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Section 1: Configure and Administer vSphere Security

Objective 1.1: Configure and Administer Role-based Access Control
- Identify common vCenter Server privileges and roles
- Describe how permissions are applied and inherited in vCenter Server
- View/Sort/Export user and group lists
- Add/Modify/Remove permissions for users and groups on vCenter Server inventory objects
- Create/Clone/Edit vCenter Server Roles
- Determine the correct roles/privileges needed to integrate vCenter Server with other VMware products
- Determine the appropriate set of privileges for common tasks in vCenter Server

Objective 1.2: Secure ESXi, vCenter Server, and vSphere Virtual Machines
- Enable/Configure/Disable services in the ESXi firewall
- Enable Lockdown Mode
- Configure network security policies
- Add an ESXi Host to a directory service
- Apply permissions to ESXi Hosts using Host Profiles
- Configure virtual machine security policies
- Create/Manage vCenter Server Security Certificates

Objective 1.3: Enable SSO and Active Directory Integration
- Configure/Manage Active Directory Authentication
- Configure/Manage Platform Services Controller (PSC)
- Configure/Manage VMware Certificate Authority (VMCA)
- Enable/Disable Single Sign-On (SSO)
- Identify available authentication methods with VMware vCenter

Section 2: Configure and Administer Advanced vSphere Networking

Objective 2.1: Configure Advanced Policies/Features and Verify Network Virtualization Implementation
- Identify vSphere Distributed Switch (vDS) capabilities
- Create/Delete a vSphere Distributed Switch
- Add/Remove ESXi hosts from a vSphere Distributed Switch
- Add/Configure/Remove dvPort groups
- Add/Remove uplink adapters to dvUplink groups
- Configure vSphere Distributed Switch general and dvPort group settings
- Create/Configure/Remove virtual adapters
- Migrate virtual machines to/from a vSphere Distributed Switch
- Configure LACP on Uplink portgroups
- Describe vDS Security Policies/Settings
- Configure dvPort group blocking policies
- Configure load balancing and failover policies
• Configure VLAN/PVLAN settings
• Configure traffic shaping policies
• Enable TCP Segmentation Offload support for a virtual machine
• Enable Jumbo Frames support on appropriate components
• Determine appropriate VLAN configuration for a vSphere implementation

Objective 2.2: Configure Network I/O Control (NIOC)
• Identify Network I/O Control requirements
• Identify Network I/O Control capabilities
• Enable/Disable Network I/O Control
• Monitor Network I/O Control

Objective 2.3: Configure vSS and vDS Policies
• Identify common vSS and vDS policies
• Describe vDS Security Polices/Settings
• Configure dvPort group blocking policies
• Configure load balancing and failover policies
• Configure VLAN/PVLAN settings
• Configure traffic shaping policies
• Enable TCP Segmentation Offload support for a virtual machine
• Enable Jumbo Frames support on appropriate components
• Determine appropriate VLAN configuration for a vSphere implementation

Section 3: Configure and Administer Advanced vSphere Storage
Objective 3.1: Manage vSphere Storage Virtualization
• Identify storage adapters and devices
• Identify storage naming conventions
• Identify hardware/dependent hardware/software iSCSI initiator requirements
• Compare and contrast array thin provisioning and virtual disk thin provisioning
• Describe zoning and LUN masking practices
• Scan/Rescan storage
• Configure FC/iSCSI LUNs as ESXi boot devices
• Create an NFS share for use with vSphere
• Enable/Configure/Disable vCenter Server storage filters
• Configure/Edit hardware/dependent hardware initiators
• Enable/Disable software iSCSI initiator
• Configure/Edit software iSCSI initiator settings
• Configure iSCSI port binding
• Enable/Configure/Disable iSCSI CHAP
• Determine use case for hardware/dependent hardware/software iSCSI initiator
• Determine use case for and configure array thin provisioning

Objective 3.2: Configure Software-defined Storage
• Configure/Manage VMware Virtual SAN
Create/Modify VMware Virtual Volumes (VVOLs)
Configure Storage Policies
Enable/Disable Virtual SAN Fault Domains

Objective 3.3: Configure vSphere Storage Multi-pathing and Failover
Configure/Manage Storage Load Balancing
Identify available Storage Load Balancing options
Identify available Storage Multi-pathing Policies
Identify features of Pluggable Storage Architecture (PSA)
Configure Storage Policies
Enable/Disable Virtual SAN Fault Domains

Objective 3.4: Perform Advanced VMFS and NFS Configurations and Upgrades
Identify VMFS and NFS Datastore properties
Identify VMFS5 capabilities
Create/Rename/Delete/Unmount a VMFS Datastore
Mount/Unmount an NFS Datastore
Extend/Expand VMFS Datastores
Place a VMFS Datastore in Maintenance Mode
Identify available Raw Device Mapping (RDM) solutions
Select the Preferred Path for a VMFS Datastore
Enable/Disable vStorage API for Array Integration (VAAI)
Disable a path to a VMFS Datastore
Determine use case for multiple VMFS/NFS Datastores

Objective 3.5: Setup and Configure Storage I/O Control
Enable/Disable Storage I/O Control
Configure/Manage Storage I/O Control
Monitor Storage I/O Control

Section 4: Upgrade a vSphere Deployment
Objective 4.1: Perform ESXi Host and Virtual Machine Upgrades
Identify upgrade requirements for ESXi hosts
Upgrade a vSphere Distributed Switch
Upgrade VMware Tools
Upgrade Virtual Machine hardware
Upgrade an ESXi Host using vCenter Update Manager
Stage multiple ESXi Host upgrades
Determine whether an in-place upgrade is appropriate in a given upgrade scenario

Objective 4.2: Perform vCenter Server Upgrades
Identify steps required to upgrade a vSphere implementation
Identify upgrade requirements for vCenter
Upgrade vCenter Server Appliance (VCA)
Identify the methods of upgrading vCenter
• Identify/troubleshoot vCenter upgrade errors

Section 5: Administer and Manage vSphere Resources

Objective 5.1: Configure Advanced/Multilevel Resource Pools
• Describe the Resource Pool hierarchy
• Define the Expandable Reservation parameter
• Describe vFlash architecture
• Create/Remove a Resource Pool
• Configure Resource Pool attributes
• Add/Remove virtual machines from a Resource Pool
• Create/Delete vFlash Resource Pool
• Assign vFlash resources to VMDKs
• Determine Resource Pool requirements for a given vSphere implementation
• Evaluate appropriate shares, reservations and limits for a Resource Pool based on virtual machine workloads

Section 6: Backup and Recover a vSphere Deployment

Objective 6.1: Configure and Administer a vSphere Backups/Restore/Replication Solution
• Identify snapshot requirements
• Identify VMware Data Protection requirements
• Explain VMware Data Protection sizing Guidelines
• Identify VMware Data Protection version offerings
• Describe vSphere Replication architecture
• Create/Delete/Consolidate virtual machine snapshots
• Install and Configure VMware Data Protection
• Create a backup job with VMware Date Protection
• Install/Configure/Upgrade vSphere Replication
• Configure VMware Certificate Authority (VMCA) integration with vSphere Replication
• Configure Replication for Single/Multiple VMs
• Identify vSphere Replication compression methods
• Recover a VM using vSphere Replication
• Perform a failback operation using vSphere Replication
• Determine appropriate backup solution for a given vSphere implementation

Section 7: Troubleshoot a vSphere Deployment

Objective 7.1: Troubleshoot vCenter Server, ESXi Hosts, and Virtual Machines
• Identify general ESXi host troubleshooting Guidelines
• Identify general vCenter troubleshooting Guidelines
• Troubleshoot Platform Services Controller (PSC) issues
• Troubleshoot common installation issues
• Monitor ESXi system health
- Locate and analyze vCenter and ESXi logs
- Export diagnostic information
- Identify common Command Line Interface (CLI) commands
- Troubleshoot common virtual machine issues
- Troubleshoot virtual machine resource contention issues
- Identify Fault Tolerant network latency issues
- Troubleshoot VMware Tools installation issues
- Identify/Troubleshoot virtual machines various states (e.g. orphaned, unknown, etc.)
- Identify virtual machine constraints
- Identify the root cause of a storage issue based on troubleshooting information
- Identify common virtual machine boot disk errors
- Identify and detect common knowledge base article solutions

**Objective 7.2: Troubleshoot vSphere Storage and Network Issues**
- Verify network configuration
- Verify storage configuration
- Troubleshoot common storage issues
- Troubleshoot common network issues
- Verify a given virtual machine is configured with the correct network resources
- Troubleshoot virtual switch and port group configuration issues
- Troubleshoot physical network adapter configuration issues
- Troubleshoot VMFS metadata consistency
- Identify Storage I/O constraints
- Monitor/Troubleshoot Storage Distributed Resource Scheduler (SDRS) issues

**Objective 7.3: Troubleshoot vSphere Upgrades**
- Identify vCenter Server and vCenter Server Appliance upgrade issues
- Create a log bundle
- Locate/Analyze VMware log bundles
- Identify alternative methods to upgrade ESXi hosts in event of failure
- Configure vCenter Logging options

**Objective 7.4: Troubleshoot and Monitor vSphere Performance**
- Describe how Tasks and Events are viewed in vCenter Server
- Identify critical performance metrics
- Explain common memory metrics
- Explain common CPU metrics
- Explain common network metrics
- Explain common storage metrics
- Identify CPU/Memory contention issues
- Identify Host Power Management Policy
- Monitor performance through esxtop
- Troubleshoot Enhanced vMotion Compatibility (EVC) issues
- Troubleshoot virtual machine performance via vRealize Operations
- Compare and contrast Overview and Advanced Charts

Objective 7.5: Troubleshoot HA and DRS Configurations
- Identify HA/DRS and vMotion requirements
- Verify vMotion/Storage vMotion configuration
- Verify HA network configuration
- Verify HA/DRS cluster configuration
- Troubleshoot HA capacity issues
- Troubleshoot HA redundancy issues
- Interpret the DRS Resource Distribution Graph and Target/Current Host Load Deviation
- Troubleshoot DRS load imbalance issues
- Troubleshoot vMotion/Storage vMotion migration issues
- Interpret vMotion Resource Maps
- Identify the root cause of a DRS/HA cluster or migration issue based on troubleshooting information
- Verify Fault Tolerance configuration
- Identify Fault Tolerance requirements

Section 8: Deploy and Consolidate vSphere Data Center

Objective 8.1: Deploy ESXi Hosts Using Autodeploy
- Identify ESXi Autodeploy requirements
- Configure Autodeploy
- Explain PowerCLI cmdlets for Autodeploy
- Deploy/Manage multiple ESXi hosts using Autodeploy

Objective 8.2: Customize Host Profile Settings
- Create/Edit/Remove a Host Profile from an ESXi host
- Import/Export a Host Profile
- Attach/Apply a Host Profile to an ESXi host or cluster
- Perform compliance scanning and remediation of an ESXi host using Host Profiles

Objective 8.3: Consolidate Physical Workloads using VMware Converter
- Identify VMware Converter requirements
- Convert Physical Workloads using VMware Converter
- Modify server resources during conversion
- Interpret and correct errors during conversion

Section 9: Configure and Administer vSphere Availability Solutions

Objective 9.1: Configure Advanced vSphere HA Features
- Explain Advanced vSphere HA settings
- Enable/Disable Advanced vSphere HA settings
- Explain how vSphere HA interprets heartbeats
- Interpret and correct errors during conversion
- Identify virtual machine override priorities
• Identify Virtual Machine Component Protection (VMCP) settings

**Objective 9.2: Configure Advanced vSphere DRS Features**
- Identify Distributed Resource Scheduler (DRS) affinity rules
- Enable/Disable Distributed Resource Scheduler (DRS) affinity rules
- Identify Distributed Resource Scheduler (DRS) Automation levels
- Configure Distributed Resource Scheduler (DRS) Automation levels

**Objective 9.3: Setup and Configure AppHA**
- Identify vSphere App HA requirements
- Identify available services protected by vSphere App HA
- Add applications to vSphere App HA
- Configure vSphere App HA policies

**Section 10: Administer and Manage vSphere Virtual Machines**

**Objective 10.1: Configure Advanced vSphere Virtual Machine Settings**
- Identify available virtual machine configuration settings
- Interpret virtual machine configuration files (.vmx) settings
- Identify virtual machine DirectPath I/O feature
- Enable/Disable Advanced virtual machine settings

**Objective 10.2: Create and Manage a Multi-site Content Library**
- Configure Content Library to work across sites
- Configure Content Library authentication
- Set/Configure Content Library roles
- Add/Remove Content Libraries

**Objective 10.3: Configure and Maintain a vCloud Air Connection**
- Identify vCenter Server and vCloud Air Connection requirements
- Configure vCenter Server connection to vCloud Air
- Identify connection types
- Configure replicated objects in vCloud Air Disaster Recovery service

**Section 11: Knowledge References**

**Section 1: Configure and Administer vSphere Security**
- [vSphere Installation and Setup Guide](#)
- [vSphere Security Guide](#)
- [What’s New in the VMware vSphere® 6.0 Platform](#)
- [vSphere Administration with the vSphere Client Guide](#)
- [Security of the VMware vSphere® Hypervisor](#)
- [vSphere Administration with the vSphere Client Guide](#)
- [VMware Hardened Virtual Appliance Operations Guide added to Tech Resource Directory](#)
- [VMware vCenter Server™ 6.0 Deployment Guide](#)
Section 2: Configure and Administer Advanced vSphere Networking
- **vSphere Installation and Setup Guide**
- **vSphere Networking Guide**
- **What’s New in the VMware vSphere® 6.0 Platform**
- **Leveraging NIC Technology to Improve Network Performance in VMware vSphere**
- **Performance Evaluation of Network I/O Control in VMware vSphere 6**

Section 3: Configure and Administer Advanced vSphere Storage
- **vSphere Installation and Setup Guide**
- **vSphere Storage Guide**
- **Leveraging NIC Technology to Improve Network Performance in VMware vSphere**
- **Best Practices for Running VMware vSphere® on iSCSI**
- **Administering VMware Virtual SAN**
- **What’s New: VMware Virtual SAN 6.0**
- **What’s New in the VMware vSphere® 6.0 Platform**
- **Virtual SAN 6.0 Performance: Scalability and Best Practices**
- **Multipathing Configuration for Software iSCSI Using Port Binding**
- **VMware vSphere® Storage APIs – Array Integration (VAI)**
- **vSphere Resource Management Guide**

Section 4: Upgrade a vSphere Deployment
- **vSphere Upgrade Guide**
- **vSphere Virtual Machine Administration Guide**
- **vSphere Installation and Setup Guide**
- **VMware vCenter Server™ 6.0 Deployment Guide**
- **Command-Line Installation and Upgrade of VMware vCenter Server 6.0 for Windows**
- **Command-Line Installation and Upgrade of VMware vCenter Server Appliance 6.0**

Section 5: Administer and Manage vSphere Resources
- **vSphere Resource Management**
- **vSphere Virtual Machine Administration Guide**
- **What’s New in VMware vSphere® Flash Read Cache®**

Section 6: Backup and Recover a vSphere Deployment
- **VMware vSphere® Data Protection™ 6.0**
- **vSphere Data Protection Administration Guide**
- **VMware vSphere® Data Protection™ Evaluation Guide**
- **What’s New in the VMware vSphere® 6.0 Platform**
- **VMware vSphere Replication Administration**

Section 7: Troubleshoot a vSphere Deployment
- **vSphere Installation and Setup Guide**
- **vSphere Troubleshooting Guide**
- **vSphere Virtual Machine Administration Guide**
- **vSphere Security Guide**
- **vSphere Server and Host Management Guide**
• vSphere Monitoring and Performance Guide
• vSphere Networking Guide
• vSphere Upgrade Guide
• vSphere Availability Guide
• vCenter Operations Manager Getting Started Guide (vSphere UI)

Section 8: Deploy and Consolidate vSphere Data Center
• vSphere Installation and Setup Guide
• vSphere Host Profiles Guide
• VMware vCenter Converter Standalone Guide

Section 9: Configure and Administer vSphere Availability Solutions
• vSphere Installation and Setup Guide
• vSphere Availability Guide
• What’s New in the VMware vSphere® 6.0 Platform
• vSphere Resource Management Guide
• vSphere App HA Installation and Configuration Guide
• vSphere App HA User’s Guide

Section 10: Administer and Manage vSphere Virtual Machines
• vSphere Installation and Setup Guide
• vSphere Administration with the vSphere Client Guide
• vSphere Virtual Machine Administration Guide
• What’s New in the VMware vSphere® 6.0 Platform
• vSphere Networking Guide
• VMware vCloud Air – Disaster Recovery User’s Guide