

The Computing Model of the Experiments at PETRA III.



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The highly-brilliant 3rd generation synchrotron radiation source PETRA III came into operation in 2009. A new online control system has been implemented to cope with the requirements of the highly complex beamlines and a framework for data management and data processing was developed to handle the data rates from modern 2D detectors.



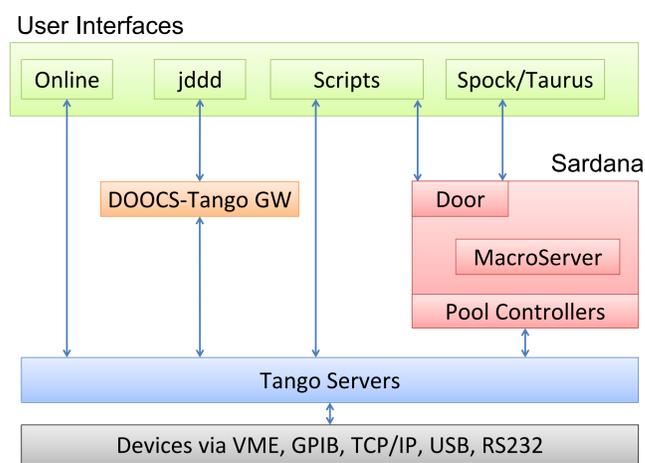
The PETRA III Experiment Hall at DESY

Objectives for designing an experiment control system

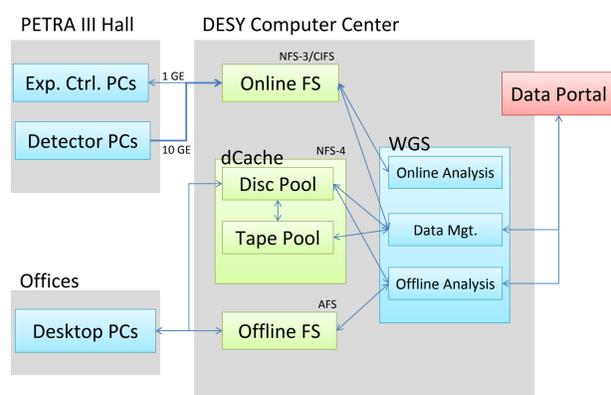
- **Sustainability**
Modular systems can be extended and maintained by a group of programmers
- **Flexibility**
An efficient customization is important to support frequently changing user groups.
- **Platform independence**
Hardware from all kinds of vendors has to be implemented
- **Collaboration & Community**
The communication with colleagues of other laboratories saves resources and fosters the development of common user interfaces

Experiment Control

- **Communication layer: Tango [1]**
 - A networked, platform independent hardware access layer
 - Bindings: C++, Python, etc.
 - Collaboration: ESRF, SOLEIL, ELETTRA, ALBA, DESY, FRM II, MaxLab
- **User interfaces:**
 - **Online [2]:** experiment control program, CLI, GUIs, Perl/PerlTk
 - **jddd [3]:** synoptic displays for a beamline overview
 - **Scripts:** PyTango [4] and Perl, are mainly used to execute specific measurements, for monitoring purposes and feedback loops
 - **Sardana [5]:** Pool controllers standardize hardware access, the Macroserver executes procedures, Doors are access points, Spock is the command line interface, Taurus creates GUIs



The Main Components of the Control System at the PETRA III Experiments



The Data and Control Flow Paths

Data management and data processing

- Based on services provided by the DESY computer center
- Network for 2D detectors: 10 GE
- Buffering, near online analysis: online file server, 145 TB, Raid 6
- Archive, analysis: dCache[6], disk pool 100 PB, tape pool ~ 3PB
- Reconstruction, simulation, analysis data: Offline file server, 40 TB
- Remote data management, work flow control: data portal
- Workgroup servers are allocated for different purposes: online analysis, data management, offline computing

References:

- (1) Tango Control System, <http://www.tango-controls.org>
- (2) Online, Data Acquisition and Beamline Control, <http://hasylab.desy.de/online>
- (3) jddd, Java DOOCS Data Display, <http://jddd.desy.de>
- (4) PyTango, <http://www.tango-controls.org/static/PyTango/latest/doc/html/index.html>
- (5) J. Klora, T. Coutinho et al., The architecture of the ALBA Control System, Proceedings Nobugs 2008
- (6) <http://www-dcache.desy.de>