Vblock Infrastructure Packages: Accelerating Deployment of the Private Cloud
IT is undergoing a transformation…

Enterprise IT solutions remain costly to analyze and design, procure, customize, integrate, inter-operate, scale, and maintain

- The current architecture of IT today increases procurement, management costs, and complexity
- IT is now moving towards a service based consumption model (Private Cloud)
- This new model requires a new way of thinking about both the underlying technology and the way IT is delivered for customer success
- The need for a new IT model has never been more clear, but navigating the path to that model has never been more complicated
- The realities of outdated technologies, rampant incremental approaches, and the absence of a compelling end-state architecture are impeding adoption by customer
IT Transformation Has Begun....

- Consolidation
- Virtualization
- Automation
- Private Cloud
- Public/Hybrid Clouds

- Security and Compliance?
- Integration?
- SLA?
- Standardization?
IT Transformation Has Begun…

… Vblock Infrastructure Packages Accelerate Infrastructure Virtualization and Private Cloud Adoption
Vblock Infrastructure Packages
A New Way of Delivering IT

- Rapid deployment model of virtualized infrastructure
- Pre-integrated and validated solutions reduce total cost of ownership
- Service-level driven through predictable performance and operational characteristics
- Improved compliance/security and reduced risk

Accelerate time to results, Reduce TCO
Vblock Infrastructure Packages
A New Way of Delivering IT

Benefits:

Accelerate the journey to pervasive virtualization and private cloud computing while lowering risk and operating expenses

Ensure security and minimize risk with certification paths

Support and manage Service Level Agreements
  – Resource metering and reporting
  – Configuration and provisioning
  – Resource utilization

Vblock is a validated platform that enables seamless extension of the environment

Secure, Extensible, SLA-driven, Infrastructure
Architectural Principles

- Repeatable 'units' of construction based on 'matched' performance, operational characteristics and discrete of power, space and cooling
- Repeatable design patterns facilitate rapid deployment, integration and scalability
- Designed from the 'Facilities to the Workload' to be scaled for the highest efficiencies in virtualization and workload re-platforming
- An extensible management and orchestration model based on industry standard tools, APIs and methods
- Built to contain, manage and mitigate failure scenarios in hardware and software environments
Vblock Design principles

- A *unit of assembly* that provides a set of services, at a known level, to target consumers
- Self contained, but it may also use external shared services
- Optimized for the classes of services it is designed to provide
- Can be clustered to provide availability - or aggregated for scalability, but each Vblock is still viable on its own
- Fault and service isolation - the failure of a Vblock will not impact the operation of other Vblocks (Service Level degradation may occur unless availability or continuity services are present)

A Data Center is a collection of pooled 'Vblocks' aggregated in 'Zones'.
Vblock Infrastructure Packages
Scalable Platform for Building Solutions

Vblock 2 (3000 – 6000+ VMs)
- A high-end configuration - extensible to meet the most demanding IT needs
- Typical use case: Business critical ERP, CRM systems

Vblock 1 (800 – 3000+ VMs)
- A mid-sized configuration - broad range of IT capabilities for organizations of all sizes
- Typical use case: Shared services – Email, File and Print, Virtual Desktops, etc.

Vblock 0 (300 – 800+ VMs) ~1H 2010
- An entry-level configuration addresses small datacenters or organizations
  - Test/development platform for Partners and customers

Designed for a Broad range of Organizations
Deterministic Performance, Predictable Architecture

Predictable SLA:
Granular SLA measurement and assurance

Deterministic space and weight floor tiles become unit of capacity planning

Power and Cooling:
consistent power and cooling (KWh/BTUs) per unit

Pre-determined capacity and scalability:
Uniform workload distribution and mobility

Deterministic fault and security isolation
Vblock Infrastructure Packages
Scalable IT capability and performance

Vblock 0: Virtualized Workload Environment
Vblock 1: Virtualized Workload Environment
Vblock Unified Infrastructure Management
Aggregation Layer Application and Network Services
Vblock 2: Very Large Virtualized Compute and Storage Array
Vblock Architectural Solution
Modular, Scalable, Repeatable, Predictable

Simplifies expansion and scaling
Add storage or compute capacity as required
Can connect to existing LAN switching infrastructure enables graceful migration
Graceful, non-disruptive expansion
Self-contained SAN environment with known standardized platform and processes
Enables introduction of FCIP, Storage Volume Virtualization, Encryption, etc services
Vblock 1 Components

Compute
- Cisco UCS B-series

Network
- Cisco Nexus 1000V
- Cisco MDS 9506

Storage
- EMC CLARiiON CX4

Hypervisor
- VMware vSphere 4

Management
- EMC Ionix Unified Infrastructure Manager
- VMware vCenter
- EMC NaviSphere
- EMC PowerPath
- Cisco UCS Manager
- Cisco Fabric Manager
Vblock 2 Components

Compute
– Cisco UCS B-series

Network
– Cisco Nexus 1000V
– Cisco MDS 9506

Storage
– EMC Symmetrix V-Max

Hypervisor
– VMware vSphere 4

Management
– EMC Ionix Unified Infrastructure Manager
– VMware vCenter
– EMC Symmetrix Management console
– EMC PowerPath
– Cisco UCS Manager
– Cisco Fabric Manager
# Network and Storage Components

## Vblock 1
- Fabric Interconnect: 2 x 6120
- Fixed ports (Unified Fabric to UCS / Enet to Agg): 20
- Interconnect GEM: 8 * 4GB
- SAN Fabric Switching MDS: 2 * 9222i

## Vblock 2
- Fabric Interconnect: 2 x 6140
- Fixed ports (Unified Fabric to UCS / Enet to Agg): 40
- Interconnect GEM: 8 * 4GB
- SAN Fabric Switching MDS: 2 * 9506

## NAS Gateway
- Vblock 1: NS-G2*
- Vblock 2: NS-G8*

This is the required minimum configuration for the NAS Gateway. A NAS Gateway may be shared across multiple Vblocks as long as the minimum requirements are met for the Vblock type.

## Drive Capacities

<table>
<thead>
<tr>
<th>Drive Type</th>
<th>Vblock 1</th>
<th>Vblock 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fibre (450GB)</td>
<td>79</td>
<td>105</td>
</tr>
<tr>
<td>Flash (400GB)</td>
<td>9</td>
<td>53</td>
</tr>
<tr>
<td>SATA (1TB)</td>
<td>17</td>
<td>23</td>
</tr>
</tbody>
</table>

Minimum: 178 | Maximum: 220

<table>
<thead>
<tr>
<th>Drive Type</th>
<th>Vblock 1</th>
<th>Vblock 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fibre (450GB)</td>
<td>125</td>
<td>220</td>
</tr>
<tr>
<td>Flash (400GB)</td>
<td>17</td>
<td>230</td>
</tr>
<tr>
<td>SATA (1TB)</td>
<td>78</td>
<td>25</td>
</tr>
</tbody>
</table>

Minimum: 100 | Maximum: 355

---

**Balanced systems performance, capability & capacity**
## Compute Components

<table>
<thead>
<tr>
<th>Compute Power</th>
<th>Vblock 1</th>
<th>Vblock 2*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Minimum</td>
<td>Maximum</td>
</tr>
<tr>
<td>Number of Chassis</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Number of Blades</td>
<td>16</td>
<td>32</td>
</tr>
<tr>
<td>Number of Cores</td>
<td>128</td>
<td>256</td>
</tr>
<tr>
<td>Memory per chassis</td>
<td>6 * 48GB, 2 * 96 GB</td>
<td>8 * 96GB</td>
</tr>
<tr>
<td>Total Memory for the system (GB)</td>
<td>960</td>
<td>1920</td>
</tr>
</tbody>
</table>

* Also has 2 * 73Gb Internal HDD for Swap Space per blade

<table>
<thead>
<tr>
<th>Number of Virtual Machines</th>
<th>Vblock 1</th>
<th>Vblock 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Minimum</td>
<td>Maximum</td>
</tr>
<tr>
<td>Core to VM Ratio</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1:4</td>
<td>512</td>
<td>1024</td>
</tr>
<tr>
<td>1:16</td>
<td>2048</td>
<td>4096</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Memory per Virtual Machine (MB)</th>
<th>Vblock 1</th>
<th>Vblock 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core to VM Ratio</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1:4</td>
<td>1920</td>
<td>3072</td>
</tr>
<tr>
<td>1:16</td>
<td>480</td>
<td>768</td>
</tr>
</tbody>
</table>

---

High Density Compute Environment
Accelerating Virtualization…
Accelerate IT Standardization and Simplification

Enable Virtualization at Scale—Simplify IT
Vblock 1: Consolidation Use Case
Projected performance and capacity

<table>
<thead>
<tr>
<th>Vblock 1</th>
<th>Storage Platform</th>
<th>Fibre (450GB)</th>
<th>Flash (400GB)</th>
<th>Minimum SATA (1TB)</th>
<th>System Total</th>
<th>Fibre (450GB)</th>
<th>Flash (400GB)</th>
<th>Maximum SATA (1TB)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>CX4-80</td>
<td># of Drives</td>
<td>74</td>
<td>9</td>
<td>17</td>
<td>100</td>
<td>140</td>
<td>17</td>
<td>23</td>
<td>180</td>
</tr>
<tr>
<td></td>
<td>Capacity (GB)</td>
<td>33,300</td>
<td>3,600</td>
<td>17,000</td>
<td>53,900</td>
<td>63,000</td>
<td>6,800</td>
<td>23,000</td>
<td>92,800</td>
</tr>
<tr>
<td></td>
<td>RAID Capacity (GB)</td>
<td>23,310</td>
<td>2,520</td>
<td>11,050</td>
<td>36,880</td>
<td>44,100</td>
<td>4,760</td>
<td>14,950</td>
<td>63,810</td>
</tr>
<tr>
<td></td>
<td>IOPS</td>
<td>13,320</td>
<td>45,000</td>
<td>850</td>
<td>40,807</td>
<td>25,200</td>
<td>85,000</td>
<td>1,150</td>
<td>50,000</td>
</tr>
<tr>
<td></td>
<td>Bandwidth (Mbps)</td>
<td>2,442</td>
<td>1,350</td>
<td>255</td>
<td>4,047</td>
<td>4,620</td>
<td>2,550</td>
<td>345</td>
<td>6,000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Application Profiles</th>
<th>IOPS per user</th>
<th>Bandwidth per User (Kbps)</th>
<th>Disk/user (GB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Virtual Desktop</td>
<td>6</td>
<td>12</td>
<td>9</td>
</tr>
<tr>
<td>Exchange</td>
<td>0.5</td>
<td>4</td>
<td>0.5</td>
</tr>
<tr>
<td>SAP</td>
<td>4</td>
<td>32</td>
<td>1</td>
</tr>
<tr>
<td>Sharepoint</td>
<td>0.2</td>
<td>1.6</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>10.7</td>
<td>49.6</td>
<td>11.5</td>
</tr>
</tbody>
</table>

Use Case: VMware View desktops with SAP, Exchange and Sharepoint on Vblock 1

<table>
<thead>
<tr>
<th>Vblock 1</th>
<th>Users</th>
<th>IOPS</th>
<th>Bandwidth (Kbps)</th>
<th>Disk</th>
<th>IOPS Utilization %</th>
<th>Bandwidth Utilization</th>
<th>Disk Utilization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum</td>
<td>3,000</td>
<td>32,100</td>
<td>148,800</td>
<td>34,500</td>
<td>0.79</td>
<td>0.03</td>
<td>0.94</td>
</tr>
<tr>
<td>Maximum</td>
<td>4,500</td>
<td>48,150</td>
<td>120,968</td>
<td>51,750</td>
<td>0.96</td>
<td>0.05</td>
<td>0.81</td>
</tr>
</tbody>
</table>

Note: 5,000 users can be supported at IOPS utilization of 107%
Vblock 2: Consolidation Use Case
Projected performance and capacity

<table>
<thead>
<tr>
<th>Vblock 2</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Storage Platform</td>
<td>Fibre (450GB)</td>
<td>Flash (400GB)</td>
</tr>
<tr>
<td>V-Max</td>
<td>125</td>
<td>17</td>
</tr>
<tr>
<td>IOPS</td>
<td>22500</td>
<td>85000</td>
</tr>
<tr>
<td>BW</td>
<td>4125</td>
<td>2550</td>
</tr>
<tr>
<td>Capacity</td>
<td>39375</td>
<td>4760</td>
</tr>
</tbody>
</table>

Application Profiles

<table>
<thead>
<tr>
<th>Application Profiles</th>
<th>IOPS per user</th>
<th>Bandwidth per User (Kbps)</th>
<th>Disk/user (GB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Virtual Desktop</td>
<td>6</td>
<td>12</td>
<td>9</td>
</tr>
<tr>
<td>Exchange</td>
<td>0.5</td>
<td>4</td>
<td>0.5</td>
</tr>
<tr>
<td>SAP</td>
<td>4</td>
<td>32</td>
<td>1</td>
</tr>
<tr>
<td>Sharepoint</td>
<td>0.2</td>
<td>1.6</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>10.7</td>
<td>49.6</td>
<td>11.5</td>
</tr>
</tbody>
</table>

Use Case: VMware View desktops with SAP, Exchange and Sharepoint on Vblock 2

<table>
<thead>
<tr>
<th>Use Case: VMware View desktops with SAP, Exchange and Sharepoint on Vblock 2</th>
<th>Users</th>
<th>IOPS</th>
<th>Bandwidth (Kbps)</th>
<th>Disk</th>
<th>IOPS Utilization %</th>
<th>Bandwidth Utilization</th>
<th>Disk Utilization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vblock 1 Minimum</td>
<td>8,000</td>
<td>85,600</td>
<td>396,800</td>
<td>92,000</td>
<td>0.93</td>
<td>0.05</td>
<td>0.96</td>
</tr>
<tr>
<td>Vblock 1 Maximum</td>
<td>12,500</td>
<td>133,750</td>
<td>2,943,750</td>
<td>143,750</td>
<td>0.94</td>
<td>0.23</td>
<td>0.98</td>
</tr>
</tbody>
</table>

Balanced systems Design
Vblock: O/S and Application Support

Vblock accelerates virtualization of applications by standardizing IT infrastructure and IT processes

Broad range of O/S support

Over 300 Enterprise Applications explicitly supported

Vblock applications
  - SAP
  - VMware View 3.5
  - View 4 in-test
  - Oracle RAC
  - Exchange
  - SharePoint

- Windows NT 4.0
- Windows 2000
- Windows Server 2003
- Windows Server 2008
- Windows Vista
- Windows XP
- RHEL5
- RHEL4
- RHEL3
- RHEL2.1
- SLES10
- SLES9
- SLES8
- Ubuntu 7.04
- Solaris 10 for x86
- NetWare 6.5
- NetWare 6.0
- NetWare 6.1
- Debian
- CentOS
- FreeBSD
- Asianux
- SCO OpenServer
- SCO Unixware
- …
Policy driven IT Infrastructure

Templates ensure repeatable, compliant IT processes

- IT defines storage, server, fabric and application and OS configuration policies to meet the business SLAs

Resources rapidly assigned according to IT policies and SLA reducing time to application availability

Reduces configuration error and non-compliance

Reduce downtime and risk, Improve compliance
Policy-driven Infrastructure enables Private Cloud

<table>
<thead>
<tr>
<th>Business Requirements</th>
<th>IT Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application</td>
<td># VMs</td>
</tr>
<tr>
<td>Operating System</td>
<td>Disk Capacity (MB)</td>
</tr>
<tr>
<td># Users</td>
<td>Synchronous Replication</td>
</tr>
<tr>
<td>SLA (Gold, Silver, Bronze)</td>
<td>Fault Tolerant</td>
</tr>
<tr>
<td>Etc...</td>
<td>Security Policy</td>
</tr>
</tbody>
</table>

Enables business requirements to translate to IT resources
- Business owner inputs application, uptime, number of users, business continuity, backup, and security requirements
- Resources are rapidly assigned according to user specification reducing time to application availability

Enable choice and flexibility, retain control
Use Case: Acquisition of 500 Person Sales Force
Consolidation and Rapid Provisioning via Templates

Create 500 virtual desktops to enable new team to access corporate information and applications

Increase database capacity to support sales consolidation effort

Create 500 new mailboxes
Unified Vblock Element Management
Single Point of Management, Extensible Integration Framework

Unified Vblock Management Interface
- Consolidated view into all Vblock infrastructure
- Single integration point

IT self-service portal
- Mini service catalog and dashboard for self-provisioning

Policy-based management
- Fine-grained tracking, traceability, reproducibility
- System-wide compliance and remediation

Automated discovery and deployment

Enterprise Management Platforms

Unified Vblock Element Management
Example: EMC Ionix UIM
Provides Vblock Self-Service Portal, Service Profile Catalog, Policy Based Management, Unified Provisioning, Config and Change, Configuration Compliance Analysis, Infrastructure Recovery (DR)

Vblock
- UCS Manager
- Symmetrix Management Console or Navisphere
- vCenter
Vblock Security Framework

- Integrates with existing security tools and frameworks
- Ensures consistent security between physical and virtual infrastructure
- Delivers better-than-physical security
Vblock Seamless Support Experience
Enabling Pervasive Virtualization and Private Cloud

- Unified inter-company collaboration tool
- Joint problem re-creation labs
- Single experience for onsite and remote support
- Cross-company, cross-product-trained support experts
- Cooperative Engineering Groups
- Common metrics and alignment
- Shared problem resolution and escalation processes
- Documented processes via best practice Support Implementation Plan
Benefits of a Seamless Support Experience

Simplified Support Process
- Single contact point to cross-company, cross-product support experts
- Collaborative support process across all three companies
- Sophisticated tools to speed collaboration (Telepresence, WebEx)

Reduced Time to Resolution
- Cross trained technical teams
- Experts with deep virtualization, networking, compute and storage expertise needed to resolve technical problems

Lower impact on business operations
- Interoperability testing and troubleshooting

Increased solution availability, reliability, and productivity
- Labs with equipment and software from all three companies to help replicate and resolve problems
Vblock Infrastructure Packages
Accelerating Deployment of the Private Cloud

- Deliver private cloud efficiencies and flexibility
- Standardize infrastructure, streamline IT process
- Accelerate Infrastructure Virtualization

CHOICE
CONTROL
EFFICIENCY
Thank You