

C&M Review

**Infrastructure, networking &
configurations**

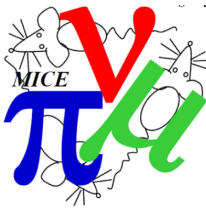
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19th December 2016



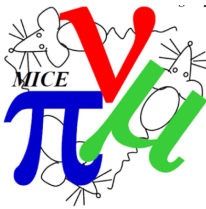
Network: miceNet

- Class C, secure virtual LAN administered by RAL networking
- Network stack in Rack Room 1 near MLCR
- External access through a gateway, using *ssh* key pairs
- Lockout for the staff network before the next user cycle
- Serving MICE hall, MLCR, RR1 and RR2 + 1 port in R1 in the MRMR and 1 port in R9
- About 210 machines (OPIs, IOCs, webcams, servers, storage, laptops, etc)



Network configuration

- Only registered devices can connect in to miceNet
- Static IP assigned by DHCP according to the MAC address
- 1 DNS server and 2 mirrors
- Removed the dependency on DNS: C&M devices communicate only using IP numbers
- The network can be isolated without interrupting the normal activity
- Firewall: *iptables*, different rules for different machines



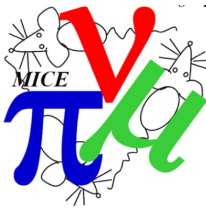
Input/Output Controllers

- Daresbury Lab VME systems:
 - No network dependencies
 - Direct control/monitoring of hardware and sensors
- Linux machines:
 - Network dependencies
 - Higher level functions
 - No direct connection with CC power supplies
 - ssh key w/ password for the login



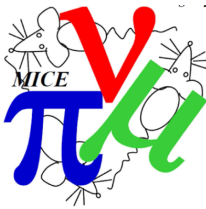
List of IOCs

IOC	Description	Network Dependencies
miceiocpc1 miceiocpc2	Channel, MICEStates, Environment, Rackmon hot spare for miceiocpc1	CS7A/B/C, SP-5ES, HallProbes
miceiocpctk miceiocpchv	IOC for Trackers, Tracker SM IOC for HV	miceioc2 & RATS running on target1ctl
miceisisgateway	IOC for ISIS monitoring	gateway to ISIS controls
miceiocpca miceiocpcb miceiocpcc miceiocpcd miceiocpce miceiocpcf miceiocpcg miceiocpch miceiocpci miceiocpcj miceiocpck miceiocpcl	IOC for BeamLine IOC for BeamLine State machine IOC for Detectors IOC for Detector State Machine IOC for DAQ Monitoring IOC for Run Control IOC for DS State Machine hot spare for State Machine IOC for SSU State Machine IOC for SSD State Machine IOC for FCU State Machine IOC for FCD State Machine	TargetMon, CS1, SP-5ES, CS4 CS4, BeamLine IOC miceiocpchv, micehv1, micehv2, SP-5ES iceiocpcc DAQ, miceonrec CDB, all State Machines, OnMon, data mover CS1 CS7A/B/C, Channel CS7A/B/C, Channel CS7A/B/C, Channel CS7A/B/C, Channel
miceioc1	Decay Solenoid IOC	CS1
miceioc2 miceioc4 miceioc5 miceioc7a miceioc7b miceioc7c miceioc9a miceioc9b	VME – Target Drive IOC VME – Beamline Magnets IOC VME – Linde refrigerator IOC VME – Cooling channel IOC; analog VME – Cooling channel IOC; digital VME – Cooling channel IOC; analog VME – Vacuum/Compressors IOC–analog VME – Vacuum/Compressors IOC–digital	micecss1 when booting micecss1 when booting micecss1 when booting micecss1 when booting micecss1 when booting micecss1 when booting micecss1 when booting micecss1 when booting



Operator interfaces

- EPICS client interfaces on miceNet:
 - MICE Local Control Room
 - Hall and RR2
 - Laptops
- Shifters GUIs
- Expert (password protected) GUIs for the critical interfaces



Bazaar repository

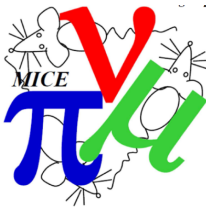
- EPICS repository on a miceNet server (miceecserv)
- Development and Production branches
- Repository synchronized in a mirror machine

- Software code freeze:
 - Before the expert run
 - Software IOCs meant to run from PRO



NFS mounts

- Common areas shared across the machines:
 - EPICS modules: easy synchronization
 - Data folder: Archiver data and configuration files
- The IOCs software is running locally on the IOC machines
- Any lost of network should not affect the hardware



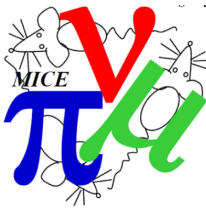
Monitoring

- All the machines are monitored using Nagios
 - Health (memory, cpu, disk, ssh, mount points, zombie processes, ...)
 - IOCs processes
 - EPICS software update status
 - Archiver engines
- Status reported on web interface and by email to experts
- Critical problems reported to the shifters using the ALH
- Future Auto-SMS implementation



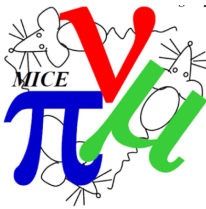
Spares and backups

- Linux IOCs have hot spares:
 - Rack mounted servers
 - Intel thin clients
- Failover procedure in place
- NAS drive used for selective backups
- Archiver data incrementally stored on the Grid



External monitoring

- Experts not on-site (in the Control Room) can:
 - Monitor the equipment from remote thanks to the gateway serving a PPD machine (hepInv154)
 - Install a miceNet OPI-like machine (SL64+EPICS)
 - Sit in the Remote Monitoring Room in R1
- Any remote activity is allowed purely for monitoring
- A way to lockout any users access during the runs to the IOCs has been tested



Conclusions

- The network has proved to be robust and reliable, so the infrastructure from the hardware point of view
- Tested and experienced few failovers that have lead to new procedures and improvements
- Few machines failed: quick rescue and spares in places
- In case of network/infrastructure hardware failure or loss of communication, the equipment is designed to end in safe mode
- MICE note #488: “Stability of Controls & Monitoring on MICE Net”