Virtual Architecture 101

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Integrity - Service - Excellence
Overview

• Present Control Room Configuration

• Virtualization Overview

• GPUs

• Desktop

• Virtualization in the Control Room
Today’s Control Room
Control Room Model

Telemetry Processor

Video Switch

8 Servers

54 Workstations
Physical Vs Virtual

- Virtualization is the decoupling of operating system from the hardware
The hypervisor is the interface between the guest operating System and the layer below.
Hypervisor Types

• Two types of Hypervisors:
  – Type 1: Bare Metal
    • VMWare ESXI,
    • Microsoft Hyper-V,
    • Citrix Xen Server
  – Type 2: Hosted
    • VMWare Workstation
    • Oracle VirtualBox
Cluster

- Clusters create a fault tolerant high availability infrastructure
- The virtual network is a component of the cluster
Hyperconvergence

• The industry term which describes the tight integration of computing, storage, and networking resources

• Resources are now resource pools
  – Cores, memory, graphics, storage

• Management tools are now integrated and necessary
Virtualization Considerations

• Old model: OS drivers support hardware
• New model: hypervisor support required
  – Compatibility matrix
  – CPU support of virtualization
  – Graphics support
  – Storage
Graphics

• 3D graphics

• CUDA processing
  – Parallel processing to the user

• Passthrough
  – Entire card goes to one user

• Fractional card
  – vGPUs allocated to users
  – 1, 2, 4, 8, 16 vGPUs per real GPU
Desktop Equipment

• Sending video (only) to the desktop over the network

• GPU acceleration optional
  – From inside the VM (not at the desk)

• Several protocols available
  – Teradici PCOIP
  – Microsoft RDP
  – Citrix HDX
  – VMWare BLAST
Desktop Equipment

• Zero client
  – Video only
  – Infrequent updates

• Thin client
  – Small OS
  – Video + application + storage
  – Medium updates

• Thick client
  – Full PC
  – Transition
  – Plenty of updates
Storage

• **Persistent Storage**
  – Desktop changes kept day to day
  – Offline processing
  – Conventional office desktop

• **Non Persistent Storage**
  – Every startup reset back to the original state
Security

• All clients can use the same image
  – Changes rolled out faster

• Security of guest OS is improved
  – Hypervisor security

• Zero clients have no storage
Control Room Lab Environment

- System studies in process
- Testing real time processing
- Testing off line processing
- Testing office tools
Appliance Resources

Appliance
• 160 Processor CPUs
• 4 Graphics GPUs
• 6 TB Memory
• 184 TB Storage
• Virtual network
Implemented Resources

Status
- 4 physical machines
- 6 (12) servers
- 11 (50+) simultaneous clients
Implemented Functions

Goal

- Software Decom
- IADS CDS
- APS (MCS and IADS)
- Video Support
- Soft RMOR
- PCM Simulator
- Situational Awareness
- Software Recording
Distributed Test

- Hardware at one location
- Desktops at several locations
- Only limited by network connectivity