

Azure 70-533 Exam Prep Bootcamp

Session 2 of 5

Implement Virtual Machines



Nov 6, 2017

Module Overview

- **Azure Virtual Machines**

- Overview
- Storage
- Configuration
- Monitoring

- **Docker Containers and Azure**

- Understand Docker and containers
- Run Windows Server and Linux containers in Azure

- **Exam 70-533 Study Tips and Tricks**

- Study strategies
- Practice questions and answers

Case Study Scenario (timw.info/er533)

You are the IT administrator for your business. You are tasked with migrating an existing web farm and database to Microsoft Azure. The web application is written in PHP and is deployed across twenty physical servers running Ubuntu for the operating system and Apache for the web server. The backend consists of two physical servers running MySQL in an active/passive configuration.

The solution must provide the ability to scale to at least as many web servers as the existing solution and ideally the number of web server instances should automatically adjust based on the demand. All the servers must be reachable on the same network so the administrator can easily connect to them using SSH from a jump box to administer the VMs.

Case Study Scenario

1. Which compute option should you choose for the web servers?
2. Should all the servers be deployed into the same availability set, or should they be deployed in a stand-alone manner?
3. What would you recommend for the storage configuration for the web servers? What about the database servers?
4. What feature could be used to ensure that traffic to the VMs only goes to the appropriate services (Apache, MySQL, and SSH)?



Azure Virtual Machines (VMs) Overview



What are Azure VMs?

1

Virtual machine sizes:

- Basic tier (development and test workloads):
 - Five sizes: A0 to A4
- Standard tier (production workloads):
 - Multiple series: A, Av2, D, Dv2, Dv3, DS, DSv2, DSv3, Ev3, Esv3, F, Fs, G, GS, Ms, NV, NC
 - 80+ sizes with up to 128 vCPUs, 2048 GB of RAM, and 64 disks

2

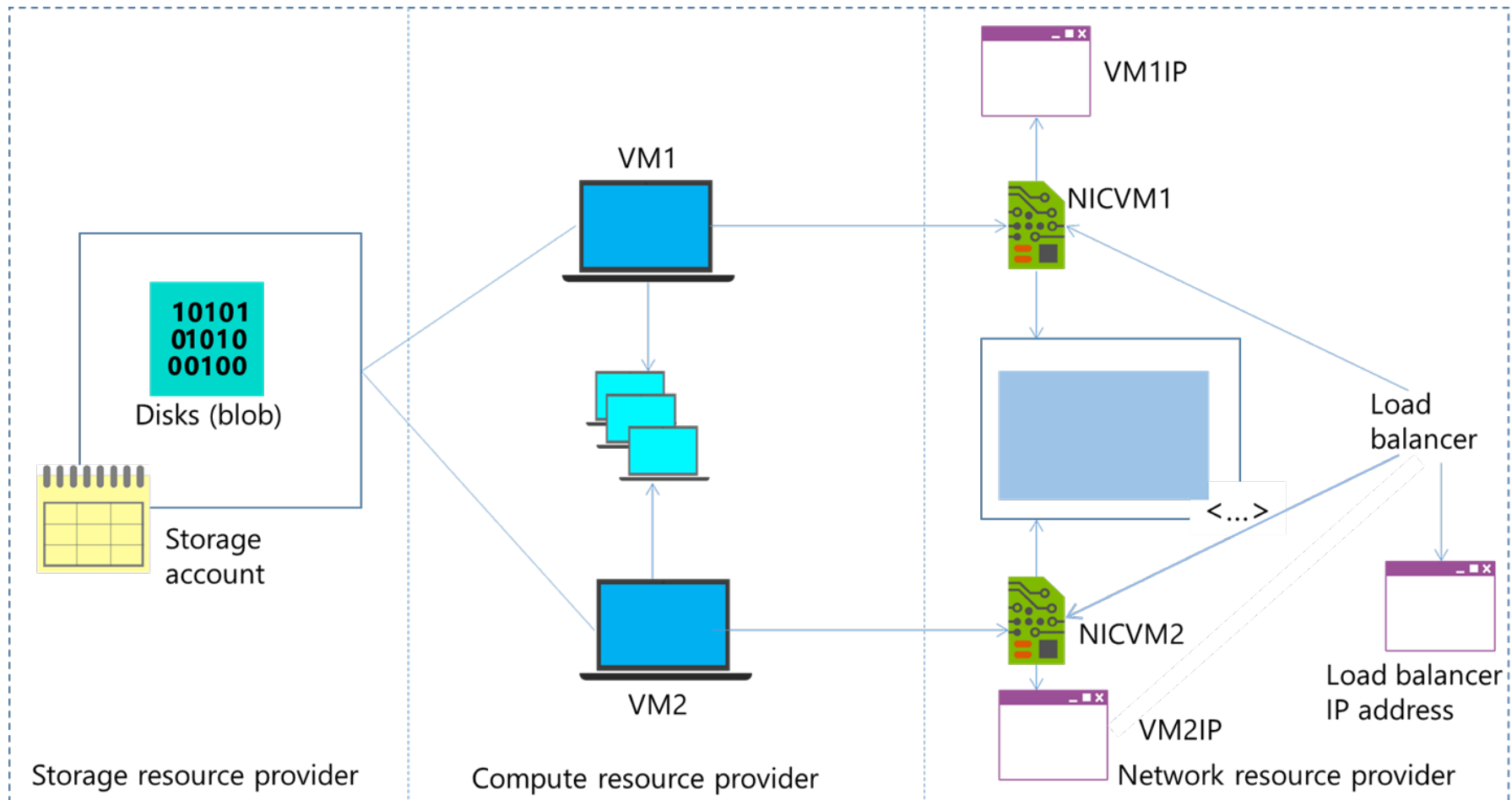
Virtual machine disks:

- Size limit: 4TB
- Performance limit:
 - Standard. 60 MBps or 500 8-KB IOPS per disk
 - Premium. 250 MBps or 7500 256-KB IOPS per disk
- Disk type and format: .vhd fixed only

3

Virtual machine generations: Generation 1 only

Azure Resource Manager VMs



Identifying workloads for Azure VMs

Windows Server:

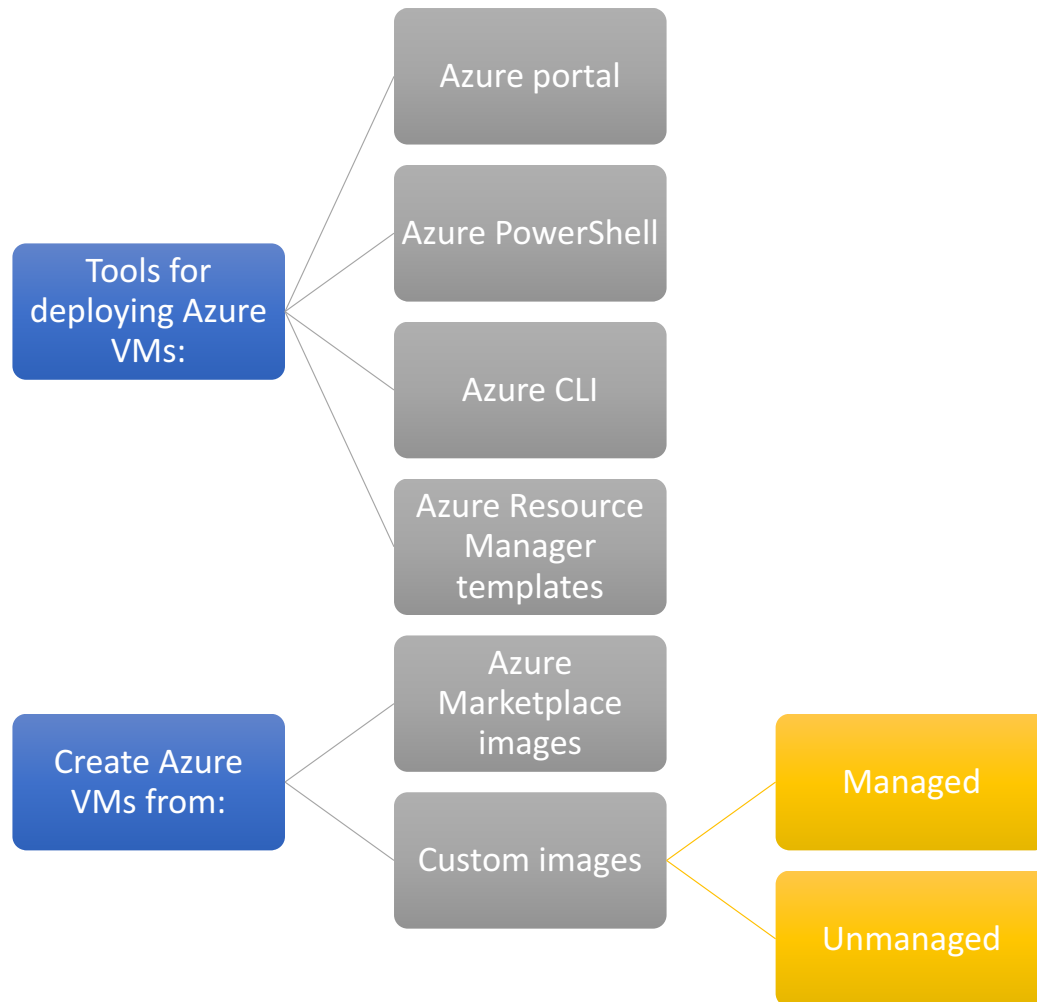
- All currently supported versions (CSA required for older ones)
- All roles and features, except:
 - DHCP, Direct Access, RMS, Windows DS
 - iSNS, MPIO, NLB, PNRP, SNMP, Storage Manager for SANs, WINS, Wireless LAN Service

Linux:

- CentOS, CoreOS, Debian, Oracle Linux, Red Hat, SUSE, openSUSE, and Ubuntu

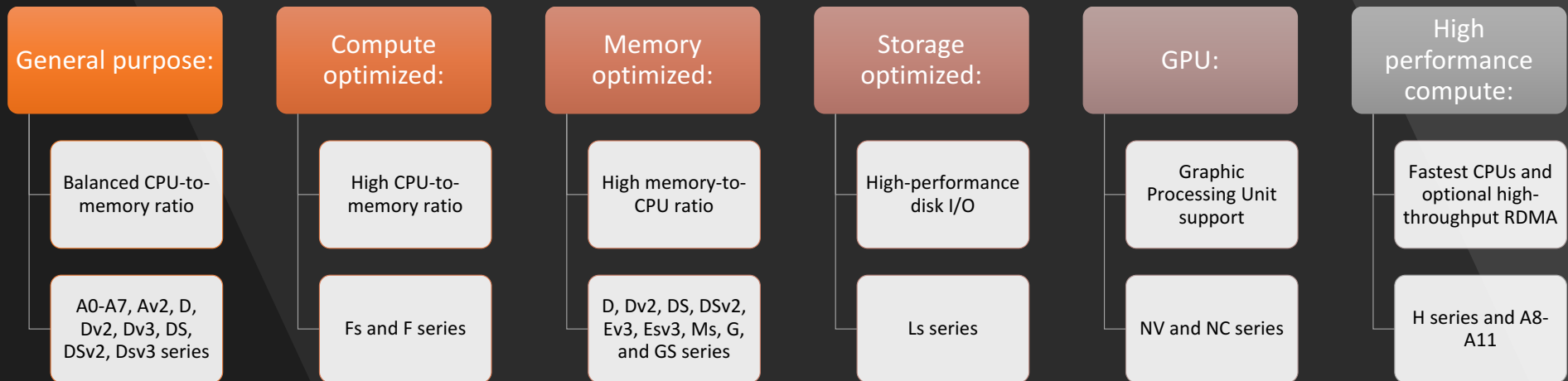
Windows Server software:

- FIM, MIM, SharePoint Server, SQL Server, System Center, and more



Determining
the
deployment
method

Virtual machine sizing



Scaling Azure VMs

With managed disks:

- Up to 1000 VMs when using VM Marketplace image
- Up to 100 VMs when using custom images

With unmanaged disks:

- Up to 100 VMs when using VM Marketplace image
- Up to 40 VMs when using custom images (overprovision = \$true)
- Up to 20 VMs when using custom images (overprovision = \$false)

5 fault domains and 5 update domains

Stateless workloads

Azure VM availability

Azure VMs in an availability set:

- Logical grouping of two or more Azure VMs
- Must be assigned during Azure VM deployment
- Up to 3 fault domains
- Up to 20 update domains
- 99.95% availability SLA
- Considerations:
 - Add multiple virtual machines to the same availability set
 - Place application tiers in separate availability sets
 - Combine availability sets with load balancing

Standalone VMs:

- 99.9% availability SLA if using Premium storage disks

Network security groups

- Restrict access to individual IP addresses
- Combine with OS-level protection

Azure Key Vault

- Store secrets and keys
- Use Azure AD authentication to control access

Azure Drive Encryption

- Encrypt OS and data volumes on Windows and Linux VMs
- Integrate with Azure Key Vault
- Encrypt by using existing keys

Configuring security of Azure VMs

Demo

Create Linux VM (in availability set) in the portal

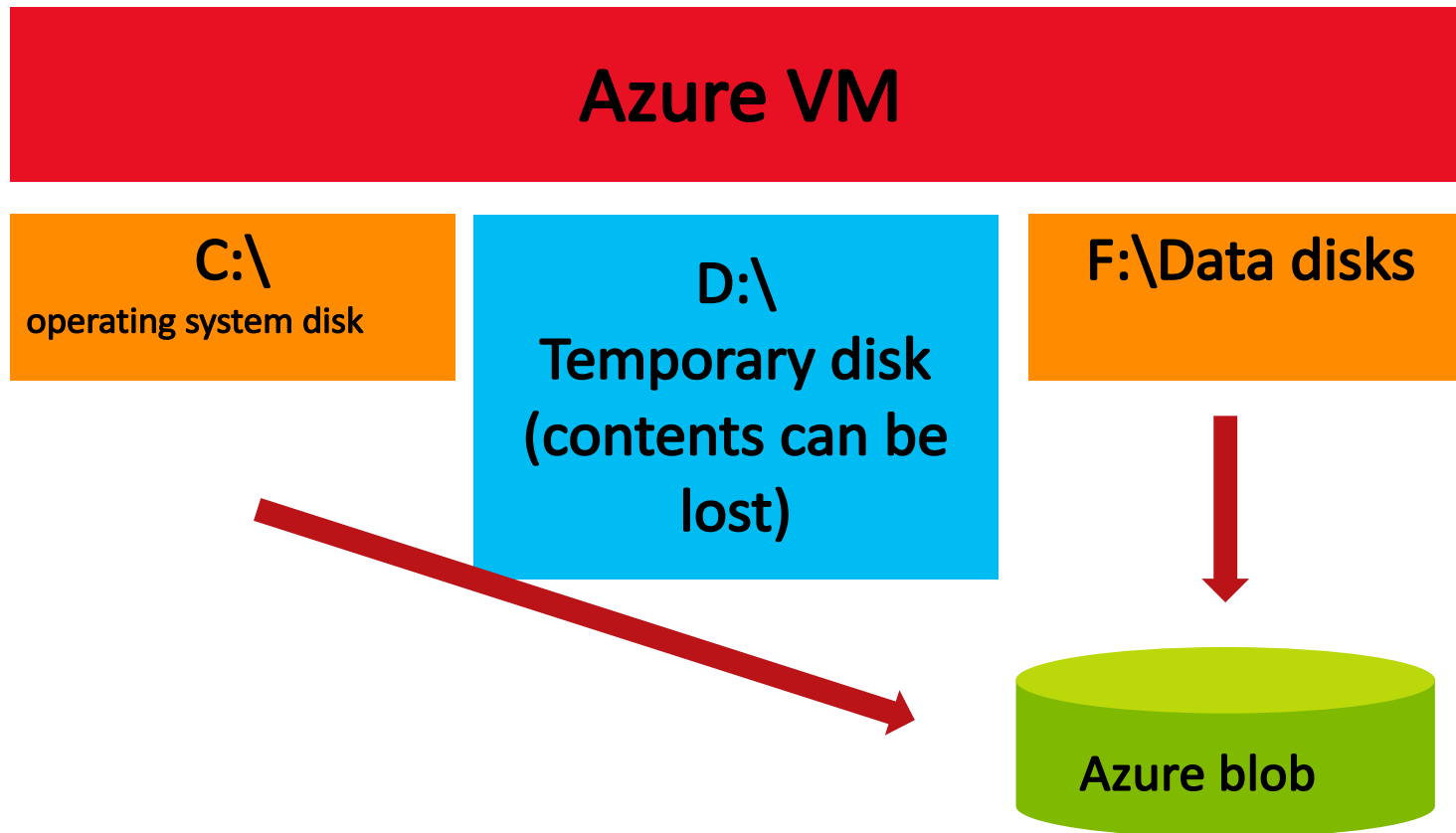
Connect to the VM using SSH



Azure VM Storage



Virtual machine storage



Managing VM disks

Attach an OS or data disk:

- Unmanaged disks:
 - New (empty)
 - Existing blob
- Managed disks:
 - New (empty)
 - Existing blob
 - Snapshot

Detach a data disk

Modify disk settings:

- Host caching mode
- Disk size (up to 4 TBs)
- Storage account type (standard unmanaged disks only)
- Performance tier (managed disks only)

Overview of unmanaged and managed disks

- Unmanaged disks:
 - Up to 200 storage accounts per region
 - Up to 40 disks per Standard storage account
 - Storage accounts for VMs in the same availability set might be in the same storage stamp
 - A custom image must be in the same storage account as VM disks
- Managed disks:
 - Up to 10,000 disks per region
 - Storage account performance limits not relevant
 - Disks of VMs in the same availability set in different stamps
 - A custom image must be in the same region as VM disks

Demo

Managed and unmanaged disks

Standard and premium storage



Azure VM Configuration



VM Configuration Options

VM Extensions

- Desired State Configuration
- Chef, Puppet
- Third-party backup agents

Hybrid Configuration Management

- Operations Management Suite (OMS) management solutions
- System Center
 - Configuration Manager
 - Operations Manager

VM Agent:

- Recommended but optional for Azure VMs
- Mandatory for Linux

VM Extensions:

- Azure VM Access Extension
- Chef Client and Puppet Enterprise Agent
- Custom Script extension for Windows and Linux
- DSC extension for Windows and Linux
- Azure Diagnostics extension for Windows and Linux
- Docker extension
- Microsoft Antimalware extension and many others

Overview of VM Agent and VM extensions

What is the VM Agent DSC extension?

Leverages Windows DSC and DSC for Linux:

Windows Management Framework–based (Windows)

Open Management Infrastructure–based (Linux)

Implemented as VM Agent extensions:

DSC extension for Windows Azure VMs
Azure DSCForLinux extension for Linux Azure VMs

Deployment support:

Azure portal

Windows PowerShell

Azure CLI

Azure Resource Manager templates

Demo

Configuration management

Use DSC



Azure VM Monitoring



Metrics:

- Available for VMs running Windows and Linux
- Displayed in the Azure portal

Diagnostics:

- Implemented as a VM extension
- Stored in Azure Storage (tables and blobs)
- Windows – basic metrics, performance counters, logs, ETW, crash dumps, Application Insights data, boot diagnostics
- Linux – basic metrics and boot diagnostics

Alerts:

- Based on metric, condition, threshold, and time period
- Can trigger
 - Email notification
 - Webhook
 - Azure Automation runbook
 - Azure Logic App

Monitoring Azure VMs

Demo

Per instance monitoring

Azure Monitor

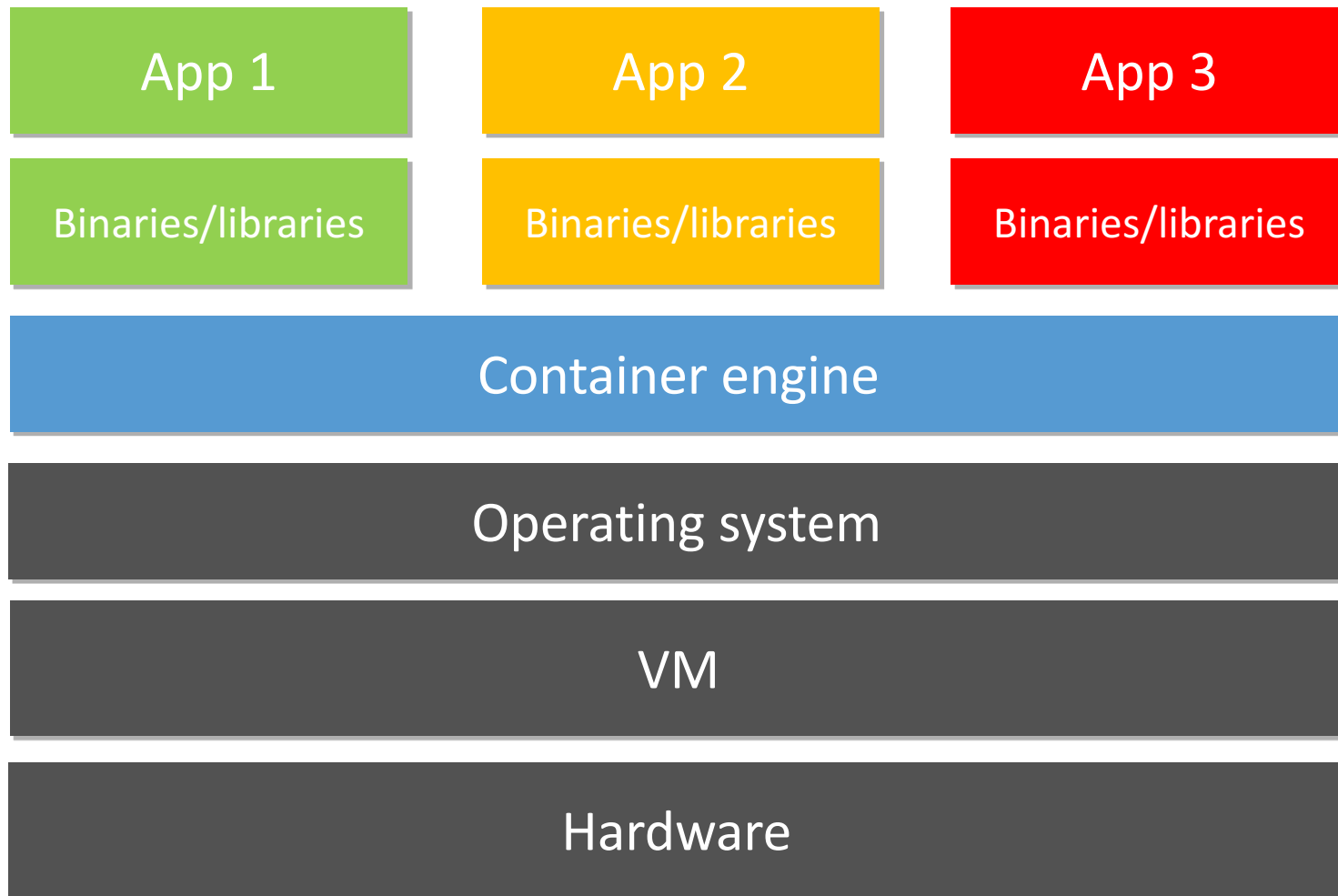
OMS



Containers in Azure



Introduction to containers



Docker terminology:

- **Image**
- **Container**
- **Dockerfile**
- **Build**

Docker toolbox:

- **Docker client**
- **Docker Engine**
- **Docker Compose**
- **Docker Machine**
- **Docker Registry**
- **Kitematic**
- **Docker Swarm**

Introduction to Docker

Implementing Docker hosts in Azure

Docker VM Ext.

Install the Docker VM extension:

- Use an Azure Resource Manager template, Azure PowerShell, or Azure CLI
- Intended for Windows or Linux Azure VMs

Azure Gallery

Provision a Docker Azure VM from Azure Marketplace:

- Intended for Windows or Linux Azure VMs

Docker Machine

Run the Docker Machine Azure driver:

- Download from [docker.com](https://docs.docker.com/machine/drivers/azure/) (Windows, Linux, or Mac OS X)
- Run `docker-machine create --driver azure`
- Use the `--azure image` parameter to specify the intended image
- Intended for Windows and Linux Azure VMs

NuGet

Use NuGet provider:

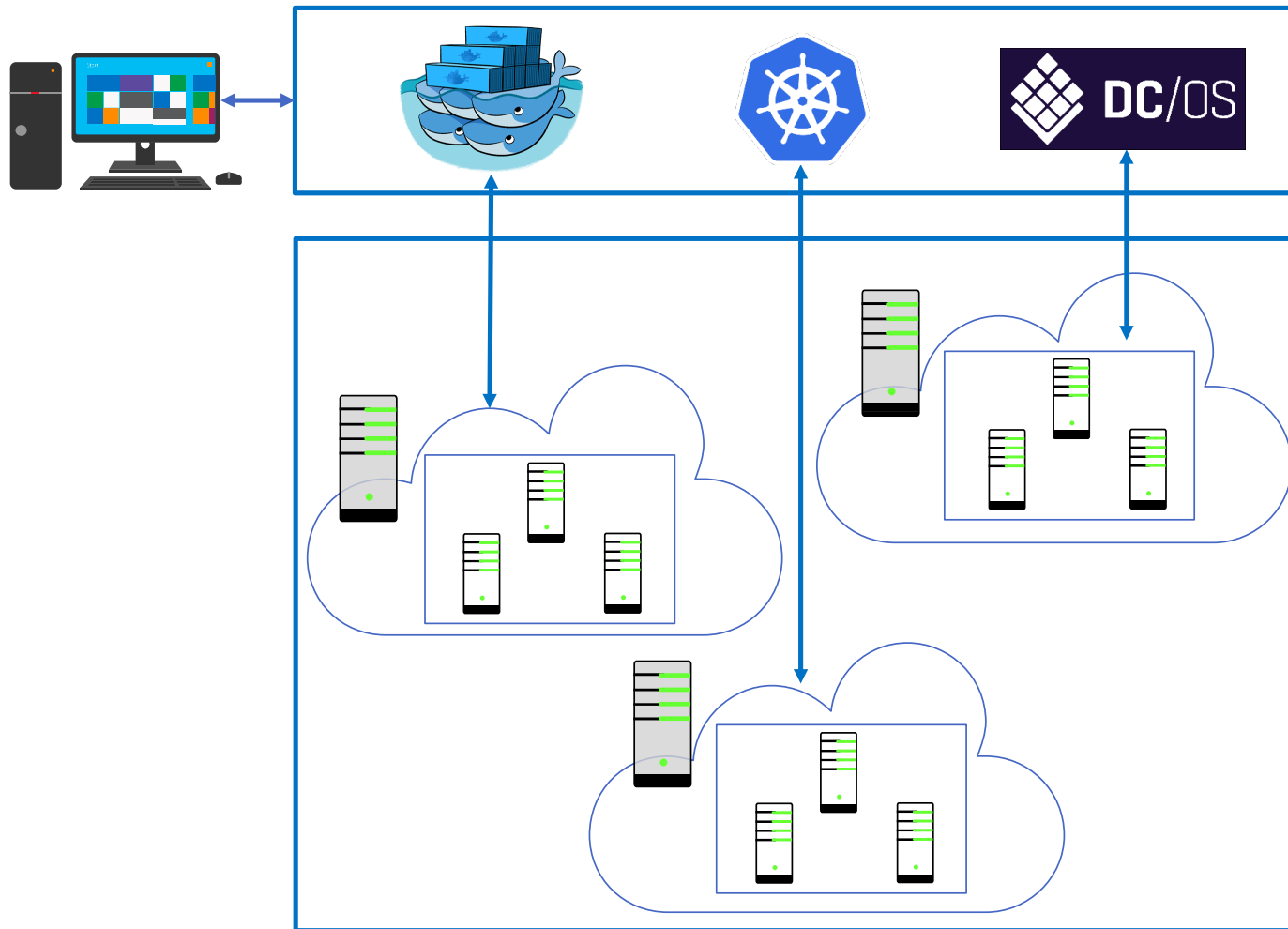
- Intended for Windows Azure VMs

ACS Cluster

Deploy an ACS cluster:


- Intended for clusters of Docker Windows or Linux hosts and containers

Overview of container-clustering solutions in Azure



Demo

Docker in Windows Server 2016 (use marketplace image)



Case Study Scenario – Proposed Solution

1. The web servers would be best served by deploying them into a virtual machine scale set (VMSS). Autoscale should be configured on the VMSS to address the requirement of automatically scaling up/down the number of instances based on the demand (CPU) used on the web servers.
2. No, the web servers should be deployed into their own availability set, which is provided by a VMSS, and the database tier should be deployed into its own scale set.
3. The web servers will likely not be I/O intensive so standard storage may be appropriate. The database servers will likely be I/O intensive so Premium storage is the recommended approach. To minimize management overhead and to ensure that storage capacity planning is done correctly managed disks should be used in both cases.
4. Use Network Security Groups (NSGs) to ensure that only traffic destined for allowed services can communicate to the VMs.

Azure VMs

- IaaS is the most popular Azure service
- It's most familiar to on-premises systems administrators

Containers in Azure

- Microservices are the way of the future
- Get comfortable with the Docker ecosystem – it's not going away!

Session 2 Review

Azure App Service

ARM Templates

Come back
tomorrow for
Session 3!

<https://tinyurl.com/AzS02ImplVM>

Session 2 Student Materials