SAPHIR Data Center
(first year experience)

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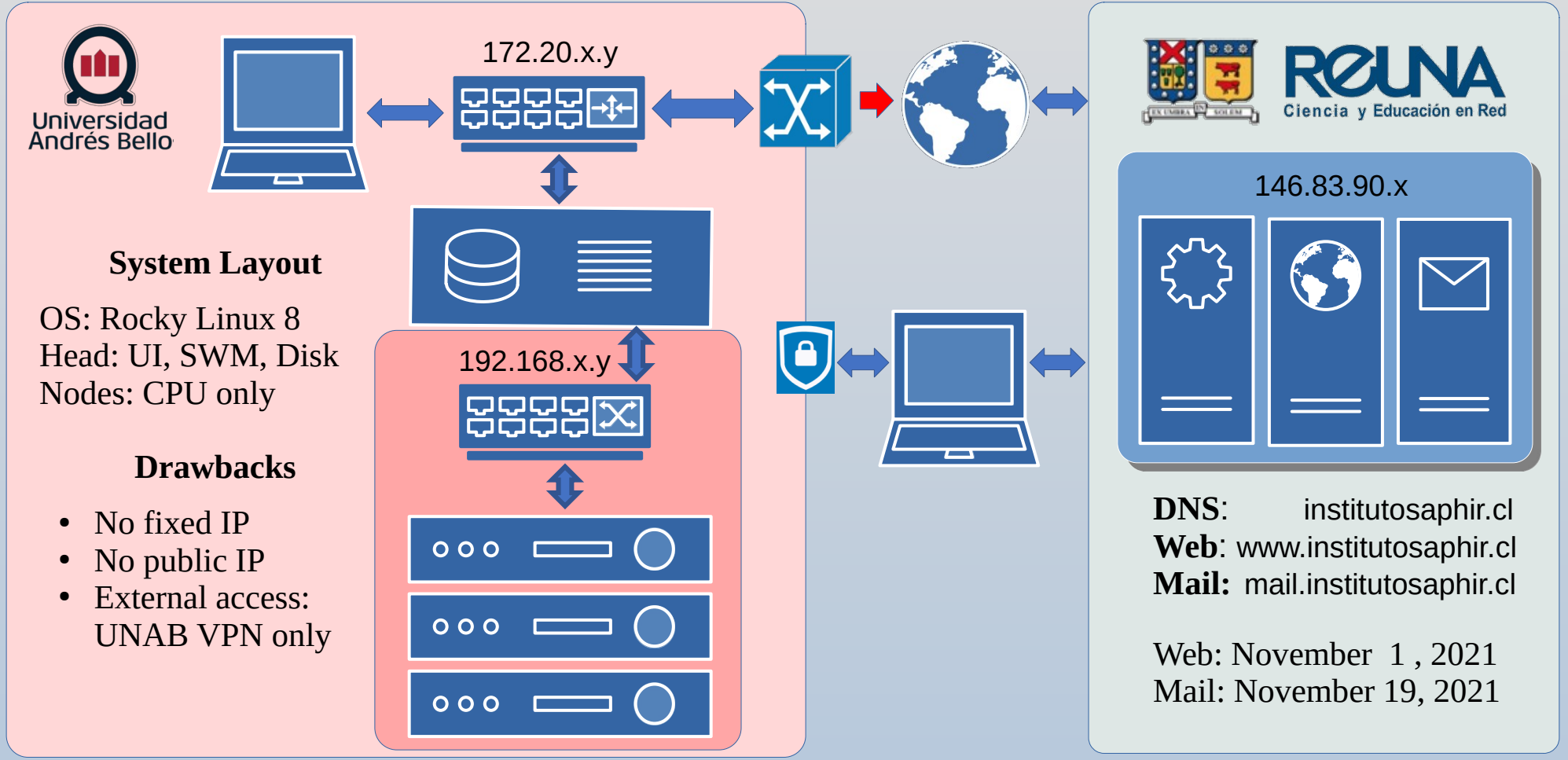
Outline

- History
  - First Setup (UNAB, C-A)
  - Cluster Hall (UNAB, C-1)
- Current State
  - Computational Resources
  - Network Infrastructure
  - Data Center Layout
- Services (Web, Mail, Storage, etc.)
- User Access
- Outlook

First Setup (UNAB, C-A)

Installation: September 2021
First jobs: October 19, 2021 (Jilberto Zamora)

First Setup (network, layout, services)



System Layout

OS: Rocky Linux 8
Head: UI, SWM, Disk
Nodes: CPU only

Drawbacks

- No fixed IP
- No public IP
- External access: UNAB VPN only

DNS: institutosaphir.cl
Web: www.institutosaphir.cl
Mail: mail.institutosaphir.cl

Web: November 1 , 2021
Mail: November 19, 2021

Cluster Hall (UNAB, C-1)

Construction started on November 17, 2021

Cluster Hall (UNAB, C-1)

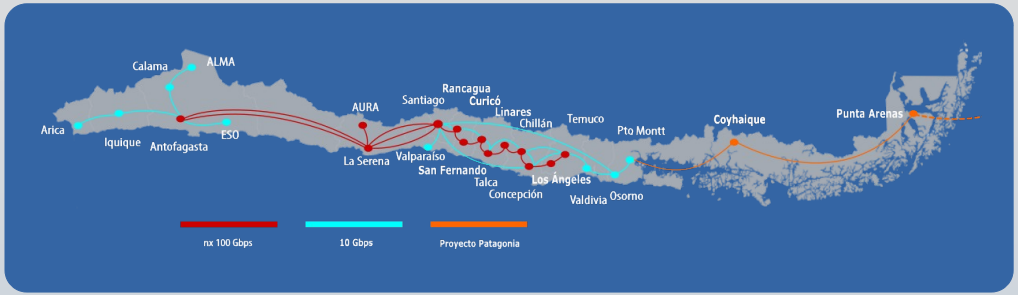
The official opening of the data center hall was on April 12, 2022

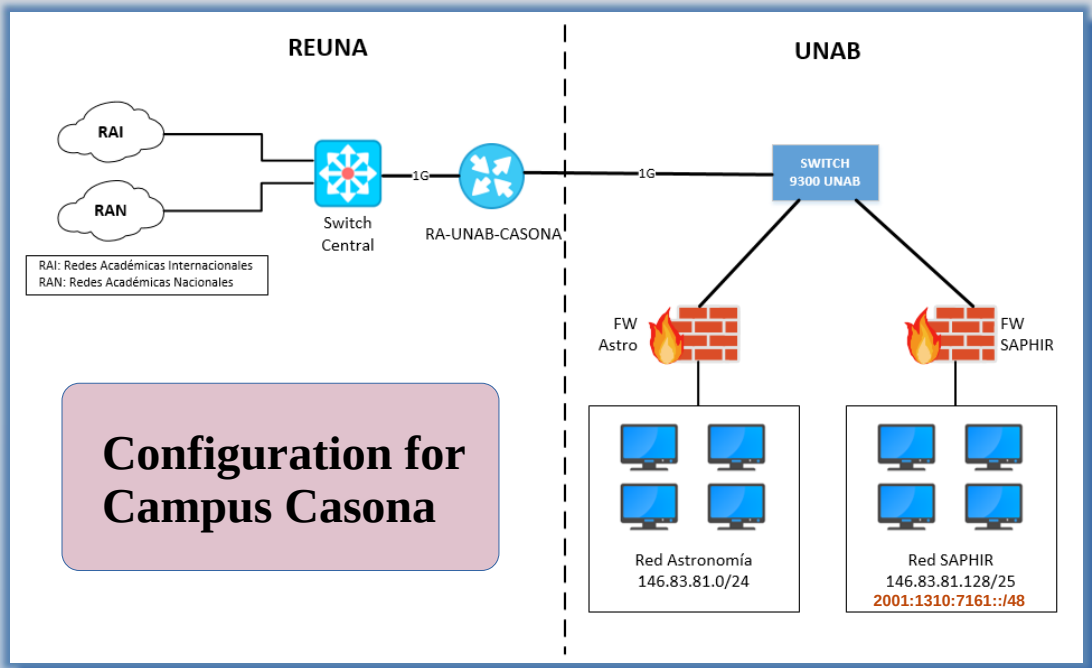
Computational Resources

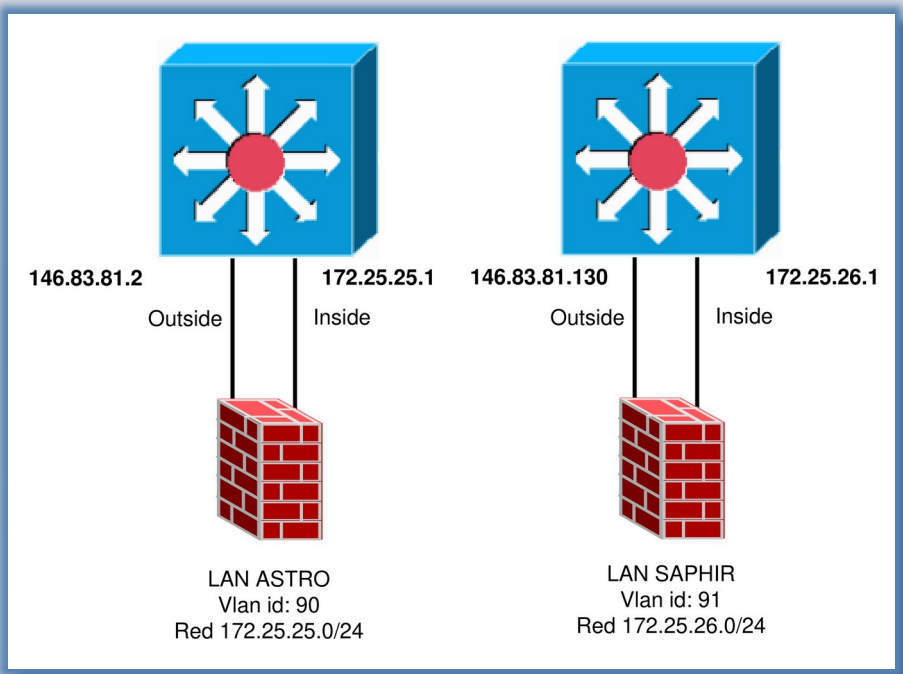
Name	Model	CPU	Cores	Threads	Memory	Notes
wn[01-03]	Supermicro X11-DPG-SN	2 Xeon 6248R, 3GHz	48	96	512GB	CPU only
ac01	Dell R740	2 Xeon 5220, 2.2GHz	36	72	128GB	CPU, 2 x FPGA (Alveo U200)
gc01	Dell R840	2 Xeon 5220, 2.2GHz	36	72	128GB	CPU, GPU (Quadro RTX 8000)
ruby	Supermicro X11-DPH-T	Xeon 4214R, 2.4GHz	12	24	128GB	Storage: 24 x 10TB (ZFS: ~150TB)
ns	Dell R250	Xeon E2336, 2.9GHz	6	12	32GB	Infrastructure (DNS, VH etc.)

Network Infrastructure

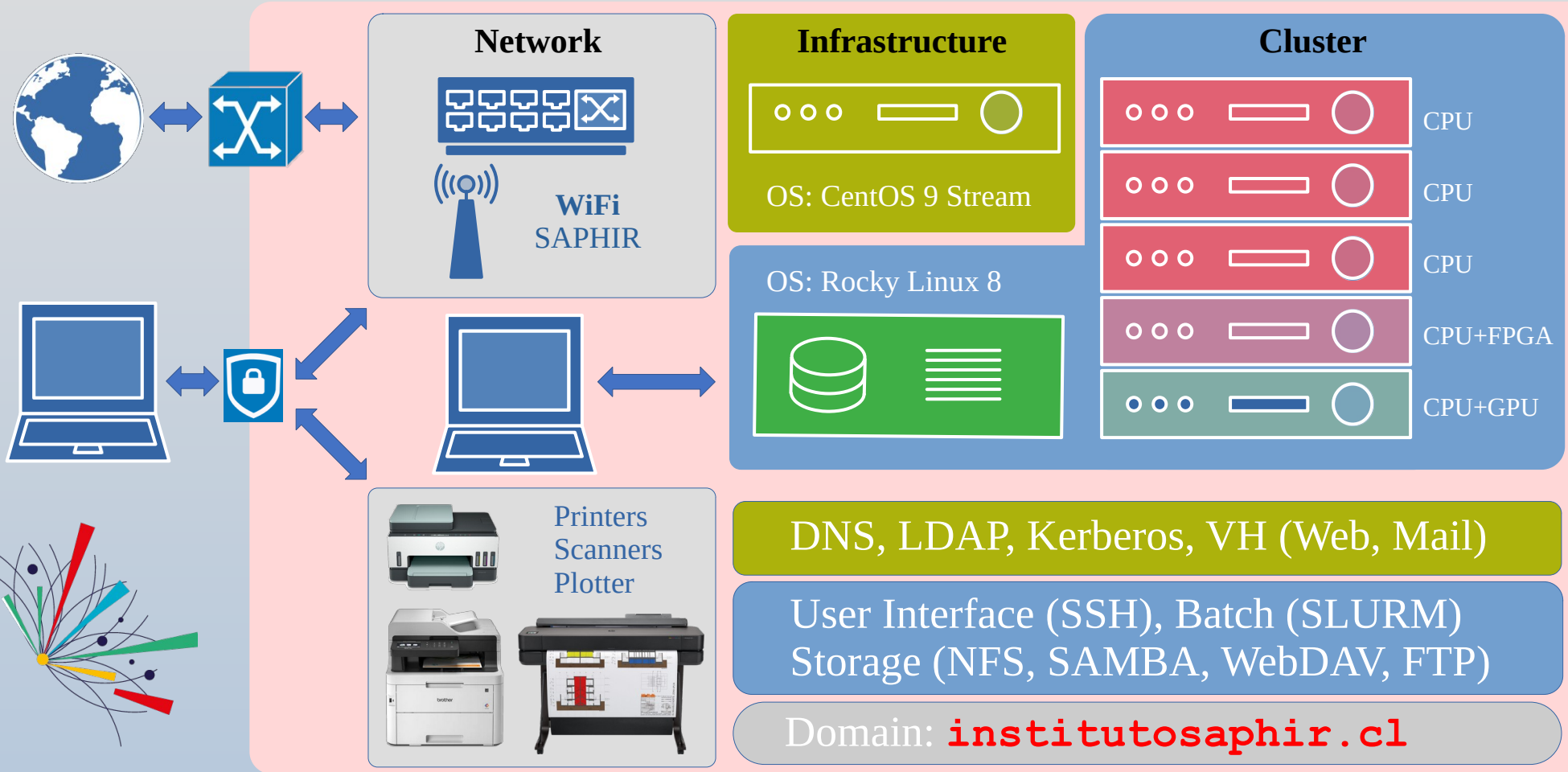
REUNA (Red Universitaria Nacional) connects national and also international universities and research centers. Since 2018 part of LHCONE. **Collaboration agreement between SAPHIR and REUNA was signed in July 2022.**





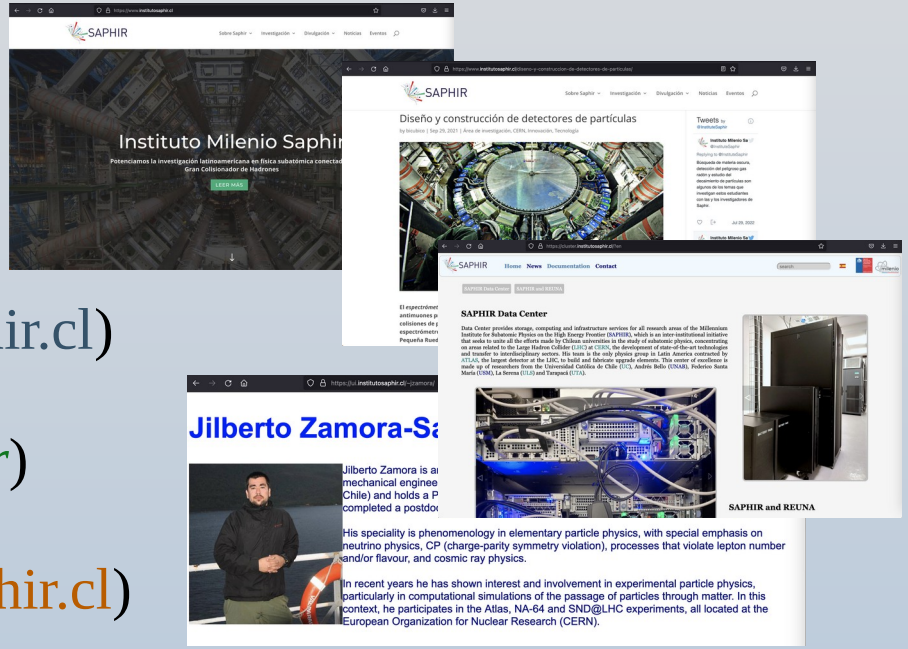


Data Center Layout



Services

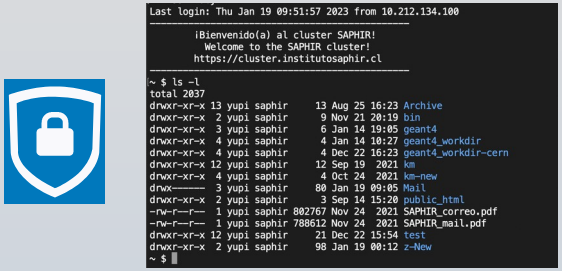
- **DNS** (institutosaphir.cl), **LDAP** (authentication), **Kerberos** (authorization)
- **Web servers**:
  - SAPHIR (www.institutosaphir.cl)
  - Cluster info pages (cluster.institutosaphir.cl)
  - User's pages (ui.institutosaphir.cl/~*user*)
- **SAPHIR Mail** (*user.name*@institutosaphir.cl)
- **Data Storage** (ZFS) via NFS, SAMBA, WebDAV (shared/private access)



User Access

Access via SSH to ui.institutosaphir.cl:

Directly from SAPHIR network, CCTVal, CERN (lxplus), ...
or via SAPHIR VPN



Program packages and Development tools:

Standard: C/C++, FORTRAN, Octave, Python, Perl)
HEP: FLUKA, Geant4, ROOT
CernVM-FS
GPU: nVidia CUDA
FPGA: Xilinx Vitis, Vivado

Batch processing: Slurm Workload Manager

Information on access and work: https://cluster.institutosaphir.cl

User Access for NICA SPD

NICA Nuclotron-based Ion Collider fAcility

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Spin Physics Detector (SPD)

Measurements of asymmetries in the lepton pair (Drell-Yan) production in collisions of non-polarized, longitudinally and transversally polarized protons and deuterons beams are suggested to be performed at the collider NICA of the JINR using the specialized Spin Physics Detector (SPD). These measurements can provide an access to all leading twist collinear and Transverse-Momentum Dependent ditsribution functions of quarks and anti-quarks in nucleons. The measurements of asymmetries in production of J/Ψ and direct photons, which supply complimentary information on the nucleon structure, will be performed simultaneously with Drell-Yan data using dedicated triggers. The set of these measurements permits to tests the quark-parton model of nucleons at the QCD twist-2 level with minimal systematic errors. Physics motivations and possible layout of SPD will be presented as well as the plans for polarized beams at NICA.

Collaboration with the research group from the JINR NICA experiment “Study of FPGA-based Cluster Search Algorithms for the SPD ECal Reconstruction for Online Event Filtering” was established October 2022.

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Veksler and Baldin
Laboratory of High Energy Physics
Joint Institute for Nuclear Research
Joliot-Curie 6,
Dubna, RUSSIA

Outlook

Hardware upgrades:

- New servers: compute, storage (?)
- Enhancement of power supply (redundant lines)
- Enhancement of air flow in the cluster hall

Software installations/updates:

- New libraries/packages
- Data access: dCache (IPv6), EOS (?)
- Migration to Alma Linux 9 (?)

Thank You!