Getting Access to LUMI

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3 March 2025

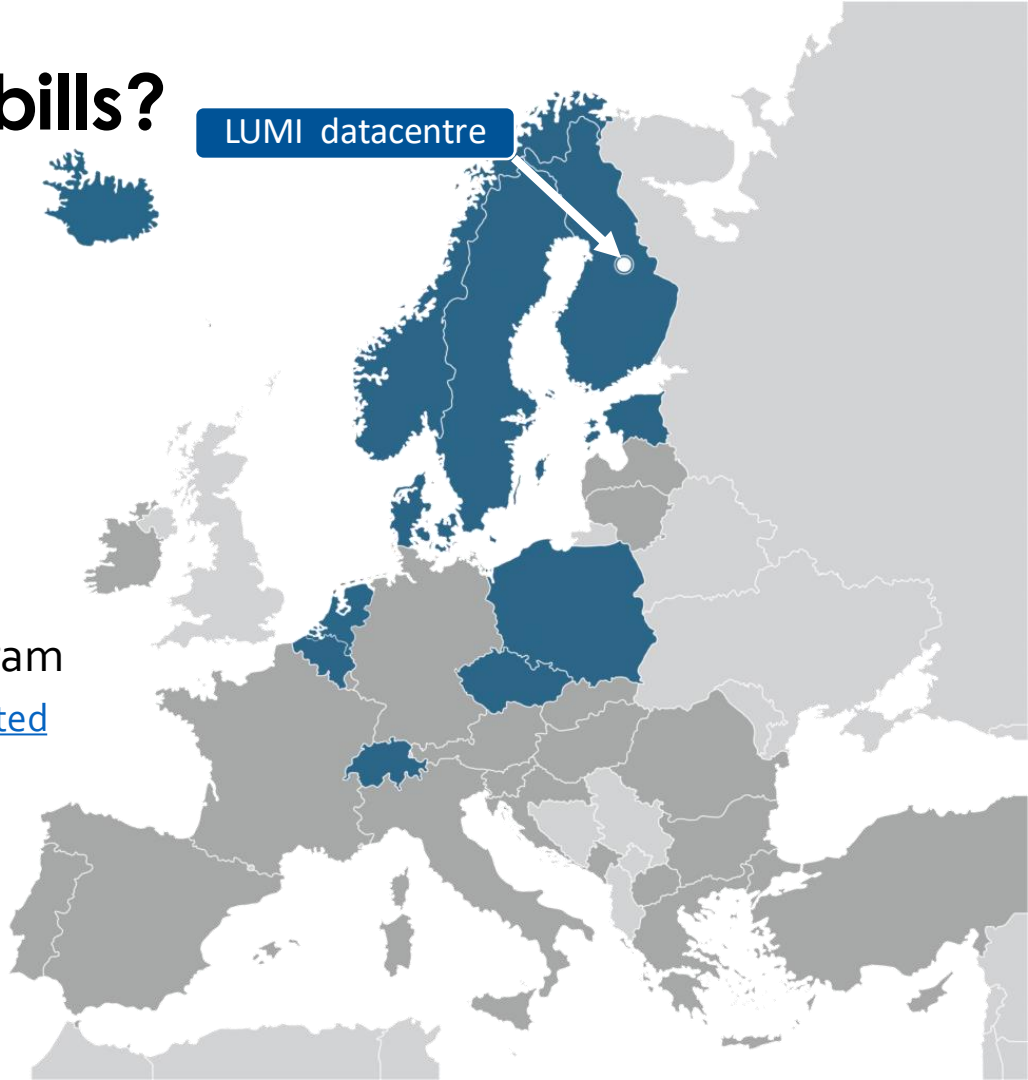
LUMI

EuroHPC supercomputers

- 5 petascale supercomputers: Meluxina, VEGA, Karolina, Discoverer, Deucalion
- 3 pre-exascale computers: LUMI, Leonardo and MareNostrum5
- Two exascale computers under constructions or procurement: Jupiter and Alice Recoque
- 4 new mid-range systems coming up, including Arrhenius and Daedalus
- Future: "AI-optimised" supercomputer
- All are a joint investment of EuroHPC with one or more countries

LUMI: Who pays the bills?

- EuroHPC machine so joint funding of:
  - EuroHPC JU (50%)
  - Consortium of 11 countries (The Netherlands recently joined)
- The resources of LUMI are allocated proportional to the investments
- Each LUMI consortium country sets its own policies for a national access program
  - See www.lumi-supercomputer.eu/get-started
- So LUST does not manage access to LUMI!



Projects and users

LUMI

- A project
  - Corresponds to a coherent amount of work done by a single person or a collaboration between a group of users.
    - Typically a research project
    - Project for a course
    - Some projects for organisational issues, e.g., local support team project
  - The basis for most resource allocations on LUMI
    - Compute budget: CPU core-hours for LUMI-C, GPU hours for LUMI-G and visualisation nodes
    - Storage budget: Expressed in TB·hours
    - Budgets are assigned and managed by the resource allocators, not by the LUMI User Support Team
  - LUMI projects: project_465XXXXXX or project_462XXXXXX (Finland only)
    - This is the number that you should mention when contacting LUMI User Support

Projects and users (2)

LUMI

- A user account
  - One physical person per account
    - Do not share accounts!
  - Some physical persons have more than one account
    - An unfortunate consequence of decisions made very early on in the project
  - Needs a project to do anything useful on LUMI
- Many-to-many mapping between projects and user accounts
  - Projects can of course have several users who collaborate
  - Users can be a member of multiple projects (and this is more common than you think)
- Resources:
  - Mostly attached to projects
  - Bare minimum for user accounts: just a fixed size home directory

Projects management

LUMI

- Different systems in different countries
  - Finland: MyCSC, completely independent management
  - Other countries and EuroHPC projects are managed via puhuri
    - Web-based portal developed by the Nordic countries for project and resource allocation management (and not just for LUMI)
    - Some countries have their own front-end, other countries use a Puhuri front-end
  - Login to Puhuri via MyAccessID
    - MyAccessID is a GÉANT service that then interfaces with your institute identity provider and several alternatives
    - Always use the same credentials!
    - This is also the place for ssh key management for Puhuri projects
- Quick check of your resources on the system command line: `lumi-workspaces`

File spaces – User-specific

LUMI

- Home directory: /users/<my_uid>
  - Limited in size and not extensible
  - Should be used only for very personal stuff: user-specific configuration files, etc.
  - Not meant as a way to transfer data to future projects
  - Not billed

File spaces – Project based (1)

LUMI

- All billed against the storage budget
- Permanent storage in /project/project_46YXXXXXX
  - For historical reasons, also appears as /projappl/project_46YXXXXXX
  - Place for, e.g., software installations, permanent input data sets
  - Billed at 1 TB·hour per TB per hour used
- Disk-based scratch storage in /scratch/project_46YXXXXXX
  - May be erased after 90 days, but this is not active
  - Billed at 1 TB·hour per TB per hour used

File spaces – Project based (2)

LUMI

- Flash-based scratch storage in /flash/project_46YXXXXXX
  - May be erased after 30 days, but this is not active
  - Billed at 3 TB·hour per TB per hour used
- Permanent object storage (LUMI-O)
  - Billed at 0.25 TB·hour per TB per hour used

File spaces - Quota

LUMI

Goal	Where?	Capacity	Files	Retention
User home	/users/<username>	20 GB	100k	User lifetime
Project persistent	/project/<project>	50-500 GB	100k	Project lifetime
Project scratch	/scratch/<project>	50-500 TB	2M	90 days (not active)
Project fast scratch	/flash/<project>	2-100 TB	1M	30 days (not active)

- Flexibility in block quota (within limits) but less flexibility in file quota
  - See day 2 session: Big parallel file systems don't like small files
  - Singularity containers should be used for software installations with lots of small files
  - Quota extensions currently done by the LUMI User Support Team

Day 2 and 5

File spaces – Further information

LUMI

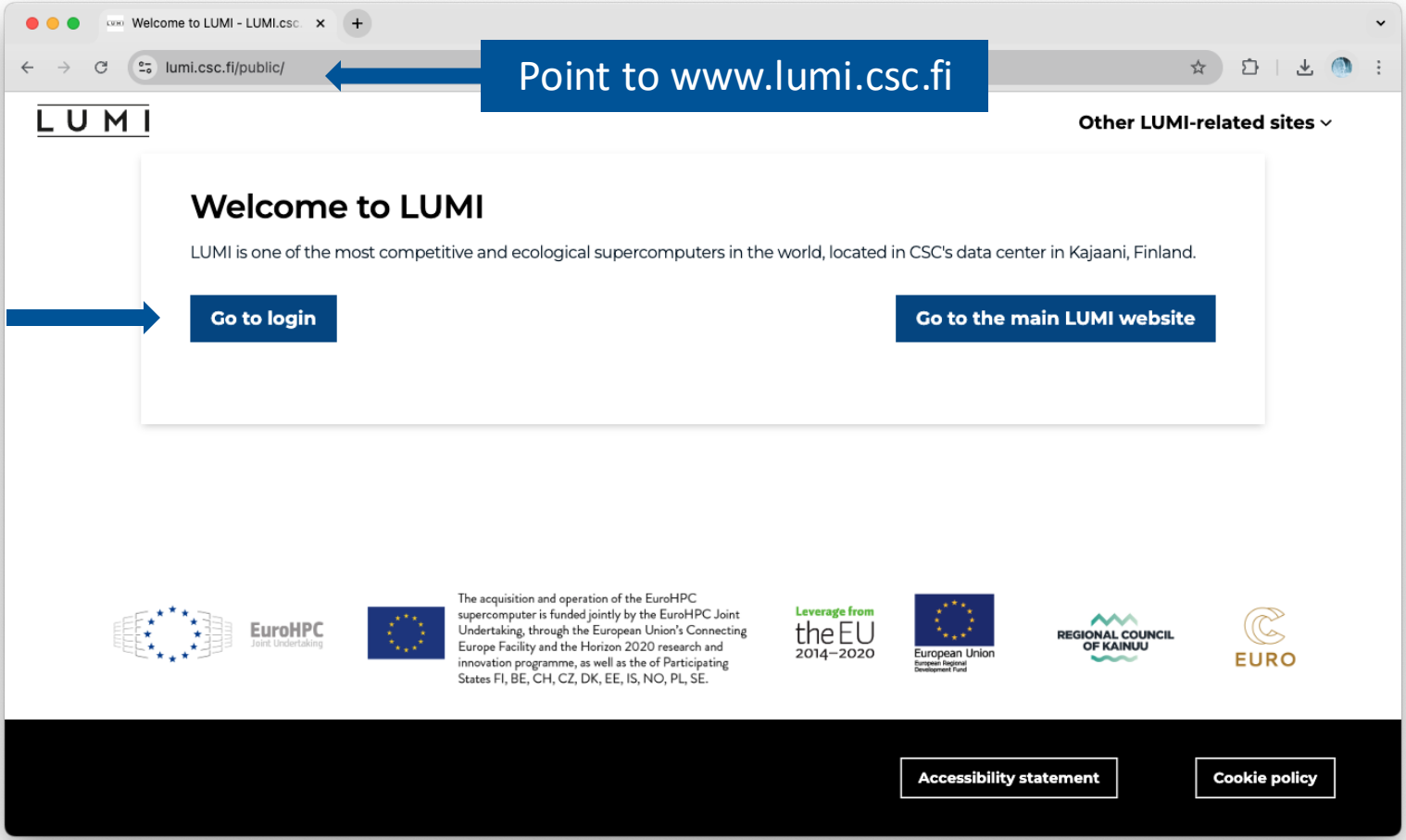
- 4 disk based file systems for /users, /project and /scratch
  - Your user home directory may be on a different file system as your /project and /scratch directory
  - And no, the LUMI User Support Team cannot change that
- /flash is also a parallel file system…
- LUMI is not a data archiving or data publishing system
  - "Permanent" = for the duration of the project
  - Data that is not needed anymore should be moved to your home institute or an archiving service
  - No backup. Repeat: NO BACKUP.
  - Example: NL: SURF Data Archive and SURF Data Repository

Access

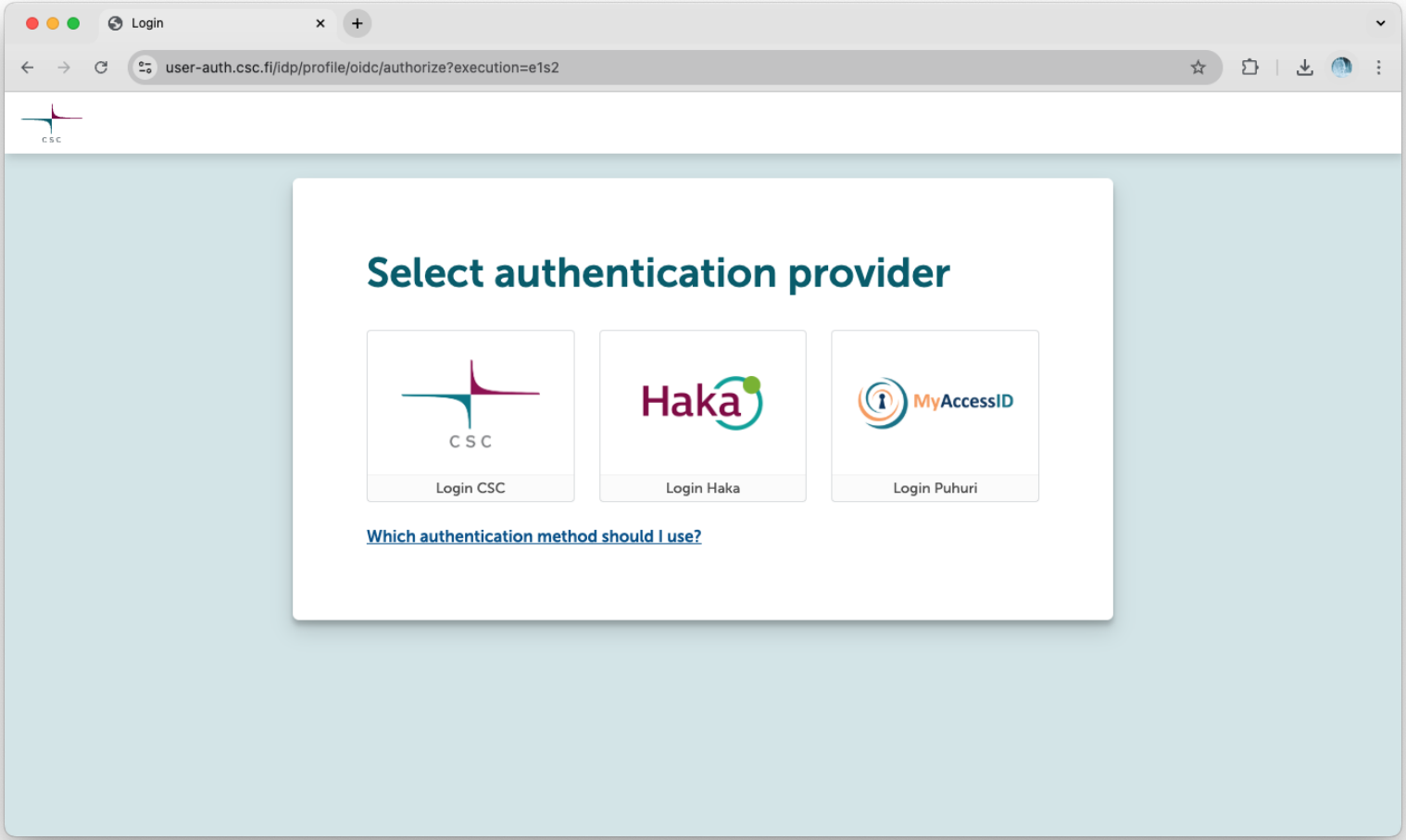
LUMI

- 4 login nodes accessible via key-based ssh
  - Generic name: lumi.csc.fi
  - Specific login nodes: lumi-uan01.csc.fi, lumi-uan02.csc.fi, lumi-uan03.csc.fi, lumi-uan04.csc.fi
    - May be needed for tools for remote editing etc.
  - Key management:
    - Most users: Via MyAccessID: mms.myaccessid.org
    - Users who entered first via CSC: my.csc.fi
- Web interface via Open OnDemand: www.lumi.csc.fi
  - Own set of login nodes
  - Simple GUI environment via the "Desktop" app, based on VNC
- Little support for GUI applications on LUMI through other technologies
  - X11 over ssh is unbearibly slow for most users
  - Additional primitive VNC support outside of OOD

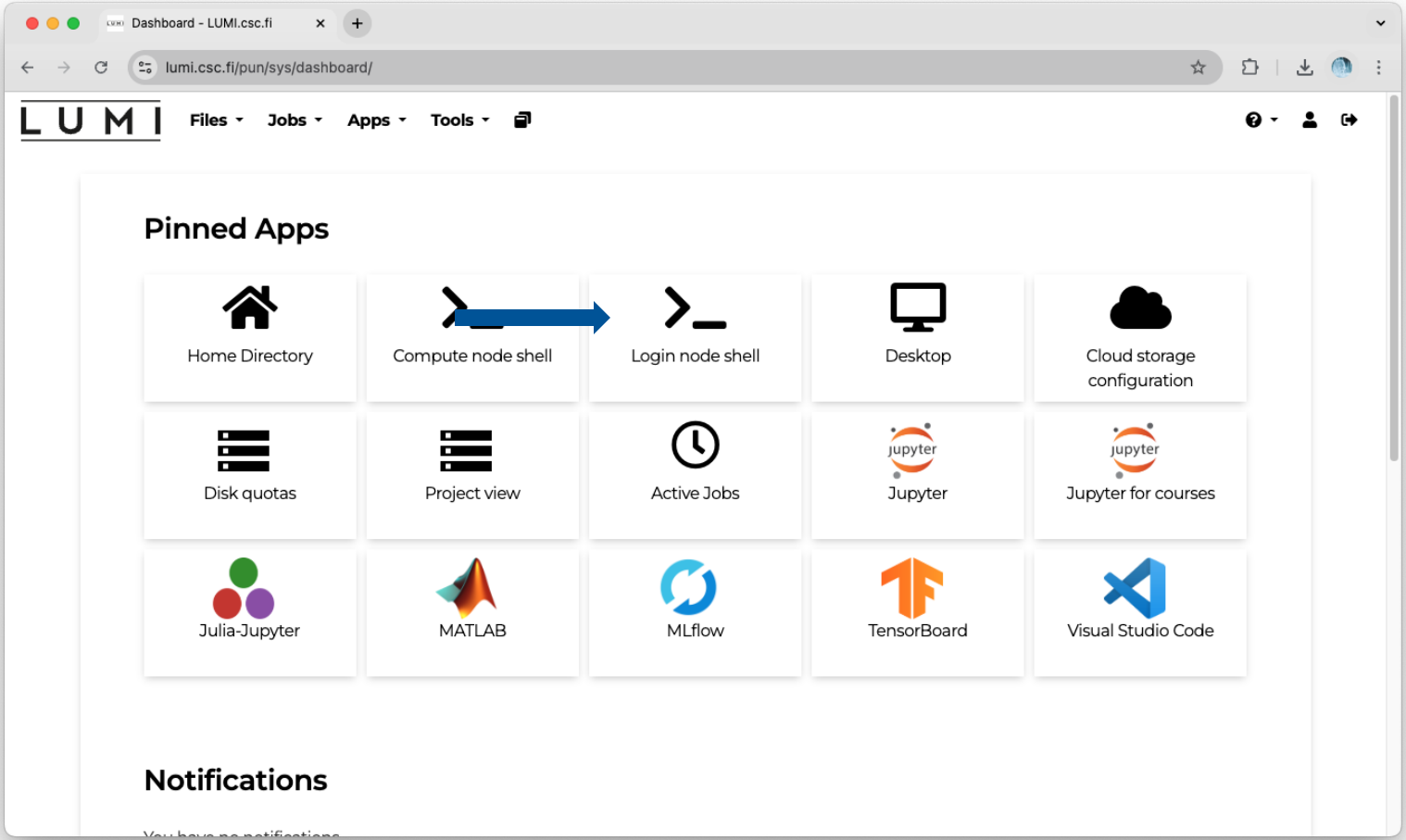
Open OnDemand (1)



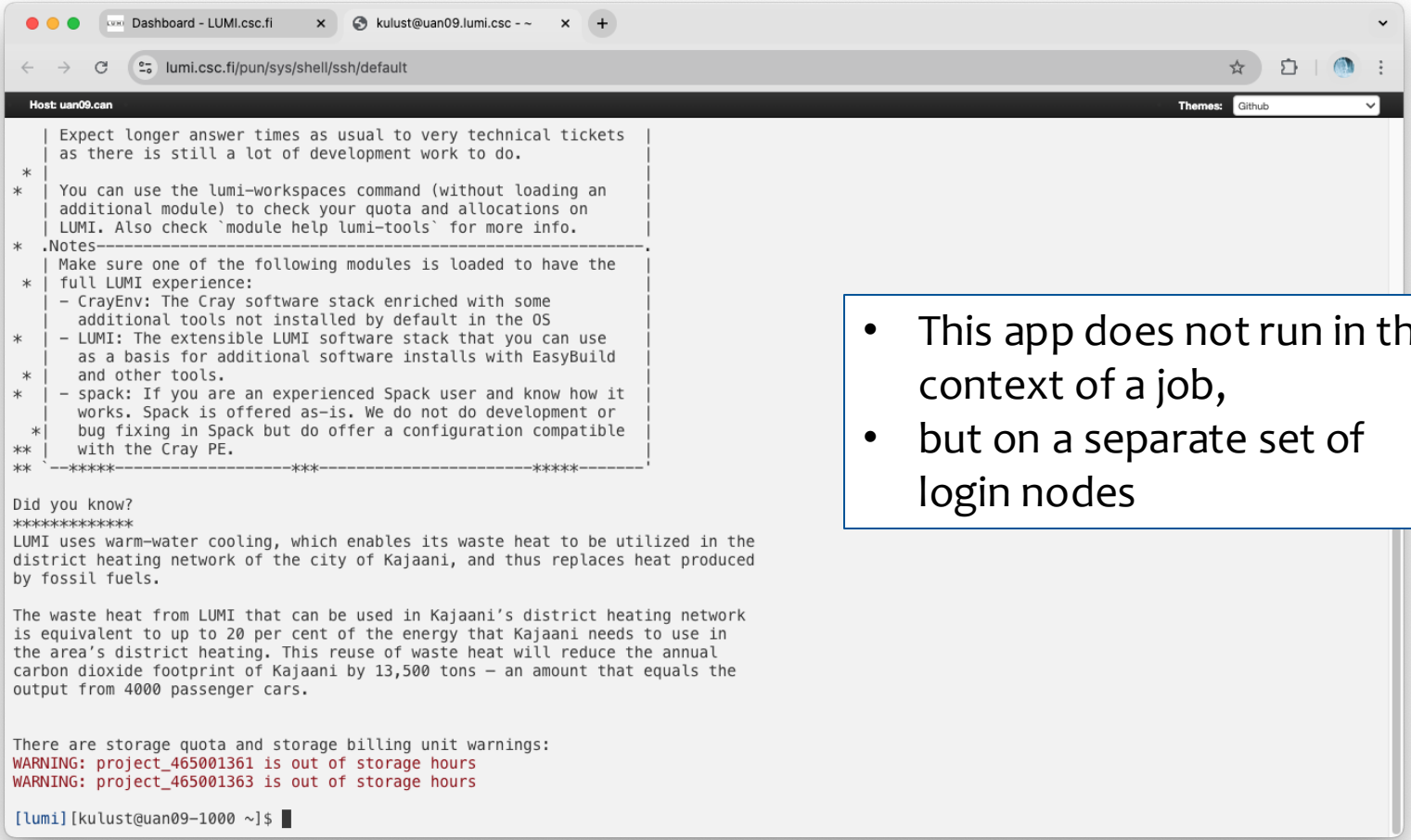
Open OnDemand (2)



Open OnDemand (3)

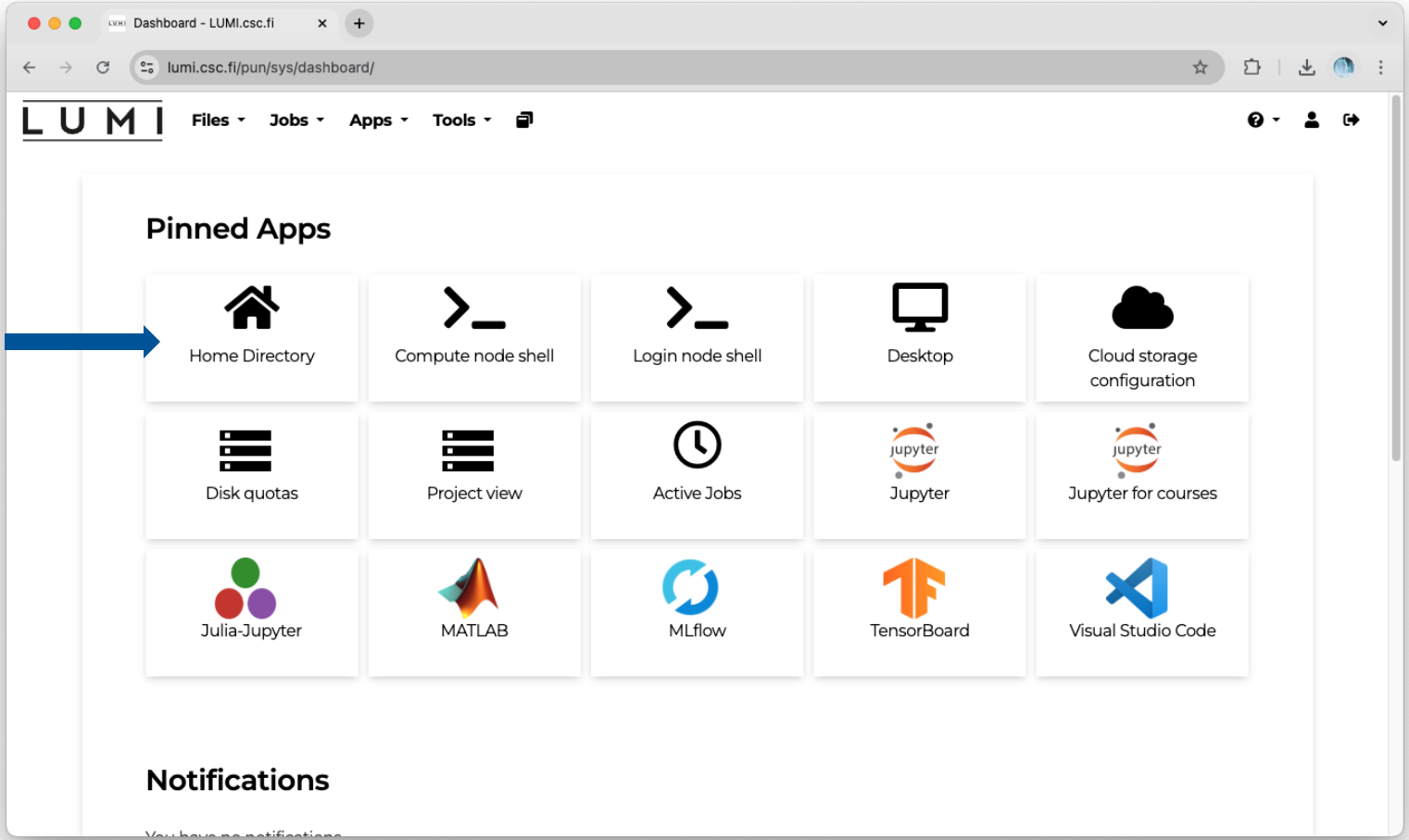


Open OnDemand (4) – Login node shell

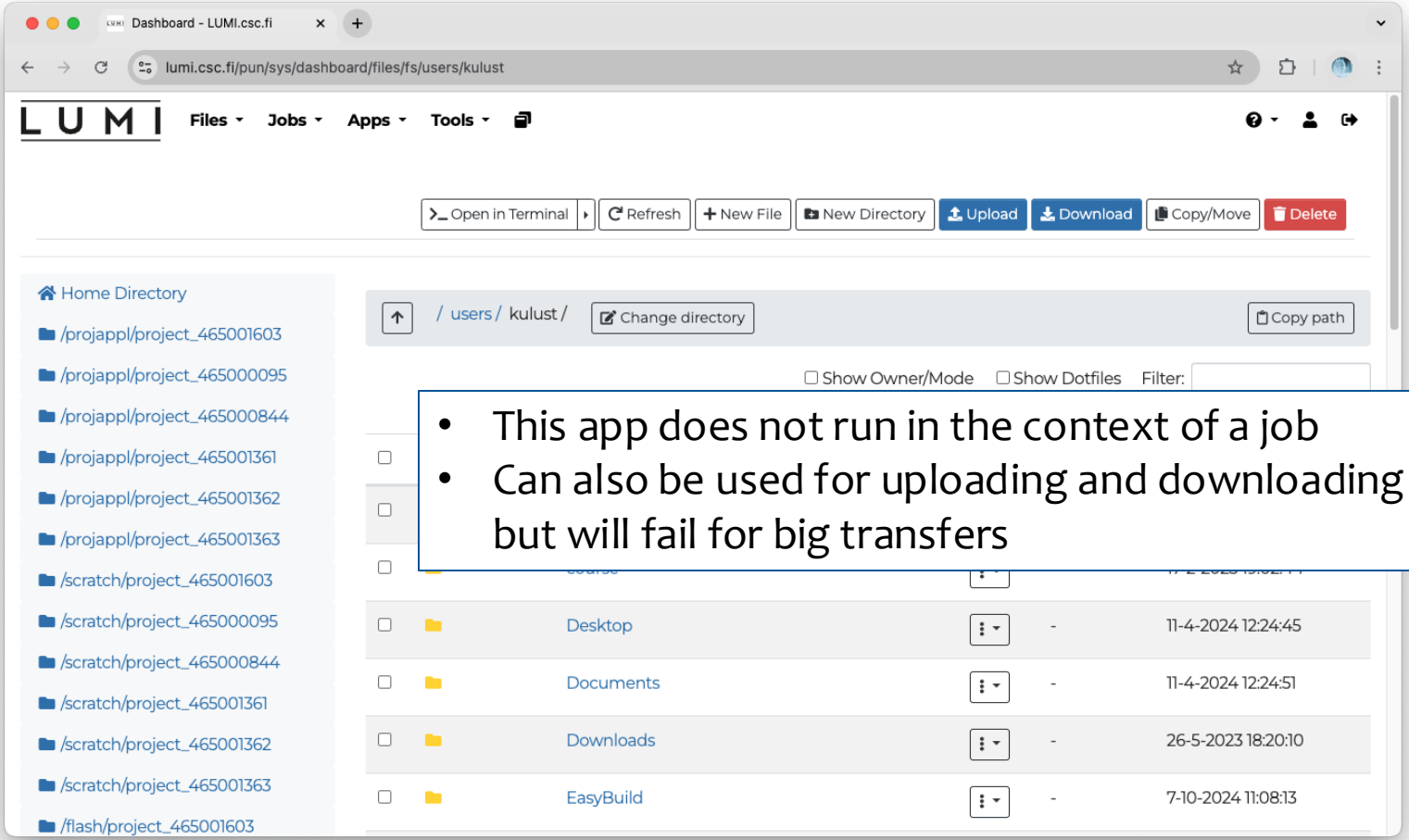


- This app does not run in the context of a job,
- but on a separate set of login nodes

Open OnDemand (5)

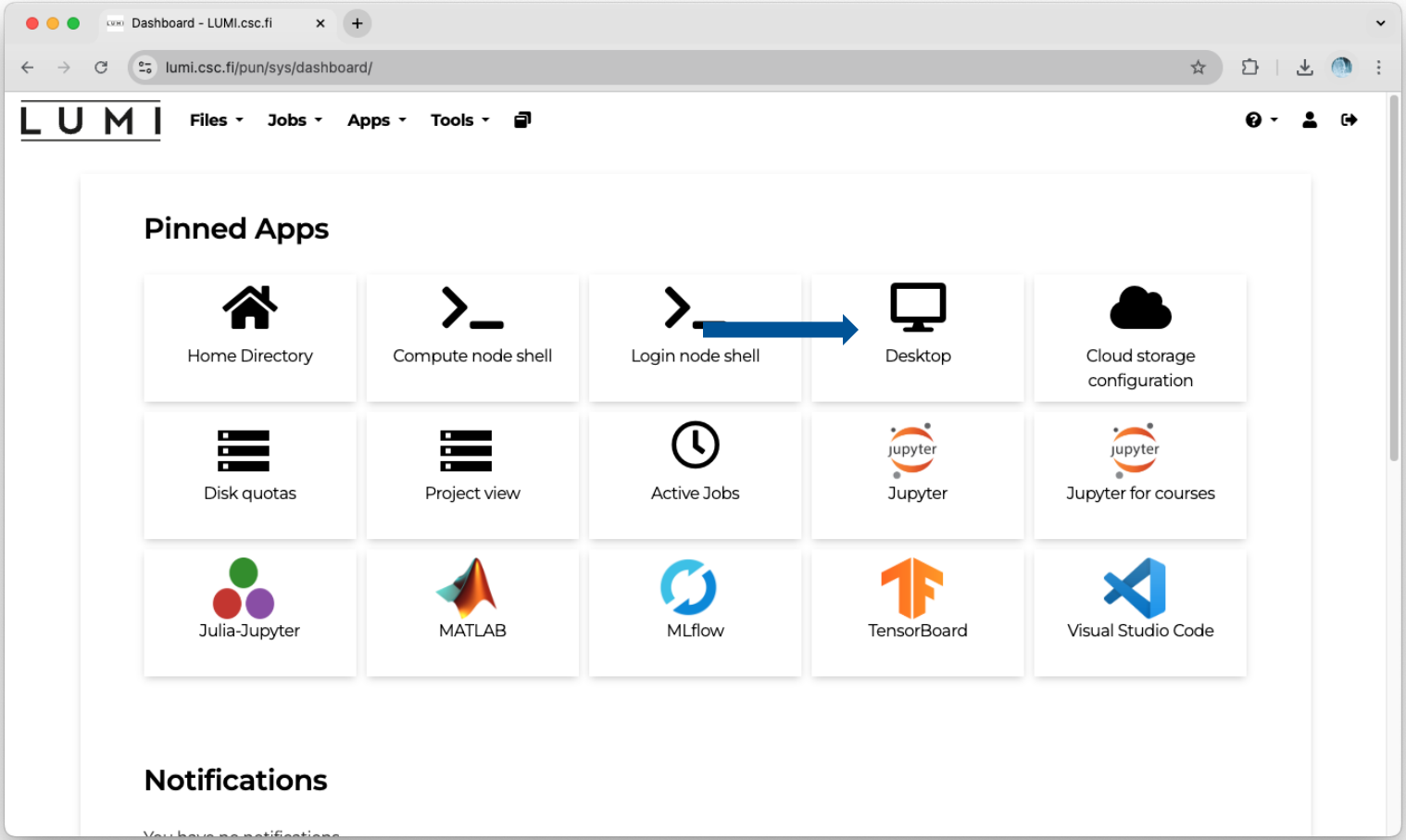


Open OnDemand (6) – Home Directory

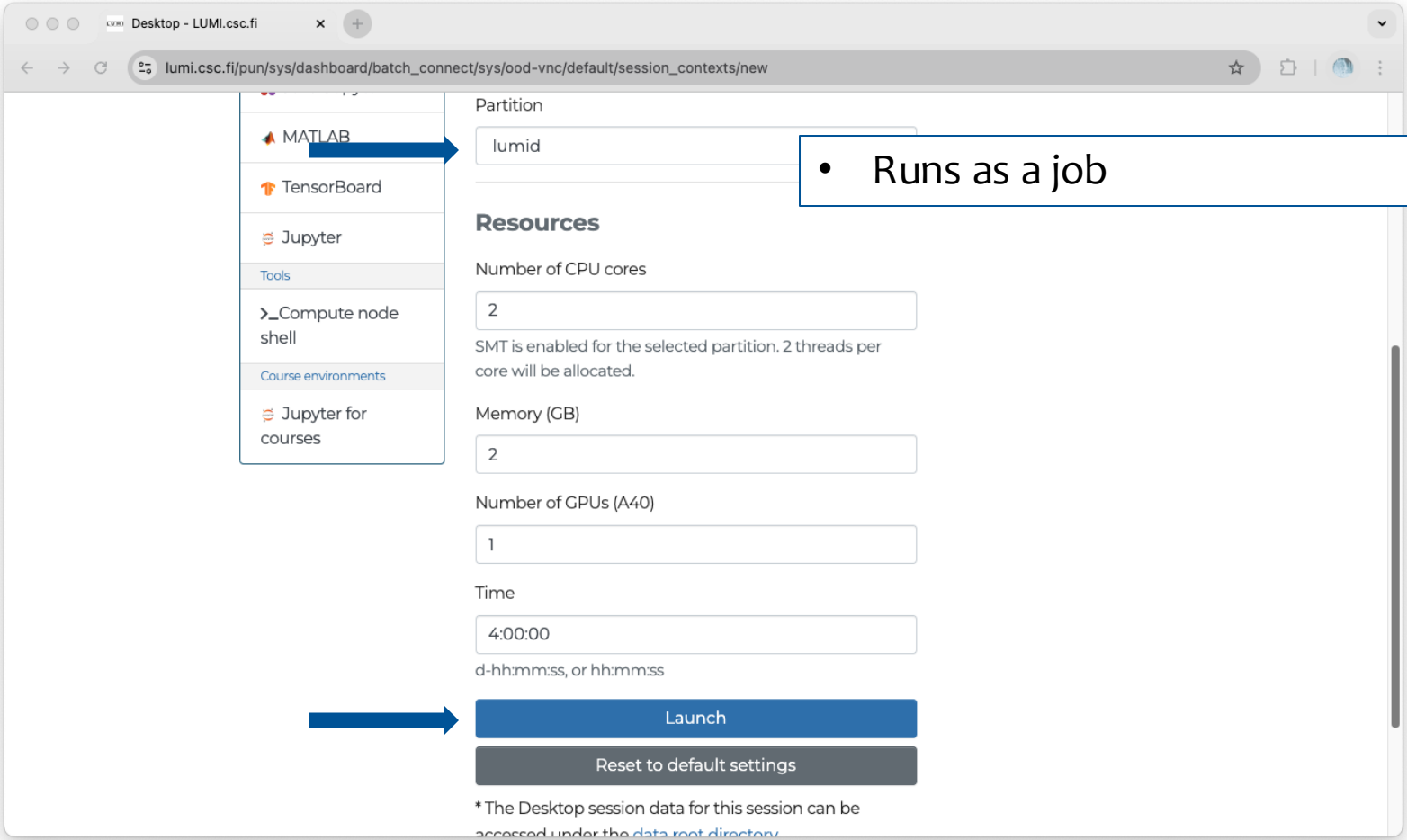


- This app does not run in the context of a job
- Can also be used for uploading and downloading data, but will fail for big transfers

Open OnDemand (7)

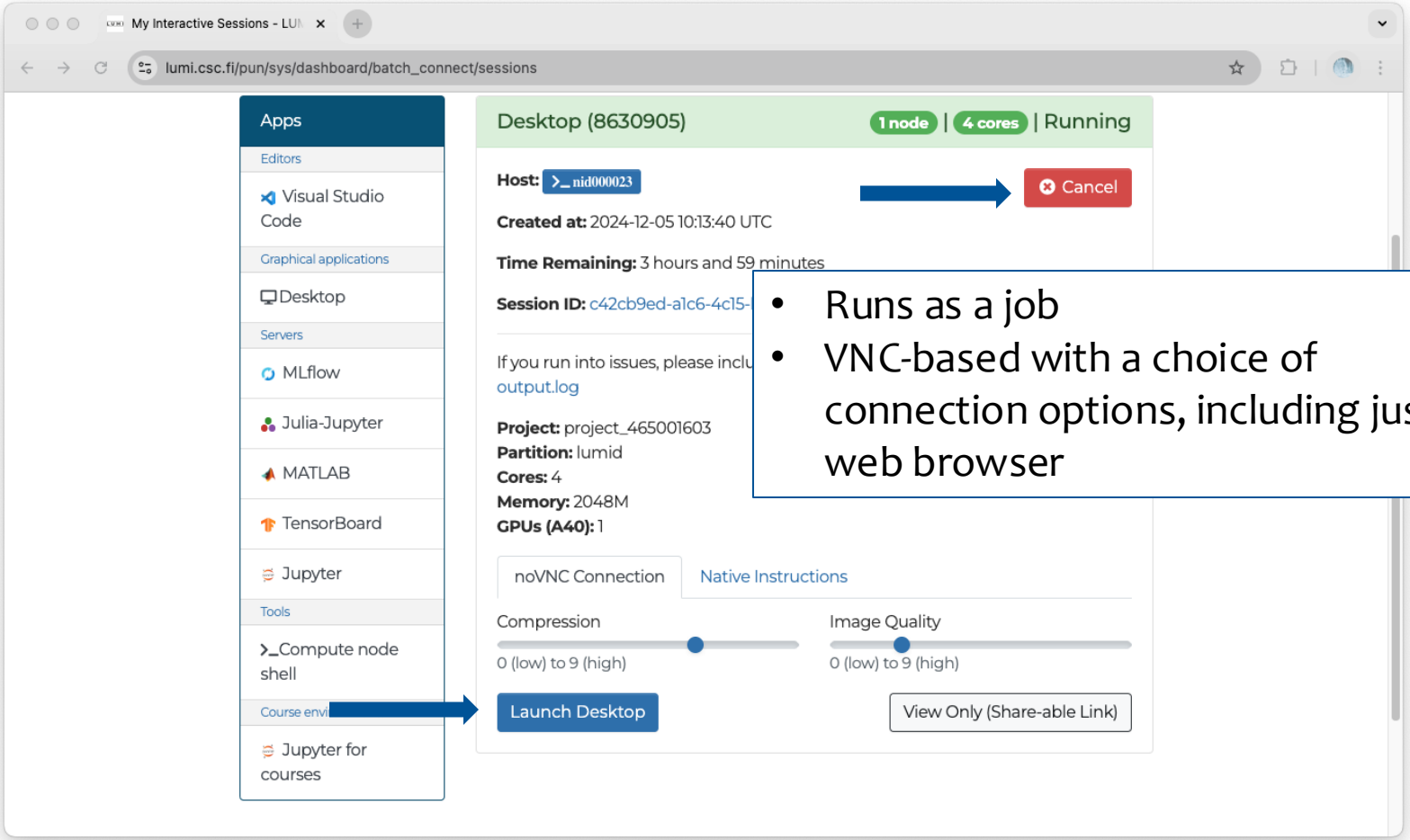


Open OnDemand (8) – Desktop app



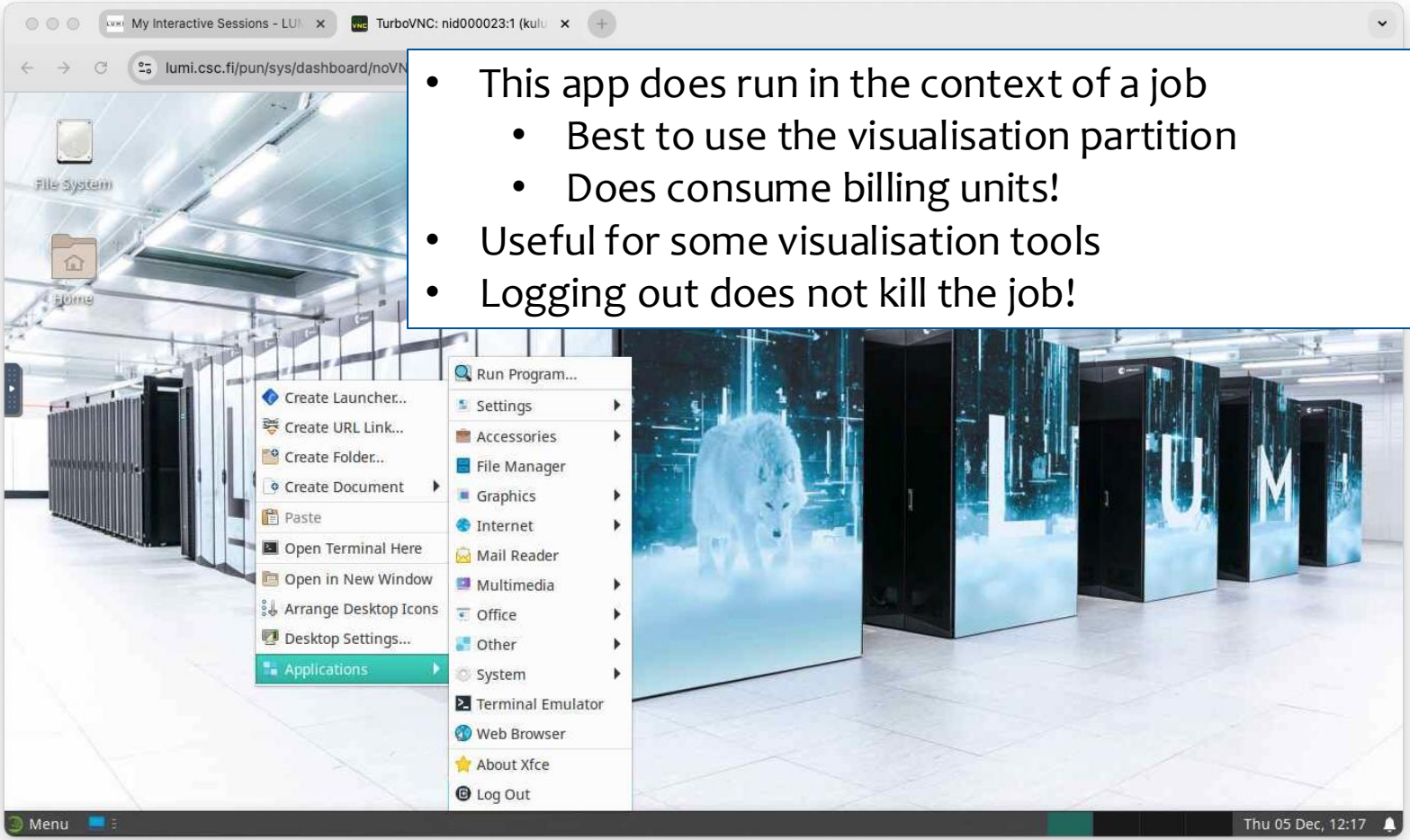
- Runs as a job

Open OnDemand (9) – Desktop app



- Runs as a job
- VNC-based with a choice of connection options, including just the web browser

Open OnDemand (10) – Desktop app



- This app does run in the context of a job
  - Best to use the visualisation partition
  - Does consume billing units!
- Useful for some visualisation tools
- Logging out does not kill the job!

Data transfer

LUMI

- sftp to the login nodes
  - Authentication with your ssh key
  - Can be slow on high latency connections
  - Slow connections are not the fault of LUMI but of the whole path to the machine
- Data transfer via the object storage system LUMI-O

  Day 2
  - Transfer to LUMI-O and then to other LUMI file systems
  - Or from the file systems of LUMI to LUMI-O and then to your home institute
  - Support for various tools including rclone and S3 commands
  - Multi-stream transfers are a way to deal with high latency
  - See the storage section of the LUMI documentation at docs.lumi-supercomputer.eu and the presentation on day 2 of this course
- Unfortunately no support yet for Globus or other forms of gridFTP


LUMI
Questions?