

Data Taking and Online

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- The Online group provides the interface between the Operations team and the MICE hardware.
 - ▶ In conjunction with the C&M and Offline software groups
- Responsible for hardware in the MICE Local Control Room (MLCR) and Rack Room 1 (RR1). This covers:
 - ▶ Local network switch
 - ▶ Majority of the servers and operator interface machines
 - ★ Online Reconstruction
 - ★ C&M
 - ▶ Data Acquisition (DAQ)
 - ★ Particle Identification detectors
 - ★ Trigger
 - ★ Tracker
 - ★ Online monitoring of the data

- I have been managing the group since Sep 2013, but will be leaving MICE at the end of this week.
- Paul Smith, U. of Sheffield, has accepted the role after my departure, and we have had some fruitful handover discussions during this month.

- Infrastructure

- ▶ Network Switch Stack (3+1)
- ▶ UPS (6)
- ▶ KVM (2)
- ▶ miceserv1 (1)
- ▶ micestore (1)

- Online Monitoring / Reconstruction

- ▶ miceonrec (3)

- C&M Servers

- ▶ miceecserv (1+1)
- ▶ miceiocpc (1+1)
- ▶ miceopipc (2+1)
- ▶ targetctl1 (1)
- ▶ cagateway (1)
- ▶ miceisgateway (1)
- ▶ micecss (1+1)

- DAQ

- ▶ Detector readout boards
- ▶ Trigger hardware
- ▶ miceacq (6)
- ▶ miceraid (2)

Machine Type (Required + Backups)

6 spare servers will be available soon.

- MICE runs a secure virtual LAN, managed by RAL Networking, of 254 IP addresses.
 - ▶ The virtual network allows us to communicate securely across the site, but maintain simple local configurations.
- This forms the backbone of the C&M, DAQ, Online Reconstruction tasks.
 - ▶ The majority of traffic goes through a three switch stack in the MICE RR1.
 - ▶ A reflash of the stack firmware in Jan'14 has led to improved network stability, with no significant network downtime since.
 - ★ MICE has acquired a spare switch element, which has been prepared for immediate installation if required.
 - ▶ Steps have been taken to remove dependencies on RAL site infrastructure, e.g. making individual locations self-contained, where possible.

- The majority of the servers in RR1 are in good working condition.
- The six DAQ servers are being replaced by U. of Geneva, as part of a rolling replacement plan.
 - ▶ The original servers are all still in working condition, and will be held on site at RAL, available to all working groups as spares.
- The primary C&M server developed a HDD failure during February.
 - ▶ Replacing with the spare was more difficult than necessary, and highlighted a central weakness of the C&M systems.
 - ★ Unnecessary dependencies have been identified and mitigated.
 - ★ Steps are being taken to ensure all machines can be more quickly replaced.

- The C&M server infrastructure is being updated:
 - ▶ All new machines are running Scientific Linux 6.4, which will be supported through to 2020-11-30. All necessary changes to the C&M software have been made.
 - ▶ Stable releases of the MICE C&M software have been initiated.
 - ★ Changing the build structure required a significant effort, but allows parallel installs of Production and Development code.
 - ▶ This stable release is being installed on all C&M machines (approx. 40% done)
 - ★ Assuming correct usage and testing, ensures stability for future data taking runs.

- Currently, the MLCR has 6 work stations:
 - ▶ Three for C&M operators
 - ▶ One for the Online Monitoring & Reconstruction
 - ▶ Two on a shared KVM system:
 - ★ DAQ interface
 - ★ Administrator access to Infrastructure servers
- The disadvantages of this system were:
 - ▶ Each work station was rigidly defined in its role; e.g. only two operators could access the DAQ or infrastructure servers at any given time.
 - ▶ A KVM unit failing would prevent the use of multiple workstations, and make accessing some systems very difficult.

- The solution, eight thin client systems, to be installed in the MLCR.
- Each will be based on the Intel NUC system, costs < £200 for parts, and requires approximately 1.5 hours to prepare in the first instance.
 - ▶ Installing a system (or replacing a faulty system) takes approximately 5 minutes.

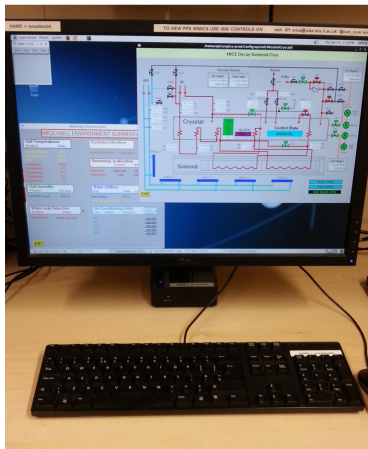


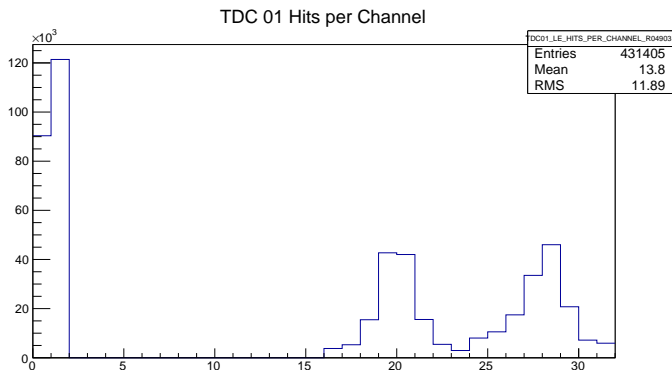
Figure : Installed in the MLCR, running C&M GUIs.

- Each system will be configured for all roles, with all necessary software for controlling the DAQ, OnMon, OnRec and C&M systems installed.
 - ▶ Workstations will still have assigned roles, but these will be by convention only; experts will be able to work from any station as required.
- The C&M GUIs will run locally, removing a single point of failure.
- All machines will communicate over the MICE network switch:
 - ▶ This is already unavoidable as a failure point.
 - ★ We hold a spare switch element.
 - ▶ The KVM systems will be maintained as a fallback solution.
- A single prototype workstation has been set up, and everything appears to be working perfectly.

- The DAQ for all installed detectors (TOF, CKov, KL and EMR) is working perfectly.
 - ▶ All detectors recorded data simultaneously during the EMR run last year.
- Development for the Tracker DAQ is on schedule; all software has been written, tests and documentation are being developed, and commissioning of the system will proceed when the trackers are installed in the MICE Hall.
 - ▶ Early commissioning will depend on installed pulser / LED systems, or cosmics, but final commissioning will require beam data, and will presumably be the first element of the Step IV run plan.

- A new, FPGA based, DAQ system has been installed.
 - ▶ The previous trigger logic was based on a number of VME, CAMAC and NIM crates, was complicated, poorly documented and prone to failure.
- The new system relies on a single programmable board, with a replacement board held on site.
 - ▶ It was tested in April, in parallel with the old system. It produced each trigger that the old system did, and approximately 2% that the old system missed. Each trigger was investigated, and confirmed to be valid.
 - ▶ A second test will occur during the June activation study, after which we intend for it to take over as the primary system; the original system will be maintained for some time as a fallback solution.

- Online Monitoring applies low level tests to detector data, as it is written to disk, e.g.:
 - ▶ Counts of start_of_burst, physics_event and end_of_burst tags.
 - ▶ Number of hits per TOF channel.



- The system for producing and viewing plots is in place
- Work prior to Step IV will include:
 - ▶ More variables, as the EMR and Tracker are integrated into MICE.
 - ▶ Automated tests, which will compare the present runs to past data, and highlight any potential inconsistencies for the shifter.

- The Online Group's work package is on track for Step IV.
 - ▶ The Network is in good health, and requires only reactionary work.
 - ▶ The Servers and DAQ systems are undergoing useful improvements, but could serve as currently implemented.
 - ★ The Tracker DAQ is the only vital component that is not in working order.
 - ★ Restricted by Tracker installation and commissioning work, as well as Hall access time; to be coordinated with operations, construction and Tracker group.
 - ▶ The operator interface is being replaced, which will make the MLCR easier to work in, and will remove possible failure points.
- Management is changing again, but will be in safe hands with Paul Smith.