

PEO-STRI / PEO-C3T Collaboration Meeting

9-10 July 2008, Fort Monmouth, NJ



# Interactive Training with High Performance Computers

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# Objectives

- Leverage the power of HPC as the server farm for interactive simulation for training
  - OneSAF
  - WARSIM
- Multiple simultaneous exercises supported from a single simulation center
- Physics-based object, weather, and terrain modeling (put the “reality” in virtual reality)
- Tighter network connections between applications to eliminate lag



# Predecessor Experiments

- Physics-based Environment for Urban Operations
  - HPCMO, STRI, SAIC
- Millennium Challenge Exercise Clutter
  - JFCOM, Maui SCC, Alion
- C4ISR On-the-Move (OTM) program
  - CERDEC, HPTi, SAIC, HPCMO



# One Semi-Automated Forces (OneSAF)

- A composable, next generation simulation architecture supporting both Computer Generated Forces (CGF) and SAF operations
- Provides a full range of operations, systems, and control processes (TTP)
- Supports modeling from entity up to brigade level
- Supports DIS, HLA, MSDL, JC3IEDM and USA ABCS interoperability
- Provides variable levels of composability, fidelity and representation
- Supports multiple Army M&S domain (ACR, RDA, TEMO) applications.

• Urban Operations with Contemporary Operating Environment (COE) Focus

Software only

Platform Independent  
( Linux / Windows )

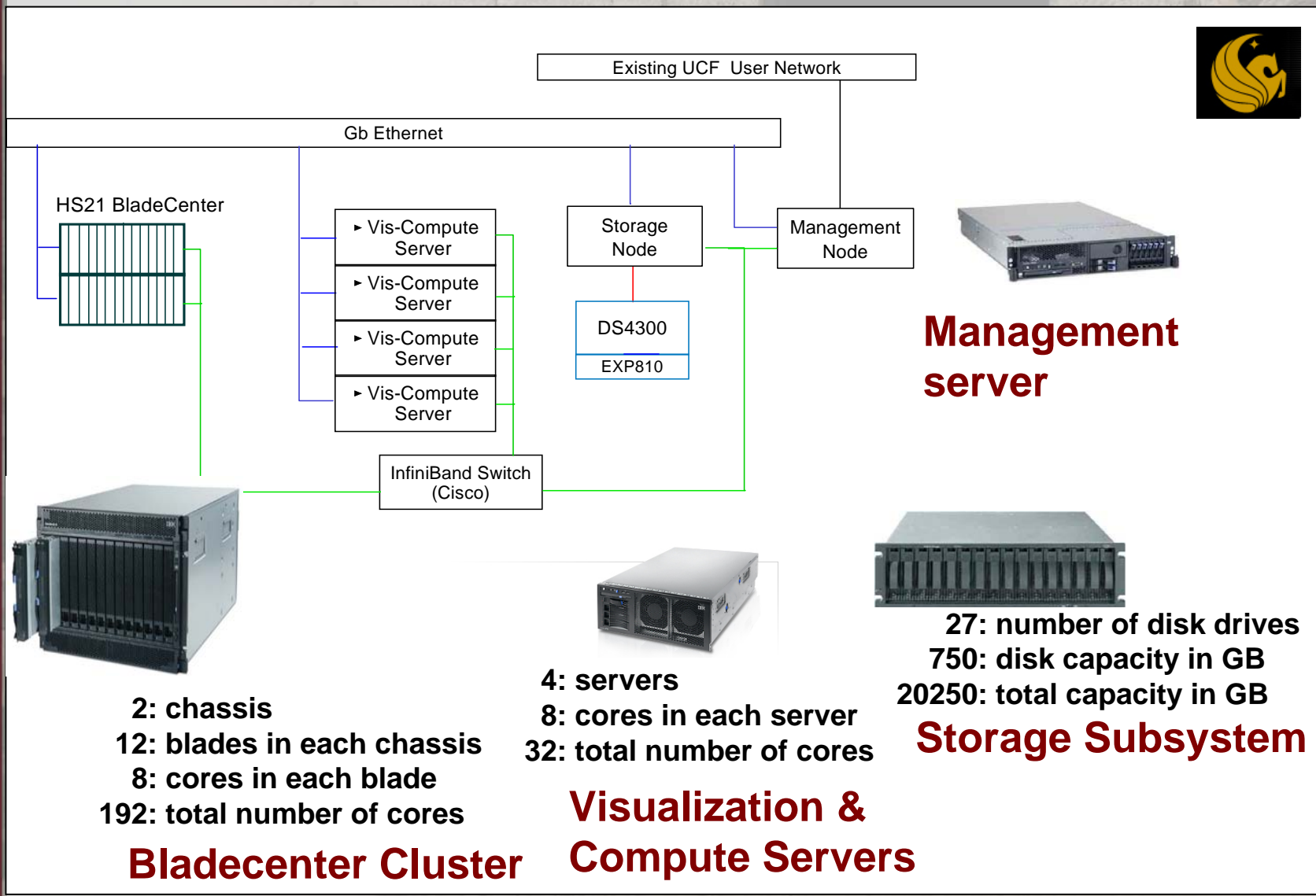
• V2.0 Released Feb 2008

Capable of replacing US Army legacy entity-based simulations: BBS, OTB / ModSAF, CCTT / AVCATT SAF, Janus (A&T), JCATS MOUT

Software Distribution to:

- RDECs / Battle Labs / Active Duty Brigades & Battalions
- Service / Joint Organizations
- International Partners
- USG / Academia

# Team Orlando HPC Server Hardware



**Management server**



27: number of disk drives  
750: disk capacity in GB  
20250: total capacity in GB

**Storage Subsystem**



4: servers  
8: cores in each server  
32: total number of cores

**Visualization & Compute Servers**

2: chassis  
12: blades in each chassis  
8: cores in each blade  
192: total number of cores

**Bladecenter Cluster**

O  
C  
F  
U  
S  
F

# IBM HS21 Bladecenter Cluster



|                      | Installed in Each Blade                                 |
|----------------------|---|
| Intel Xeon Processor | 2 quad-core E5450 (Harpertown)<br>8 cores @ 3.0 GHz     |
| L2 Cache             | 2 X 2 X 6144 KiB  |
| Memory               | 8 GB, 667 MHz, DDR2                                     |
| Front Side Bus       | 1333 MT/s   |
| internal disk        | 73 GB, 10K RPM SAS                                      |
| Power                | 80 W  |
| Ethernet             | 1 Gb Ethernet   |
| InfiniBand           | Single-port 4X DDR IB PCI-E HCA (Cisco)                 |
| Linux OS             | Red Hat V5  |
| Compilers            | GCC<br>Intel Fortran V10.1<br>Intel C++ V10.1<br>PGI V7 |

Orlando HPC: 24 Blades, 192 cores

# OneSAF HPC Research Problems

- Porting
  - Host OneSAF Sim Core and MCT on HPC
- Computational Distribution
  - Efficiency of thread distribution in HPC environment
  - Function of JVM, Node/Process/Core availability
- MCT Interface
  - Internal to HPC with VNC video exported
  - External with efficient network comms
- Light Interface
  - Operate via light GUI interface outside of HPC (e.g. Aries game interface, Browser interface)
- Infiniband Network
  - Multiple instances using Infiniband vs. Ethernet to communicate



# MANAGEMENT AND CONTROL TOOL

MCT [Login ID: onesaf] - COE\_Sniper\_Basic\_T012-A1

Unclassified

File Edit View Manage Replication Exercise Control Checkpoint Tools Window Help

PVD 1:482.379 Views Select Any

Task Organization

| Task Org                     | Mission Description |
|------------------------------|---------------------|
| Name                         | Type                |
| Coalition                    |                     |
| U H S convoy_mr              | Transportation      |
| U H S 1/convoy_m             | Transportation      |
| E H S convoy_mr:FHMMWV       |                     |
| U H S snipers                | Infantry            |
| E H S snipers:AUTIC, Loaded  |                     |
| E H S snipers:FIR IC, Loaded |                     |
| Insurgents                   |                     |
| E H S opforSniper            | IC, Loaded          |
| E H S svdSniper              | IC, Loaded          |
| Civilian                     |                     |
| E H S nc1                    | IC, Normal          |
| E H S nc2                    | IC, Normal          |
| E H S nc3                    | IC, Normal          |

Status - opforSniper

General Supplies Command Relationship External Components

Supplies Roll-up Class III 100.0 % Class V 100.0

Composition entity/mr/COMBAT/INFANTRY/Sniper\_SVD\_Inf\_MRC\_RS\_IC

Type IC, Loaded

Name opforSniper

Activity Requesting Report Message

Edit

Mission Editor

|                   | Phase 1                              | Phase 2                      |
|-------------------|--------------------------------------|------------------------------|
|                   | On Command                           | On Command                   |
| E H S opforSniper | CP Change Posture CP Move Tactically | CP OccupySniperPosition CP C |
| E H S svdSniper   | CP Change Posture CP Move Tactically | CP OccupySniperPosition CP C |
| S civilian        |                                      |                              |

Engage ICs Engage Convoy Engage Civ

Mission Editor Status - opforSniper PVD Task Organization

POV: Coalition Elapsed Sim Time: 00:00:00:00 Sim Time: Jan 01 00:00:00 Sim Scale: 0.00 Clock: May 21 14:24:43 Node: localhost Current sim state is 'Loaded' Alerts



# Conclusion

- Reduce operational costs for hardware, shipping, set-up time, travel, staffing
- Increase soldier/unit access to training systems
- Increase exercise reliability and availability
- Increase model fidelity
- Increase model synchronization

