

Chapter 1

What's New in vSphere 5.5

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- Support for Reliable Memory Technology
- Enhancements for CPU C-States

✓ Virtual Machine Enhancements

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vSphere 5.5 continues to build on the rich feature sets of both vSphere 5.0 and vSphere 5.1. There are new capabilities at all levels of the product, and the introduction of these new features will in many ways be what will differentiate the updated VCP5-DCV exam from the prior version. This chapter briefly reviews the new vSphere 5.5 features. The purpose here is simply to get everyone introduced to what is new and different in vSphere 5.5. Many of these features will be covered in greater detail in the following chapters.

vSphere ESXi Hypervisor Enhancements

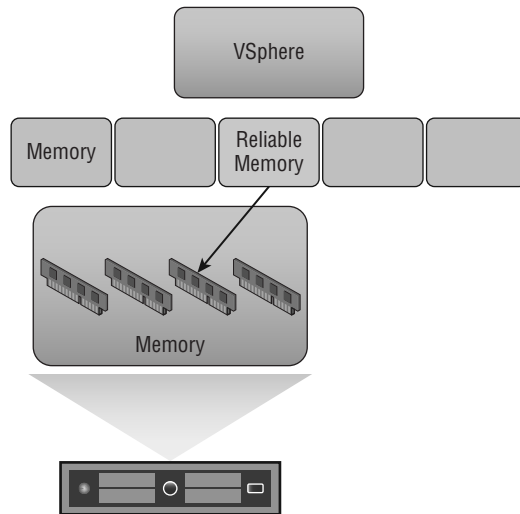
vSphere 5.5 introduces several improvements to the hypervisor. These changes were introduced to provide greater performance, reliability, and efficiency.

Hot-Pluggable PCIe SSD Devices

PCIe SSDs (Peripheral Component Interconnect Express solid-state drives) can be used to provide high-performance local storage options in ESXi. Allowing administrators to hot-swap these drives should offer advantages in uptime and host resiliency. Hot-add or hot-remove of an SSD on an ESXi host is now supported, and the ESXi storage stack will detect these operations.

Support for Reliable Memory Technology

Reliable Memory Technology is a CPU hardware feature that the ESXi hypervisor can use to place the VMkernel on what is reported as more reliable memory. Because the ESXi hypervisor is loaded into memory, using Reliable Memory Technology should provide greater protection from memory errors. In addition to the VMkernel, certain processes like `hostd` and `watchdog` are also protected. Figure 1.1 shows how ESXi might use Reliable Memory Technology.

FIGURE 1.1 Reliable Memory Technology and VMkernel

Enhancements to CPU C-States

vSphere 5.5 introduces the ability to leverage both the performance state (P-state) and the deep processor power state (C-state) in the balanced as well as the low power policy for host power management. vSphere 5.1 and prior leveraged only the performance state (P-state). These changes provide additional power savings as well as potentially enhanced CPU performance.

Virtual Machine Enhancements

Virtual machine enhancements are included in ESXi 5.5 to provide the ability to run even more Tier 1 workloads, and to provide additional abilities to VMs. Many of these enhancements are introduced to provide better end-user experiences for VM consumers, such as applications that have graphic-intensive workloads.

VM Compatibility with VMware ESXi 5.5

A new virtual machine compatibility level (or virtual machine hardware version 10) is introduced in vSphere 5.5. A new virtual-SATA Advance Host Controller Interface (AHCI)

controller that supports both virtual disks and CD-ROM devices can now be used, which allows you to connect up to 30 devices per controller. With a maximum of four controllers, your VMs can now have 120 disk devices.

Expanded vGPU Support

A virtual graphics processor unit (vGPU) is a processor for rendering graphics on a VM network's host instead of an endpoint PC, with comparable performance. vGPU support in vSphere 5.5 includes GPUs based on both Intel and AMD. This support provides more flexibility for VMs or applications that have graphic-intensive workloads. vMotion of virtual machines configured with automatic rendering is possible across a mix of GPU vendors and also between ESXi hosts that use software-backed graphics rendering.

Graphic Acceleration for Linux Guests

With vSphere 5.5, VMware introduces a new guest driver that will accelerate the entire Linux graphics stack. This guest driver code is also open source, which means that any modern Linux distribution could be packaged with the guest driver. Modern distributions that are supported include Ubuntu 12.04 and later, Fedora 17 and later, and Red Hat Enterprise Linux (RHEL) 7.

vCenter Server Enhancements

vCenter Server 5.5 also has new features that improve installation ease, increase performance, improve scalability, and reduce complexity. Improvements to vCenter Single Sign-On (SSO) include a complete rewrite of the product.

vCenter Single Sign-On

vCenter Single Sign-On (SSO) was introduced in vSphere 5.1 with the intention of providing a single sign-on experience to products in the vCloud Suite. In vSphere 5.5, a single installation model is now offered and the requirement for a separate database has been eliminated. These changes, coupled with enhanced Microsoft Active Directory integration, have greatly improved SSO in this release.

vCenter Server Appliance

The vCenter Server Appliance (VCSA) included with vSphere 5.5 uses an embedded vPostgres database. This embedded database supports 100 hosts and 3000 virtual machines.

If an external Oracle database is used, those numbers increase to 1000 hosts and 10,000 virtual machines. These changes allow the standalone VCSA with the vPostgres database to be supported with very large environments.

vSphere Web Client

The vSphere Web Client is still on track to replace the traditional vSphere Client. All of the new vSphere 5.5 features can be managed only with the vSphere Web Client. Drag-and-drop, filters, and recent items are new features of the vSphere Web Client, in addition to full client support for Mac OS X. It is also important to note that in vSphere 5.5, Linux OS support has been removed. This is due to the fact that Adobe has dropped support for Flash on Linux.

vSphere App HA

vSphere 5.5 introduces vSphere App HA, which works with vSphere HA host monitoring and virtual machine monitoring to provide improved application uptime. vSphere App HA works with VMware vFabric Hyperic Server to restart an application when issues are detected. Note that App HA requires Enterprise Plus licensing.

HA Compatibility with DRS VM-VM Affinity Rules

Prior to vSphere 5.5, in the event of an ESXi host failure vSphere HA would not honor VM-VM anti-affinity rules defined in vSphere DRS when restarting virtual machines. This behavior is now more intelligent and should provide a better recovery experience following a host failure.

vSphere Big Data Extensions

Big Data Extensions (BDE) is another new feature of vSphere 5.5 that allows the deployment and management of Hadoop clusters from within the vSphere Web Client. This feature is available only with the vSphere Enterprise and Enterprise Plus editions, and it requires the vSphere Web Client.

Storage Enhancements

With the release of vSphere 5.5, VMware introduces many new features aimed at making storage more scalable, capable, resilient, and available. The first feature, which was long overdue, is the capability to create virtual machine disk (VMDK) files greater than 2TB minus 512 bytes.

Support for 62TB VMDK

In vSphere 5.1 and earlier, the maximum VMDK size was limited to 2TB minus 512 bytes. With vSphere 5.5, the new maximum size is 62TB. This means you could have a 62TB VMDK on a 64TB VMFS volume. This also includes support for virtual mode Raw Device Mappings (RDMs) as well. You may recall that support for large physical mode RDMs was first introduced in vSphere 5.0.

MSCS Updates

With vSphere 5.5, support is also expanded for Microsoft Server Cluster (MSCS). In vSphere 5.1 and earlier, only Fibre Channel was supported as the storage protocol in MSCS environments. In vSphere 5.5, both iSCSI and Fibre Channel over Ethernet (FCoE) are now supported, in addition to Fibre Channel. Microsoft Windows 2012 and the Round-Robin path policy for shared storage are both also supported in vSphere 5.5. Also, MSCS is now supported for protecting a backend Microsoft SQL vCenter Server database.

16Gb E2E Support

VMware introduces 16Gb end-to-end FC support in vSphere 5.5. This means that both the host bus adapters (HBAs) and array controllers can run at 16Gb, as long as the switch between the initiator and target also supports 16Gb.

PDL AutoRemove

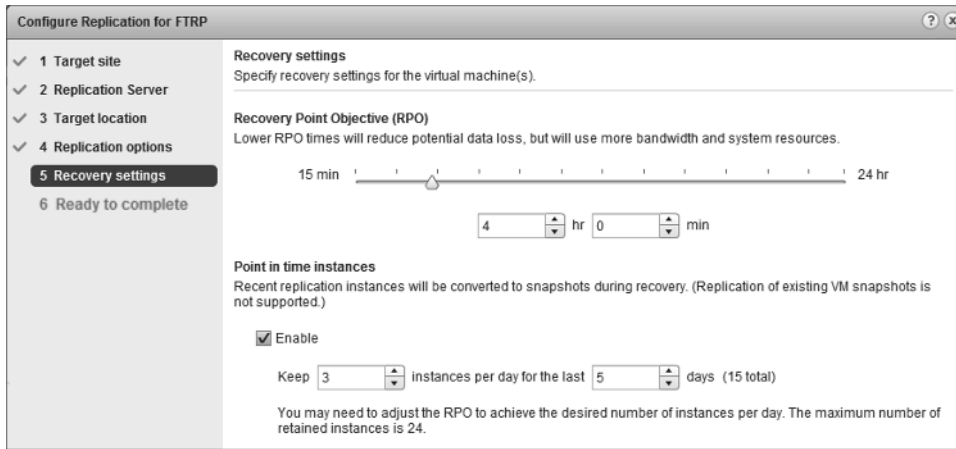
PDL AutoRemove is a feature that helps prevent an all-paths-down (APD) event on an ESXi host. When a storage device is improperly removed from an ESXi host, it enters a permanent device loss (PDL) state. vSphere hosts are limited to 256 disk devices, and too many PDLs can lead to an exhaustion of device slots. This can result in an APD event, which will generally lead to an ESXi host reboot. PDL AutoRemove automatically removes a device from a host when it enters a PDL state, and thus helps prevent an APD event.

vSphere Replication Interoperability

In vSphere 5.5, vSphere Replication has been improved to allow virtual machines at the primary site to be migrated with Storage vMotion and participate in Storage DRS datastore clusters.

vSphere Replication Multi-Point-in-Time (MPIT) Snapshot Retention

In vSphere 5.5 there is a feature that enables retention of historical points in time. This is accomplished with a multi-point-in-time (MPIT) retention policy, and it allows for multiple recovery points, as illustrated in Figure 1.2.

FIGURE 1.2 vSphere Replication Recovery Settings

VAAI UNMAP Improvements

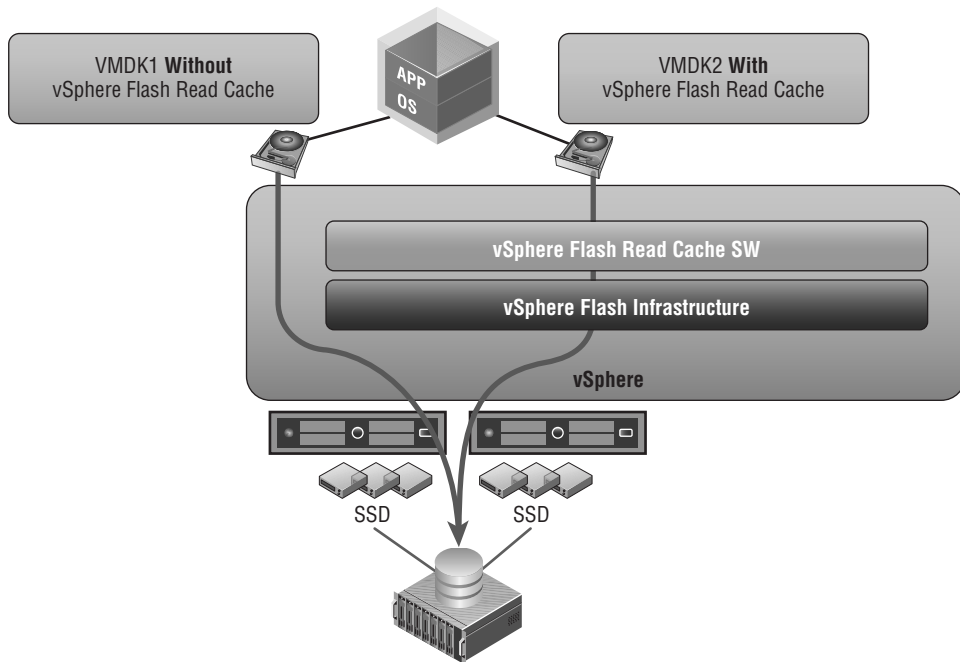
vStorage APIs for Array Integration (VAAI), first introduced in vSphere 4.1, is a feature that allows the hypervisor to offload certain storage functions to a supported storage array. In vSphere, one of the commands, UNMAP, has been optimized so that now the reclaim size is specified as blocks rather than a percentage value. Dead space is also now claimed in increments rather than all at once. UNMAP can also handle much larger dead space areas, now that 62TB VMDKs are possible in vSphere 5.5.

VMFS Heap Improvements

vSphere 5.5 has an improved heap eviction process, which means there is no longer a need for large heap sizes. vSphere 5.5 with 256MB of heap allows ESXi hosts to access all address space of a 64TB VMFS volume.

vSphere Flash Read Cache

The vSphere Flash Read Cache is a flash-based storage solution that pools multiple flash-based devices into a vSphere Flash Resource, as illustrated in Figure 1.3. It is used to accelerate read-intensive workloads and improve virtual machine performance. This feature is also supported with vMotion, HA, and DRS.

FIGURE 1.3 vSphere Flash Read Cache

Networking Enhancements

Like many of the other improvements in vSphere 5.5, the networking of the dvSwitch has been updated to simplify operations, improve performance, and enhance security.

Link Aggregation Control Protocol (LACP) Enhancements

LACP is used to aggregate multiple network connections into a single logical connection that is used to provide increased throughput and redundancy. In vSphere 5.5, the dvSwitch now supports 22 new hashing algorithms. As many as 64 Link Aggregation Groups (LAGs) are now also supported. There are also new workflows that can be used to configure LACP across multiple ESXi hosts.

Traffic Filtering

One of the security enhancements introduced in the dvSwitch in vSphere 5.5 is the ability to support packet classification based on three different qualifiers:

- MAC Source Address and Destination Address qualifiers
- System traffic qualifiers—vMotion, FT, vSphere management
- IP qualifiers: Protocol type, IP SA, IP DA, and port number

Traffic filtering can be used to allow port-level security and provides the ability to filter ingress traffic, egress traffic, or both.

Quality of Service Tagging

Support has been added for Differentiated Service Code Point (DSCP) marking in vSphere 5.5. This enables users to insert tags in the IP header, which can be useful with certain physical routers.

SR-IOV Enhancements

In vSphere 5.5, the configuration workflow for single root I/O virtualization (SR-IOV)–enabled physical NICs has been simplified. Also introduced is the ability to propagate port group properties from the virtual switch to the virtual functions.

Enhanced Host-Level Packet Capture

A host-level CLI packet capture tool, which is the equivalent of the Linux tcpdump utility, is now available.

40Gb NIC Support

Support for Mellanox ConnectX-3 Virtual Protocol Interconnect (VPI) adapters configured in Ethernet mode is introduced in vSphere 5.5.

VMware Data Protection (VDP) Enhancements

VMware Data Protection was introduced in vSphere 5.1 and replaced VMware Data Recovery, which was introduced in vSphere 5.0. The vSphere 5.5 release of VDP has been improved to include:

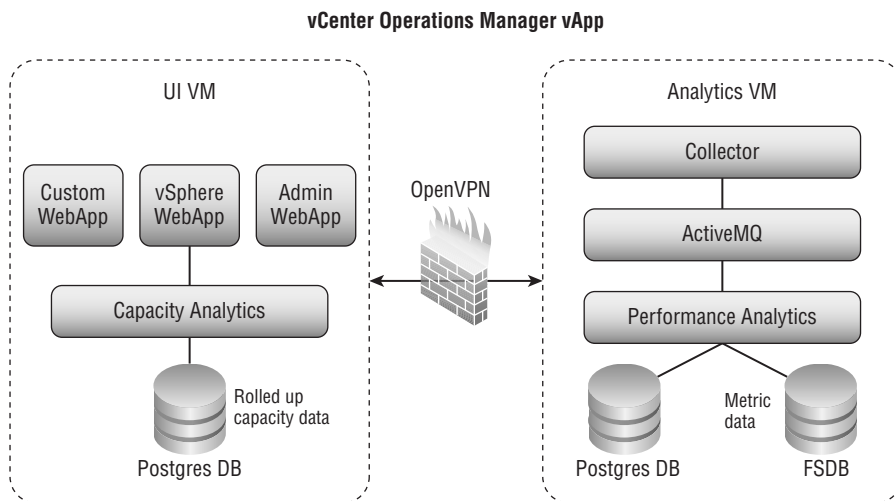
- Replication of backup data to EMC Avamar
- Direct-to-host emergency restore

- Backup and restore of individual VMDKs
- Granular scheduling of backup/replication jobs
- Flexible VDP storage management

vCenter Operations Manager

While the product has been around for many years, vCenter Operations Manager Foundation was first bundled with vSphere in the 5.1 release. vCenter Operations Manager Foundation includes performance analytics and health monitoring for your virtual infrastructure. It is deployed as a vApp and includes two virtual machines, as shown in Figure 1.4. vCenter Operations Manager will be covered in great detail in Chapter 11, “Monitoring a vSphere Implementation and Managing vCenter Server Alarms.”

FIGURE 1.4 vCenter Operations Manager vApp



Summary

Many changes and new features were introduced in vSphere 5.5. Like previous versions of vSphere, many of the new features are targeted at being able to support larger and larger Tier 1 workloads. Some of the features are also targeted at being able to support virtual desktops or the more graphic-demanding applications running on them.

There are three significant changes in terms of what has changed for the VCP5-DCV exam and its update to be relevant to vSphere 5.5. The first of these changes is the inclusion of vCenter Single Sign-On objectives. The second change is the reintroduction of

VMware Data Protection objectives. VMware Data Recovery (released in vSphere 5.0) objectives were removed shortly after the release of vSphere 5.1 and VDP. The third change is the introduction of vCenter Operations Manager objectives. These changes represent the majority of the changes that you are likely to encounter on the new VCP5-DCV exam. Also keep in mind that other new features like vSphere Flash Read Cache and vSphere Replication, while not as extensively listed in the objectives, will also be important to learn and know for the exam.

Although there are many changes to vSphere 5.5, many of which we will explore in the coming chapters of this book, there are also features that are not covered by the VCP5-DCV exam blueprint. To think that these features omitted on the blueprint are not likely to show up on the exam could be a mistake. I encourage you to learn all of the vSphere 5.5 products and explore the feature sets as you move through this book. Learn how the products work and where they might effectively be used in your virtual infrastructure, but also be mindful of the “why” of these products and feature sets.