



# Zero Clients and Virtual Desktops in Academic Environments

**Franz Agas**

Systems Analyst

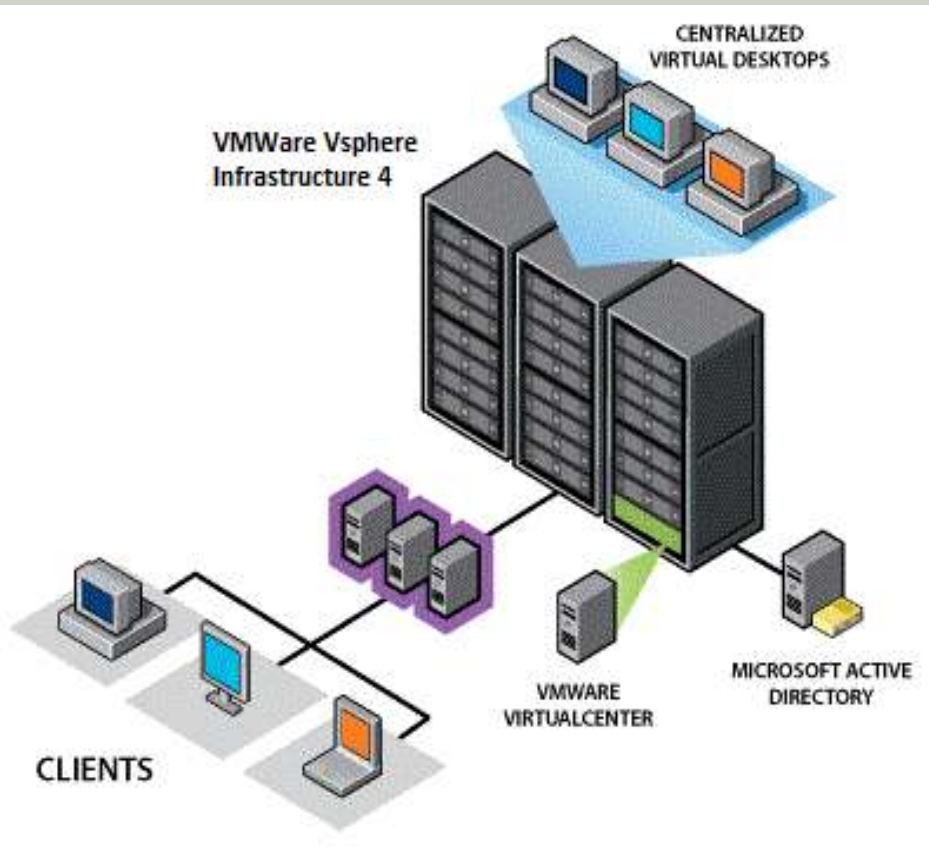
University of Michigan

School of Information

# Overview of UMSI

- Graduate School
  - 369 Master's students
  - 50 Ph.D students
  - 61 Faculty
- Our faculty and students work to develop an integrated understanding of human needs as they relate to information systems and social structures, connecting people, information, and technology in valuable ways. SI pioneers the development and application of principles of information management.

# Sample Virtual Desktop Infrastructure Overview



- Server Hardware
- Hypervisor: VMWare Infrastructure 4
- Microsoft Windows 7 Virtual Desktops
- Directory Services: Microsoft Active Directory, Novell eDirectory, Open LDAP
- Connection Broker: Pano Logic Manager or VMWare view
- Clients: Zero, Thin, Thick

# Clients Overview: How users interface with Virtual Desktops



# Thick Clients

- Local Processing
- Local Data Storage
- Installed Operating System
- IT Maintenance Needed
- Essentially a computer connected to a Network



# Thin Clients

- Limited CPU/RAM
- Limited Data Storage
- Embedded Operating System
- IT Maintenance Needed



# Zero Clients

- No CPU/RAM
- No Data Storage,
- No OS or Firmware
- No Maintenance needed



# Features We Looked For

- Cost Savings
- Scalability
- Integration within our existing Virtual Infrastructure
- Ease of Management for two locations
- Power Savings – Energy Savings Initiative
- Reduce time required for Lab and Research Desktop deployment
- Student/Faculty access both offsite and onsite

# Infrastructure Prior to Rollout

- 150 Ph.D/Staff/Faculty Windows PCs on Active Directory and Campus Network, equal amount of Apple OSX machines. User and Research data stored on central servers.
- Primarily Dell PC's: Dual Core/2GB of RAM
- Several Ph.D students and faculty using remote desktop to PCs on their desks
- Two Computer Labs:
  - 30 Seat Masters Student Lab
  - 30 Seat Economics Lab
- Servers already virtualized with VMWare ESXi

# Initial Pano VDI Rollout 2008

- **Desktop Client:**

- 15 Pano Logic Zero Clients, Keyboard/Mice, Monitor

- **Hypervisor:**

- VMWare ESXi 3.5

- **Connection Broker:**

- Pano Logic Manager

- **In The Datacenter:**

- Dell Poweredge Server: Dual Intel Quad Core (8 core) 32GB Ram 15 Windows XP Virtual Desktops

# Current/Future VDI Offering

- **Desktop Client:**
  - 50 Pano Logic Clients, Keyboard/Mice, Monitor
  - Plan to replace 30 PC Lab with 30 Pano Logic clients
- **Hypervisor:**
  - VMWare ESXi 4, VMWare virtual center
- **Connection Broker:**
  - Pano Logic Manager
- **In The Datacenter:**
  - 2 x Dell Poweredge AMD R815 Servers: 48 Cores/128GB of RAM
  - 50 Microsoft Windows 7 Virtual Desktops

# Advantages to VDI

- Cost Savings: 30% increasing year after year
- Time Savings: Quick deployment for research
- Energy Savings: 4 Watts for Pano Client w/Keyboard compared to 100 watts for a PC
- Increased Security due to data not being stored locally. 128 bit encrypted connection
- Convenience of remote desktop access for faculty and grad students

# User Perspective

- Easy Transition to Virtual Desktops
- More CPU/RAM Resources for Jobs than PC
- Issues with Audio/Video – Zero Clients not for Multimedia Use

# Long Term Benefits

- Lengthening Technology Replacement Cycle
  - Hardware upgrades result in significant cost benefits due to the increased number of Virtual Desktops per server
  - Instead of the typical 3 year PC replacement, we can make less expensive incremental upgrades over time
    - Enhancing the existing servers with more processors and memory
    - Adding additional servers to the cluster
    - Increasing storage
  - Improvements in software, both Pano and VMWare, should also enhance the end user experience



Thank you!

Questions?