

# HPC (DCSR)

Division de **C**alcul et de **S**outien à la **R**echerche  
(Scientific Computing and Research Support Unit)

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# mission & goals

- Provide support to **research projects** for all faculties
- Computational resources
  - Storage (NAS, Object Store, Cluster FS, Encrypted Storage, VM datastore)
  - High Performance Computing
  - Secure Computing Environment for sensitive data
  - Virtual Machines (Servers, Desktops)
- Logistical support for research projects
  - Infrastructure support
  - Software optimization & development
  - Research Analysis multi-level support
  - Machine Learning
  - Courses & Training

# storage resources

- Generic storage for **research data**

- **NAS**

- ~5 PB (Isilon)
- Accessible from Campus
- Non-sensitive or personal data

- **S3 ObjectStore**

- ~1.5 PB (Scality)
- Accessible worldwide
- Non-sensitive or personal data
- Data exchange with external partners

- **Long Term Storage**

- $\infty$  (StorNext – Tape HSM)
- No direct access
- Non-sensitive or personal data
- Archival space for finished projects

- **Tresorit (cloud)**

- External storage partner
- Sensitive data
- Encrypted

# computational resources

- Virtual Machine Infrastructure

- Virtual Desktop Infrastructure

- VMware VDI (Horizon)
  - 4 Nodes
    - 128 cores
    - 1 – 2 TB RAM
    - GPU: Tesla T4, Tesla V100
  - Linux & Windows Desktops
  - Accessible from Campus
  - Non-sensitive or personal data
- Security:
    - NSX-T Network Isolation

- Virtual Server Infrastructure (VSI)

- VMware ESXi
  - 3 Nodes
    - 128 cores
    - 2 TB RAM
  - Host Linux & Windows Servers
  - User Managed services
  - Expose services Internal or External
  - Non-sensitive data
- Security:
    - NSX-T Network Isolation

- VSI - Sensitive

- VMware ESXi
  - 2 Nodes
    - 64 cores
    - 512 GB RAM
  - Host Linux & Windows Servers
  - User Managed services
  - Expose services Internal or External
  - Sensitive data
- Security:
    - NSX-T Network Isolation

PowerVault

- ~400 TB



# computational resources

- HPC Infrastructure

- HPC cluster - Curnagl

- Standard HPC
- 88 Nodes + 8 GPU Nodes
  - 48 cores AMD Epyc
  - 84 nodes: 512 GB RAM, 12 nodes: 1TB RAM
  - GPU: 2x A100 / node
- Non-sensitive or personal data
- Slurm scheduler

- Security:

- Network separation & Firewalled

- HPC cluster - Urblauna

- HPC for sensitive data
- 16 Nodes + 2 GPU Nodes
  - 48 cores AMD Epyc
  - 1 TB RAM
  - GPU: 2x A100 / node

- Sensitive data
- Slurm scheduler

- Security:

- “Air-gapped” Network separation & Firewalled
- 2FA
- Guacamole WebRDP
- JumpHost for SSH & data upload (SFTP)
- POSIX Access rights

- OpenStack - SENSEA

- Cloud Computing for Medical data
- 18 Nodes + 4 GPU Nodes
  - 20 - 52 cores
  - 384 – 512 GB RAM
  - GPU: 6x A100, 2x RTX2080
- Research project isolation (Tenants)
- Tenants managed by DCSR
- Encrypted Filesystems per Tenant
- Sensitive / medical data

- Security:

- “Air-gapped” Network separation & Firewalled
- 2FA
- Guacamole WebRDP
- Encrypted data upload
- Per Tenant encrypted Filesystems

GPFS (~2 PB)

NAS

- On login-node

GPFS (~1 PB)

StorNext HSM

- At-rest tape encryption

CEPH

- At-rest encryption

WEKA.io

- At-rest & in-transit per Tenant encryption
- Tiering (S3)

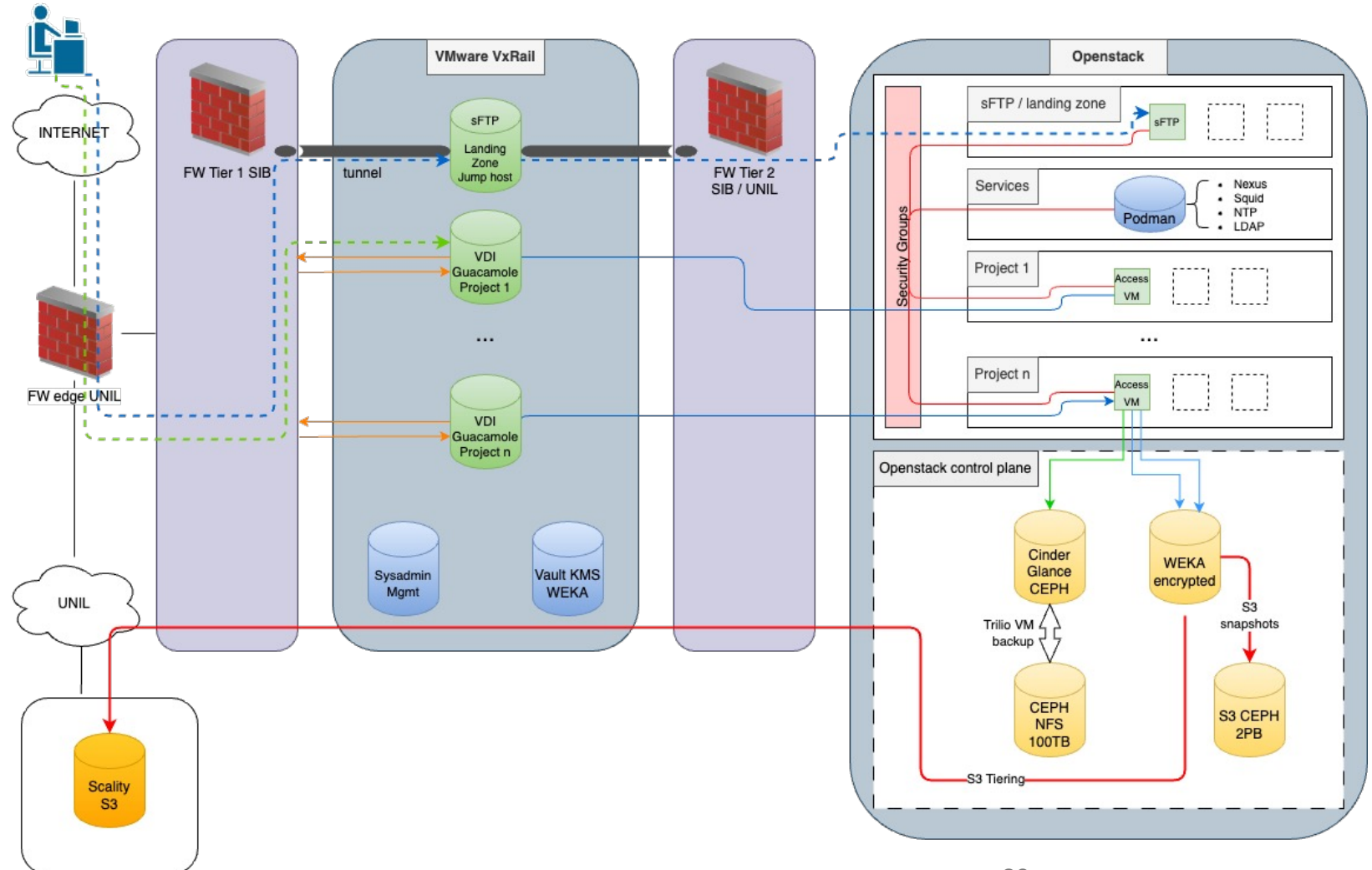
# SENSA - openstack for sensitive / medical data

- Access restrictions

- Allowlists (IP, VPN, ...)
- 2FA / eduID
- Incoming data via transfer requests
- Outgoing traffic only to proxied resources
- No Admin rights on Tenant or VM

- Project level isolation

- Web-RDP service
- Security Group network isolation
- Encrypted storage (in-transit, at rest)



question



question

Thank you

The logo for the University of Lausanne (Unil), featuring the word "Unil" in a blue, cursive script font.