Medialess Computing: High Performance Medialess Computing at Los Alamos National Laboratory

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Weapons Engineering Computer Support Team

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Los Alamos National Laboratory

Objective

- Introduction into a KVM implementation at Los Alamos National Laboratory
- Security advantages – has been showcased to other agencies and Laboratories across the complex
- Focus on system architecture
- Tools developed for implementation

Brian Martinez Bio

- **19 years of technology management and computing experience working with Los Alamos and Sandia National Laboratories.**
- **13 years of experience working on classified computing systems and red networks, 8 of these years working directly with KVM technology.**
  - Instrumental on the planning, design, and implementation of the KVM infrastructure for the Weapons Engineering complex which now serves as a proven architecture for the institutional cyber security strategy
- **Currently the IT Manager for the Weapons Engineering Computer Support Team at Los Alamos National Laboratory.**
  - His team currently supports the hardware, software and security support for over 1,500 weapons related customers. Brian and his team have received numerous LANL awards and outside recognition pertaining to the team's secure classified implementations. Brian and his team are also certified in many different technologies that support the classified infrastructure at Los Alamos.

Agenda

- Introduction to KVM Technology
- Weapons Engineering Computer Support Team
- Weapons Engineering Vault Configuration
- Questions

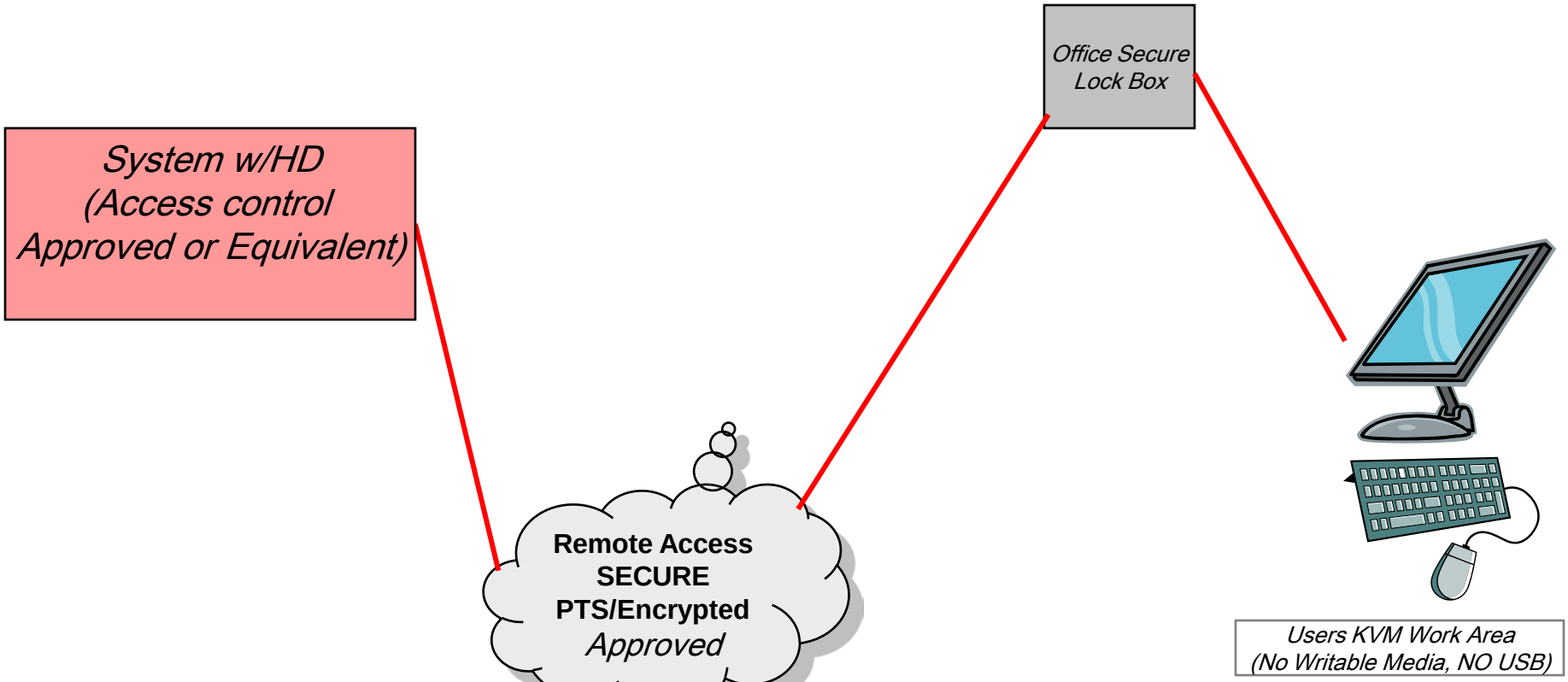
KVM (Keyboard Video and Mouse)

- **Keyboard, Video and Mouse at a users desktop.**
- **Stands for the technologies which retain personal computing advantages, while centralizing administration and physical location.**
- **More Secure, cheaper to manage**
  - No desktop ACREM (Accountable Classified Removable Electronic Media)
  - Central locations streamline physical support
  - “Always on” enables effective remote system management

Technologies

- **Different KVM technologies available and implemented**
  - Currently one size does not fit all
- **High end Graphics Logical Solutions Point to Point**
- **High end Graphics ClearCube IP solution**
- **ClearCube Point to Point Solution**
- **Virtual Clients**

SRD(Secret Restricted Data) COMPUTING



WECS Team Secure Computing Overview

- **900 KVM Units Implemented in WECS Support area**
- **Service provided to 1,566 classified users**
- **100% of classified desktop/workstations on a Non-CREM (diskless) solution**
- **Machine controllers are the only machines left with a disk**

Historical VTR Installation

- Windows supported.
- 16 systems per rack.

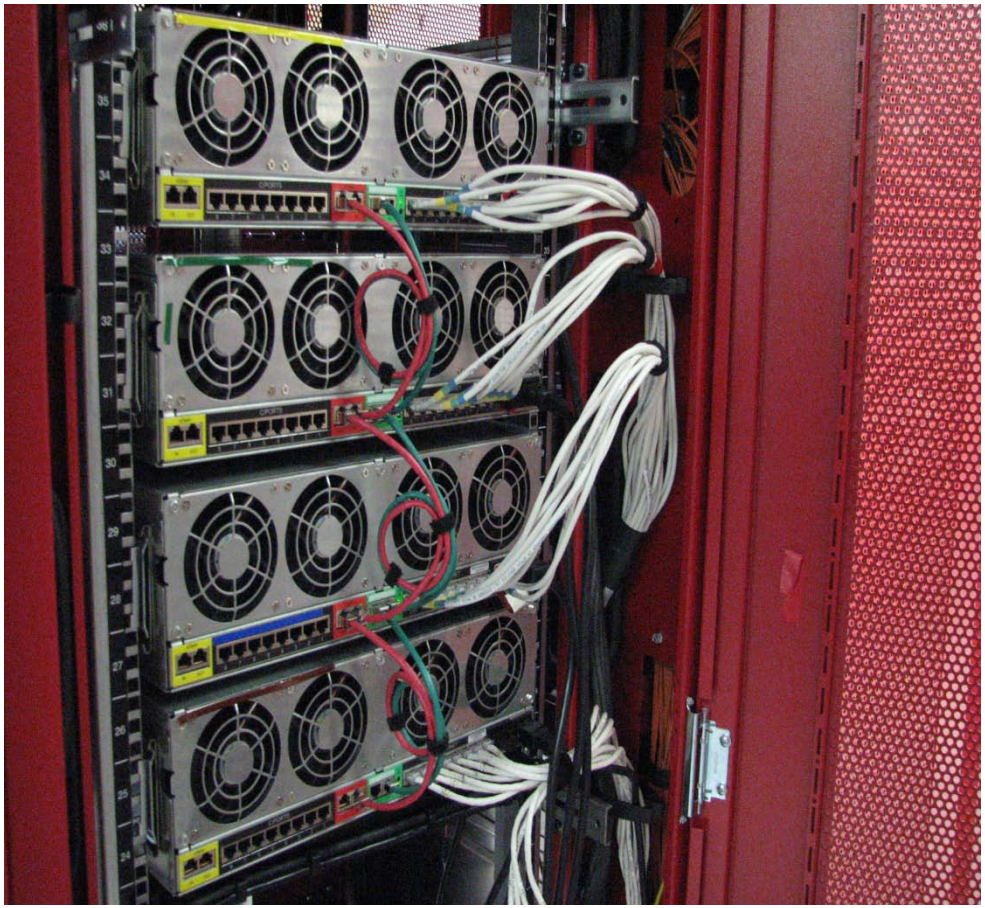
Current Weapons Engineering Vault

- Standard Weapon Systems Vault Configuration

ClearCube Rack Configuration (Front side)

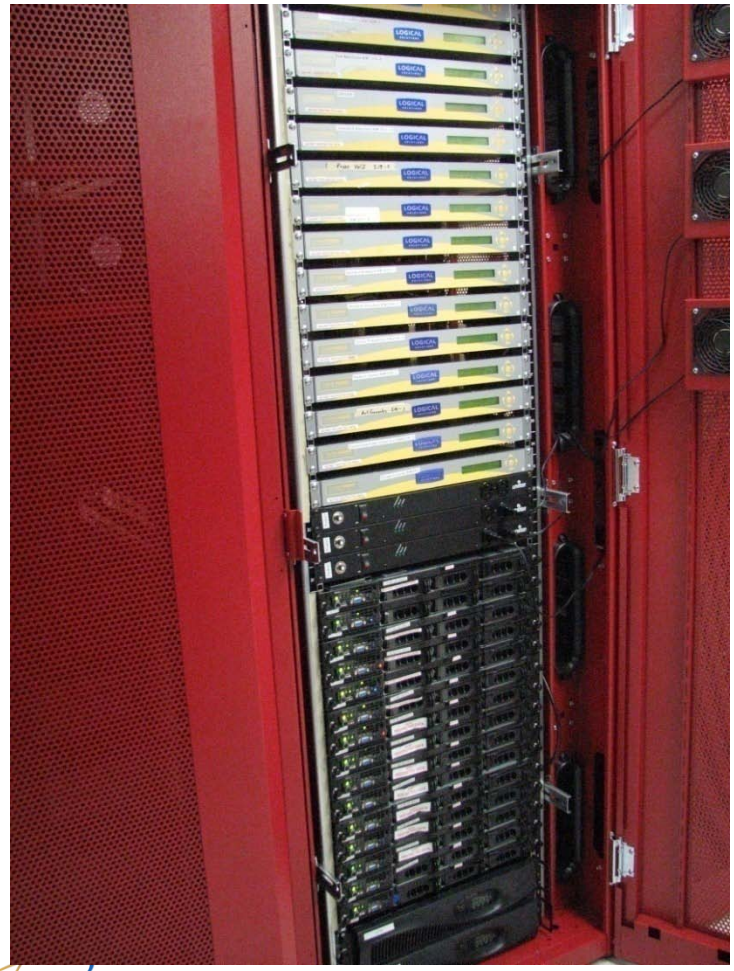
- Using ClearCube Blade Technology we are able to support 80 blades per rack.
- This rack installation also has 3 UPS(Uninterrupted Power Supply) units and 4 PDU's(Power Distribution Units)

ClearCube Rack Configuration (Back side)



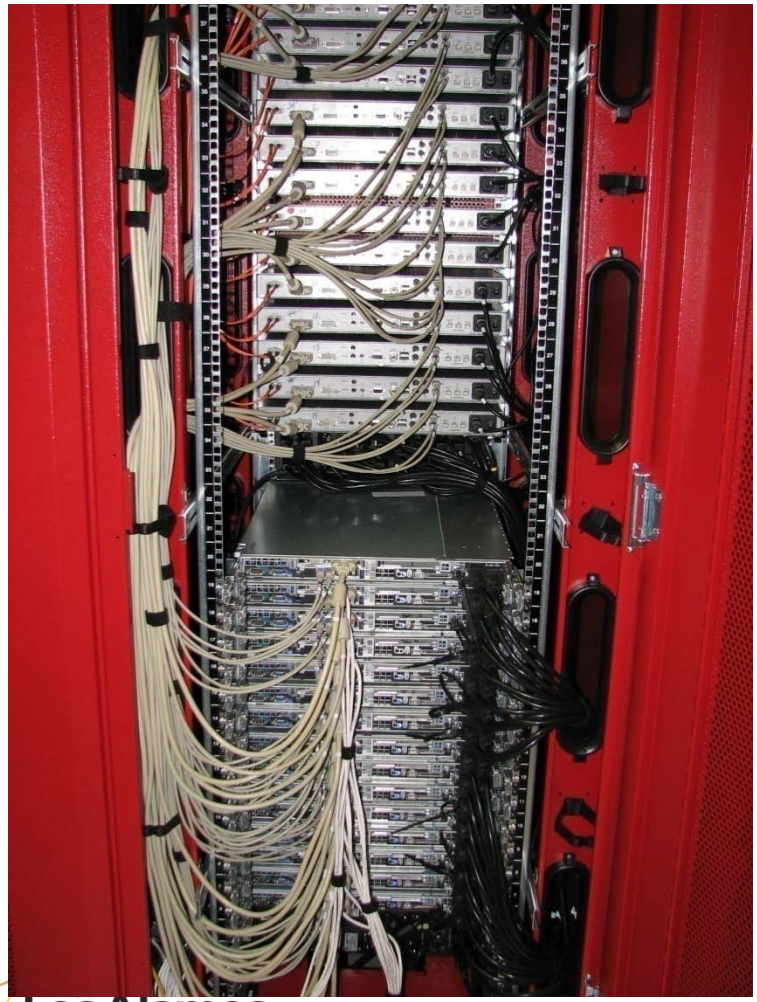
- ClearCube IP based Blade Solutions
- Installation meets separation of power, network and video requirements.

Logical Solutions/Dell/HP Rack Configuration (front)



- High end Graphics and processing available on a one to one configuration
- Windows, Apple and Linux Operatins systems supported.
- 16 systems per rack.

Logical Solutions/Dell/HP Rack Configuration (Back)



Approved PTS Wire Separation

(Power separated from Video)

No Mass Storage Devices

- **Technology used only enumerates human interface devices (HID) such as mouse and keyboard at the clients workstation.**
- **Physical hardware disablement through Jumper setting on motherboard.**
- **Software USB disablement and monitoring on all KVM machines.**

Point to Point KVM

- **Logical Solutions**
  - VIS-28- Digital Fiber Optic Transceiver, receiver System, Dual Link
    - 3840 X 2400 single link (single LCD)
    - Dual LCD's available with 1920X1200
    - Up to 1,000 meters
  - VEL-24- Digital Fiber Optic Transceiver, receiver System, Dual Link
    - DVI-D All single Link resolutions
    - Dual LCD's available with resolution pushed by video card.
    - Up to 10 kilometers using single mode fiber
- **Dell Workstations 1-U**
  - Quad core, dual 3.33 GHz processor, 8-16 gig RAM, High end Video card
    - 64 bit Operating System
- **HP Workstations 1-U**
  - Quad Core, dual 3.33 GHz processor, 4-16 gig RAM, High end Video
    - 32 bit and 64 bit Operating System

2u Workstations High End PC over IP

Dell Workstations Precision 5400/FX100

- Dual-Core (6MB L2 cache) & Quad-Core (2X 6MB L2 cache) Intel® Xeon® Processors.
- Up to 32GB1 quad-channel2 architecture Fully Buffered DIMM 667MHz ECC memory; in 4 DIMM slots (when available).
- Support for 2 PCI Express x16 graphics cards up to 150 watts including: NVIDIA® Quadro® FX 4600; Quadro FX 3700; Quadro FX 1700; NVIDIA Quadro FX570; NVIDIA Quadro NVS 290. All graphics cards support dual monitor configurations.
- PCIe x1 card for host workstation
- 2 DVI-I ports
- 1 RJ45 jack for 10/100/1000 Mbps Ethernet
- 2 DVI-I ports with one DVI-I to VGA (DB-15) adapter supplied
- Video Control Display Data Control (DDC) for automatic
- setting of resolution and refresh rate
- Single DVI at 1920x1200
- Dual DVI at 1600x1200

ClearCube Blades

R 1350

Intel® Core™ 2 Duo processor Integrated Intel® GMA 950 graphics or optional NVIDIA Quadro NVS285 PCI-Express graphics card Optional V5120 PC over IP remote desktop host adapter Support for TPM 2.0 Up to 4 GB of DDR2-667 memory SATA Hard Drive Dual integrated Ethernet Ports Microsoft Vista Business Edition, Microsoft® Windows® XP, and Linux ready Support for virtualization via VMware Server Fully managed via Sentral™

A1410

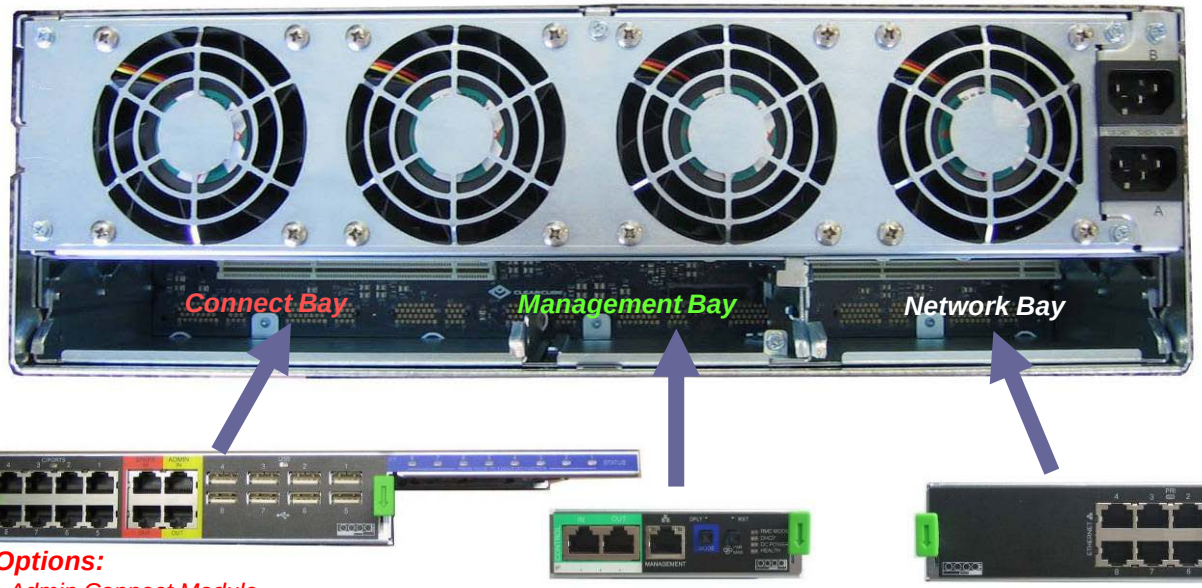
Intel® Core2® Quad processor (Pentium® 4 with HT also available)
Integrated Intel® GMA 3000
2 GB DDR-400 SDRAM (upgradeable to 4 GB)
80 GB SATA 3.0Gbps Hard Drive
Integrated 10/100/1000 Ethernet Port
Microsoft® Windows® XP or Windows Vista®
Support for I9400 with addition of v5100 series PCoIP™ cards
Support for virtualization via VMware Server
Fully managed via Sentral

R3080DS

Featuring the Intel® Clarkdale Core-i5 660 processor with advanced security features using Nehalem Dual-core 32 nm architecture, DDR3-1333 memory, and PCI-Express® graphics, ClearCube® R3080DS blade workstations offer the highest security and highest performance of any desktop blade computers available. ClearCube employs the advanced Intel security architecture and ClearCube advanced secure computing architecture in the R3080DS that includes:

Advanced Encryption Standard - NI
Trusted Execution Technology
Trusted Platform Module
Mass Storage Lockout

Blade Infrastructure – Chassis & Connection Modules



Dual AC Input

Options:
- *Admin Connect Module (I/Port/HPC)*
- *User Connect Module (Mainstream C/Port)*
- *8x8 Connect Module (Specialty C/Port)*

One Option:
- *Remote Management Module*

"Pass-thru" Options:
- *8 port Network Module*
- *16 port Network Module*

112 PC Blades per 42U Rack

C/Ports

- **C 7420-Fiber (Currently using)**
- Dimensions: 1.6 inches H × 9.5 inches W × 5.2 inches D
- Operating System: None
- Fiber Type: 62.5 µm or 50 µm fiber
- Distance: Up to 2,000 meters direct connect (3000 miles over IP network)
- Video: Supports 1 or 2 monitors at 32 bit color depth and up to 1600x1200 @ 60 Hz
- Connections: 4 USB ports (2 on front and 2 on back)
- 2 DVI-I digital video ports
- HD Audio Out and Audio In

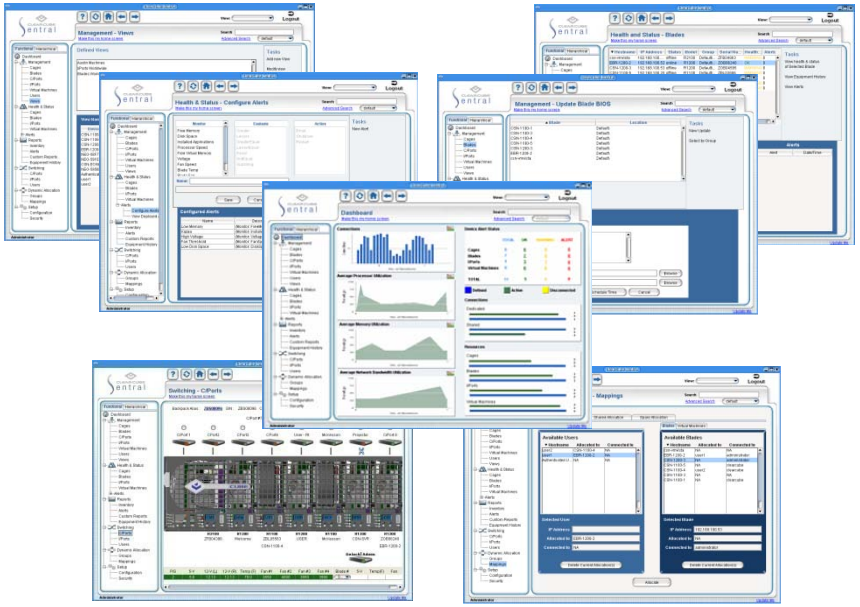
C7424 Digital (Future)
Fiber Zero Client Benefits

☐Direct or IP switch network capability
☐Increases security of physical and data assets
☐☐Seamless Integration with VMware View 4.0
☐Fully Integrated Smart Card Reader for Secure Access

•Dimensions: 2 inches H × 8.5 inches W × 5.3 inches D
•Operating System: None
•Fiber Type: 62.5 µm or 50 µm fiber
•Distance: Up to 2,000 meters direct connect (3000 miles over IP network)
•Video: Supports 1 or 2 monitors at 32 bit color depth and up to 1920x1200
•Connections: 3 USB ports
•2 DVI-I digital video ports
•HD Audio Out and Audio In
•10/100 Mbps or 1 Gbps LC Fiber module

Software

- **Key New Features**
- **Combines previous generation tools into a single integrated console (5th generation)**
- **Enterprise Scalability: Powerful Views and Dashboard let admins "slice and dice" their environments**
- **Remote Browser-based access and User Roaming**
- **Support for virtual machines**
- **Modular architecture supports "plug-in" software modules for added functionality (Switching Module and Dynamic Allocation Module)**



WECS TEAM KVM Visitors

- Livermore National Laboratory
- Sandia National Laboratory
- Department of Energy; LA, Abq., DC
- Pantex
- Savannah River
- Nevada Test Site
- University of California
- Congressional Members
- Many Divisions in the Laboratory
- Acting NNSA Administrator
- Department of Energy Chief of Staff

KVM

- KVM technology has proven to be a secure and cost effective solution to the “ACREM” issue
- Technology continues to evolve
- LANL continues to evaluate improvements and development in media-less technologies
- Solutions presented were a 1 to 1 solution

Contact Information

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