Updates to IT Infrastructure in ASICLab

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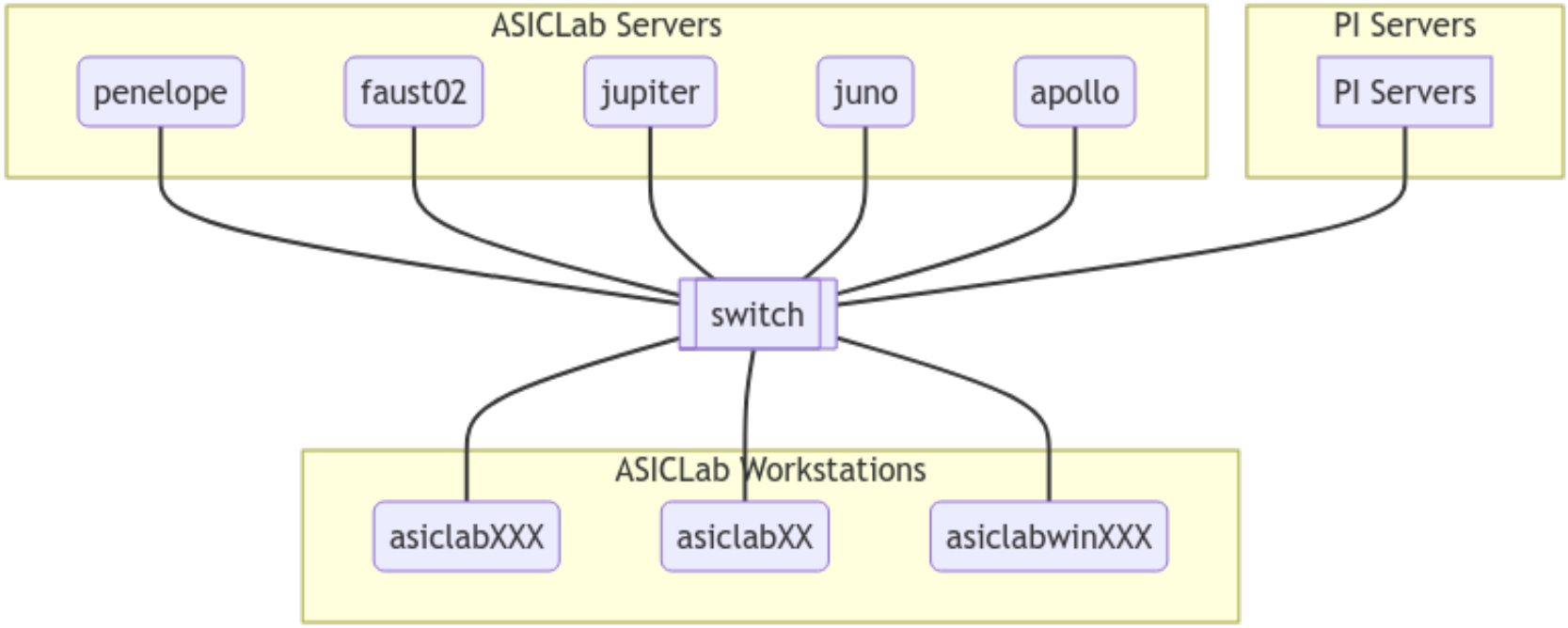
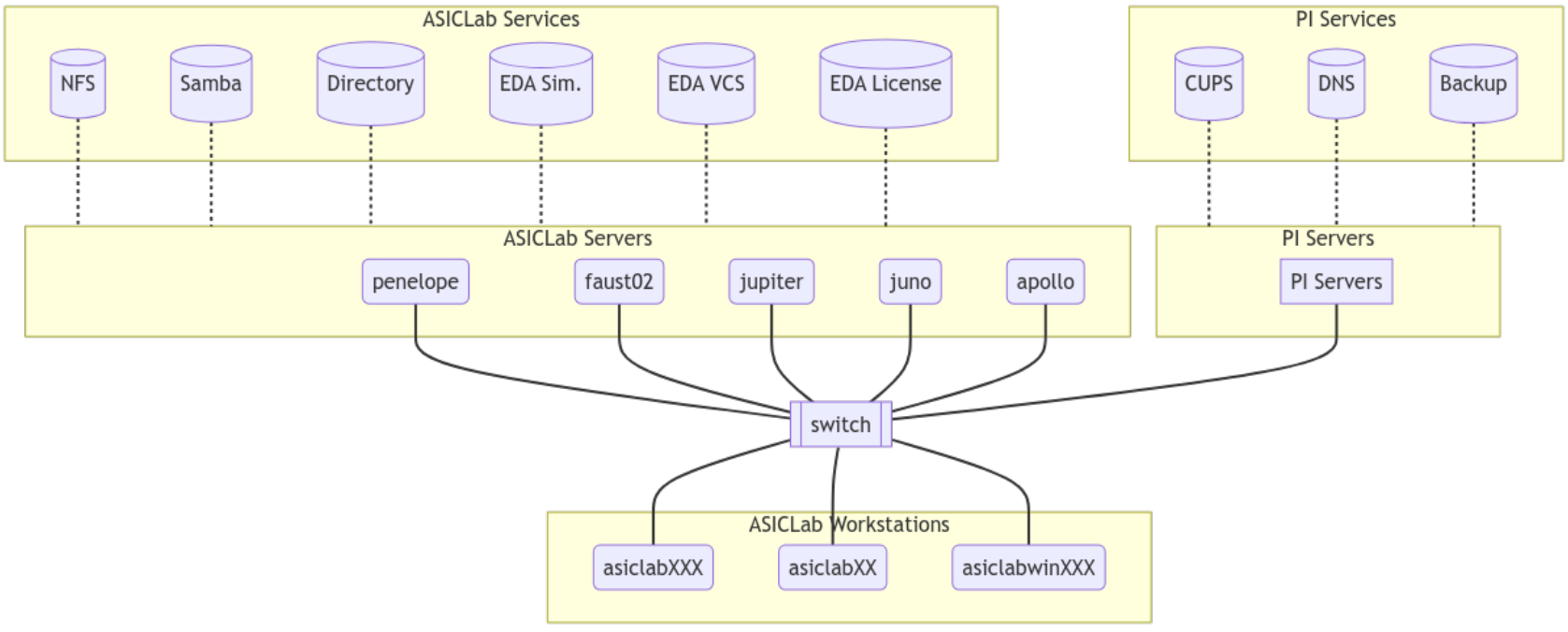
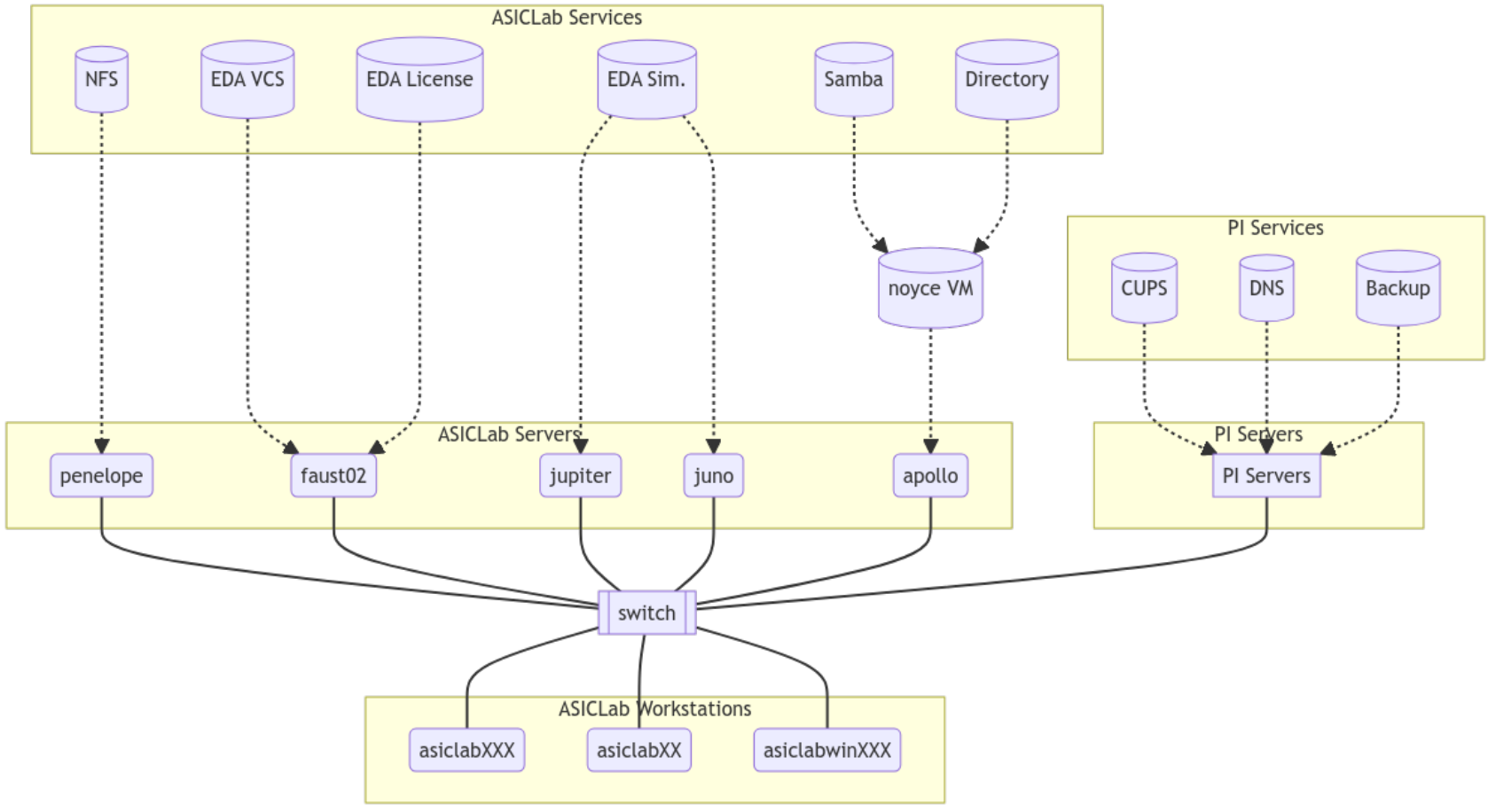
Servers & Workstations



Services & Apps




ASICLab Services
NFS
EDA VCS
EDA License
EDA Sim.
Samba
Directory
noyce VM
PI Services
CUPS
DNS
Backup
ASICLab Servers
penelope
faust02
jupiter
juno
apollo
PI Servers
PI Servers
switch
ASICLab Workstations
asiclabXXX
asiclabXX
asiclabwinXXX

The Before Times: Problems to be fixed

- Hard drives failing in NFS server
- Desktops were randomly crashing and not booting on CentOS7
- Configuration management strategy was monolithic: couldn't understand it
- CentOS7 was released in 2014, EOL in 2024.
  - Repos very outdated for key software: gcc, Firefox, etc.
  - Workaround have existed for tools, but aren't perfect
  - There's no CentOS8/9
  - Alternative clones like AlmaLinux8/9 and Rocky Linux8/9 are facing issues as RH closed access to RHEL source
- Documentation (on Confluence) was outdated and difficult to work with
- BIOS firmware never updated on some machines

Change: An OS Upgrade

- Philosophy: Can live with self-vendoring software core to work, but the auxillary stuff should be easy
- Ubuntu is a good choice too, but Fedora has:
  - more built-in enterprise features (FreeIPA, Ansible support, to be discussed)
  - more of the enterprise 'mindshare' and documentation
  - upstream of RHEL, so some engineers apps may work out of the box
- Updates 2x per year make apps like Slack, Zoom, desktop usage, more streamlined
- Successful version upgrades 36 -> 37 -> 38 -> 39 (in Oct)
- Bonus: Automatic firmware upgrades + network config

Change: A Better Way to Configure Workstations

- How to take a machine from a fresh install -> desired state (and keep it that way)
- Used for workstations only (just make root account, enable SSH), as we want the 12+8 machines to be the same
- Now using Ansible, whenever it make sense
  - State based or 'idempotent', rather than action based
    - Example: Write line to file
  - Replaces monolithic Clonezilla; force us to know our stack

Demo

1. Install `sudo dnf install ansible` on one controller machine
2. Copy SSH public key to all target machines `ssh-copy-id asiclab001.physik.uni-bonn.de`
3. List machines to target in `inventory.yaml`:

```
workstations:
  hosts:
    asiclab001.physik.uni-bonn.de:
      mac: 54:BF:64:98:25:D4
```

Changes: Files Storage

- Installed Fedora on machine (`penelope`)
- Built a new Raid6 array with 48 TB of total HDD storage

`command to show raid array`

- Copied design data over from manual back (3+ days)
- Started NFS server on Fedora, with (renamed) `/tools` and `/users`

```
- name: Create directory and mount /users
    ansible.posix.mount:
    src: penelope.physik.uni-bonn.de:/export/disk/users
    path: /users
    opts: rw
    boot: true
    state: mounted
    fstype: nfs4
    tags: nfs
```

```
$ ls /
```

Changes: Identity Management

- User data on `rw` NFS share
- Ported old LDAP data to modern FreeIPA distribution (LDAP, SSSD, NSS)
- Data protected using groups `base`, `icdesign`, `tsmc65`, etc
- Downside: No IdM or NFS = no login or crashing

Don't just manually add users

`freeipa command to list users`

Also available on GUI: FreeIPA GUI

Then on client client

```
SHOULD PUT THE ANSIBLE VERSION
sudo realm join penelope.physik.uni-bonn.de
```

```
$ ls /home
asiclab


$ ls /users
```

Changes: EDA Tools

- Living on the read only NFS mount `tools`, executed on workstation
  - Must query against FlexLM and SOS to start
- EDA tools typically only certified on a handful of OSes (RHEL, Suse) see here
- We can't easily use RHEL equivalents with RHEL rebuilds due to CentOS EOL, and RHEL source now being closed
- Turns out FPGA tools (ISE & Vivado) just work on Fedora
- In other, what would be hands would be to be able to run the software inside of a complete `OS virtual environment`, so that the tools sees all the right package versions: i.e. we want Containerization
- There are several choices (Docker, Podman, etc) but the best for our high-performance + GUI needs is `apptainer` best

```
$ ls /tools
cadence  clio  containers  designs  kits  mentor  synopsys
```

1. Create a `.def` file, for target application. Add the following:

Changes: Documentation

- Markdown, git repo (show screenshots)
- Ansible is more or less ‘self-documenting’, for the workstations

Remaining Work + Problems

- 6/20 workstations still on CentOS7
- 3/5 Servers (Faust02/Jupiter/Juno) still on CentOS7
- Apollo decommission (is on CentOS 6)
- faust02 renamed to -> faust
- How to organize the lab?
- Bandwidth of access to NFS shares doesn't work well
- SSH keys don't work with LDAP users
- FreeIPA instance transfer
- Discussion: Should we port any of these changes elsewhere in the lab

Up Next

- In two weeks
- GUI-based design Cadence and the alternative of Python-based Circuit generators