Enterprise Computing and Cloud Initiatives: A Report Card

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DISA
Agenda

• Enterprise Computing in DISA
  – Operational, Business, Financial
  – Partnerships & Opportunities

• “The Cloud”
  – DISA’s Tenets
  – Progress to date
  – Service Models & Future Offerings
Enterprise Computing

Defense Enterprise Computing Centers (DECCs)

Command & Control
- Global Combat Support System (GCSS)
- Theater Battle Management Core Systems (TBMCS)

Warfighter Logistics
- Defense Distribution Standard System (DSS)
- Transportation and cargo movement systems
- Combat requisition and maintenance systems

DoD Financial and Security
- Military and Civilian Pay & Personnel
- Electronic business and contracting systems
- Public Key Infrastructure (PKI)

Health & Medical Readiness
- Composite Health Care System (AHLTA)

Remote Systems Management

DECC EUR (Stuttgart)
- (2600 sq-ft expansion Dec 09)
- PKI RCVS
- HBSS
- Cross-Domain (BICES)
- Rel DMZ

TECC-SWA (Bahrain)
- (1700 sq-ft expansion Dec 09)
- AKO/DKO Forward
- DLA Forward
- VoSIP
- MHS

- Missile Defense C2BMC
- GCSS-JTF
- CENTRIXS ISAF
- GRIFFIN

DECC PAC (Pearl)
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Remote Systems Management
Computing at the Edge: GIG Content Delivery (GCDS)

Legend:
- DECC
- GCDS Nodes

- **What:** Distribute content and extend computing to the Edge
  - 50 Regions/25 Cities
  - Deployed deep into SWA
  - SIPR (20 Nodes) and NIPR (24 Nodes)
- **Who (# Applications):** Army (4), Navy (8), AF (4), USMC (2), DoD (28)
- **Impact:**
  - Saving millions in IT expansion
  - End user performance gain as much as 30 times
  - Significant bandwidth off-load
    - 2X to 30X Performances Improvements
    - 85.7% DISN Bandwidth Offload (avg.)
Continuous DECC consolidations and transformations have yielded significant reductions in unit cost.
Server & Storage Rates

Includes basic & hardware services – small OE

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Partnerships

• Consolidations of enterprise applications/systems
• Application hosting support for BRAC migrations
• Server optimization using capacity services and virtualization technologies
• Global services support
  – GIG Content Delivery System
  – HBSS
  – DoD DMZ

Opportunities

• Desktop-centric solutions for common services
  – Active Directory, Exchange, SharePoint
• Grid Virtualization supporting dynamic computing services – Integrated Orchestration
• Computing support at the Edge
  – Remote management of regional nodes
• Agile software development/self provisioning support
A model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction. (NIST)

### Characteristics
- Rapid Elasticity
- On Demand Self-Service
- Broad Access
- Resource Pooling
- Measured Service

### What’s new?
- Acquisition Model: Based on purchasing of services
- Access Model: Over the network to ANY device
- Technical Model: Scalable, elastic, dynamic, multi-tenant, & sharable
- Business Model: Based on pay for use

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Computing As A Service
### Acquisition Model: Capacity Services

<table>
<thead>
<tr>
<th>Innovative Services Contracts</th>
<th>Orders to date</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Vendors provide capacity to CSD:</strong></td>
<td><strong>Processor</strong></td>
</tr>
<tr>
<td>- Acquire processing, storage and communications capacity as a service</td>
<td>• 1251 Total Orders Completed</td>
</tr>
<tr>
<td>- Pay much like a homeowner pays for utilities, e.g., by megawatt-hours, BTUs, call-minutes, CPU-hours consumed</td>
<td>• 82% of IBM Mainframe MIPS replaced</td>
</tr>
<tr>
<td>- Install</td>
<td>• Average delivery timeline of 10 days</td>
</tr>
<tr>
<td>- De-install</td>
<td>• 12 days for mainframe</td>
</tr>
<tr>
<td>- Maintenance (both HW and SW)</td>
<td>• 15 days for server</td>
</tr>
<tr>
<td><strong>Benefits</strong></td>
<td>• 125 orders took less than 5 days</td>
</tr>
<tr>
<td>- Reduces time to add capacity</td>
<td>• 443 orders took between 5-14 days</td>
</tr>
<tr>
<td>- Reduces overhead</td>
<td>• 247 orders took more than 14 days</td>
</tr>
<tr>
<td>- Simplifies our cost drivers</td>
<td>• 2 hour provisioning where capacity available</td>
</tr>
<tr>
<td>- Streamlines operating system management</td>
<td><strong>Storage</strong></td>
</tr>
<tr>
<td>- Facilitates technological currency</td>
<td>• 502 Total Orders Completed</td>
</tr>
<tr>
<td><strong>Capacity is managed by CSD personnel</strong></td>
<td>• 36 Disk capacity assets installed</td>
</tr>
</tbody>
</table>

**Speed, Agility, Utility Pricing, Reduced Overhead & Technology Currency**
Technical Model:
Standard Architecture - Server

- **Windows / Linux**
  - HP BL460c / BL490c blade, c7000 enclosure, CISCO 3020 switches
    - Mini: < 1 socket & 4 GB memory
    - Small: ≥ 1 ≤ 2 sockets & 8 GB memory
    - Large: > 2 ≤ 4 sockets & 16 GB memory
    - Enterprise: > 4 sockets & 32 GB memory

- **Unix**
  - Sun – T5220; M5000
  - HP – BL860c; RX3600; RX8620
    - Mini: < 1 socket & 4 GB memory
    - Small: ≥ 1 ≤ 2 sockets & 8 GB memory
    - Medium: > 2 ≤ 4 sockets & 16 GB memory
    - Large: > 4 ≤ 8 sockets & 32 GB memory
    - Enterprise: > 8 < 21 sockets & 64 GB memory

- **Virtualization** - Drive virtualization as much as possible
  - VMware on x86 (∼ 10 VOEs per host)
  - Logical domains (LDOM) on shared Solaris environment
  - Virtual Server Environment (VSE) on shared HP-UX environment

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Standards = Economies
Technical Model: Virtualization

• Basic concept
  – First implemented more than 30 years ago by IBM as a way to logically partition mainframe computers into separate virtual machines
  – Speed and capacity of processors, memory, network and storage have outpaced the needs of most applications

<table>
<thead>
<tr>
<th>Current virtual environments:</th>
<th>If these weren’t virtualized:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• 1012 VOEs</td>
<td>• 1012 Blade/Servers</td>
</tr>
<tr>
<td>• 147 Hosts</td>
<td>• 22 Racks</td>
</tr>
<tr>
<td>• 4 Racks</td>
<td>• 1012 Windows Licenses</td>
</tr>
<tr>
<td>• 253 Windows Licenses</td>
<td>• 1024 Network Cables</td>
</tr>
<tr>
<td>• 160 Network Cables</td>
<td>• 128 SAN Cables</td>
</tr>
<tr>
<td>• 20 SAN Cables</td>
<td></td>
</tr>
</tbody>
</table>

41% virtualized using capacity services
Access/Business Model:
Rapid Access Computing Environment (RACE)

Development/Test
- 24-hour automated provisioning
- Customer root access
- Ability to promote from Dev to Test
- Standard CSD Operating Environments (LAMP & Windows)
- Minimized and streamlined accreditation
- Increase capacity ~ 24 hours
- Month-to-month service
- Reduced cost

Today
- User self-service provisioning within the PRODUCTION environment
- Ability to promote from test to production
- Streamlined/Automated accreditation
- Pre-established inherited IA controls

1 October 2008

FY10 Initiatives
- SIPRNet deployment
- Complete integrate accreditation automation processes
- Continue to refine RACE Portal
- Interface with Forge.Mil Projects
- Complete integration with DISA standardized configuration management system (BladeLogic)

User Self-Service ~ Highly Standardized ~ Cost Effective ~ Fast
DISA’s Cloud Maturity

On Demand – Self Service

OD-SS Available only in RACE T&D currently. To be expanded to Race P2P. Current production OEs are not Self-Service and fulfillment is 24+ hours (not including application environment build)

State of the Art:
7 Minute provisioning
Fully automated, self service (manual via Web interface or auto via API) provisioning of OS, Storage and Network, in multiple geographically dispersed zones.

Broad Network Access

Broad network access is constrained by DOD IA constructs that delay network access and compartmentalize ‘zones’ or DMZs. Self service T&D OEs have no broad access at all.

State of the Art:
7 Minute provisioning
Fully automated, self service (manual via Web interface or auto via API) provisioning of OS, Storage and Network, in multiple geographically dispersed zones.

Resource Pooling

Processing: Virtual OE resources are pooled at DECCs within the constraints of DOD IA policy
Storage: HDP technology enables efficient storage pooling
Network: Consolidated network infrastructure at DECCs provide network pooling

State of the Art:
Processing, Storage and Network resources are arranged into massive and dynamic pools to support the Cloud offering. The pooled resources are available for either automatic (demand based) or manual self service allocation.

Rapid Elasticity

Current OE Size: Manual VMWare change on request
Current OE Qty: Manual VMWare provisioning on request
Planned OE Size: VMWare DRC
Planned OE Qty: RACE P2P

State of the Art:
Primarily leverages ability to stamp out a large quantity of standard size OEs very quickly. OEs themselves not designed to dynamically change allocated size

Measured Service

Resource consumption measurement for billing purposes is manual, not tied to actual consumption. No online tools that enable real-time or near real-time monitoring of utilization by customer

State of the Art:
Use of OEs in Cloud is automatically billed by the hour. Customer has access to online tools that show real-time utilization of cloud resources and APIs that enable automatic expansion of processing resources to meet both anticipated and unanticipated demand
### Services Deployment Model Roadmap

<table>
<thead>
<tr>
<th></th>
<th>Current</th>
<th>Near Term</th>
<th>Future</th>
</tr>
</thead>
<tbody>
<tr>
<td>IaaS</td>
<td>PaaS</td>
<td>SaaS</td>
<td>IaaS</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>PaaS</td>
</tr>
<tr>
<td>SaaS</td>
<td></td>
<td></td>
<td>SaaS</td>
</tr>
</tbody>
</table>

#### High Utility
- Self-Service Portal
- Race Dev & Test
- Web Hosting
- ATAAPS
- Capacity Services VOEs for Standard Solutions
- Capacity Services VOEs for Custom Solutions

#### Medium Utility
- Enterprise Portal
- Path-To-Production
- Rate-Based Elasticity
- Race Dev & Test
- SharePoint as a Service
- eMASS
- Web Hosting
- Capacity Services VOEs for Standard Solutions
- Capacity Services VOEs for Custom Solutions

#### Low Utility
- CGOAL Solutions
- C&A as a Service
- ITSM as a Service
- Type Accredited Web Hosting
- Integrated Orchestration
- Utility-Based Elasticity
- Integrated Portals
- Web Hosting
- Capacity Services VOEs for Custom Solutions

**Target Services**
Platform as a Service: DISA’s SharePoint Initiatives

- **Dedicated SharePoint**
  - MOSS 2007 with upgrade path to SharePoint 2010
  - Cost for dedicated hardware

- **Enterprise SharePoint Services (ESPS)**
  - Available in Aug on MOSS 2007 – Shared Governance
  - Upgrade to multi-tenant SharePoint 2010

- **Office Web Applications (VOffice)**
  - Web versions of Word, PowerPoint, Excel, OneNote
  - Capability demonstration – DoD Visitor scenario
  - Optional service for ESPS
ESC develops Services and tests them in the IT-LC

Service Boundary

SaaS – AF ESC

PaaS - DISA

DISA

PaaS Enterprise Middleware

- J2EE 1.6 and .NET 3.5 Windows Communications Foundation - runtime application programming interfaces for building service-oriented applications
- ERP Platform (SAP/Oracle)
- Data aggregation via Enterprise Mashup Markup Language (EMML) - JackBe

Operating Model

- Customer brings code only; DISA provides operating stack and all support services
- Profound impact on IA accreditation model
Summary

• Understand that it’s a journey
  – Recognize that the infrastructure fundamentals matter
  – Know the “marketplace” and warfighter needs
  – Agility in processes will continue to be refined
• Close partnership with our customers is imperative
  – Work together early to avoid misfires
  – Collective buy-in on computing direction
• Brutal standardization
  – Drives the economic savings
Target Service Platform

Unified Provisioning & Admin
Unified Ordering Processes
Common Developer Admin Consoles/Interfaces

SIPRCloud Operating Environment
( Delivers basic platform unit where applications execute)

DoD Store Front
Common Entry Point - User Defined Pages - Widget Marketplace
User Facing Enterprise Apps

NetOps
(Integrated Netops across network, computing & services)

Virtual Compute
Virtual Storage
Virtual Network
Virtual Security

DCO, White Pages, Collaboration, etc.

Development Tools
(Forge provided or Forge compatible)

LAMP & WinTel stacks
Enterprise Mashup Engine
Widget Framework
Sharepoint, DBs, PEP/PDP ...

Knowledge Resources
(Registry, MDR)
Coding Resources
(xxForge,)
Testing Resources
(Harnesses, Security CTKs, Test Data Sets)

Multi-tenancy Services
(Services optimized for tenants of the platform. Web Service Interfaces use REST or SOAP)

Data Exchange/Delivery Services
M2M & JUM
GCDS
CDES
UDDI

AAUP* Services
RCVS
Attribute Services
PEP/PDP Service
Ent User Account Store

Other
ESM
...
...
...

COI Services
....
....
....
....

Virtualization/Cloud Resource Mgmt Fabric
Physical Infrastructure (Machines & Facilities)

Version 1.6 as of 8 Apr 10

AAUP = Authentication, Authorization & User Provisioning
Global Content Delivery (GCDS)

Globally Distributed Enterprise Computing Infrastructure
Saving Millions in IT Expansion Costs for DoD
50 Regions in 25 cities/12 Countries Deployed Deep in SWA
DISA’s First Cloud Service

Accelerating Collaborative Applications to Warfighters
2X to 30X Performances Improvements
85.7% DISN Bandwidth Offload (June)

46 Multi Service Enterprise Applications LIVE
Service & Mission Support Portals, Geospatial & eLearning Applications, Large File Downloads (Anti-virus, MS Patches, CRL)

Adjusting Quickly to Changes in Network Conditions
Demonstrated availability in theater during Mideast cable cuts
GCDS Applications Remained Operational at all times

Excellent Customer Feedback & Reputation

<table>
<thead>
<tr>
<th>DISN CLOUD</th>
<th>ARMY</th>
<th>NAVY</th>
<th>AIR FORCE</th>
<th>MARINES</th>
<th>DoD</th>
<th>Pending</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>NIPRNET</td>
<td>2</td>
<td>8</td>
<td>3</td>
<td>0</td>
<td>10</td>
<td>5</td>
<td>28</td>
</tr>
<tr>
<td>SIPRNET</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>18</td>
<td>5</td>
<td>28</td>
</tr>
<tr>
<td>TOTAL</td>
<td>4</td>
<td>8</td>
<td>4</td>
<td>2</td>
<td>28</td>
<td>10</td>
<td>56</td>
</tr>
</tbody>
</table>

Extending Computing Power To The Edge
Enabling the Cloud Environment

- Infrastructure
  - Standardization
  - Consolidation
  - Capacity Services
  - Virtualization
  - Content Delivery
  - Rapid Provisioning

- Services
  - Software (SaaS)
  - Applications
  - Communications

- Processes
  - Metrics & benchmarking
  - ITIL
  - Service Level Management (SLM)
  - Security (Certification & Accreditation (C&A))

It’s A Journey
Applications-As-A-Service: Forge.mil (Software Development)

Systems Development Life Cycle (SDLC)

- Analysis
- Design
- Planning
- Implementation
- Maintenance

- The logical process used to develop an information system
- Includes requirements validation, training, and user ownership
- Works like a library – Code checked out, worked on, & checked in

DoD SDLC

- First standardized approach to an enormous problem
- Proven development model
- Based on the open source community’s approach

Forge.mil “Bits & Pieces”

- Public: Freely available to all DoD users
- Shared: All DoD users can access the same code, development environment for DoD open source and community source software
- Available: Today

- Common evaluation criteria and an agile certification process to accelerate the certification of reusable, net-centric solutions
- Available: TBD

- Private: Allows a closed development environment for DoD projects and programs
- Fee-for-service
- Availability: Today

DoD’s Software Development Life Cycle
OS Service

Service Plane

Supporting Systems
Application
LAMP Stack
Operating System Instance
Server
Facilities

Product Plane

Customer support role under IaaS Framework
CSD Proposed Services under IaaS framework
CSD Current Services

Generic System Description Plane