Getting access to LUMI

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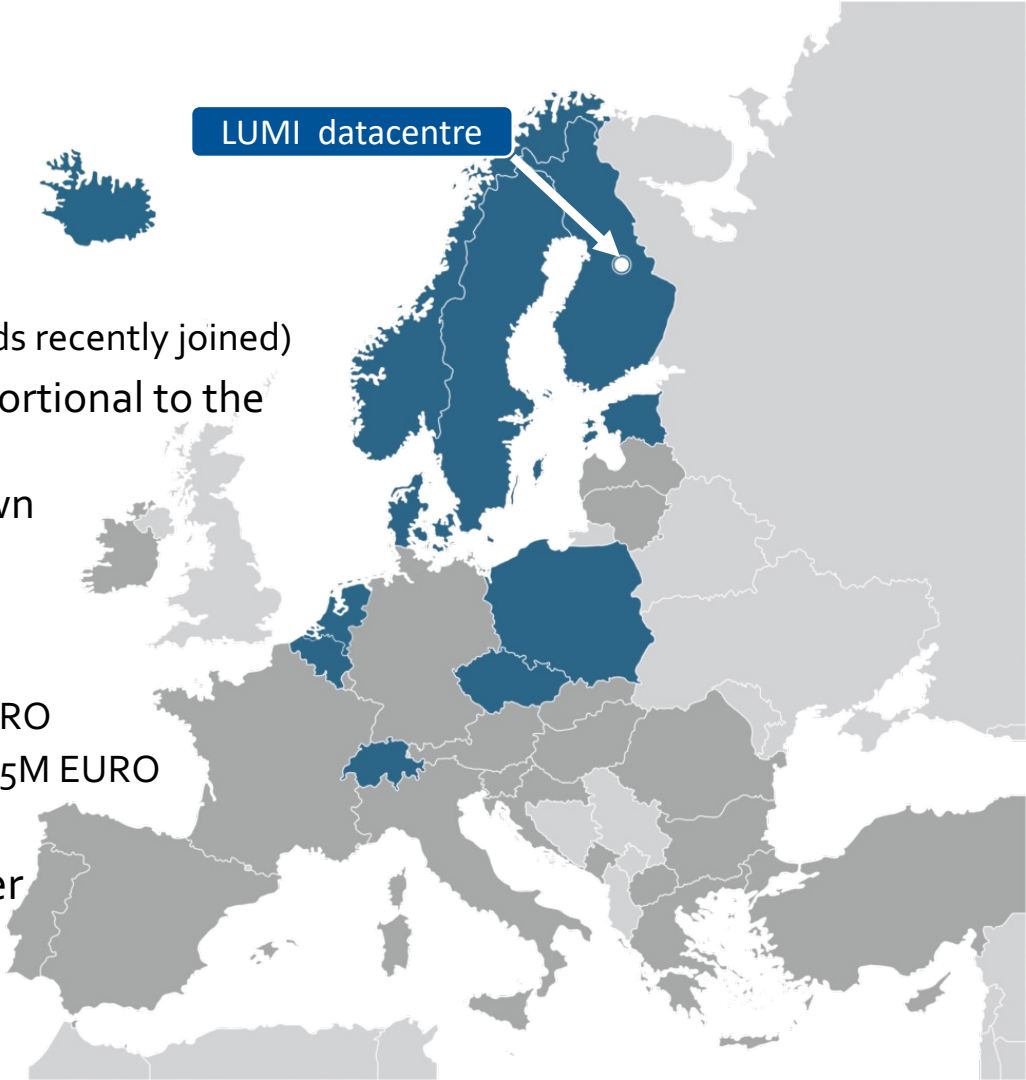
Evolving version

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
- Belgian contribution from 4 entities:
  - BELSPO – Federal government: 5M EURO
  - SPW Économie, Emploi, Recherche: 5M EURO
  - Dept. of Economy, Science & Innovation: 3.5M EURO
  - Innoviris: 2M EURO
- Belgium is third largest contributor after EuroHPC JU and Finland



Projects and users

- 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., VSC support 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)

- 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

- 2 entities manage projects for Belgium: VSC and CÉCI
  - Called the Resource Allocators in LUMI language
- All projects allocated by Belgium are managed through the Puhuri system
  - Web-based portal developed by the Nordic countries for project management
  - 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!
  - URL: puhuri-portal.neic.no
- Quick check of your resources on the system command line: `lumi-workspaces`

File spaces – User-specific

- 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

- All billed against the storage budget
- Permanent storage in /project/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
  - Billed at 1 TB·hour per TB per hour used
- Flash-based scratch storage in /flash/project_46YXXXXXX
  - May be erased after 30 days
  - Billed at 10 TB·hour per TB per hour used
- Permanent object storage (LUMI-O)
  - Billed at 0.5 TB·hour per TB per hour used

File spaces - Quota

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
Project fast scratch	/flash/<project>	2-100 TB	1M	30 days

- 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

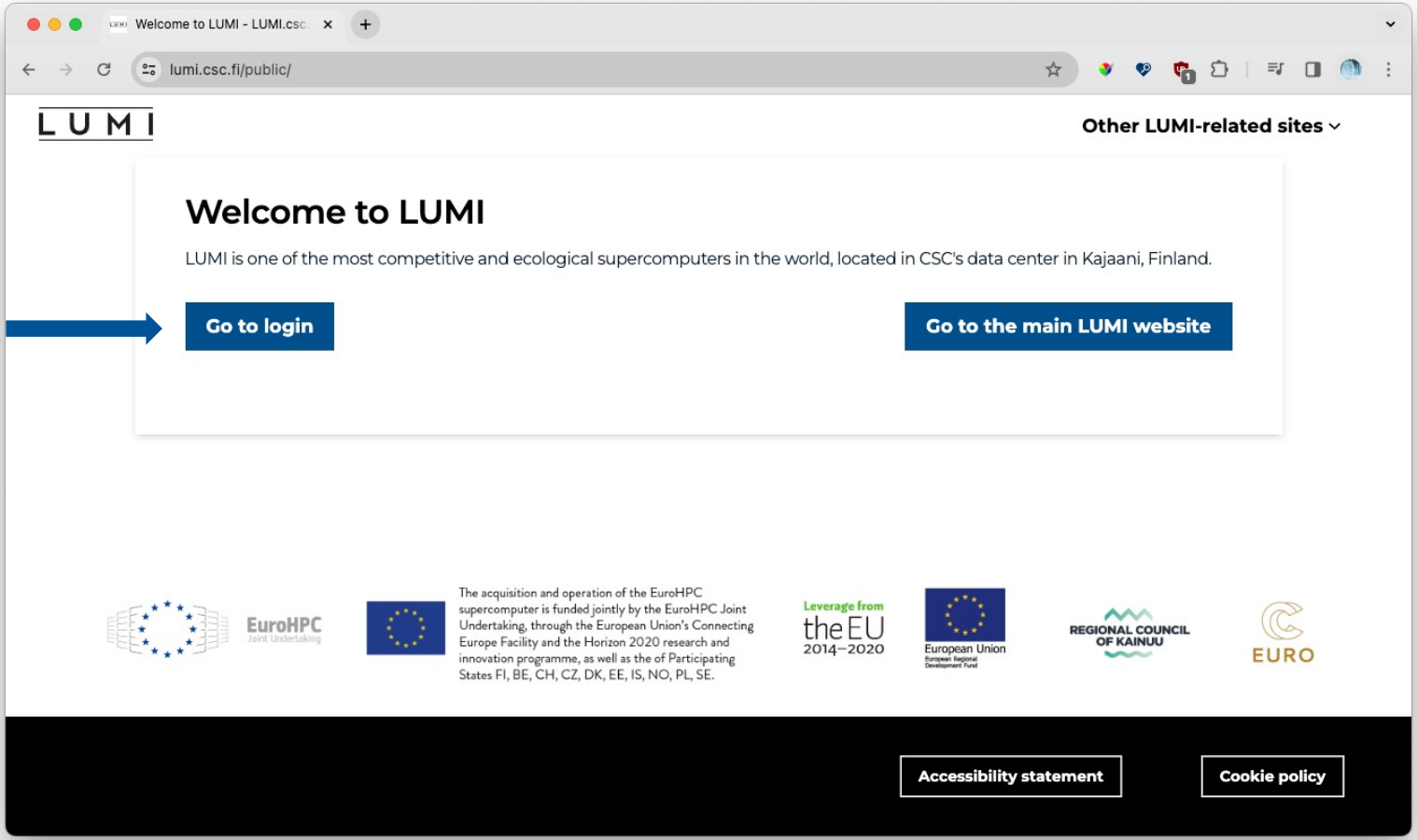
File spaces – Further information

- 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

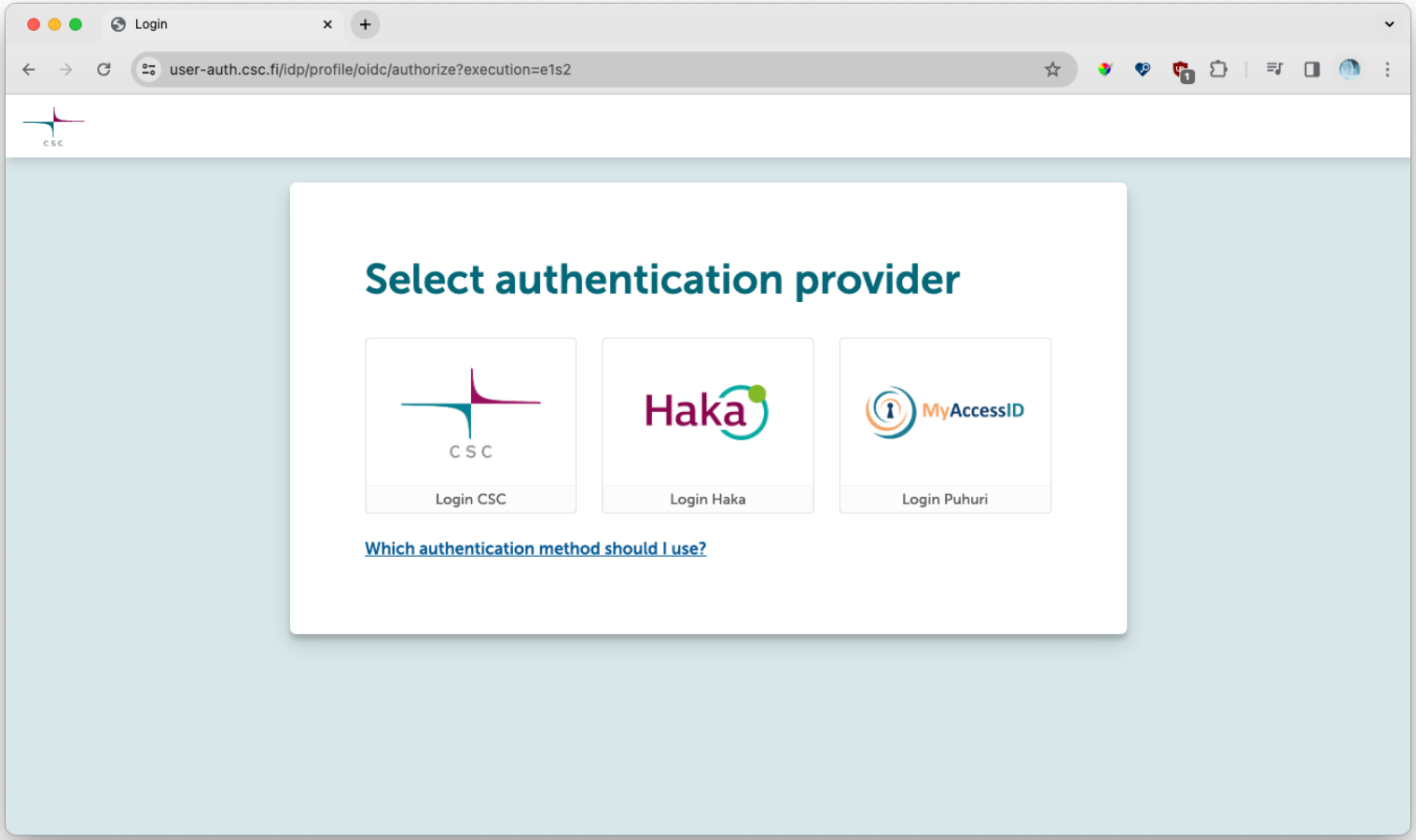
Access

- 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
  - Tools still being added
- Little support for GUI applications on LUMI through other technologies
  - X11 over ssh is unbearibly slow from Belgium
  - Primitive VNC support provided via browser of VNC client

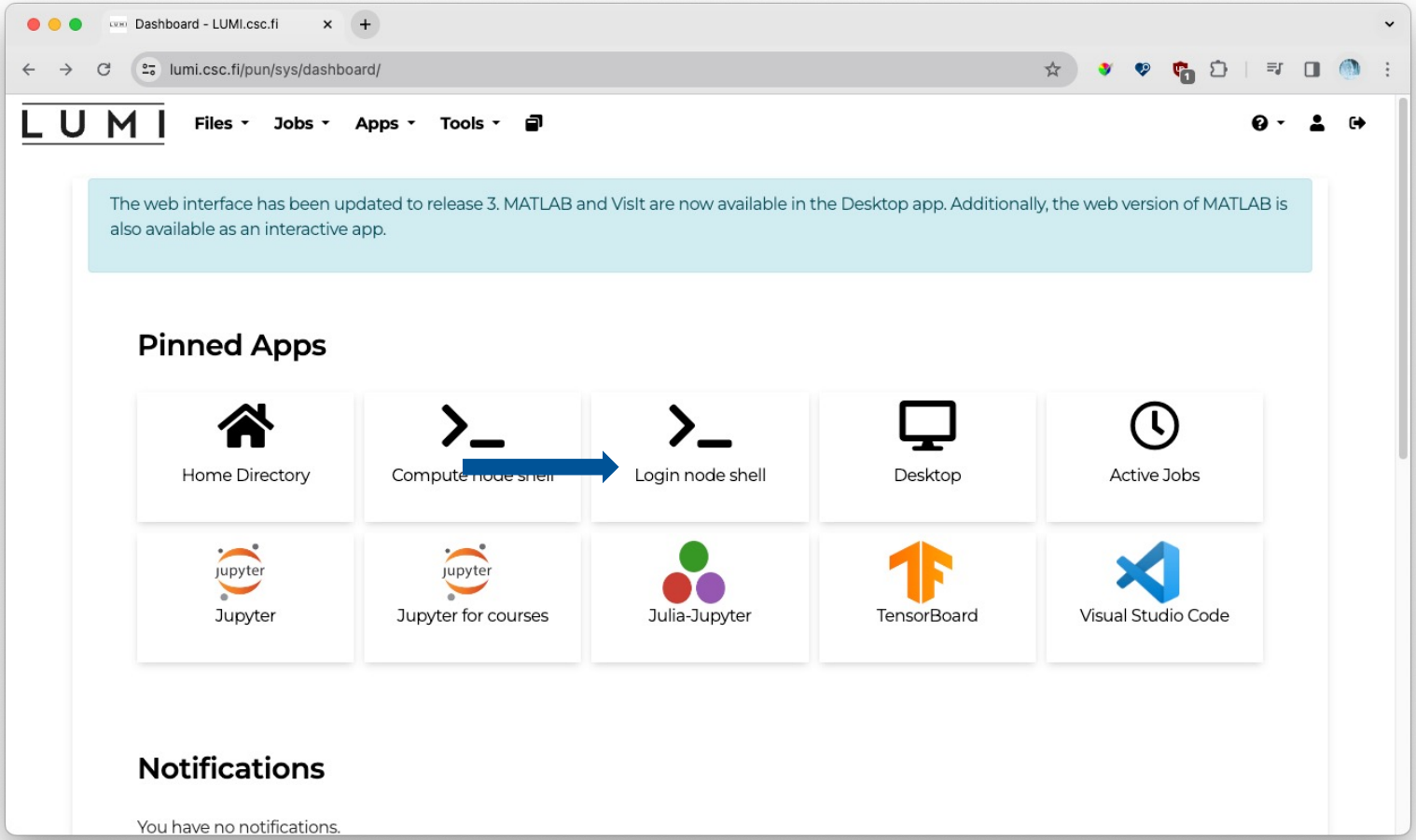
Open OnDemand (1)



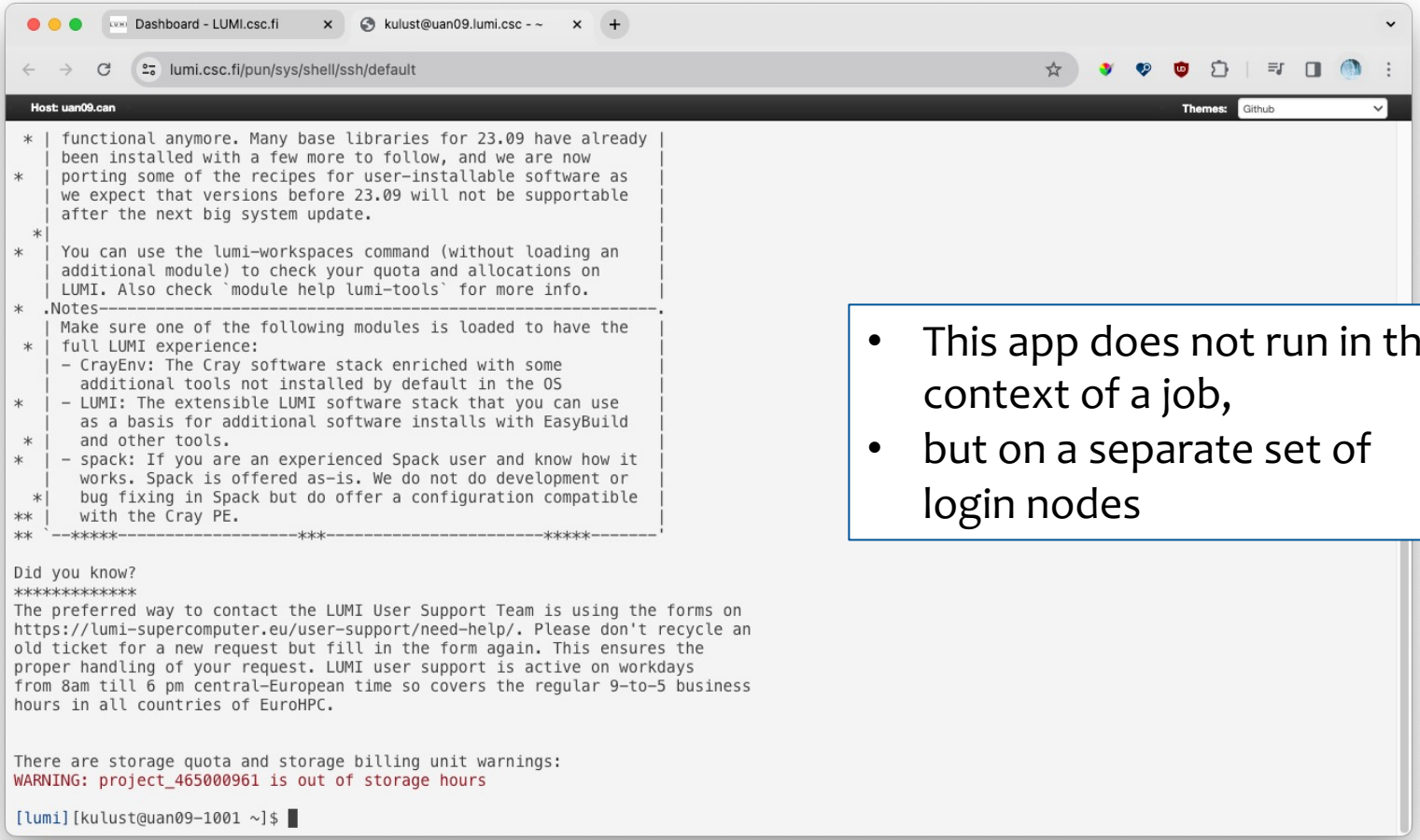
Open OnDemand (2)



Open OnDemand (3)

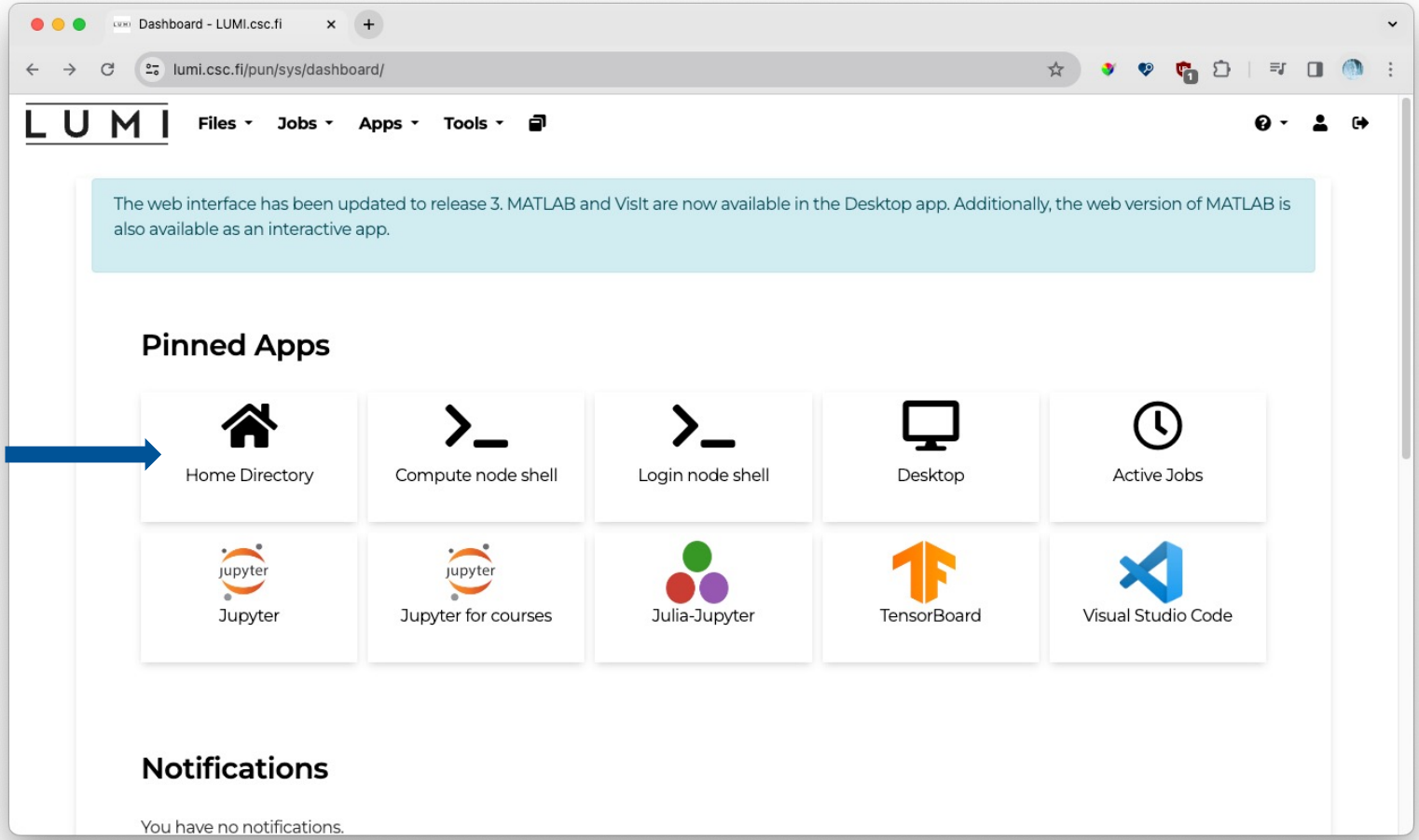


Open OnDemand (4) – Login node shell

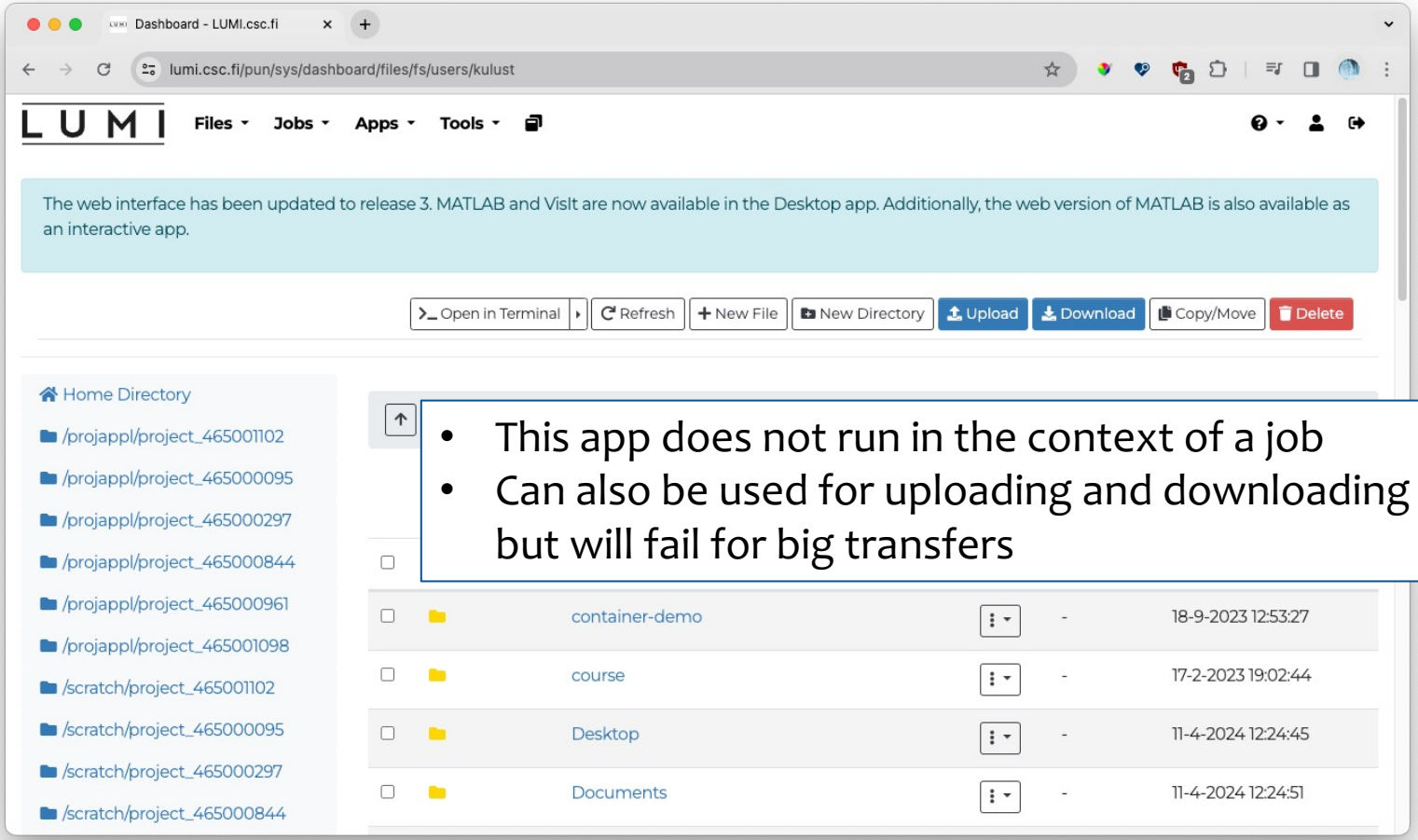


- This app does not run in the context of a job,
- but on a separate set of login nodes

Open OnDemand (5)

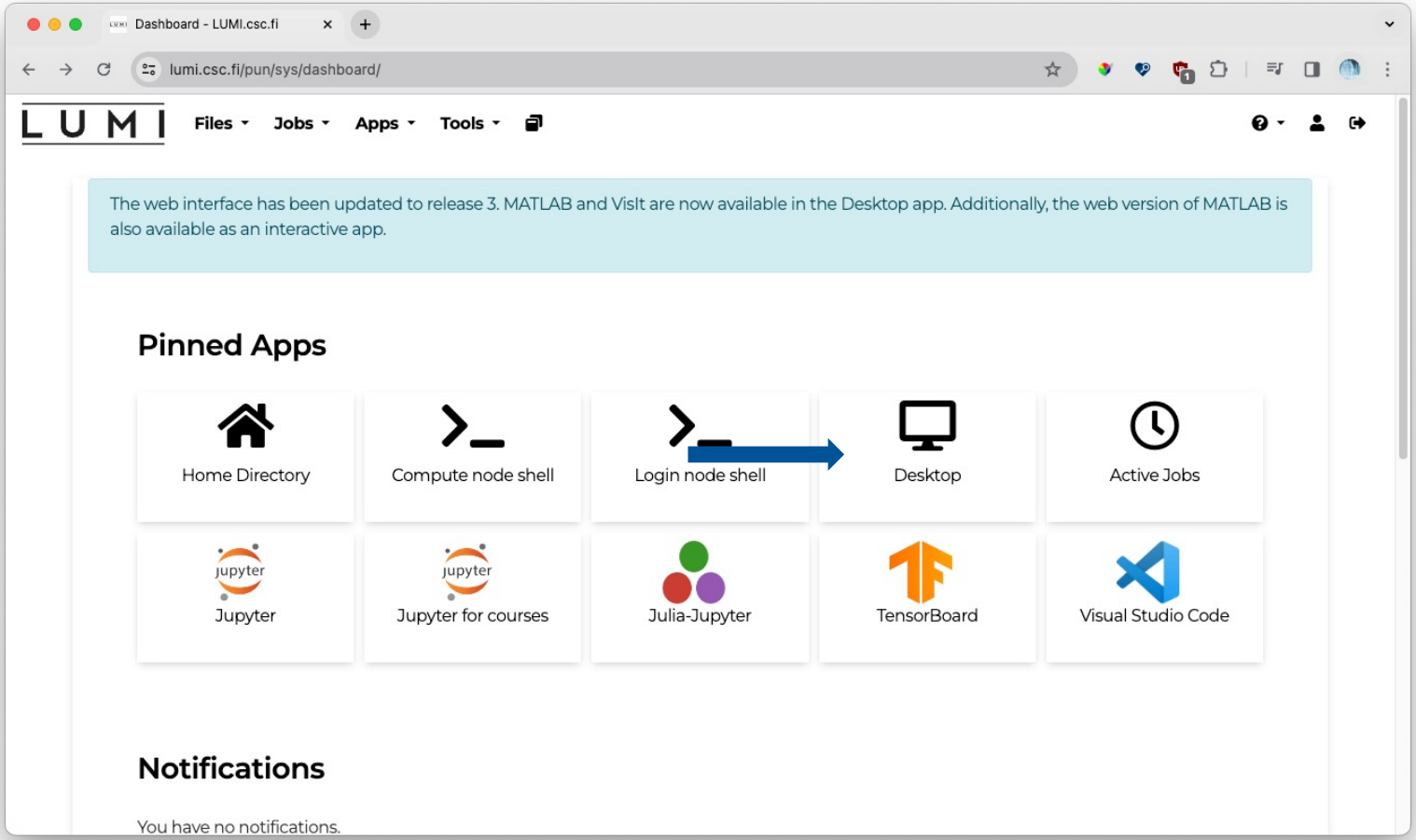


Open OnDemand (6) – Home Directory

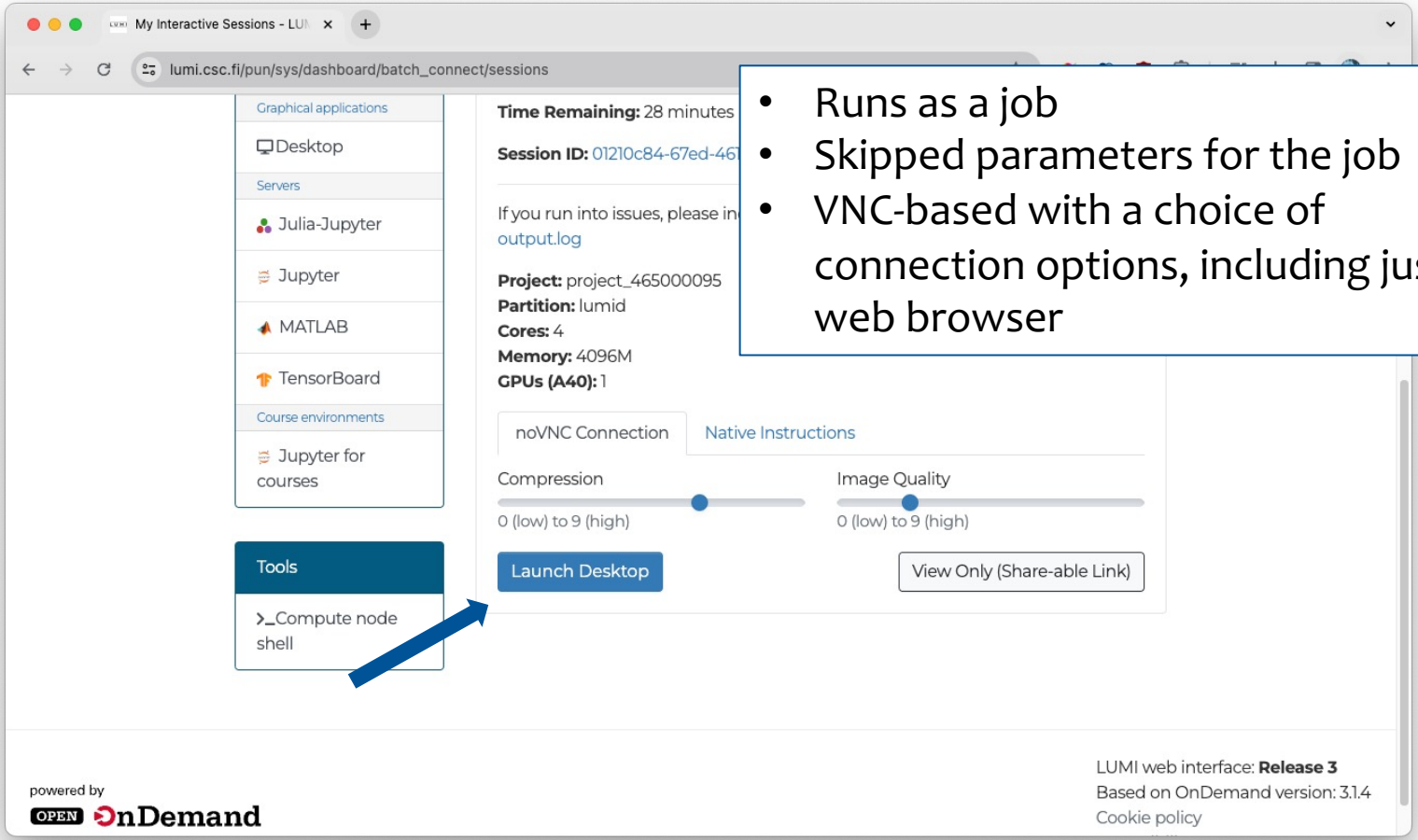


- This app does not run in the context of a job
- Can also be used for uploading and downloading data, but will fail for big transfers

Open OnDemand (7)

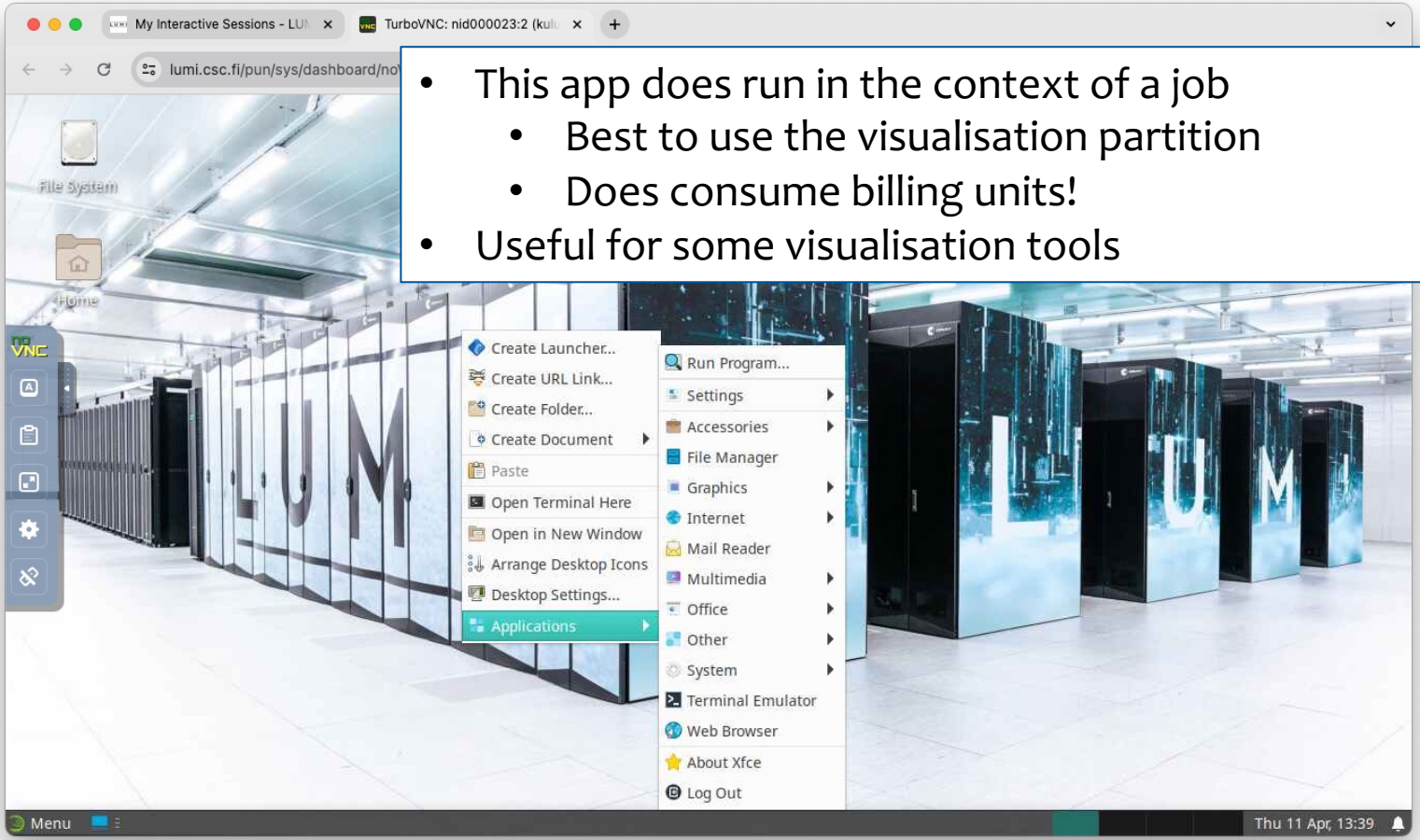


Open OnDemand (8) – Desktop app



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

Open OnDemand (9) – 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

Data transfer

- 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
  - 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 next slides
- Unfortunately no support yet for Globus or other forms of gridFTP

What is LUMI-O?

- Object storage system
  - Finnish users: similar to Allas, but less functionality at the moment
  - Specific tools to access data, not mounted as a regular file system
- Organisation:
  - Buckets: “Containers” used to store objects.
    - Flat structure: Buckets cannot contain other buckets
  - Objects: Any type of data, stored in a bucket
  - Metadata
    - Bucket: e.g., access rights
    - Custom metadata possible

What is LUMI-O? (2)

- Objects can be served on the web also
  - This is how recordings of some LUST courses are served
  - But not meant as a data publishing service (e.g., no EUDAT alternative)
- Can be reached easily from outside LUMI
  - So also a mechanism for data exchange
  - Tools of object storage are more performance and more robust than sftp
- Specs:
  - Capacity: 30 PB
  - Quota: 150 TB capacity, 1K buckets and 500K objects per bucket (fixed)
  - Billed at 0.5 TB·hour per TB per hour
  - Persistent for the duration of the project

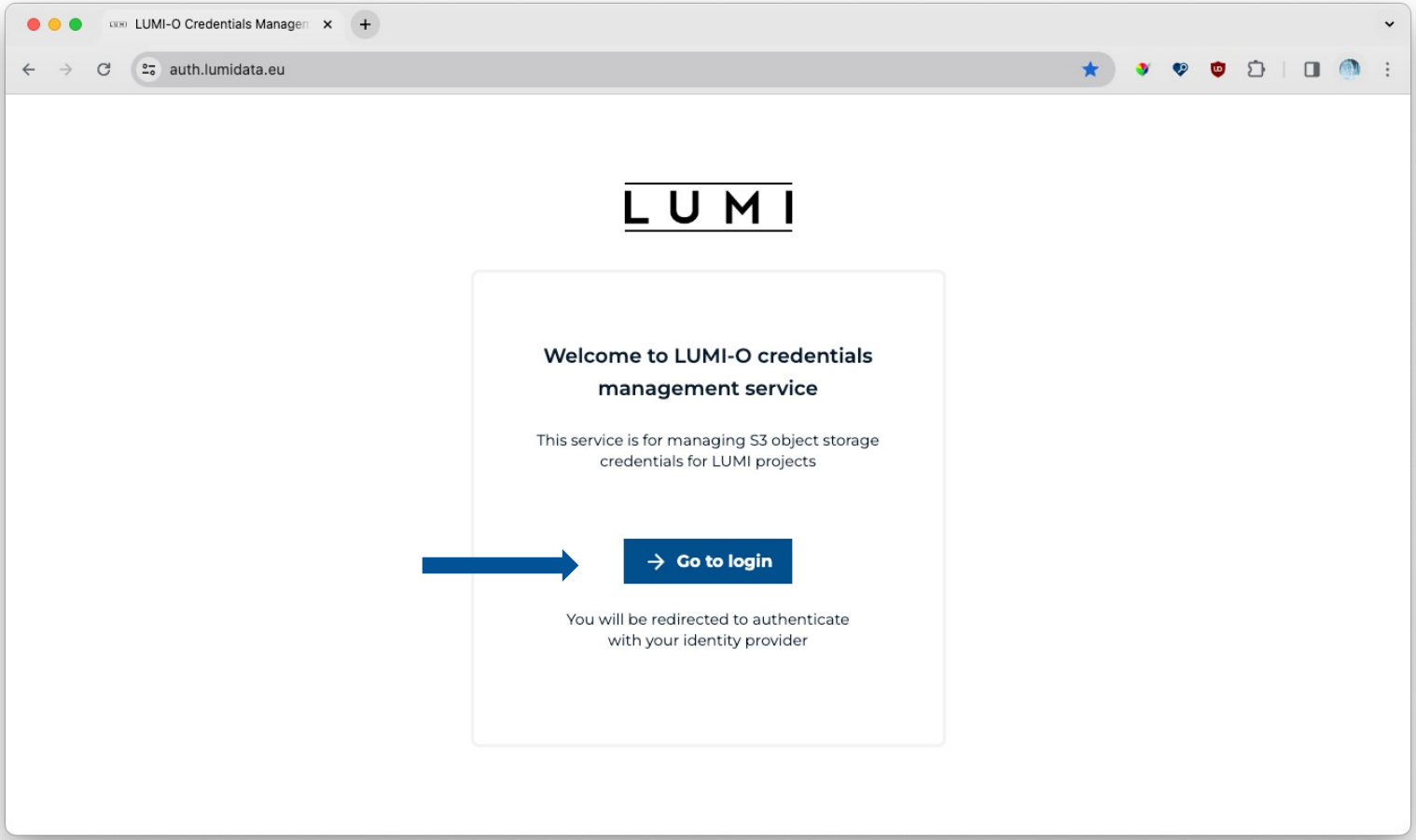
Accessing LUMI-O

- Access is based on keys
  - Generated via a web interface
  - But there may be alternatives in the future
- Tools on LUMI
  - `rclone`: Easiest tool if you want public and private data
  - `s3cmd`
  - `restic`
- Tools on remote systems (e.g., your laptop)
  - Many tools possible, though some may be a bit tricky to configure
  - Web-based tool that generates configuration scripts
- Access via the Open OnDemand web interface is work-in-progress

Accessing LUMI-O
Key generation

- Web interface at https://auth.lumidata.eu
- You'll have to select your login method in the same way as for Open OnDemand
- After a while you should see a list of projects, select the one for which you want to generate a key
  - The right column will show active keys for the project, and expired ones
- Selecting an active access key changes the right column to one where you get information about the key, can extend the key and can generate templates to configure various tools

Credential mangement web interface (1)



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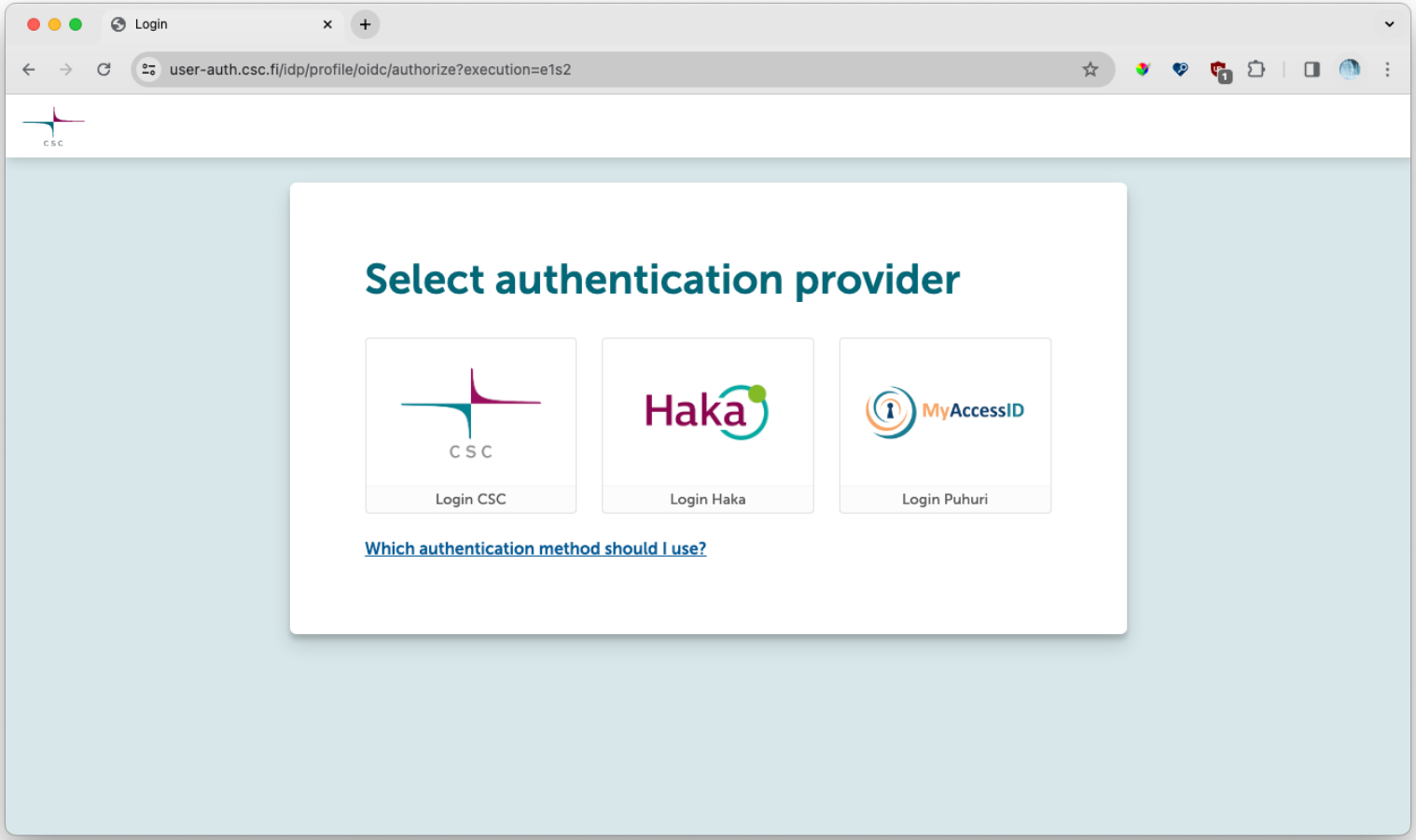
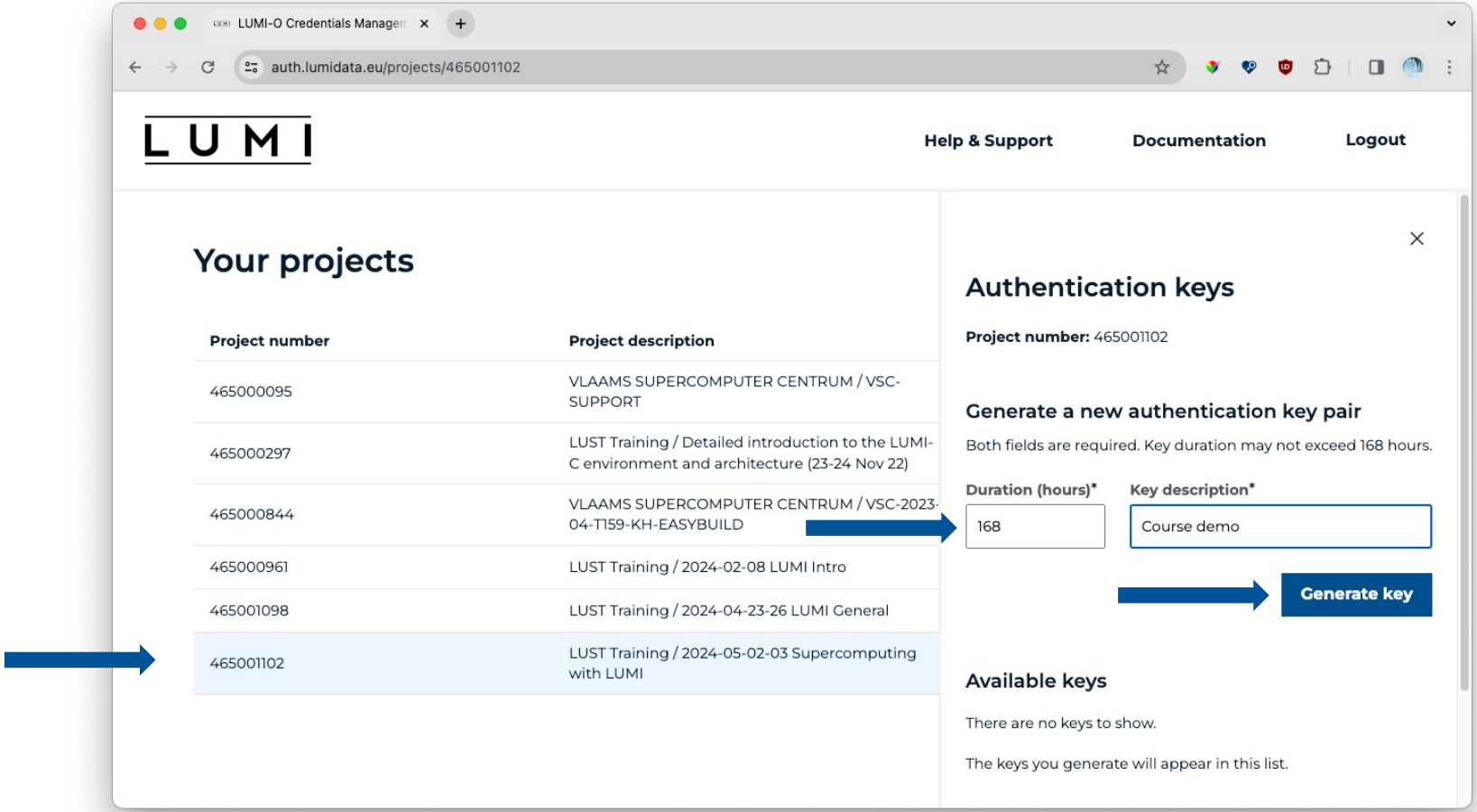


Credential mangement web interface (3)



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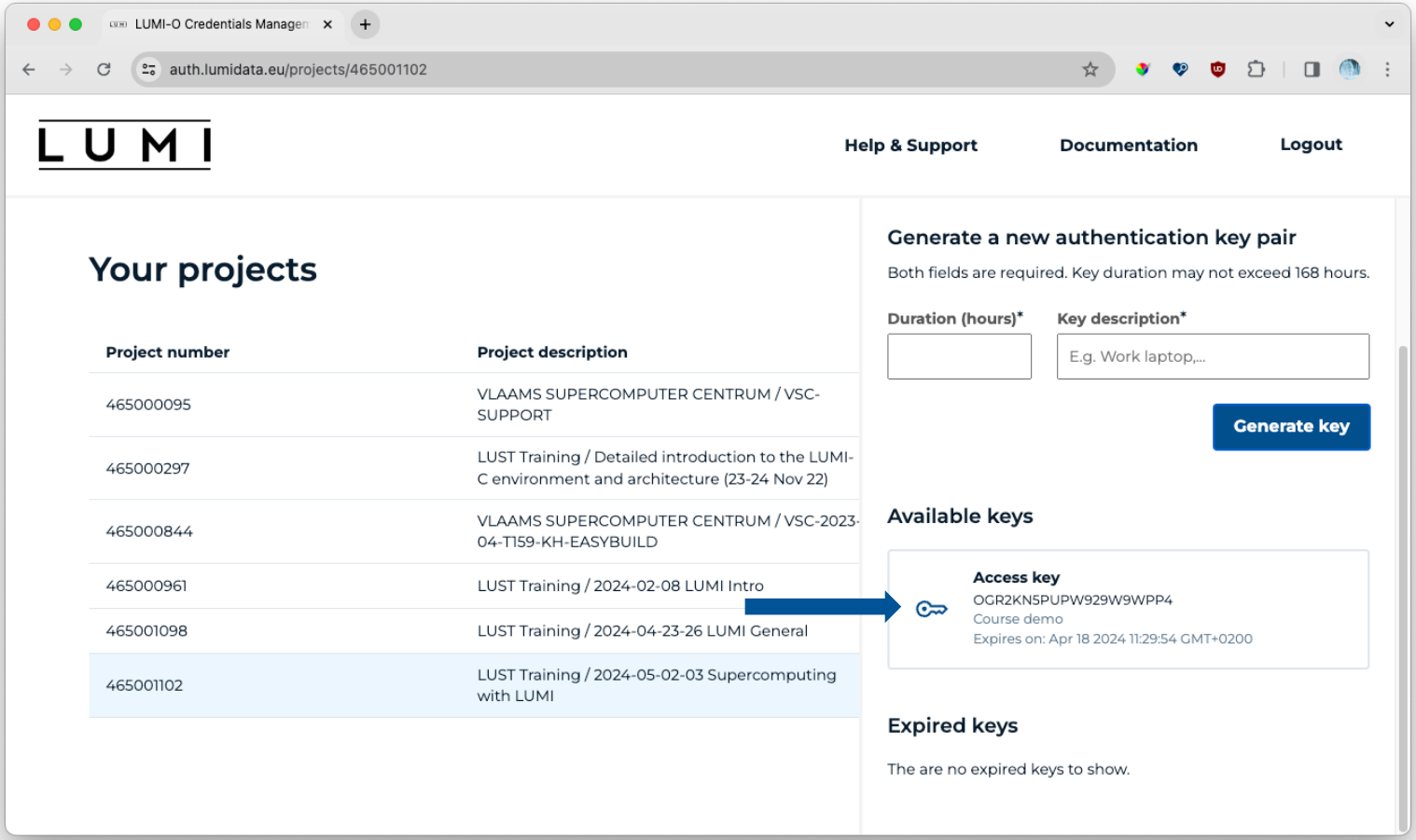

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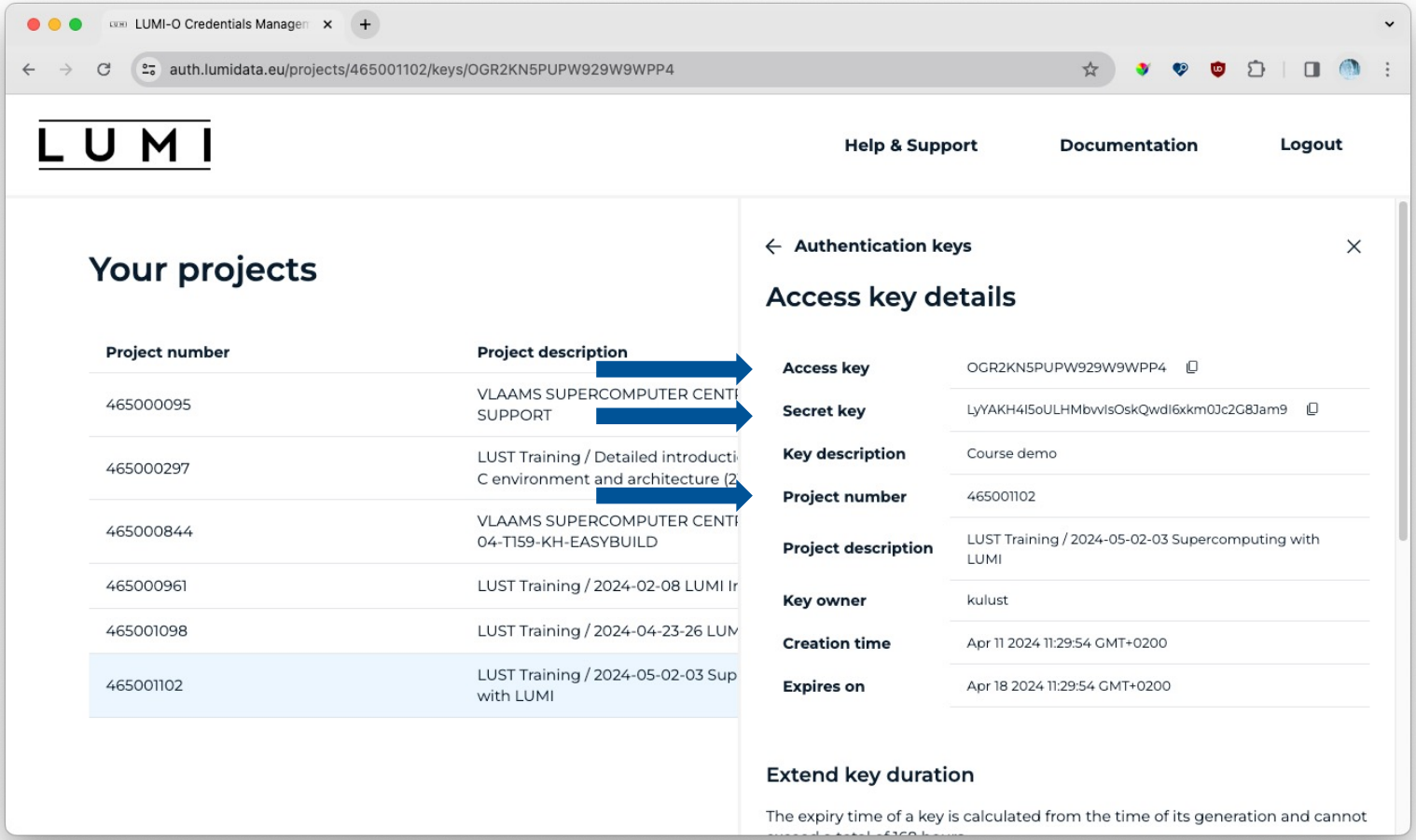

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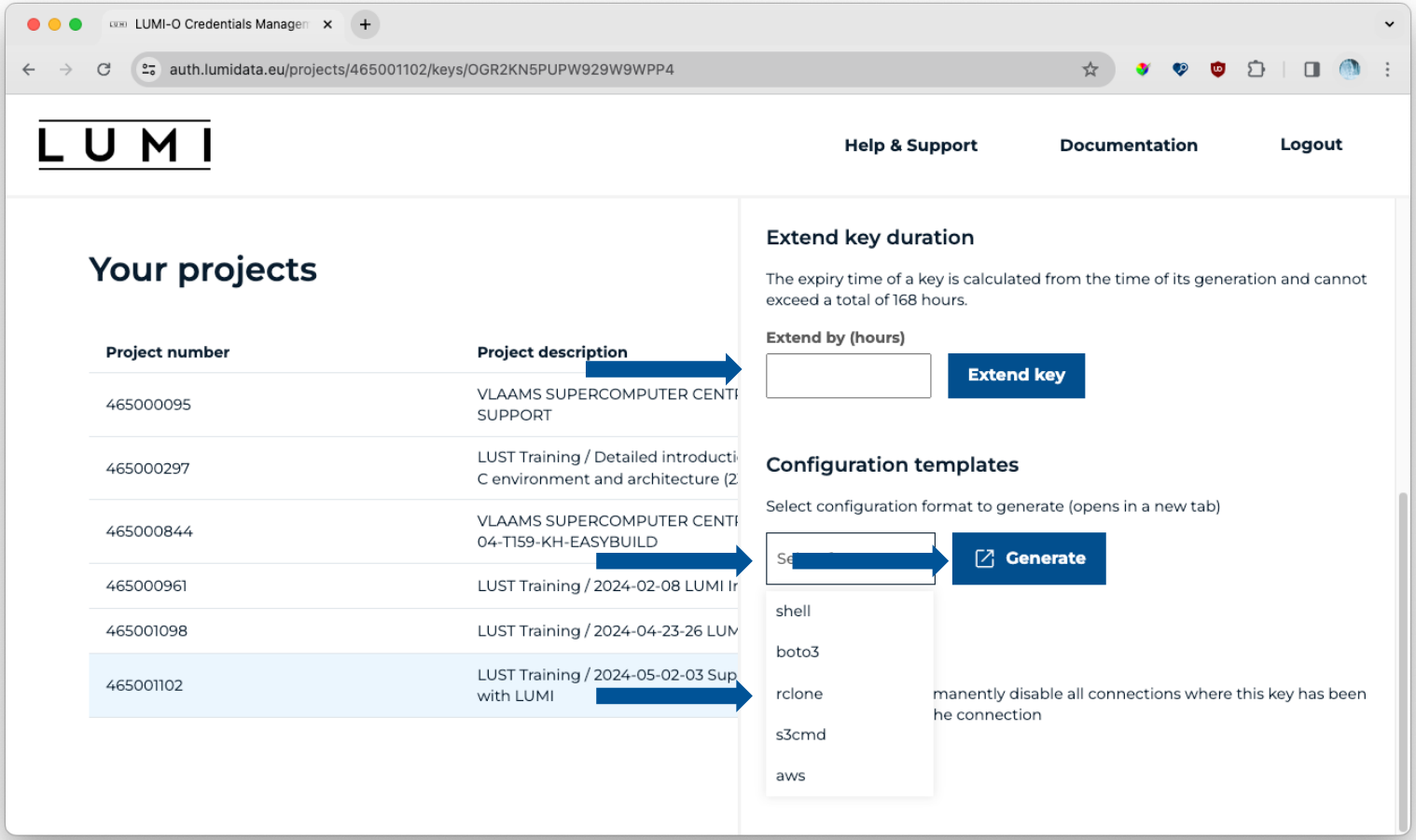

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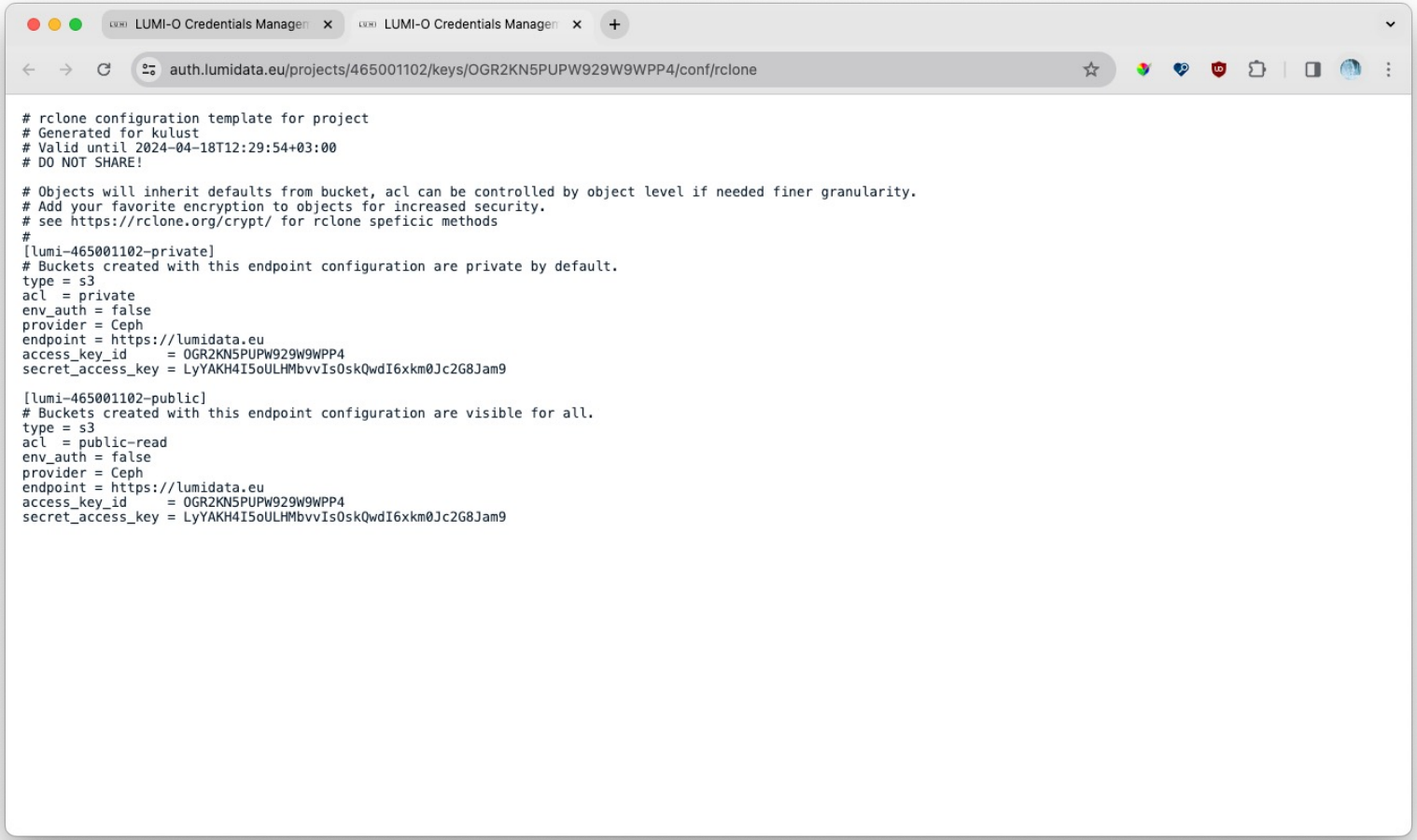

Configuring LUMI-O tools

- On LUMI, you can use `lumio-conf` to configure `rclone` and `s3cmd`
  - Need to load the `lumio` module which also provides `rclone`, `s3cmd` and `restic`
  - Will ask for data from the "Access key details" screen
  - A future version may be more automatic
  - The `rclone` configuration differs from the one generated via the web interface
- Generate the configuration snippets via the web interface
  - E.g., for rclone: copy manually to `~/.config/rclone/rclone.conf`
  - Can be used to configure tools on your computer also

Rclone on LUMI-O

- The configuration contains two end points
  - With lumio-conf :
    - `lumi-o`: Buckets and objects uploaded to this endpoint will not be publicly accessible
    - `lumi-pub`: Buckets and objects uploaded to this endpoint will be publicly accessible
    - Can have both publicly accessible and not publicly accessible objects in one bucket
  - Web generator:
    - `lumi-465001102-private`: Private buckets and objects
    - `lumi-465001102-public`: Public buckets and objects
- When using the `rclone` command line tool, it is possible to throttle the speed for many commands with the `--bwlimit` command line option
  - May be needed if you upload from home over a very bandwidth-limited connection

Questions?