USING EPICS REDUNDANT IOC IN UNIX ENVIRONMENT

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Introduction

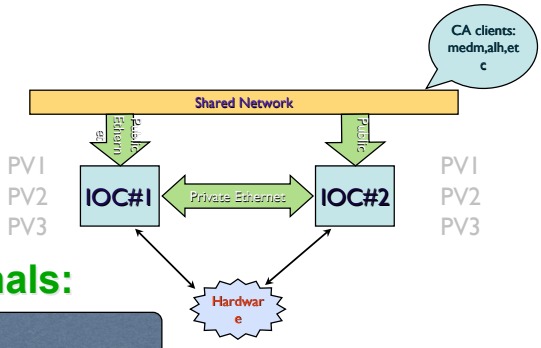
EPICS redundant Input Output Controller (IOC) has been originally developed at DESY. And two major fields of application were defined:

1.Redundancy for cryogenic plants.

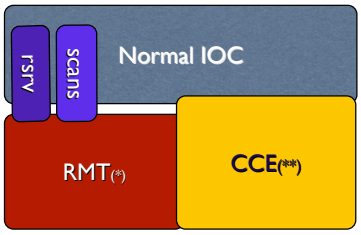
2.Redundancy for controllers in the XFEL tunnel.

Originally the project was supposed to support only vxWorks and all the code written was very vxWorks specific. But later it was seen that other operating system support is desirable. Here at KEK we use software-IOC on Linux which work as "gateways" from an old control system to EPICS-environment. Also for the ILC project ATCA-based systems under Linux control will be used. And redundant IOCs are highly desirable for this project. Thus the porting of redundant IOC was done to EPICS libCom/osi, which means that current implementation should work on any EPICS-supported operating system.

Redundant IOC



Internals:



(*) RTM (Redundancy Monitoring Task)
(**) CCE (Continuous Control Executive)

RMT functions:

- Check "health" of the drivers
- And control drivers (start, stop, sync, etc...)
- Check connectivity with the network
- Communicate with the "partner"
- And decide when to switch to the partner

Porting:

- Originally RMT, CCE and other parts were developed for vxWorks
- A lot of vxWorks specific system-calls
- were replaced with EPICS libCom/OSI wrappings
- And some additional OSI-wrappings were implemented

Replaced *libCom/OSI*

- epicsMutex.h: epicsMutexLockWithTimeout(id, tmo);
- epicsMutex.h: epicsMutexOsdLockWithTimeout(id, tmo);
- epicsThread.h: epicsThreadDelete(id);
- epicsTime.h: epicsTimeGetTicks ();

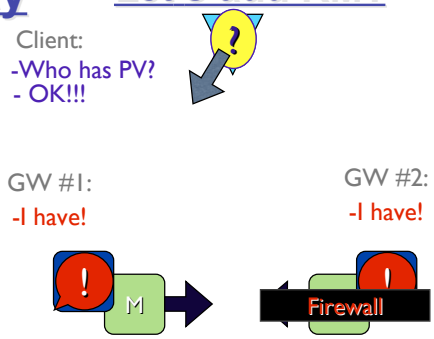
Summary

- OSI version of redundant IOC was built and successfully used back on vxWorks!
- and on Linux
- and on Darwin
- and on Solaris
- .... probably should work on any EPICS-supported OS

Redundant CA Gateway

- Nothing to synchronize between partners
- Can be "redundant" out of the box, but clients would see multiple replies for the same PVs.
- Would be nice to "load-balance" if both GW are up and running

Let's add RMT

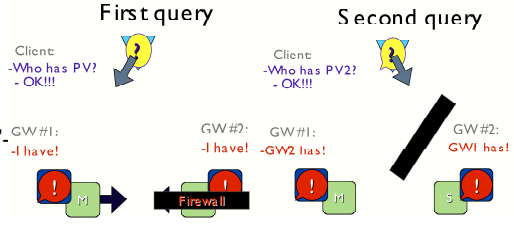


Redundancy only

- RMT as separate process, which does all "pinging", health-checking and decision making
- Gateway is just running as usual
- On "SLAVE" we block replies from the Gateway by firewall rule
- no modification to the source of GW!!!

Load-balancing

- same as previous plus:
- Inform GW about its partner status, whether it is alive
- Load-balance using "directory service"- feature of CA protocol
- GW source was altered (a little)



To be done:

- GW status check should be implemented on RMT side (i.e. simple driver could be implemented).