Institut Laue-Langevin

Technical Talk

8th of October 2020

The ExPaNDS project has received funding from the *European Union's Horizon 2020 research and innovation programme* under grant agreement No 857641.
The PaNOSC project has received funding from the *European Union's Horizon 2020 research and innovation programme* under grant agreement No 823852.

Institut Laue-Langevin

- Located in Grenoble, France
- High-flux reactor neutron source
- 40 instruments + 10 test instruments
- First experiments in 1972
- 500 employees
- Usually 3 reactor cycles (50 days each) per year
- Approx 1200 experiments per year
- Approx 2500 scientific visitors per year

NEUTRONS FOR SOCIETY

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Team

Team member	Work Packages	Role
Jamie Hall	WP3, WP4, WP6 (Full time)	Software Developer
Stuart Caunt	WP3, WP4 (Full time)	Software Developer
Philippe le Brouster	WP4, WP6	System Admin
Baptiste Pichot	WP6	System Admin
William Turner	WP4, WP6 (Full time)	System Admin
Gregory Fanjas	WP6 (Full time)	System Admin

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The Portal Architecture test experience

- **What went well?**
  - Developed and tested using a test k8s cluster
  - Installation process developed to work with multi-node infra
- **What could go better?**
  - Simplified deployment process that is not dependent on k8s
- **What is the gap between what's in your facility and what the Portal needs?**
  - The current version is far from the final product (only IT1)
  - There are many use cases still to be accounted for
  - Remote experiments at the ILL have changed the scope of the portal

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Facility needs for the Portal

- **Name the features you would prioritise/what does the portal needs in order to run in your facility?**
  - OpenStack provider (VMs)
  - More fine-grained user roles (Instrument Responsibles, Instrument Control, IT Support, etc)
  - Transparent Remote Desktop authentication
  - Instance lifecycle management
  - Support for remote experiments (security groups, scientific support)
  - Admin access (management of instances and sessions)
  - Stakeholder usage statistics (KPIs)
  - Data search and data transfer

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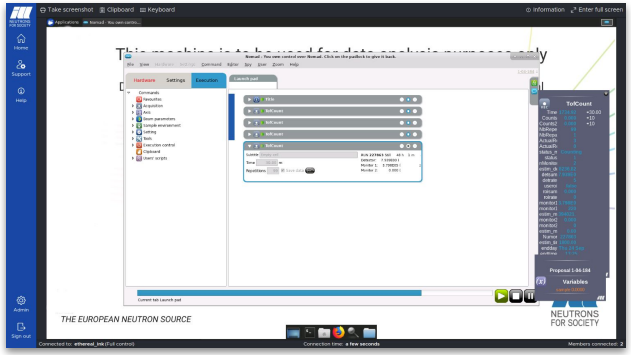
COVID-19 and the impact on your team

- **Remote experiments**
  - development focused on ensuring a successful cycle in August
  - Extension of existing ILL portal (VISA) to enable this
- **Developing new features**
  - Load balancing web-sockets
  - Increase compute infrastructure capacity
  - Emphasis on security (limiting access to instrument control workstations)
  - Enhanced collaboration features and scientific support for users
  - Administration interfaces
- **Development of VM Image**
  - Scientific data analysis software and instrument control software
  - Built automatically and versioned



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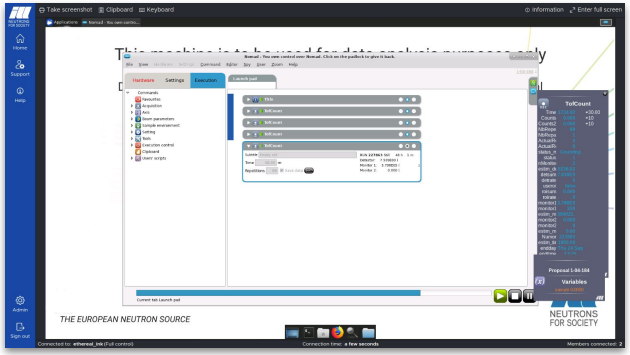
VISA: Virtual Infrastructure for Scientific Analysis

- **ILL's solution to a data analysis as a service portal**
  - Development started three years ago (before PaNOSC started)
  - In production since January this year
- **Technology**
  - OpenStack infrastructure
  - Capable of running 400 VMs (current infrastructure)
  - Developed in Java 14 and Angular 10 (65k SLOC)
- **Successfully completed a reactor cycle**
  - Remote experiments (250)
  - ~1000 VMs created
  - 400 active users during the 50 day cycle
  - Users from 20 countries
  - 10,000+ sessions
- **Users are still active after the cycle**



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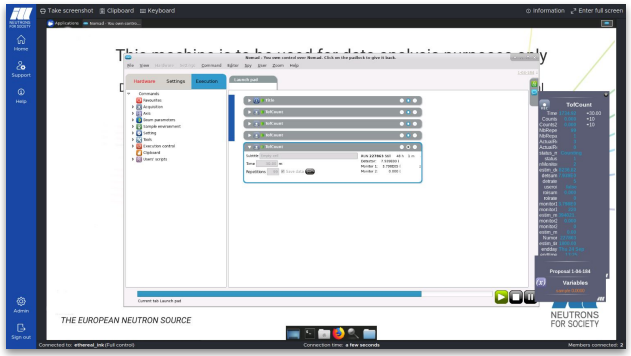
VISA: Features

- Creation and deletion of linux machines (Ubuntu 18.04)
  - User can choose from predefined *flavours* (CPU & RAM)
  - Scientific and instrument control software is already pre-installed
  - Access to experimental data (NFS)
- Remote Desktop via a browser
  - Apache Guacamole proxying of RDP via socket.io
- JupyterLab integration (testing)
- Load balanced (containerised deployment using a CI/CD pipeline)
- Sharing machines with other users
  - Enable scientific collaborations
  - Allow for scientific support
- Transparent authentication to remote desktop
  - Developed a custom PAM module using signatures
- OpenID Connect authentication (keycloak)
- Quota management
- Machine lifetime management
  - Automatic deletion after 14 days or 4 days of inactivity
- Role and proposal based security groups (data access and firewall rules)



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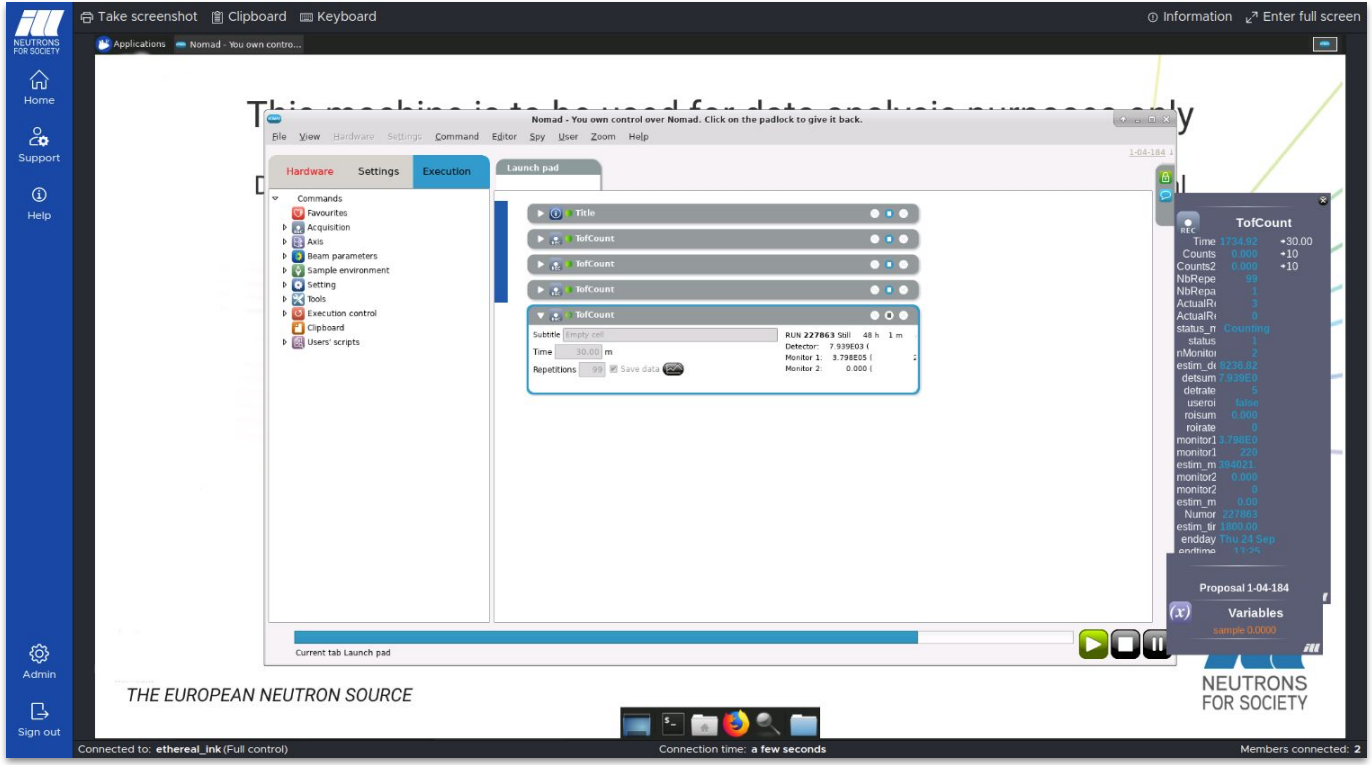
VISA: Demo



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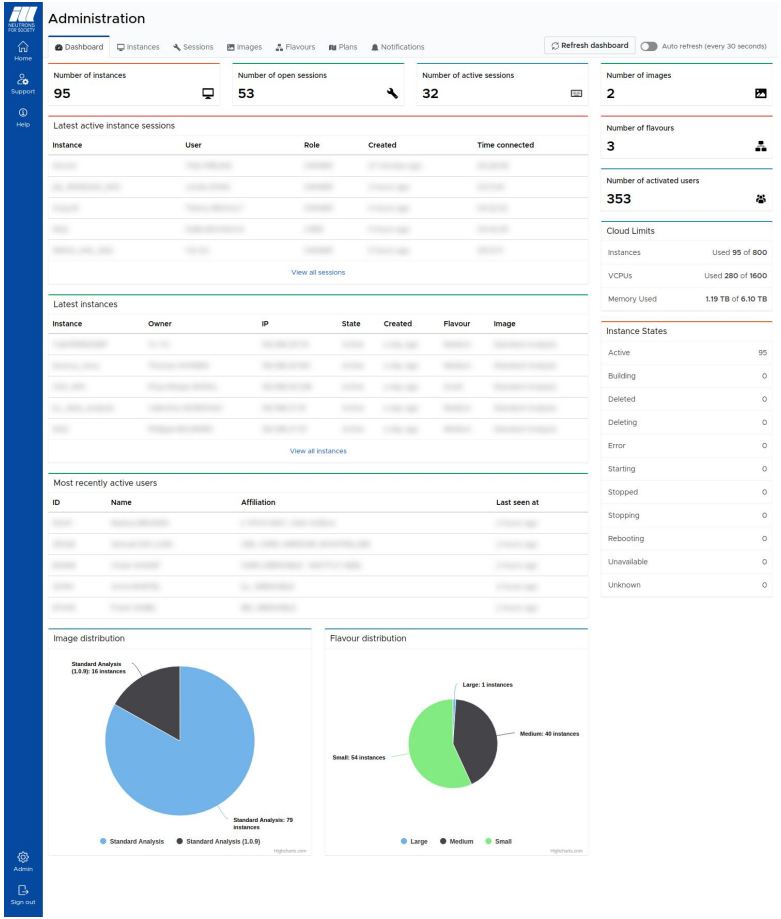

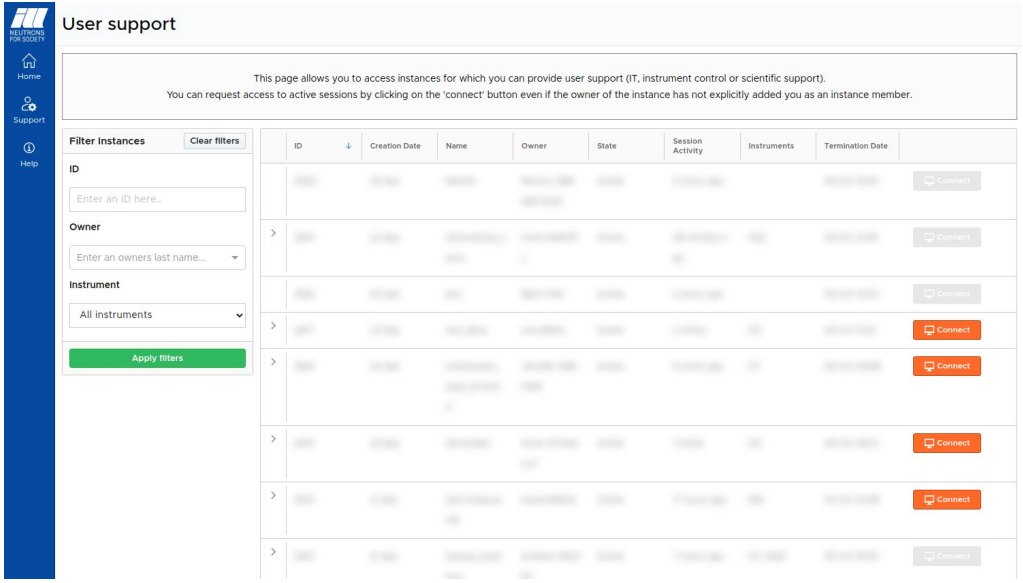

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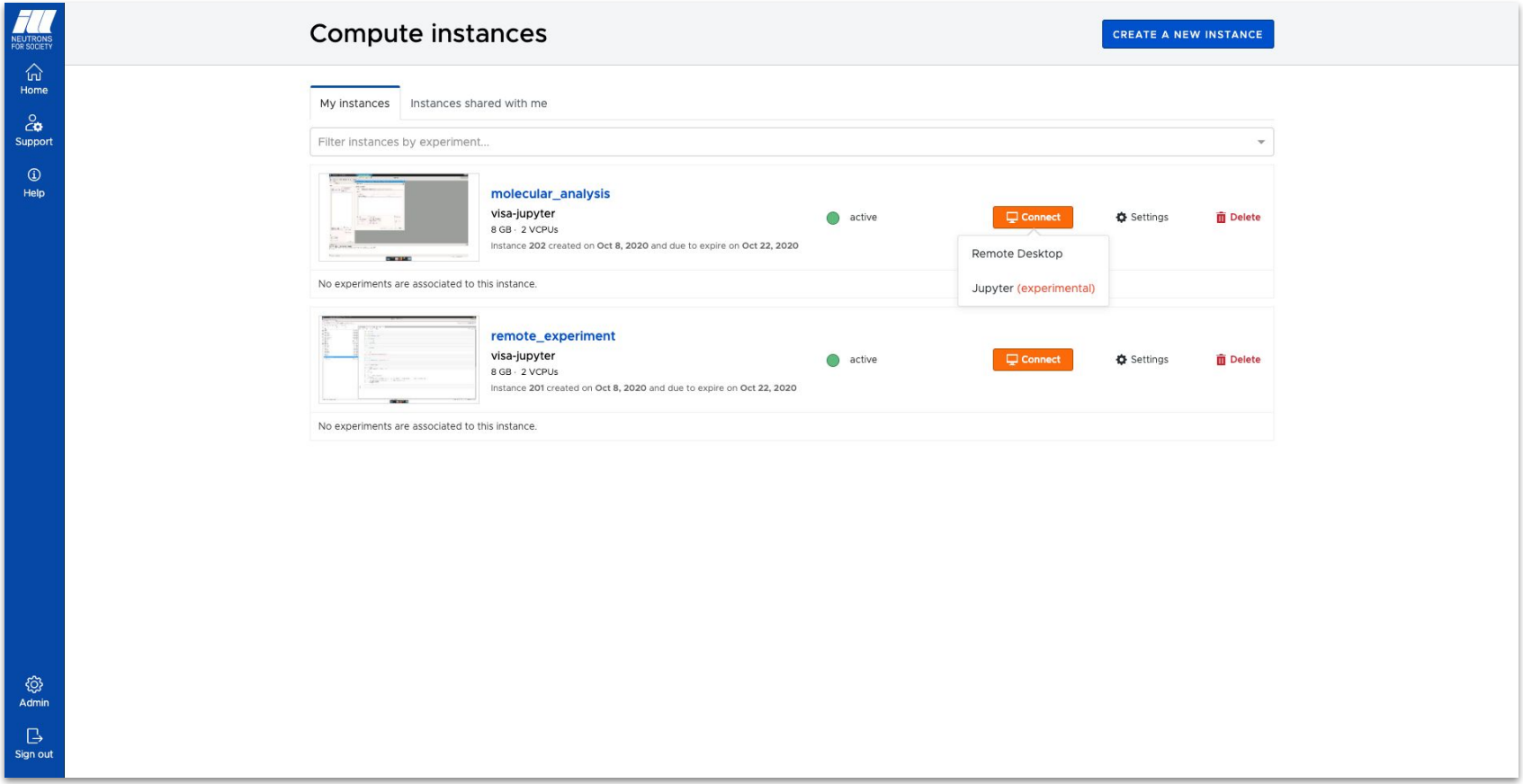

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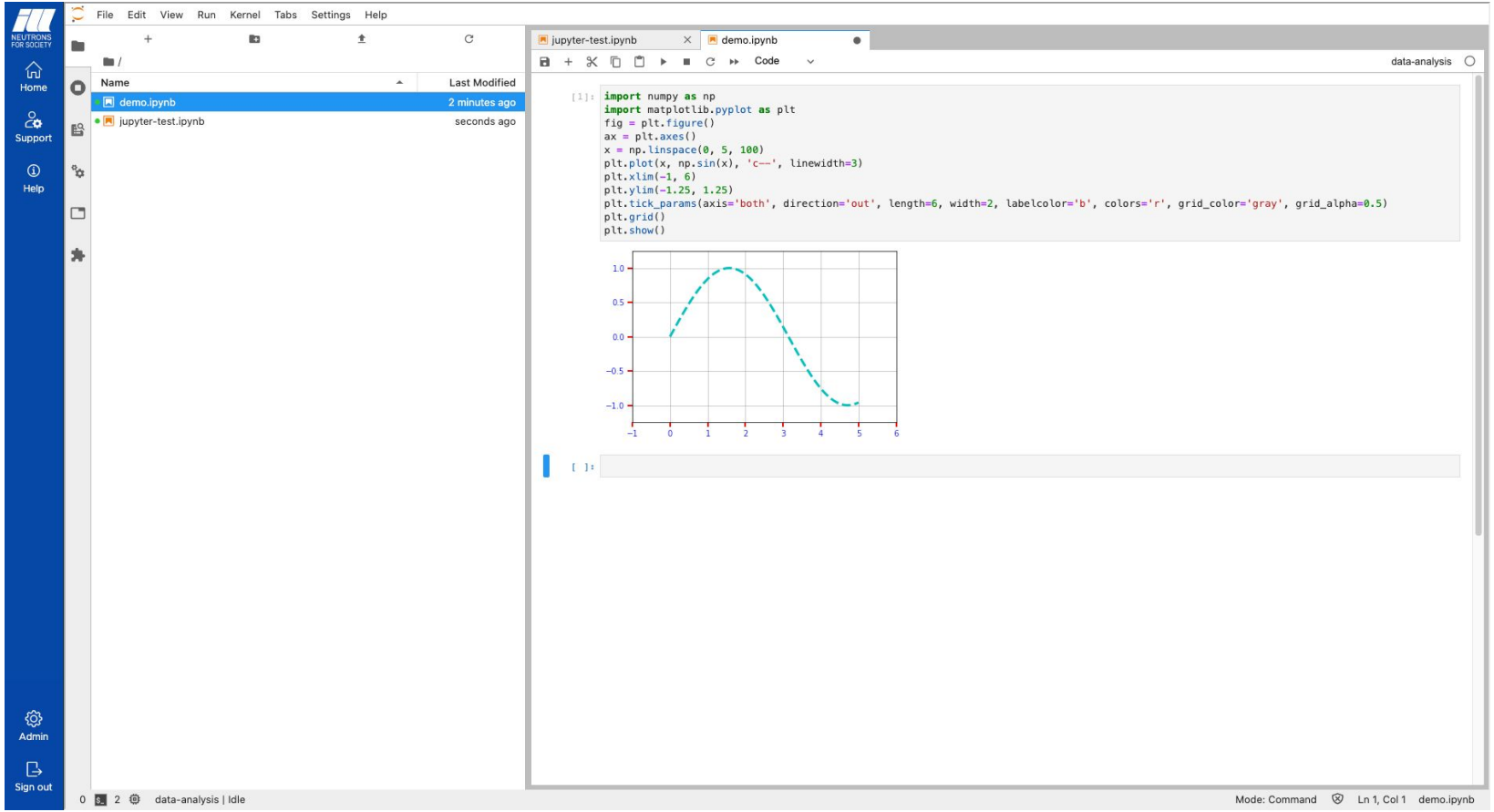

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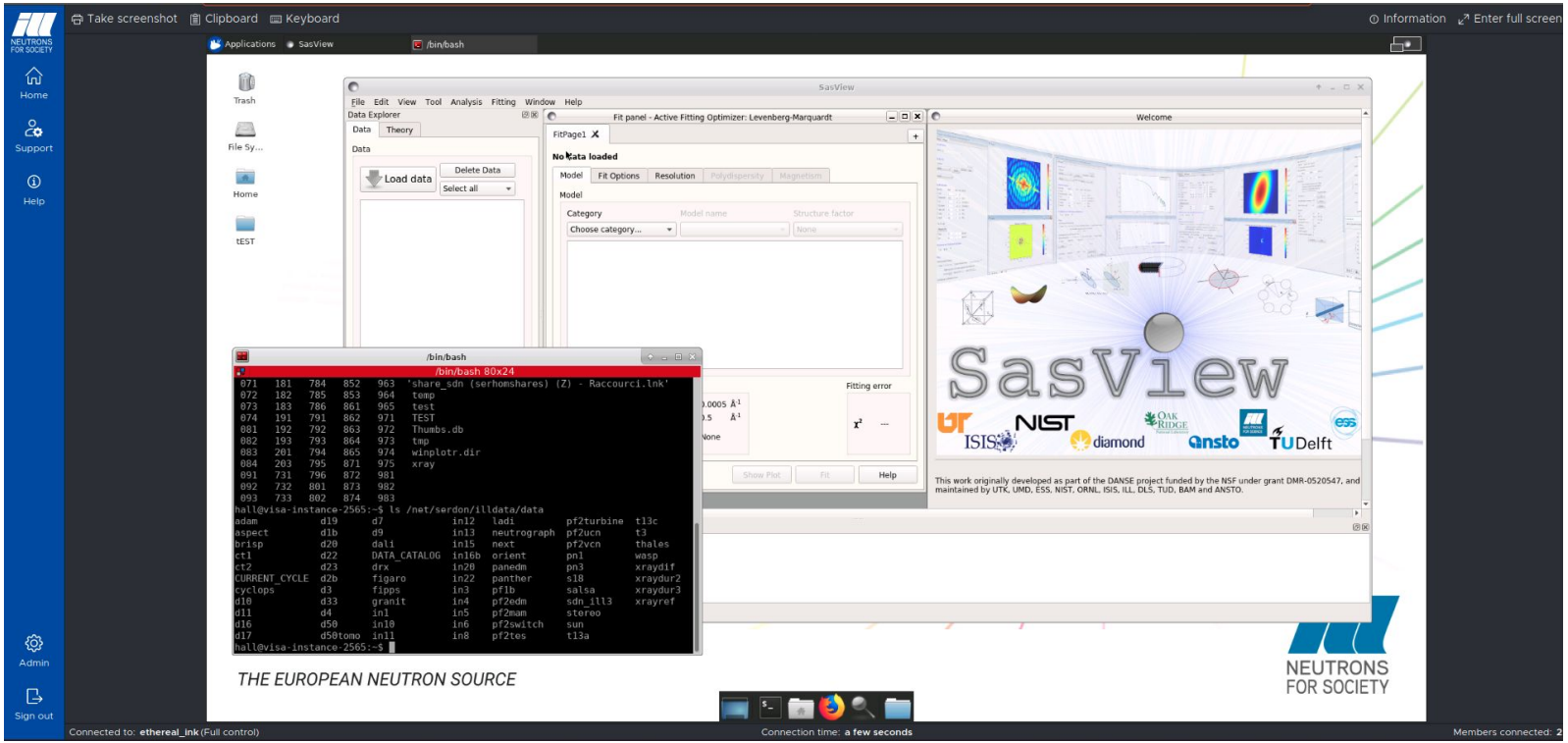

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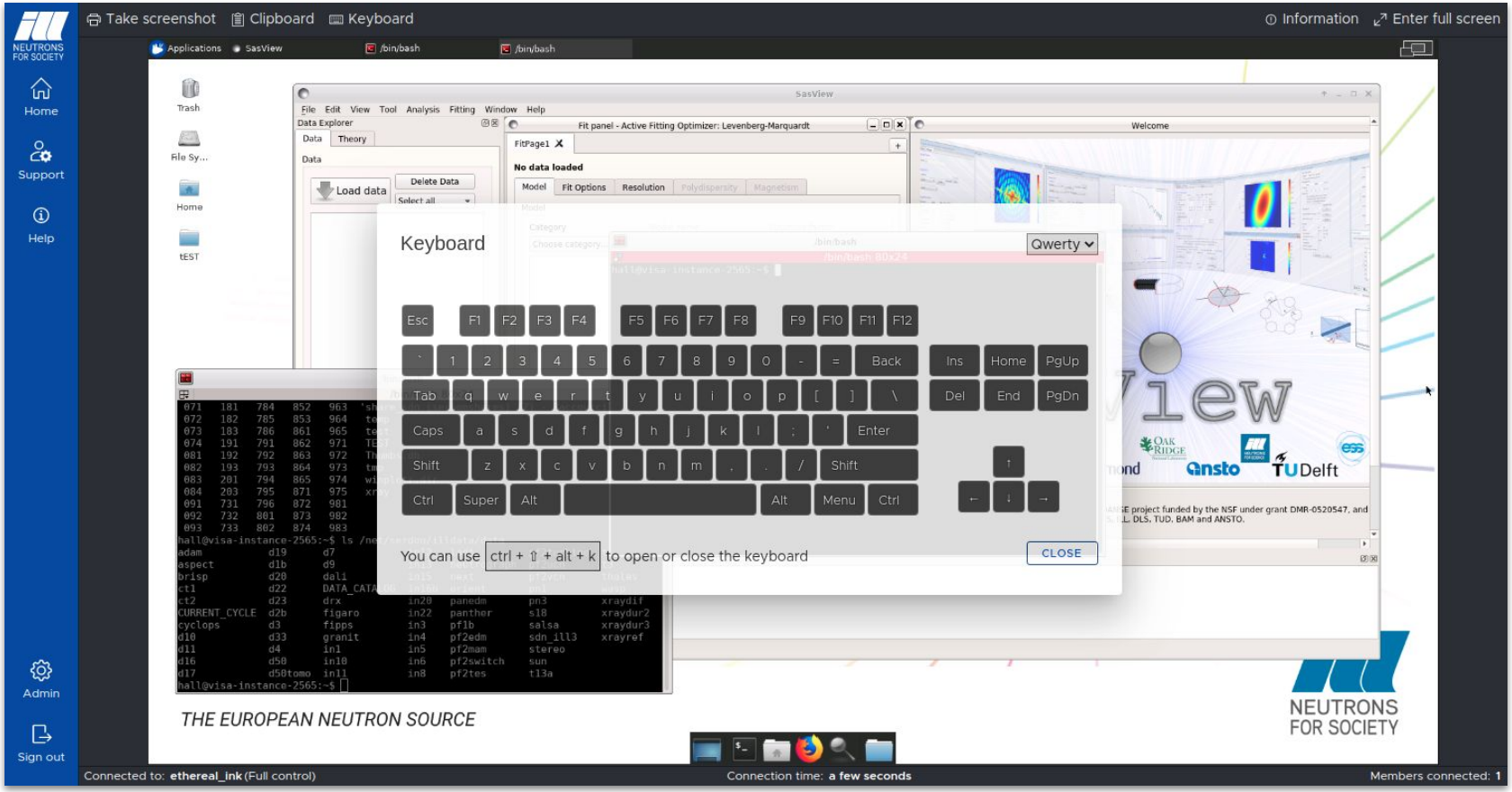

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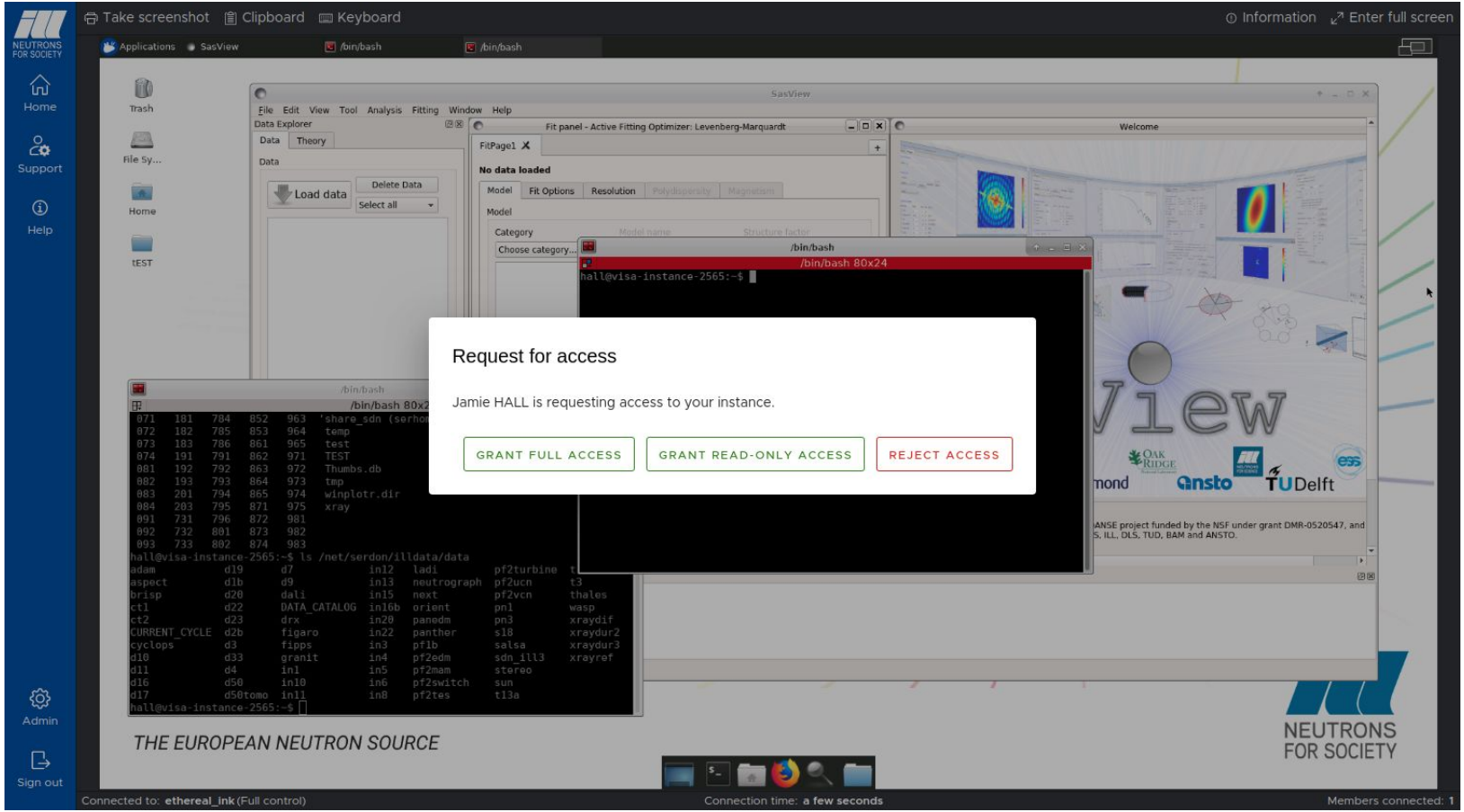

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VISA Help Centre

NEUTRONS FOR SOCIETY

Home

Support

Help

Admin

Sign out

Data Analysis, in the cloud.

VISA makes it simple to create compute instances and analyse your experimental data using just your web browser. Welcome to the Help Centre.

Compute Instances

Learn how to create and manage your own compute instances

- What is an instance?
- How do I create and launch an instance?
- How do I manage access to an instance?
- When does my instance expire?
- How do I use the clipboard?
- How do I transfer files on my personal computer?
- How do I provide user support?
- Troubleshooting an instance

Data Analysis

Learn which tools are available to start analysing your experimental data

- Which scientific software is installed?
- How do I access my data?

Still have questions?

Contact the ILL IT service at data@ill.eu for more information.

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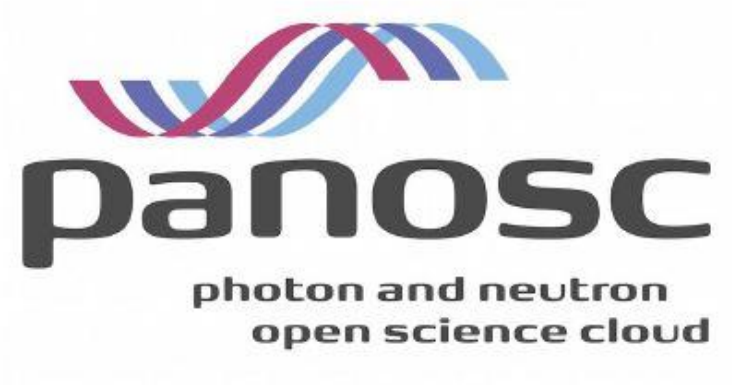

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