

Chapter 7

Migrating to the Cloud

7.01 Migration Types

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Physical to Virtual (P2V)

- Most common type
- Converting physical servers to virtual servers
 - For the cloud or for conversion to virtualization
- Involves several actions
 - Migrating OS
 - Migrating applications
 - Migrating data

Physical to Virtual (P2V)

- Process may be manual or automated
 - Manual
 - Generalize OS
 - Shut down, reboot off media, make image
 - Load image and drivers into VM
 - Semi-automated
 - Run script to generalize OS
 - Load image and drivers
 - Fully automated
 - Script or app does everything

Virtual to Virtual (V2V)

- Converting virtual server from one virtualization platform to another
- Or moving it from one location to another
- Platform-to-alternate-platform requires the same process as P2V
- Platform-to-same-platform requires only a move of the VM

Virtual to Physical (V2P)

- Converting a virtual machine to a physical machine
- May be used to move from the cloud to on-premises
- May be used in some cloud providers to dedicate a physical machine to your process
- Machine should be generalized before the move

Physical to Physical (P2P)

- Migrating the software from one physical server to another
- Often performed with imaging/cloning software
- Requires generalization before the move when moving to different hardware
- May require generalization to move between like models

Storage Migrations

- Simpler than machine migrations
- Pointers to the data must be redefined
- User data is often mapped to drive letters
- Scripts may be used to remap drives

Online vs. Offline Migrations

- Online migrations allow users to continue accessing the system
 - Most easily allowed when the data is stored external to the system
 - System can be migrated
 - Data migrated later

Online vs. Offline Migrations

- Offline migrations disable access to the system
 - May be required for data consistency
 - Most useful when data is integral to the system

7.02 Workload Management

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Workload Migrations

- Standard operating procedures (SOPs) should be defined
 - How do you migrate P2V, V2V, V2P, and P2P?
 - How is data migrated?
 - What operating systems are supported?
 - What database systems are supported?
- As you implement cloud-based virtualization, procedures should be updated based on experience

Workload Format

- Virtualization format
 - Cloud providers may have their own formats and systems
 - Private clouds are usually VMware, Hyper-V, or open source virtualization formats
 - The format of the virtual hard disks and configuration files must be considered

Workload Format

- Application and data portability
 - Can the application(s) be moved without breaking configurations?
 - Will a reinstallation be required?
 - Is the data accessed explicitly or through pointers?

7.03 Virtualizing Physical Systems

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Shared vs. Dedicated

- Will the physical systems be virtualized on shared systems or dedicated systems?
 - Processor demands
 - Memory demands
 - Physical hardware access requirements

OS Selection

- OS installation options may change when virtualizing
 - Windows Core instead of GUI
 - Linux without GUI
- Services may be moved to a better OS for virtualization
 - DNS
 - DHCP
 - NTP

Management Methods

- Remote shell (SSH)
 - Command-line interface
 - Required in-depth command line/shell skills
- Remote desktop (RDP/VNC)
 - GUI interface
 - Uses same skills as local administration

7.04 Migrating Security

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Cloud Security

- Security of cloud management
 - Who can access the cloud administration tools?
 - How can they access the tools?
 - When can they access the tools?

Cloud Security

- Security of deployed systems
 - Who can access the databases?
 - Who can access the servers?
 - Who can access the managed services?

Security Considerations

- Identity
 - How will identities be managed?
- Authentication
 - What authentication methods will be supported?
- Authorization
 - How will access be granted/denied?
 - Who will approve access and how?
 - Do you have defined access policies?

Federation

- Separation of authentication/ authorization from the service being accessed
- Accomplished through trust
 - One domain trusts another domain to authenticate/ authorize users
 - Users are required only to authenticate to a single domain

7.05 Protocols and Services

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Data Transfer Methodologies

- Data can be transferred using common file transfer protocols
 - HTTP/HTTPS
 - FTP/SFTP/FTPS
- Network connections required
 - Internet connectivity
 - VPN protocols
- Direct connection
- Out-of-channel
 - Ex: AWS Snowball

Migrating Protocols to the Cloud

- DNS
 - Cloud providers usually offer this as a service
- DHCP
 - Cloud is DHCP server
 - Set up VM as DHCP server

Migrating Protocols to the Cloud

- Certificate services
 - Deploying PKI can be expensive
 - Cloud deployment just needs 3 VM instances
- All protocols should be selected based on requirements
 - Never run a protocol you don't need

Other Services and the Cloud

- Local agents
- Load balancing
- Antivirus/anti-malware
- Firewalls
- IDS/IPS
- Multifactor authentication

7.06 Environmental Constraints

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Bandwidth

- Calculate
 - Bandwidth required per application per user (App_req)
 - Number of users per application (Num_users)
 - $\text{App_req} \times \text{Num_users} = \text{Bandwidth Per Application}$
 - Sum all of the applications for total bandwidth

Time Constraints

- Downtime impact
- Working hours restrictions
- Follow-the-sun constraints/time zones
- Peak timeframes

Legal Constraints

- Cloud service providers must be able to comply with regulations
 - Most major providers can
- Ensure implementations are in compliance