First Experience with VMware Servers at HLS

G. Liu*, C. Li, K. Xuan, J. Wang, X. Bao
National Synchrotron Radiation Laboratory, University of Science and Technology of China, Hefei, Anhui 230029, P. R. China
* gfliu@ustc.edu.cn

Abstract

Hefei Light Source (HLS) is a dedicated second generation VUV light source, which was designed and constructed two decades ago. In order to improve the performance of HLS, especially getting higher brilliance and increasing the number of straight sections, an upgrade project is undergoing, accordingly the new control system is under construction. VMware vSphere 4 Enterprise Plus is used to construct the server system for HLS control system. Four DELL PowerEdge R710 rack servers and one DELL Equallogic PS6000E iSCSI SAN comprises the hardware platform. Some kinds of servers, such as file server, web server, database server, NIS servers etc. together with the softIOC applications are all integrated to this virtualization platform. The prototype of softIOC is setup and its performance is also given in this paper. High availability and flexibility are achieved with low cost.

The hardware platform:

- 4 Dell PowerEdge R710 rack servers
- 1 Dell PowerEdge R210 rack server
- 1 DELL Equallogic PS6000E iSCSI SAN

Dell PowerEdge R710 :

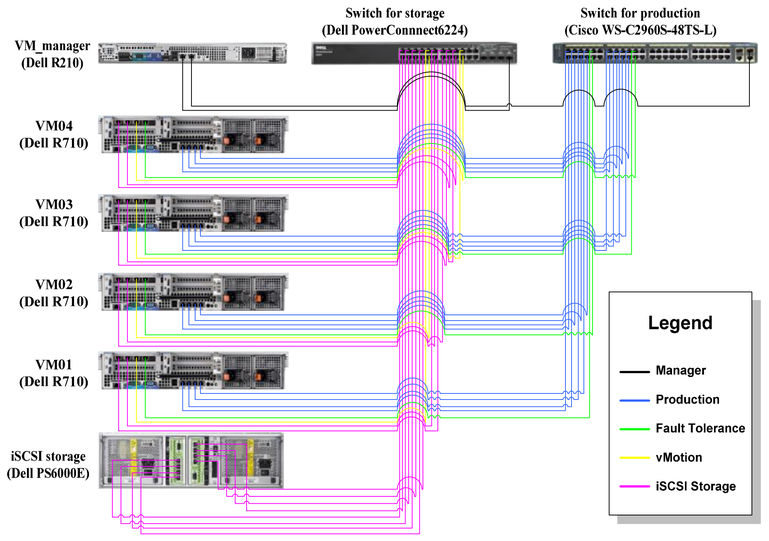
- 2 Quad-core Intel Xeon 2.53GHz processors
- 48GB DDR3 memory
- 64GB SSD
- 8 1Gigabit Ethernet ports

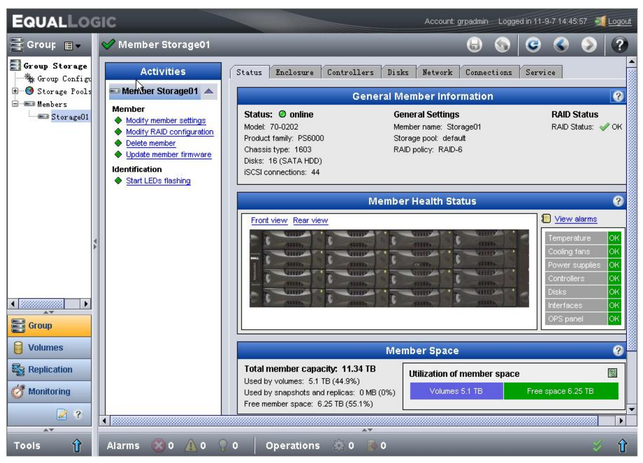
Dell Equallogic PS6000E iSCSI SAN:

- 16 1TB SATA disk
- 8 1Gigabit Ethernet ports
- dual power supplies
- dual controllers

Hardware

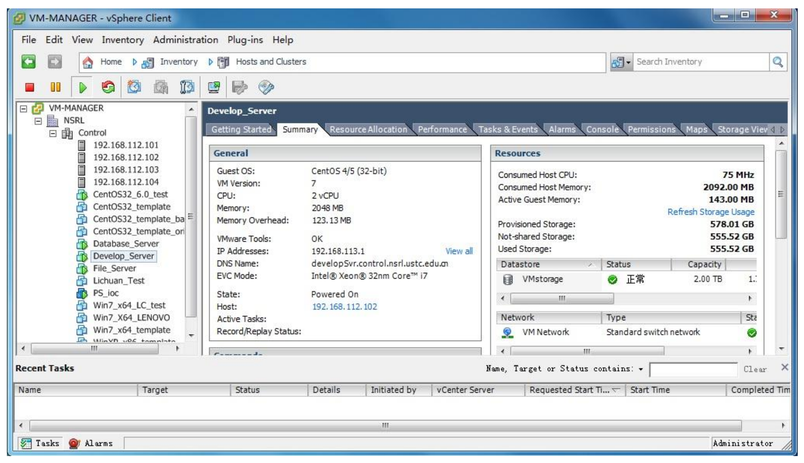
Net topology





Management interface of Dell EQ iSCSI SAN

VMware vSphere client



The usable disk space is about 11.34TB:

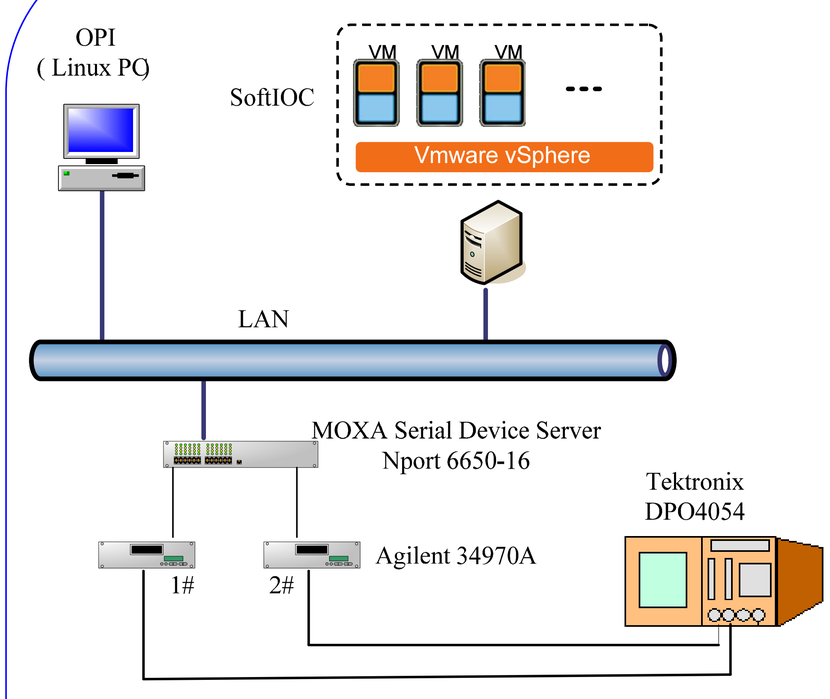
- RAID 6
- a hot spare drive

The virtual machine list:

- "Develop_Server", development environment
- "Database_Server", runs Orace10gR2
- "File_Server", for files service and svn repository
- "PS_ioc", for softIOC
- other virtual machines, for pre-configured templates and operating system tests

Features related to the availability:

- VMware vMotion. It enables the live migration of running virtual machines from one physical server to another with zero down time, continuous service availability, and complete transaction integrity.
- VMware Storage vMotion. It enables the migration of virtual machine files from one datastore to another without service interruption.
- VMware High Availability(HA). It provides high availability for virtual machines. If a server fails, affected virtual machines are restarted on other production servers that have spare capacity.
- VMware Fault Tolerance. When Fault Tolerance is enabled for a virtual machine, a secondary copy of the original (or primary) virtual machine is created. All actions completed on the primary virtual machine are also applied to the secondary virtual machine. If the primary virtual machine becomes unavailable, the secondary machine becomes active, providing continuous availability



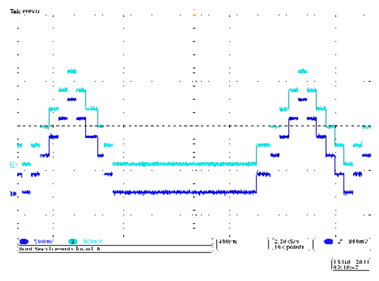
Hardware structure of SoftIOC test system

Availlability Test of softIOC

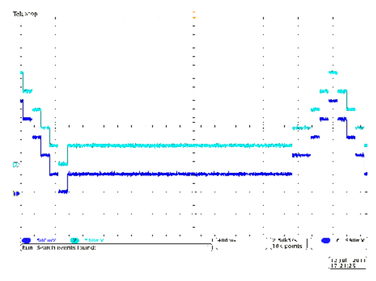
In order to investigate the availability of softIOC, a test system is setup, as shown in left figure. A softIOC runs on a virtual machine, it communicates with 2 Agilent 34970A over MOXA serial device server NPort6650. A DAC board is installed on each Agilent 34970A. A SNL program running on the softIOC controls the output of each DAC board, the waveform is triangle with100ms step and is monitored by the oscilloscope Tektronix DPO4054.

The interruption time:

- about 1600 ms during VMware vMotion
- about 2600 ms during VMware Fault Tolerance



Output waveform during VMware vMotion



Output waveform during VMware Fault Tolerance

CONCLUSION

Our first experience with VMware servers shows that the virtual infrastructure can provide a reliable, flexible, extensible and manageable environment. The down time of services during virtual machine migration is not zero, but it is acceptable at HLS. Although VMware vSphere is not cheap, cost per virtual machine will be lower when increasing the number of virtual machines.