Virtualization Update
Slimmed Down, Stretched Out and Simplified

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Oct 3rd 2018
Agenda

1. Recap of recent developments
2. Future development items
3. Questions
Key Message

• That Honeywell is continuously driving ways to simplify virtualization deployments
• The Premium Platform can easily scale to the largest sites and we are now taking steps to scale the offering down to meet the needs of smaller customers
• For customers with geographically distributed locations, we are planning to support technologies that allow virtual infrastructure to be stretched out over distance
• That Honeywell is staying current with the latest Hardware and Hypervisor developments
Virtualization Recap

Thin Client - Z90
- FTE Support

Networking
- Cisco 2960X – 48-port
- Cisco 3850X – 24-port

McAfee MOVE
- MOVE 4.5 and NSX Manager

3Q 2017
- Experion Backup and Restore
  - EBR R501
- Networking
  - 10Gbps FTE VLAN support

4Q 2017

1H 2018
- Essentials Platform Update
  - Dell R640XL Mgmt
  - Dell R640XL Std Production
  - Dell R740XL Perf-A Production
  - Dell R740XL Perf-B Production
- McAfee MOVE
  - MOVE and NSX Manager 6.3.x
- Networking
  - 1Gbps FTE VLAN support

2H 2018
- Premium Platform
  - 14G Compute Sled
- General Enhancements
  - Support for vSphere 6.5
    - FC640 Premium Platform
    - Essentials
    - vCenter Server Appliance (VCSA)
  - First Gen Premium Platform vSphere 6.0
Thin Client Solution

• Based on Dell Wyse Z90DE7
• Custom Windows 7 Embedded OS
• Single through to Quad screen monitor options
• Native FTE using USB-Ethernet Adapter

Supported Features

<table>
<thead>
<tr>
<th>Feature</th>
<th>✔</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dual Video (TP-THNCL2)</td>
<td>✔</td>
</tr>
<tr>
<td>Quad Video (TP-THNCL3)</td>
<td>✔</td>
</tr>
<tr>
<td>Honeywell IKB, OEP Interface</td>
<td>✔</td>
</tr>
<tr>
<td>4K Monitor support (Orion Console)</td>
<td>✔</td>
</tr>
<tr>
<td>Honeywell Console furniture mounting</td>
<td>✔</td>
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A Comprehensive Solution Supporting Various Hardware Platform Peripherals
Honeywell Thin Client

• Ongoing significant in the adoption of thin clients across our install base.
• Image updates provide by Honeywell delivering the latest security and functional updates
• Latest 2600 image was released in September 2017
  - TCX v7.2 now available to support Windows Server 2016 and Windows 10
  - RDP Connection Handling
  - Pre-loaded FTE & USB NIC package

Over 2.5x growth between 2015-2017
Utilizing the Benefits of FTE on Thin Clients

- Honeywell supports Fault Tolerant Ethernet on Honeywell Windows-based thin clients.
- Through the use of an Ethernet adapter, both FTE network segments can be delivered directly to the thin client.
- Provides benefits such as:
  - FTE software stack runs directly on the thin client, eliminating the need for an external port protector.
  - Flexible deployment options – connect where FTE is available.
  - Configuration via familiar FTE tools.
Virtualization VLAN Support

- Reduces the wire count by combining multiple FTE community end node connections into a single pair of vSwitches with separate VLANs
- Simplifies configuration by splitting out the VLANs in a single pair of aggregation switches per ESXi cluster
- Initial release was at 10Gbps with 1Gbps now supported
Honeywell 10GB 24 Port Switch Cisco 3850-24XU

- Used for FTE Virtual Top of Rack solution.
- Current Application specifically for Premium Virtual Solution that uses VLAN aggregation to reduce cabling from Virtual Dell FX2 solution to multiple FTE Communities.
  - FTE Communities connection to backbone
  - Supports Multiple FTE Communities to ESXi Host
  - Can be configured for redundancy to ESXi Host.
Honeywell 1 GB 48 Port Switch, Cisco 2960X-48TS-L

- 1 GB standard and VLAN switch
- All Level 2 applications
- All Level 1 and Split switch configurations.
- Includes 48 port 1000/100/10 RJ45 ports
- Four SFP ports
- 52 ports Total
- Supports use of the RPS 2300 for redundant power.
- Redundant power is not included with the unit.
Experion Backup and Restore R501

• Based on ABR v12.5 Advanced
• Released: December 2017
• Support for:
  - Experion: R50x, R432, R43x, R410
  - Data Deduplication
  - Universal Restore for physical machines
• EBR Side-by-Side Upgrade:
  - Upgrade from EBR R431 Manager to EBR R501 Manager
  - Imports agents and groups into the new release
  - EBR R431 agents continue working with the old management server until they are upgraded to version EBR R501
Experion Backup and Restore R501 cont’d

- Unified modern, interactive web-console
  - Easy to use for non-IT personnel
- Smart alerts and dashboards
- New archive format and backup engine (faster, smaller, more reliable and scalable)
- Single Backup Appliance can now handle multiple hosts
- Improved backup snapshot handling
Premium Platform - Industry Recognition

• Honeywell’s Premium Platform for Experion Virtualization Solutions has been recognized by VMware with multiple awards:
  - Partner Innovation Award, OEM Category
    ▪ 2017 & 2016
  - Technical Alliance Award for Emerging Technologies and Trends

• These awards highlight the Premium Platform’s unparalleled benefits in availability and reliability delivered through the process control industry’s first Hyperconverged Infrastructure (HCI) solution
Premium Platform Compute Node Update

• The Premium Platform has had an update to the compute sleds
• Compute sled update to the latest Dell 14G compute technology
  - Processor and memory enhancements
  - Single processor → lower licensing costs
• Same FX2 Chassis, FD332, IO Aggregator, CMC
Honeywell Essentials Platform

• Platform Update - March 2018
  - Based on Dell XL chassis platforms
  - Bundled with iDRAC Enterprise for remote administration
  - Move to the latest Intel Skylake processors
  - Memory and storage enhancements (speed and capacity)

<table>
<thead>
<tr>
<th>Usage</th>
<th>Current Platform (Date)</th>
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</thead>
<tbody>
<tr>
<td>Management Host, Standard Production Host</td>
<td>Dell R640XL (March 2018)</td>
</tr>
<tr>
<td>Performance-A Production Host, Performance-B Production Host</td>
<td>Dell R740XL (March 2018)</td>
</tr>
</tbody>
</table>
Support for McAfee Move Agentless 4.5 and NSX

- Honeywell recommend the use of Host Based AV for Experion Virtualization Solutions
- Benefits of Host Based AV is that it allows for agentless AV scanning
- Honeywell supports McAfee Move and provided significant updates in 2017 to support
  - McAfee Move 4.5
  - NSX 6.3

Note: We don’t support the full NSX suite, just the components required to support Move
Agenda

- Recap of recent developments
- Future development items
- Questions
In providing this information, Honeywell is under no obligation with regard to product planning information, anticipated product characteristics, performance specifications, or anticipated release dates.

Roadmap information forthcoming is being provided to the recipient solely for the purposes of discussion and without intending to be bound.
Virtualization Roadmap

4Q 2018

**Thin Client**
- Next Gen Thin Client
- Wyse Management Services
- Whitelisting (Z90)

**Premium Platform**
- FC630 Premium Platform - vSphere 6.5
- Improved 110V Support

1Q 2019

**Premium Platform**
- Next Gen Single Chassis Option
- Factory Customization

1H 2019

**Premium Platform**
- Storage Increase (FD332)
- vSAN Stretched Cluster
- Top of Rack vSAN/FT Networking
- Rack

**Thin Client**
- Improved Display Performance for digital video

**External Block Storage**
- External block storage for DVM, DynaMo and other large data sets (virtual disk storage only – VM runs on Premium or Essentials platform)
Premium Platform – All-in-One Single Chassis Cluster

• Honeywell is releasing a design that will achieve a vSAN cluster in a single chassis
  - Utilizes quarter-width Dell FC430 compute sleds in the Dell FX2 chassis
  - No chassis-to-chassis connections
  - Self-contained storage, computer, and vSAN/FT networking in a 2U chassis

• Targeted towards systems that don't have scale-out needs

• The target configuration will likely provide up to 30% cost savings compared to a two-chassis FC630 system
Multi Chassis vs Single Chassis Comparison

Advantages and disadvantages of the two different architectures

Premium Platform Multi Chassis Configuration

- Scale out to meet current and future resource needs
- Optional chassis redundancy
- More network capacity and better network path redundancy

Premium Platform Single Chassis Configuration

- Single vSAN cluster all in one box
- No external connections to join chassis together
- More cost effective for smaller installations
Stretched Cluster

- Distribute risk across multiple plant areas
- Allow the seamless mobility of VMs between plant areas
- Leverage Fault Tolerance and High Availability across plant areas
Top of Rack for vSAN and FT

- Simple
- Requires no Top of Rack switch
- Totally isolated

- Better for designs with large scale out needs
- Easier for maintenance
- Required for stretched cluster

Standard Deployment

Fault Tolerance and vSAN Networks
Configurable Options to Match Your System Needs

System Memory
Additional memory for resource intensive applications

IO Aggregator
Copper or SFP-based modules to support additional topologies

Improved 110V Support
Enhancements for systems without high-line power

Configurable Network Adapters
Change the quantity and type of factory-installed NICs

Dell ProSupport Hardware Warranty
Optional 5-year and 7-year hardware warranty options
Storage Capacity Increase

All of the objects that are used by the vSAN are contained within these storage sleds in the Premium Platform.
Storage Capacity Increase

By default each sled is only 50% populated. Rationale:

- Provides sufficient space for typical consolidation ratios in our industry
- Keeps system within a certain cost envelope
Storage Capacity Increase

However for customers with very large databases, they might need more storage and don’t require additional processing:

- We will provide kits that allow an additional Disk Group to be added.
- This will provide a doubling of the storage per chassis.
Introducing Honeywell’s Next Gen Thin Client

- Up to Six Discreet Video Channels
- Latest OS With Integrated Hardening & Security Features
- Support for select Honeywell Peripheral Devices
- Simple Deployment and Administration
- Integrated Dual RJ45 – No Ethernet Dongle Required
Next Gen Thin Client – Two Chassis to Fit Your Needs

• Slim Chassis
  - Passively Cooled
  - Up to three displays
    ▪ Single/Dual/Triple non-UHD, or

• Extended Chassis
  - Designed for systems with quad screen or higher display requirements
  - Integrated AMD E9173 Video Card
Enhanced Video Performance – Next Gen Thin Client

• Modern remote display protocols provide enhanced digital video performance
  - Higher digital video framerates
  - More digital video feeds
Simplifying Thin Client Administration

• Centralized Thin Client Management
• Increases efficiency and awareness by:
  • Reducing repetitive configuration tasks
  • Allowing central image maintenance
  • Providing insight into device health
Application White Listing – Wyse Z90

• For customers that require additional layers of protection to meet local security requirements, Application Whitelisting can be installed on the Wyse Z90
• Allows whitelisted applications to run, while untrusted applications are blocked from execution
vSphere 6.5

Honeywell will begin delivering Experion Virtualization Solutions with vSphere 6.5 from Q3. This will provide all of the latest VMware improvements and ensures that the product we are shipping always has the longest end of support date.

There are too many new features to discuss here but of particular relevance are:

- Honeywell support for the vCenter Server Appliance
- Update Manager integration with vCenter Server Appliance
- vSphere HA Orchestrated Restart
- vSAN Quality of Server enabled on all editions
- vSAN Proactive Drive HA

All vSphere patching and upgrades can be done online with no impact to operations. Experience is even better with the Premium Platform.
vCenter Server Appliance – The New Default

- Purpose-built Linux OS optimized for virtualization
- Significant reduction in boot and application startup times
- Eliminates dependency on a 3rd party for OS patching
- Easy migration from Windows vCenter to the Appliance
- About 3x performance improvement over vCenter Server 6.5 on Windows
## Operational Benefits of vCenter Server Appliance

<table>
<thead>
<tr>
<th>Feature</th>
<th>Appliance</th>
<th>Windows</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quick Provisioning</td>
<td>✓</td>
<td>✘</td>
</tr>
<tr>
<td>No Operating System / Database</td>
<td>✓</td>
<td>✘</td>
</tr>
<tr>
<td>Licenses</td>
<td>✓</td>
<td>✘</td>
</tr>
<tr>
<td>Minimal Database Maintenance</td>
<td>✓</td>
<td>✘</td>
</tr>
<tr>
<td>Unified Patching</td>
<td>✓</td>
<td>✘</td>
</tr>
<tr>
<td>Single Point of Support</td>
<td>✓</td>
<td>✘</td>
</tr>
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</table>
ESM – Experion Support and Maintenance helps plan, deploy and maintain Experion PKS systems remotely.

**PLAN**

Define Experion Deployment configuration for site
- Microsoft Excel.
- Experion Support and Maintenance (ESM)

**DEPLOY**

Deploy Experion cluster for site remotely
- Installation from Experion media
- Creation of Experion VM Templates
- Cloning from Templates

**MAINTAIN**

Deploy Experion Updates
- Enables to maintain the site up to date with latest Experion patches
- Helps to monitor the site to view the Updates level

ESM Server
ESM New User Interface

Getting started with Experion Service and Maintenance
Quick and easy way to manage deployments

What would you like to do?

DEPLOY
Deploy systems, generate nodes, configure files

MIGRATE
Migrate all systems and nodes

UPDATE
Apply updates, hot fixes and patches

Simple, task based interface that guides you through installation and maintenance tasks
ESM New User Interface

Dashboard that shows overall system status and per node progress.
Conclusion

• That Honeywell is continuously driving ways to simplify virtualization deployments
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• That Honeywell is staying current with the latest Hardware and Hypervisor developments
Questions?