

CONSTRUCTION AND IMPLEMENTATION OF CONTROL AND DAQ SYSTEM OF MICRO CRYSTALLOGRAPHY (MX) BEAMLINE via SERVER VIRTUALIZATION



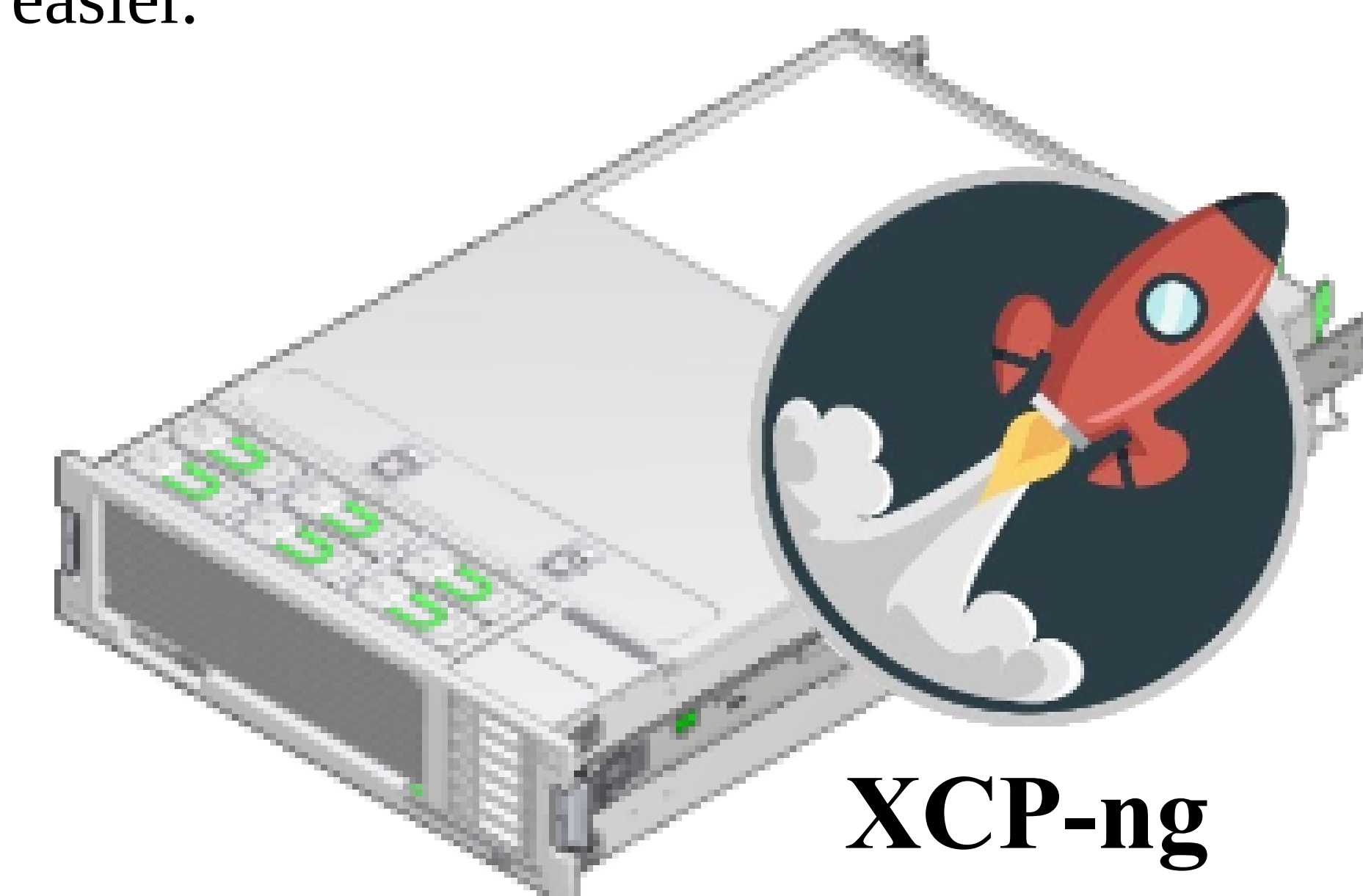
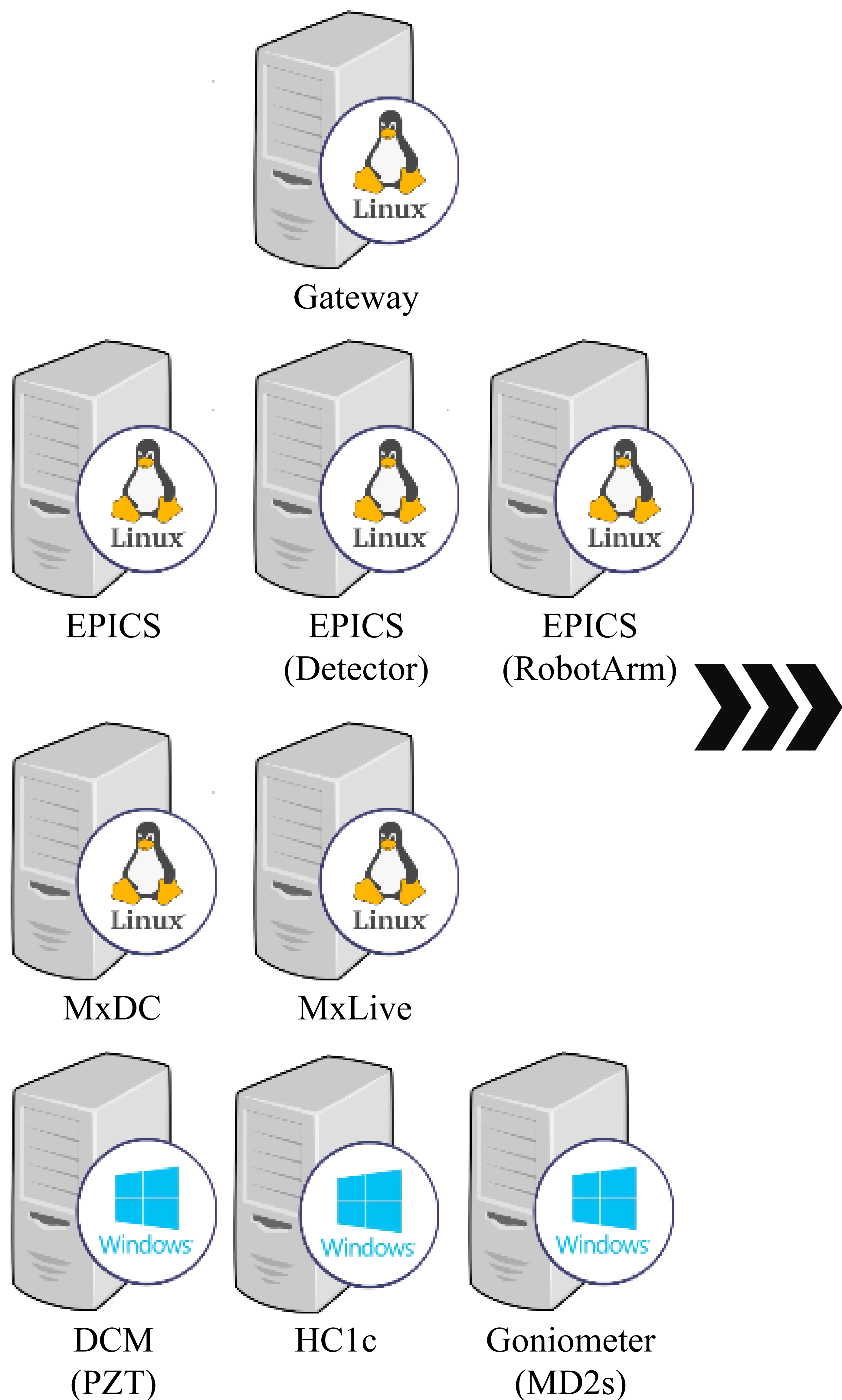
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Abstract

The project aimed to implement a beamline control and data collection system through a server Virtualization System, and was applied to the 5C beamline of the 3rd generation beamline of Pohang Accelerator Laboratory (PAL). The 5C beamline is currently under construction for the FBDD (Fragment-Based Drug Discovery) beamline with the goal of building a fully automated beamline. Therefore, the project was started to operate stably and efficiently systems to be applied to the beamline.

The control system was implemented using EPICS software tools and MxDC/MxLive software for data acquisition and storage. The control and data collection system of this beamline is integrated using XCP-ng (XenServer based), and it is in operation. With the integrated Virtualization system, network organization, simplification and data transmission/receive between systems are more stabilized. So, The overall size of the system has been significantly reduced, making maintenance easier.



Methods

The System of Server virtualization was built on a Dell PE R740XD device. The server was selected by referring to the Hardware Compatibility List (HCL). Hardware outside the HCL may or may not work, depending on how well the drivers are supported by the linux kernel included in XCP-ng.

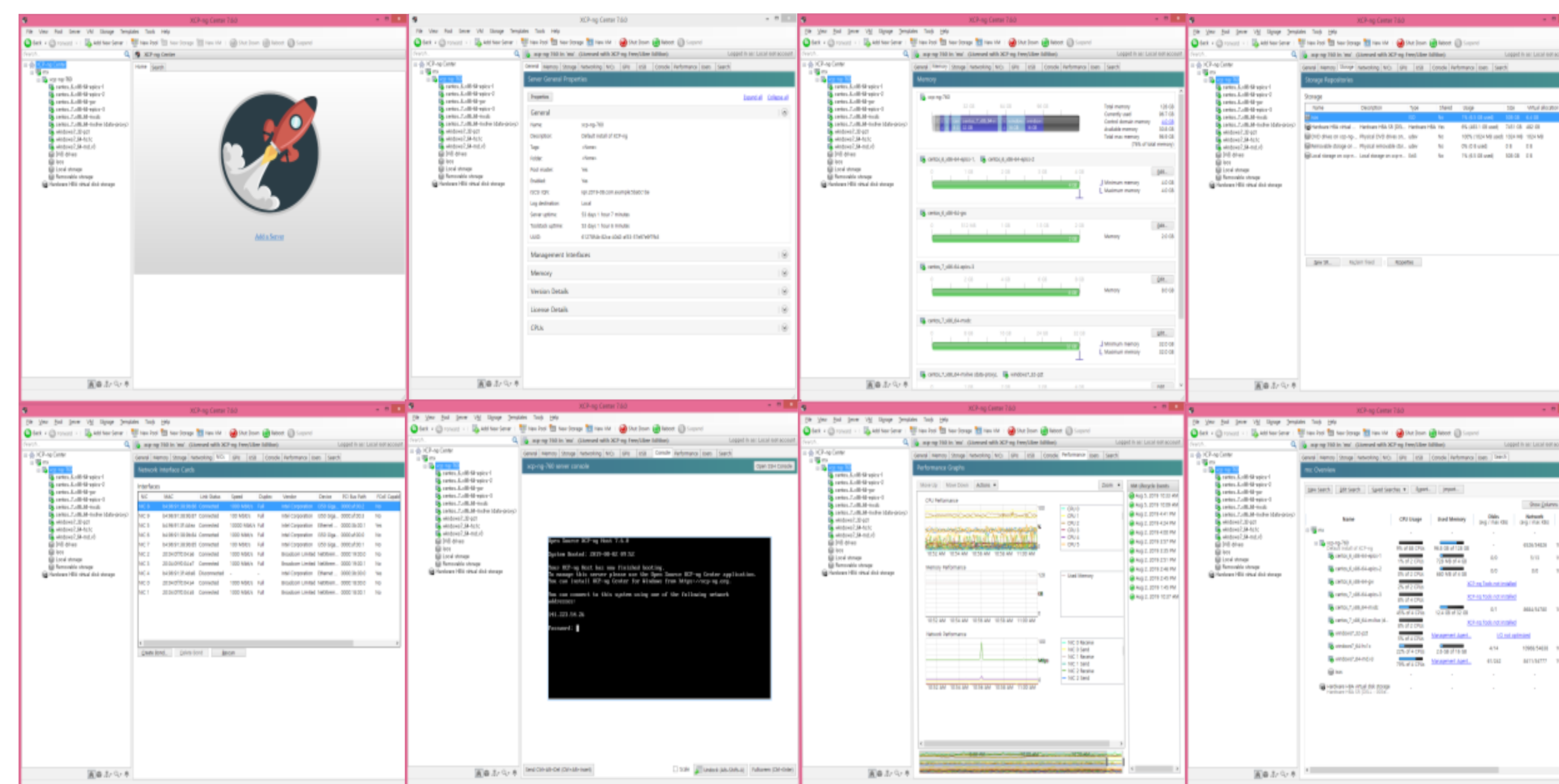
The Beamline is consist of into Control (EPICS), Data Acquisition (MxDC/MxLive from CLS), and Data Processing (DPS) systems, and there are Nine of Virtual Machine(VM) in total. Since the Control system uses various communication interfaces (Ethernet, Serial, USB, etc.), the virtualization system enables the PCI / USB passthrough function. Using this technology, a PCI card or USB device attached to a Host (Physical server) is directly connected to a Virtual Machine to interface with the card or device.

The Network of the Virtual Machine (Public, EPICS, LDAP, Storage, Detector/Automounter/Goionometer comm., etc.) is systematically classified. By configuring the network suitable for each role, there is no interference between networks to ensure smooth data transmission and receive the stable network communication.

Results

Virtual machines in the virtualization system are managed through XenCenter. XenCenter is a kind of management console that connects to Host server from outside by interworking with Xenserver of host role and provides window based user interface. Virtual machines that ready to operating can be Backup, Restore and Cloning can be done through XenCenter.

PCI/USB passthrough is a feature that allows virtual machines to directly connect PCI and USB devices. With this technology, it is not difficult to drive most beamline controls. Applied server virtualization to the beamline, we consolidated our distributed systems into one server device, greatly improving maintenance and system reliability. Virtual machines built on the beamline were created and configured using XenCenter, and full maintenance was made possible in one place. Console tabs provide easy access to virtual machines. If necessary, you can efficiently allocate, adjust, or manage the resources of your virtual machines.



References

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