Using Linux for experiment control

- Experiments
- Hardware
- Distributions
- Versions
- Installation method
- Software
- Control system
- Data management and processing
- Summary

Experiments

- Linux is the main operating system for experiment control at:
- PETRA-3
- DORIS
- FLASH

Experiments

- At DORIS and PETRA-3 all control PCs are administered by FS-EC, at FLASH only a part of the machines
- Installations at DORIS: 33
- Installations at PETRA-3: 104
- Installations at FLASH: 19

Hardware

- The bulk of the hardware are 19”-Rack DESY PCs (SPC-W6011, SPC-W1007)
- In some cases office PCs are used (SPC-B1011, SPC-B1007)
- Other hardware is only used if it comes together with measurement devices like detectors

Distributions

- The preferred distribution is Scientific Linux as supplied by DESY IT
- Other distributions (Ubuntu, Suse, …) are only used if delivered with manufacturer-supplied PCs (happens quite often for detectors)

Versions

- Most PCs are still equipped with SLD5, mainly SLD 5.1
- SLD 6.1 is only used in 3 systems at the time of writing
- Migrating to SLD 6.X / 64bit at PETRA-3 was scheduled for winter shutdown 2011/2012
- Update is not possible, OS and applications need to be installed from scratch
- Migration had to be postponed due to failure of TSM backup system in December / January
- No long shutdown during summer, so this can only be done by and by
- New machines are delivered with SLD 6.1

Installation method

- Basic installation is done with salad / wboom
- Additional software is supplied via rpm packages from hasylab yum repositories (http://wims.desy.de/hasylab/rpms)
- Number of additional packages at the moment: ca. 600
- Tools were written to configure machines and install software

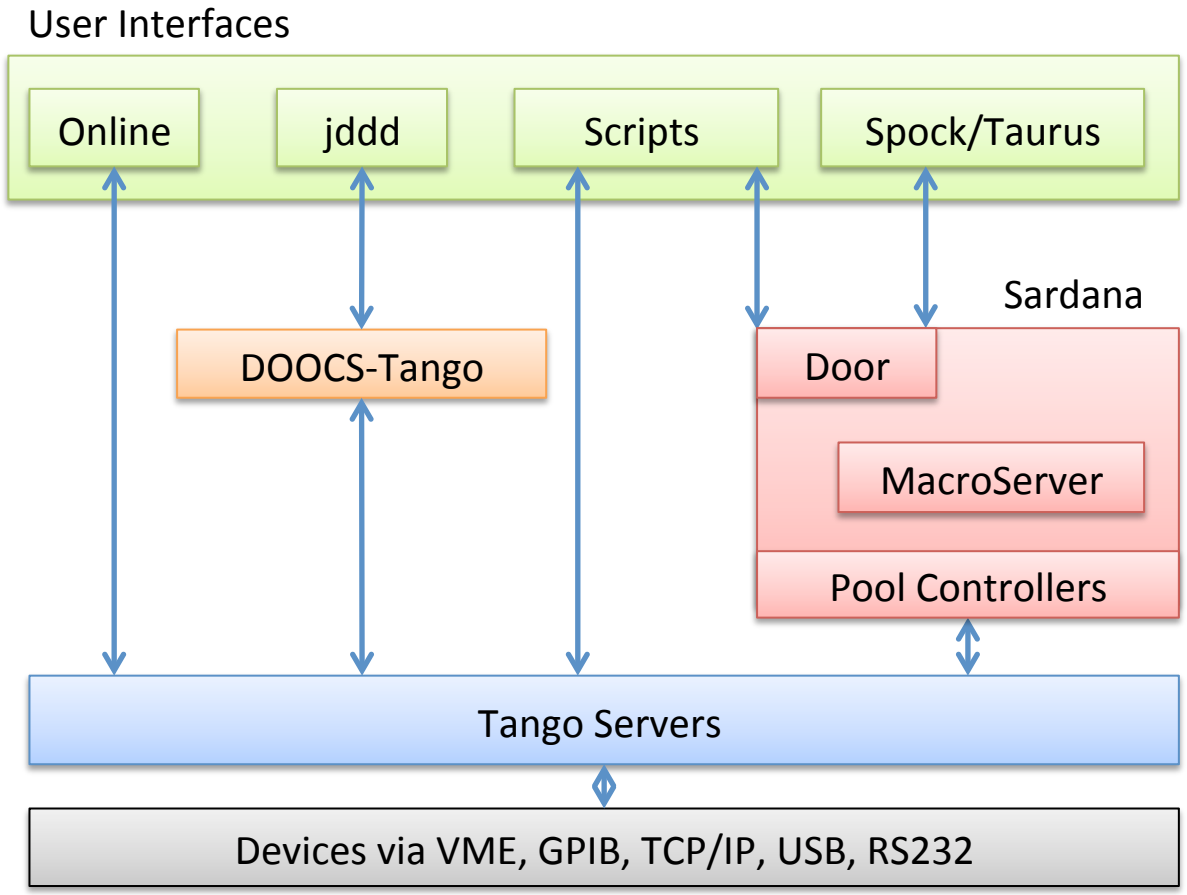
Software

- Experiment control requires support for different hardware connected to the PCs
- Besides standard communication links like RS232, Ethernet, USB or Firewire this is mainly
  - VME
  - GPIB
  - CAN
  - CAMAC (only at DORIS)
- Drivers for these busses are supplied by hardware manufacturers (Struck, NatInst, …)
- Installation is done via dkms to alleviate kernel updating

Control system

- Control system used is Tango (www.tango-controls.org)
- Tango is an object oriented distributed system using CORBA
- Tango is a collaborative effort between several european institutes (Alba, Desy, Elettra, ESRF, FRM II, MAX-lab, Soleil)
- Device servers (core components for controlling hardware) for experiments at DESY are mainly written by FS-EC staff.
- Mainly used client is Spectra / online
- The plan is to replace this with spock / taurus

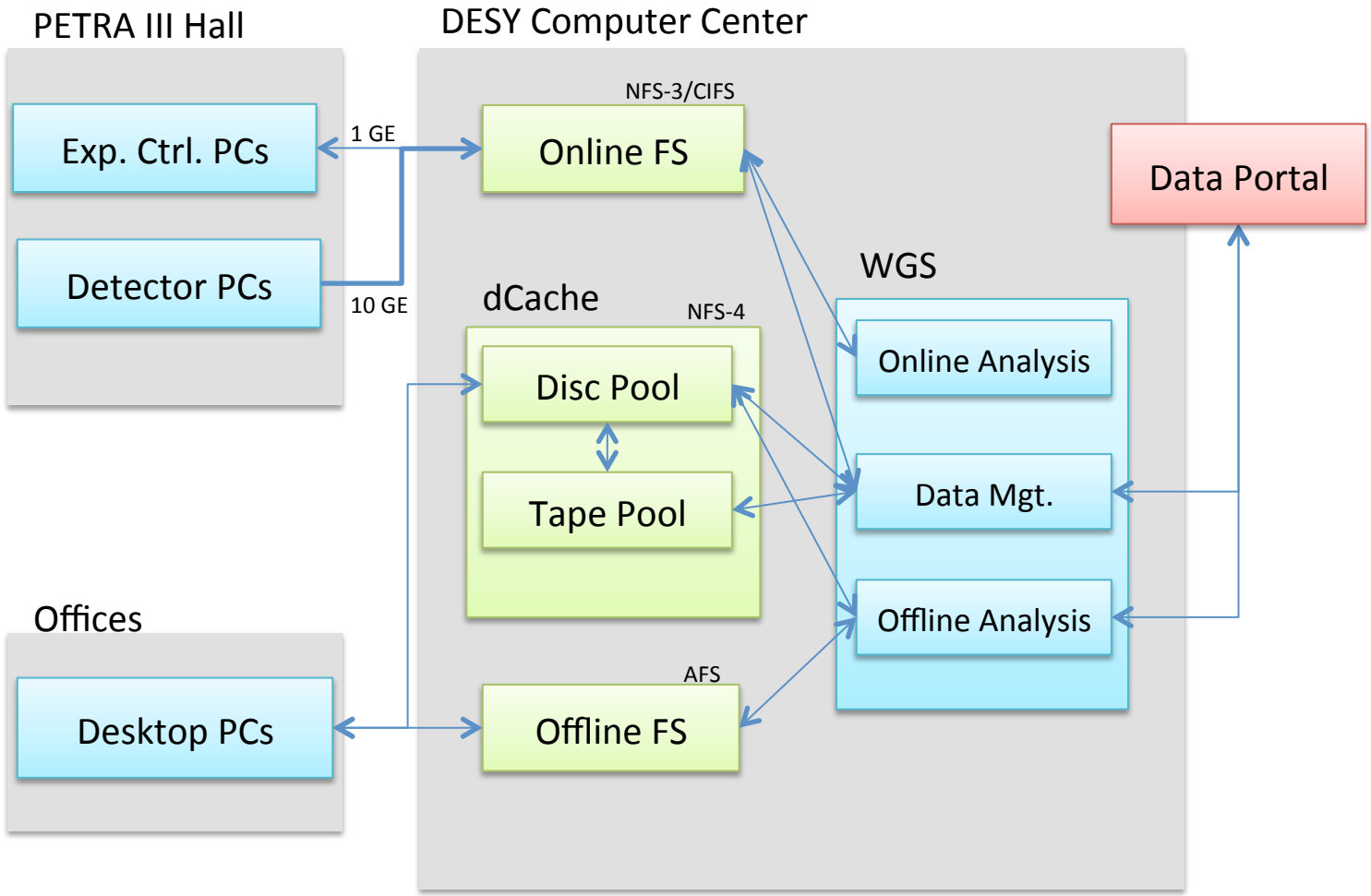
Control system



Data management and processing

- Measurement data from control PCs and detectors are written to online file servers
- 16 workgroup servers have been set up for online analysis (SLD 5.X / SLD 6.2)
- Tools for managing data in e.g. dCache are under development and can be used by administrators (some features still missing)
- A data portal to give external users access to their data is under construction

Data management and processing



Summary

- Systems are running fairly stable
- The same is true for installation and application software rollout / update, but:
  - longtime experiments (> several days) must not be interrupted, time slots for updates are rare and small
- Migration to new OS versions is problematic:
  - major operations can only be done during (long) shutdown periods
  - testing at some point requires access to the hardware
  - some tests cannot be done during shutdowns
- There is still work to be done concerning the data management