Research Report
ICRR Inter-University Research Program 2020

Research Subject: Set-up and Commissioning of the onsite data center for CTA North in La Palma, Spain

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Summary of Research Result：

The next generation observatory for the very high energy gamma-rays will be the Cherenkov Telescope Array (CTA) covering energies from 20 GeV to 300 TeV with unprecedented sensitivity. It will be built on two sites: one in the Northern hemisphere (La Palma, Canary Islands, Spain), the other one in the Southern hemisphere (Paranal, Chile). Four Large Size Telescopes (LSTs) of 23 m diameter and 28 m focal length will be arranged at the center of both arrays to lower the energy threshold and to improve the sensitivity of CTA below 200 GeV. The first LST was inaugurated in Autumn 2018 and is now in the commissioning phase.

The CTA onsite data center in La Palma (procured by the University of Tokyo) is the central analysis facility for the data and Monte Carlo studies. The system consists of 2000 cores and 3PB disk space. This cutting edge technology allows us to process data directly onsite in a very short time. Starting from April 2018 the onsite data center is operated by the ICRR. I am responsible for this data center, i.e. the correct set-up, the coordination and management of the users and the commissioning of the IT center. During the last year we set up the IT center successfully. In particular the following points were achieved:

- A second firewall was installed in high availability mode. Before we were working with just one firewall which was a single-point of failure. All devices are behind this single firewall and are all passwords protected. In case a unique firewall fails, we would be unprotected to the outside world or / and we could monitor what is happening inside the IT center from remote. Now we have two firewalls installed. In case one of them fails, the other one will immediately take over. Please find a sketch of the current IT onsite structure in Figure 1.

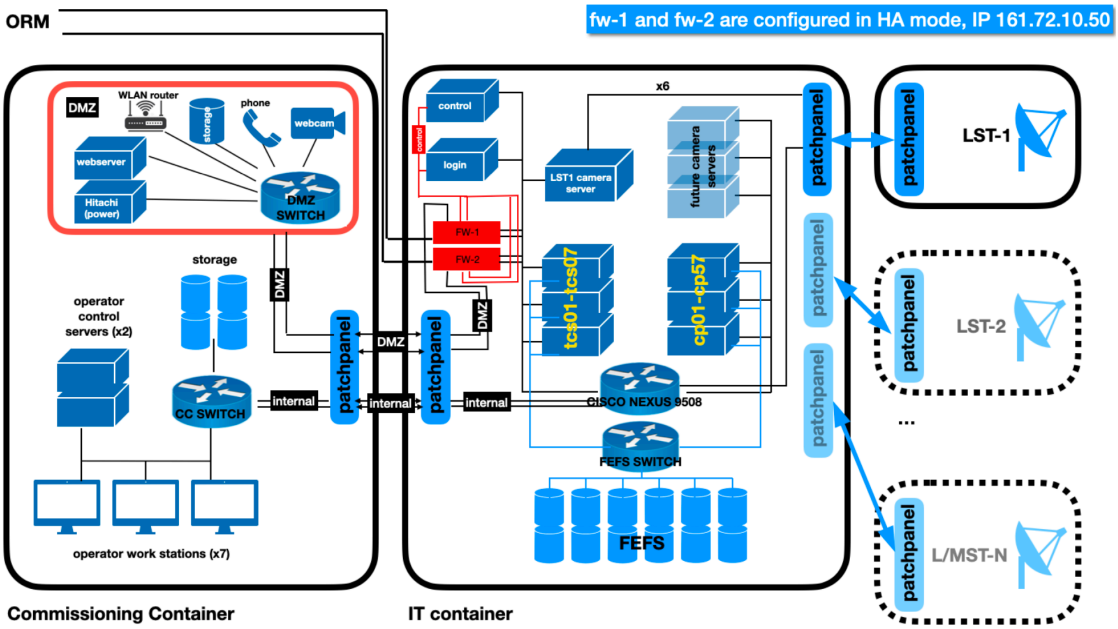

Figure 1: Organization sketch of the onsite IT system

- Implementation of automatic backup: A dedicated backup server was already installed offsite on sea level. We implemented an automatic incremental back up procedure that stores automatically once per week home directories and other important files structures on the back up server.
- Restructuring of SLURM job submission system: We implemented several analysis groups for different purposes and several queues for different lengths of submitted jobs. Furthermore, we implemented a “fair share” distribution of jobs within the different analysis groups in order to avoid that one user can block the whole cluster.
- Installation of GPU server: Installation, configuration and commissioning was successfully finished. After a major upgrade of the job submission system SLURM the server will be available for the users. For the moment only U-Tokyo members have access for testing purposes.
- LST guidelines for developers: We created a document for a more centralized organization:“LST telescope control software deployment and execution guidelines”. It was already blessed by the Executive board of the LST. The guidelines cover the user policy, structure of software installation, software repositories, back up procedures. The implementation is ongoing.

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