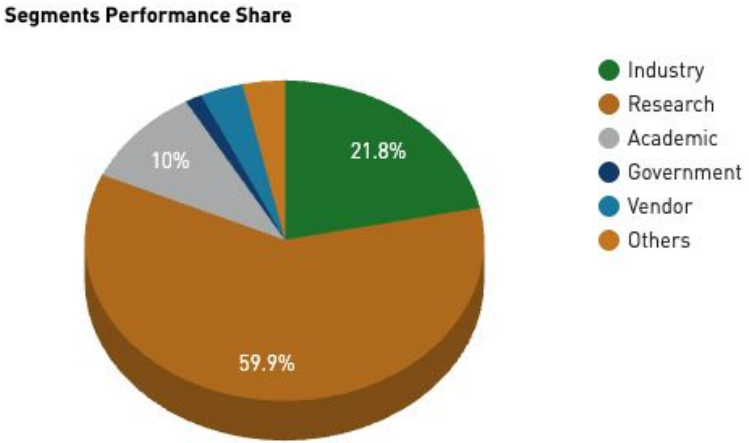




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HPC Top500 List (Jul 2026)

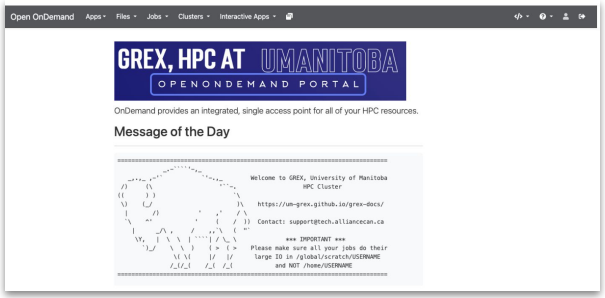




TOP 500
The List.

- Doing **Research**; Using **Linux**
- **Remote** access to the ARC systems

OpenOnDemand HPC Web Portal



https://um-grex.github.io/docs/ood/

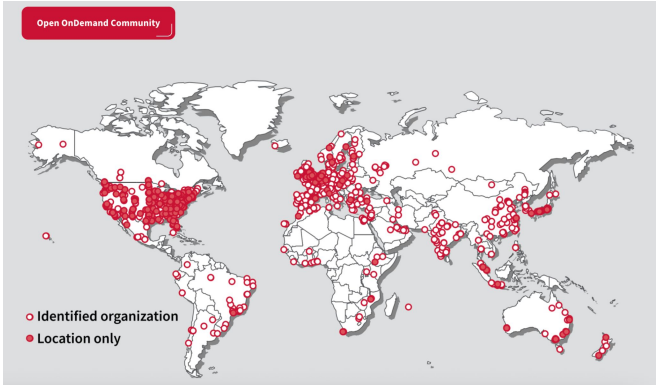
- **Popular Web-portal for remote access of HPC resources**
  - https://www.openondemand.org/
  - Developed at Ohio Supercomputing Centre (OSC)
  - Makes access to HPC easier by using Web interface

- Why sites like it
  - Secure, sessions runs as a “user” .
  - Applications run as Batch Jobs, allowing for resource control by SLURM

- What it gives to users
  - Remote Shell and Virtual Linux Desktop environments
  - Access to JupyterLab notebooks and Rstudio
  - Interface to move data.
  - Interface for session control , monitoring of jobs, etc.

Where is it available?

- Most, but not all Alliance (DRAC) HPC systems, and PAICE AI systems
  - Trillium, Nibi (Alliance)
  - Vulcan, Killarney (PAICE)
  - *Magic Castle teaching clusters (devel).*
  - Grex, local UMan HPC system



- Many HPC systems across the World
  - RIKEN and many others in Japan, some by default
  - Many USA Universities HPC (OSC, Utah, Stanford, Princeton,...)
  - Some of EuroHPC systems (LUMI AI Factory)
- HPC in public cloud deployments AWS, GCP, Azure, etc.

JupyterHub and/or OpenOnDemand

System	JupyterHub ?	OpenOnDemand ?
Fir (SFU)	jupyterhub.fir.alliancecan.ca	
Nibi (Sharcnet, UWaterloo)		ondemand.sharcnet.ca
Rorqual (CQ, Montreal)	jupyterhub.rorqual.alliancecan.ca	
Trillium (SciNet, UofT)		ondemand.scinet.utoronto.ca
MagicCastle	jupyter.demo.hpc.umanitoba.ca	ood.demo.hpc.umanitoba.ca
Grex		ood.hpc.umanitoba.ca

Remote access with OOD

- Getting to the OOD sign-on page
  - For Grex, has to be on UManitoba network or UMan VPN
  - SSH to login nodes (in the browser).
  - Desktop VDI
- Moving data in and out of the remote system
  - File Manager interface
  - May integrate with Globus endpoint (Grex, Trillium)
- Applications
  - JupyterLab (similar to CCEnv JupyterHub on other systems)
  - Other server apps (RStudio, Matlab server, CodeServer)
  - Matlab, Ovito, etc., VDI Apps
- Module Browser, and Monitoring (coming next)

Tutorial: data analysis with Pandas

- Let’s analyze Palmer Penguins dataset on an HPC system with OOD!
  a. Upload the dataset;
  b. Use a JupyterLab notebook to analyze it;
  c. Produce two X-by-Y scatter plots
  d. Download the results

- A toy problem using Pandas on a single CSV; but very common work pattern!

OpenOnDemand : limitations

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- Interactive work?
  - Limited either in *time* (max session length) or *amount* of resources (dedicated part of a cluster)
  - Person's ability to handle many interactive sessions; GUI's are hard to automate!
  - Batch Jobs are generally the way (covered in the next talk!)

- Access: some HPC centres have stricter security (VPN requirements, as Grex)

- Diversity of available applications and configurations between HPC centres using OOD

Tutorial: use Neurodesk in OOD Desktop

- Let's try to use containerised distribution of Neurodesk inside OOD Desktop
  a. Obtain the sample **sample_T1.nii** Brain dataset in OOD session using **wget**;
  b. Access the Neurodesk's **FSLeyes** via Singularity/Apptainer
  c. Observe the sample in the **fsleyes** GUI, using a GPU if available

- Just having a Linux Desktop and a container engine lets you to get started with HPC.
  a. https://neurodesk.org/getting-started/neurocontainers/singularity/
  b. Magical commands: **module load apptainer; apptainer shell --nv container.simg**
  c. (Two options, CVMFS sandbox and single .simg blob are equivalent)


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Exercise: data analysis with Pandas TBD

We will load some Eventbrite registration data (anonimized!) and analyze using the Pandas Python package

- Load necessary modules in Jupyter; using LMod tab.
- Get a Jupyter kernel for Python with JupyterLab launcher
  a. As an exercise, can create/install kernel in a virtualenv
  b. Or pick from a module.
- Import packages
- Use a notebook to load the data and analyze
- *Hands-on exercise : copy the materials and open notebooks in JupyterLab notebook*
  a. *On Grex:* ***cp -r /global/software/ws-oct2025/jupyter_pandas ~***
  b. *On Magic Castle:* ***cp -r /home/shared/ws-oct2025/jupyter_pandas ~***