Chapter 7

Maintaining Cloud Solutions

Episode 7.01

Planning Patch Management

Public Cloud Patch Management

- Virtual machines
- Virtual appliances
- Applications
- Storage components
- Clusters

Public Cloud Patch Management

- Hypervisors
  - Software layer
  - Physical hardware
  - Enables VMs to run
- Network components
  - Update OS and firmware

Patch Management Operations/Procedures

- Hypervisors
  - Software layer
  - Physical hardware
  - Enables VMs to run
- Network components
  - Update OS and firmware

Patch Management Operations/Procedures

- Production vs. development vs. QA
- Rolling update
- Blue-green deployment
- Failover cluster

Additional Considerations

- Order of operations
  - Patches may require a specified order
- Dependencies
  - What other systems depend on the patched system?

Quick Review

- Patch management in the public cloud is much like traditional server patch management – make sure the operating systems and applications are up to date
- Private cloud patch management adds the important consideration of hypervisor patches
- A rolling update is often performed to avoid bringing down all servers concurrently
- Always be careful to apply patches in the appropriate order, if required

Episode 7.02

Manual Patch Management

Demo

- Patching a Linux system in the cloud

Quick Review

- Linux instances may be patched using internal Linux commands
- APT UPDATE will refresh the list of available updates for the patch management engine
- APT UPGRADE will apply available patches to the system

Episode 7.03

Automated Patch Management Lab

Hands-On

- Automating Windows patches in the cloud

Quick Review

- Windows Update provides for automated patch management
- Enterprise installations allow for granular control of patch processes
- Patch management servers can be deployed in cloud instances

Episode 7.04

Update Types

Hotfix

- Varying terminology by different vendors
- Generally, a hotfix resolves a specific problem
- May be publicly available
- May be available only upon request
- May be available only with a specific service contract
- Not always automated

Patch

- Generally, a patch is a publicly available hotfix
- May include multiple “fixes” in a bundle
- Usually can be automated

Version Update

- Updating to an entirely new version of the software or operating system
- Requires more extensive analysis
  - What features are removed?
  - What features are added?
- May require significant downtime (hours or days)

Rollback

- The ability to undo a patch, hotfix, or version upgrade
- Should be avoided when possible
- Two common options:
  - Vendor-provided rollback function
  - Restore from backup

Maintenance Windows

- How long will the patch take?
- Will the system be unavailable during the patch?
- How many systems are affected?
- With this information, select the best maintenance window

Quick Review

- A hotfix most often references a patch available for a specific problem and may be available only to those requesting it
- A version update is an update that results in a new version of the operating system or application
- Many systems implement a rollback feature that allows you to remove a patch or update
- Maintenance windows should always be determined in advance

Episode 7.05

Automated Workflows Lab

Automated Workflow Concepts

- Runbook management
  - Single node
- Orchestration
  - Multiple node
  - Multiple runbooks

Automation Activities

- Shut down
- Restart
- Entering maintenance mode
- Patching
- Snapshots
- Clones
  Enabling/disabling alerts

Hands-On

- Show Azure runbooks

Quick Review

- Runbooks are collections of automated tasks
- Orchestration is the automation of multiple tasks or multiple runbooks
- Rebooting, patching, upgrading, and creating backups are all common automation examples

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Backup Types Lab

Backup Types

- Full
- Differential
- Incremental
- Change block
- Delta tracking
- Snapshot
  - Redirect-on-write
- Cloning

Hands-On

- Azure
  - Snapshots of instances
  - Cloning instances

Quick Review

- Full backups backup everything
- Differential backups backup changes since the last full backup
- Incremental backups backup change since any previous backup type

Episode 7.07

Backup Targets and Options

Backup Targets

- Local
  - From my cloud to local environment
  - Local to my cloud
- Remote
  - Backing up to a 3rd party
- Replicas
  - Usually has to do with databases
  - Read replica: can only read that database
  - Read/write replica: can read AND write to that database

Backup Schedules

- Schedules include
  - Nightly full backups
  - Weekend full backups
  - Nightly differential backups

Additional Backup Options

- Configurations backup
- Objects Backup
- Backup dependencies
- Online vs. offline backups
- SLAs

Quick Review

- Cloud database systems can use read replicas as backups of the database
- Many backup schedules are still based on legacy tape systems, but can still be useful in cloud backups
- Online backups are not available with every system as online backups require a locking mechanism to protect in-use data

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Maintenance Automation Techniques

Impact and Scope of Maintenance Tasks

- User downtime
- Impacted systems
- Stability/reliability
- Performance

Impact and Scope of Maintenance Automation

- Skills required
- Scripting languages supported
- Documentation

Maintenance Schedules

- Must be scheduled based on the impact and scope of the action
  - Rolling maintenance on distributed systems
  - All-at-once maintenance
  - Cost of maintenance

Quick Review

- When performing maintenance tasks, you should consider user downtime and the impact on other systems
- Automation of maintenance tasks often requires proficiency in scripting or programming languages
- Rolling maintenance is often used on distributed systems to prevent disruption of many systems

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Maintenance Automation Tasks

Common Automated Maintenance Tasks

- Clearing logs
- Archiving logs
- Compressing drives

Common Automated Maintenance Tasks

- Removing inactive accounts
- Removing stale DNS entries
- Removing orphaned resources
- Removing outdated rules from firewall/security

Common Automated Maintenance Tasks

- Resource reclamation
- Maintain ACLs for the target object
- Orchestration can be used appropriately

Quick Review

- Clearing and archiving logs in order to reduce storage space consumed by these logs
- Removing inactive accounts can enhance the security of a system
- Scripts can be used to modify ACLs so that access capabilities are managed more efficiently

Episode 7.10

Provisioning and Deprovisioning

Provisioning Resources

- Cloud provisioning is simpler than physical machine provisioning
- Still requires planning for effectiveness
  - Provisioned and used resources incur costs
  - Provision and uses resources must be managed
  - Monitor usage patterns to plan provisioning

Cloud Bursting

- Typically configured between a private and public cloud
- Allows offloading of processing to the public cloud during heavy loads
- Public cloud may be configured for auto-scaling
- Extending the scope of the public cloud may be best
  - When bursting is occurring frequently
  - When costs would be reduced

Cloud Provider Migrations

- Moving virtual machines
- Moving code
  - More complicated
  - Must support the same or similar APIs
  - Using open architectural solutions with any cloud service provider allows for easier later migrations

Cloud Provider Migrations

- Several drivers of cloud migrations
  - Business need changes
    - Mergers, acquisitions, and divestitures
  - Cloud service requirement changes
  - Regulation and law changes

Quick Review

- When provisioning cloud resources, the costs of those resources should always be considered
- Cloud bursting allows offloading of processes to cloud resources during heavy loads
- When moving resources from one cloud service to another, careful consideration must be made for code support

Episode 7.11

Application Life Cycle

Cloud-Managed Application Life Cycles

- Deployment
- Upgrade
  - Features
  - Usage
  - Licenses
- Migration

Cloud-Managed Application Life Cycles

- Retirement/ replacement
  - How to remove data?
  - Consider feature use
  - Consider new features in other applications

Quick Review

- Application deployment should be based on effective planning
- Maintenance involved backups, updates and troubleshooting
- All applications eventually have an end-of-life and retirement should be considered

Episode 7.12

Monitoring and Reporting Lab

Hands-On

- Monitor in Azure

Selecting Monitoring and Reporting Metrics

- Chargeback/showback models
- Company policy-driven reporting
- SLA-driven rporting

Quick Review

- All major cloud service providers offer monitoring and reporting services
- Reporting is often driven by SLAs and company policies
- Some organizations require chargeback reporting so that appropriate departments are charged for cloud usage

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Monitoring Metrics

Understanding Monitoring Metrics

- Functional performance measurements used to analyze the effectiveness of a solution
- Choosing the right metric is key to determining effectiveness
- Operating systems. Applications, and hardware may provide metrics

Common Metrics

- Connectivity
- Capacity
- Latency
  - Delay
  - Processing, disk, network
- Overall Utilization
- System availability
  - Uptime
  - Downtime

Additional Management Metrics

- Health
- Cost
- Elasticity Usage
- Incidents

Quick Review

- Functional performance measurements are called metrics
- Latency metrics are used to ensure proper response times
- Cost metrics are used to ensure the implementation of budget constraints

Episode 7.14

Efficient Operations

Life-Cycle Management

- Roadmaps
- Old/current/new versions
- Upgrading and migrating systems
- Deprecations or end of life

Asset Management

- Configuration management database (CMDB)
  - Used to track configuration items (CIs)
    - Hardware
    - Software
    - Network Devices
  - A single source of truth
  - Includes details like location, version, vendor, etc.
  - May be used to track assets deployed in the cloud

Patch Management

- Scope of cloud elements
  - Hypervisors
  - VMs or Virtual appliances
  - Networking components
  - Firmware
  - Operating System (OS)
  - Applications/Software
  - Storage components
- Policies and rollbacks

Upgrade Methods

- Rolling upgrades
- Blue-green
- Canary
- Active-passive
- Development/QA/Production/DR

Dashboarding and Reporting

- Tagging
- Costs (Chargebacks and Showbacks)
- Elasticity usage
- Connectivity and latency
- Capacity and overall utilization
- Incidents
- Health and availability