70-532 Exam Prep Session 1 of 5

Create and Manage Azure Resource Manager Virtual Machines

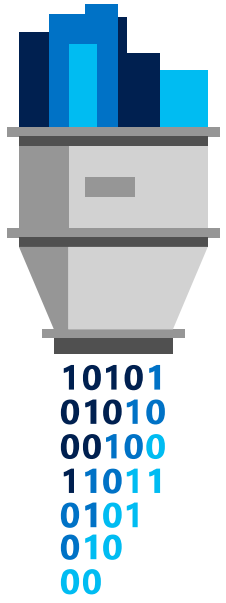
Agenda

- Azure Services
- Azure Portals
- Deploying Azure Virtual Machines
- Azure Virtual Machine Workloads
- Highly Available Azure Virtual Machines
- Virtual Machine Configuration Management
- Azure DevTest Labs

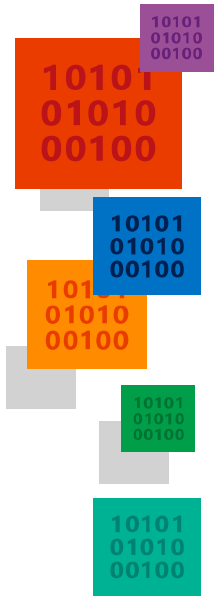
Services Overview

Microsoft Azure is a collection of services

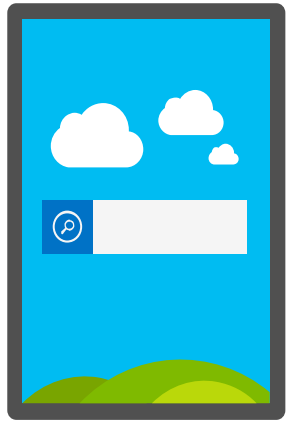
Communication Infrastructure



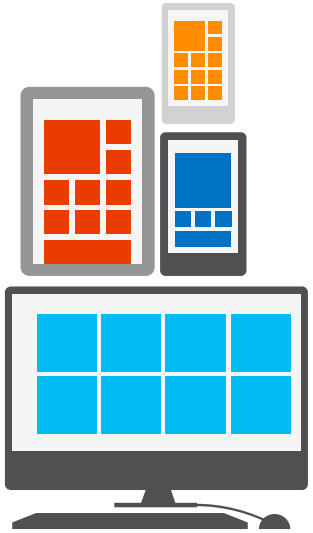
Data Streaming and Storage



Web Hosting

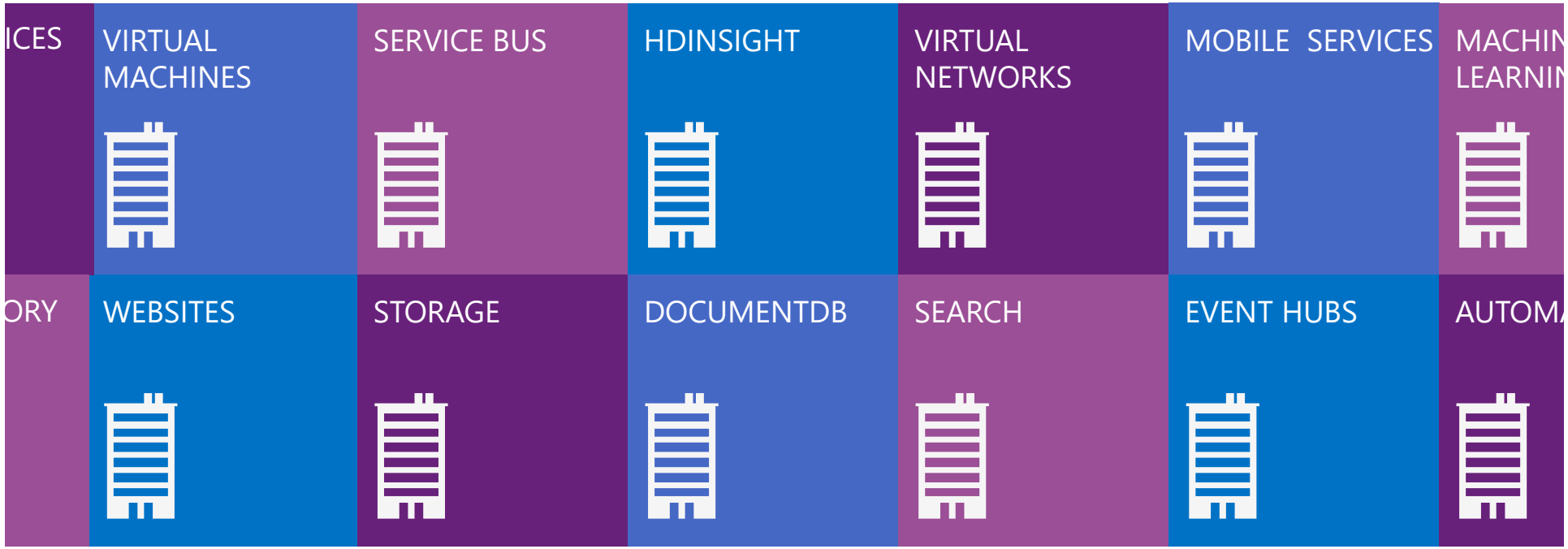


Mobile Connectivity



Services Overview (cont.)

You may only use a small subset of the available services:



In this course, you will learn about the services that you could use in your projects

Websites

- Azure Websites is a Platform-as-a-Service offering that allows you to quickly and easily deploy and scale up a web application.

- Features:
  - Create a website instance from the gallery
  - Configure linked resources
  - Create and use hosting plans
  - Change between the Free, Shared, Basic, and Standard modes
  - Deploy from a source control provider

Virtual Machines

- Infrastructure-as-a-Service offering that allows you to deploy compute instances in minutes to be used for Windows or Linux workloads.

- Features:
  - Use images built by the product teams to deploy workloads such as SQL Server, SharePoint and Apache
  - Attach, format and configure multiple disks for a VM
  - Remotely connect to a Windows or Linux VM
  - Select between VM sizes (A0-A9)
  - Select a Basic or Standard tier VM

Cloud Services

Cloud Services is a Platform-as-a-Service offering that allows you to focus on your application code while the Azure platform takes care of scaling up your application and making it highly available

Features:

- Associate virtual machines with Cloud Services
- Scale up an instance and configuring load balancing
- Deploy an existing Cloud Service package

Storage

Reliable and scalable storage service for data of all types and sizes.

Features:

- Select a datacenter for storage
- Configure geo-replication options
- Manage blobs and files
- Secure a container
- Upload files
- Access files

SQL Database

Azure SQL Database

- SQL Database is a Database-as-a-Service offering that makes SQL databases accessible for cloud developers

Features:

- Create a logical SQL Server or SQL Database instance
- Configure a SQL Server instance firewall
- Compare the SQL Database service and Standalone SQL Server in an Azure virtual machine
- Use SQL Server Data Tools, Azure SQL Database Management Portal, and SQL Server Management Studio to connect to a database instance

Virtual Networks

Private network that is available for grouping of services and compute instances in the cloud or on premise.

Features:

- Create a Virtual Network (VNET) specifying a region or affinity group
- Configure a VNET to use a DNS server
- Configure VNET subnets
- Implement a point to site connection to a VNET
- Create a Virtual Machine in an existing VNET

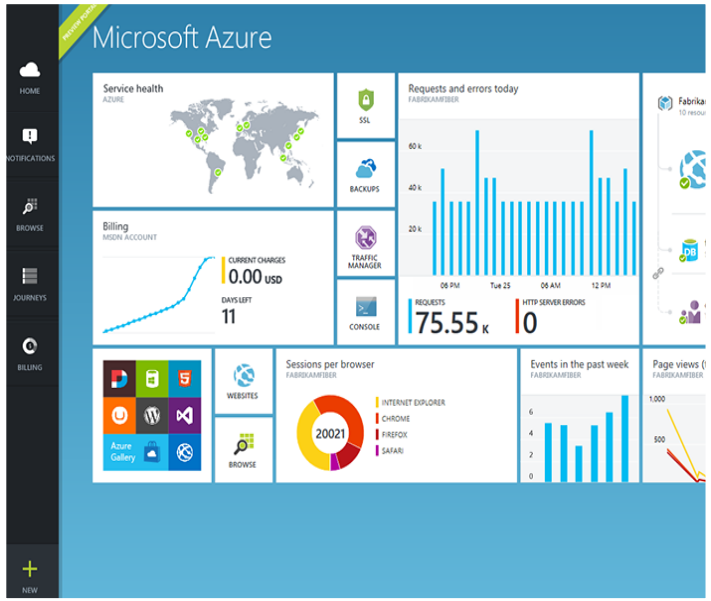
App Services

Azure provides a collection of services that you can integrate in new or existing applications to enhance their functionality

Examples:

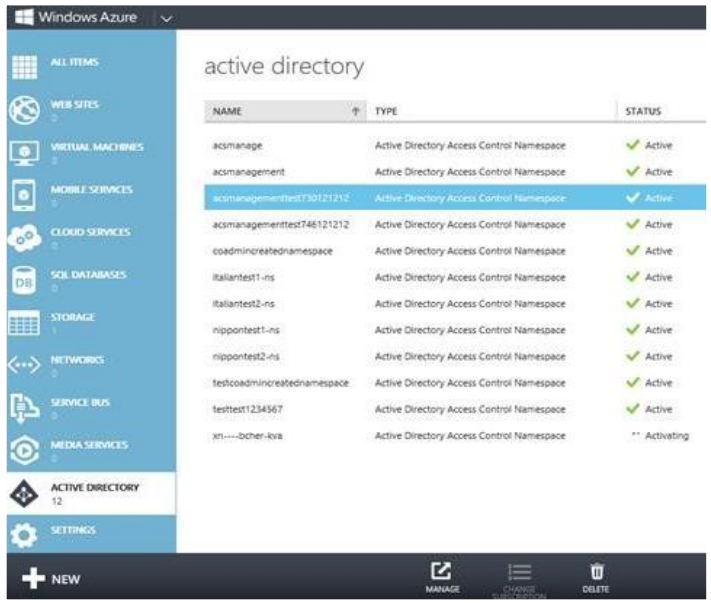
- Azure Active Directory
- Media Services
- Mobile Services
- Automation

Azure Portals



2014

Current (ARM) Portal
(https://portal.azure.com)

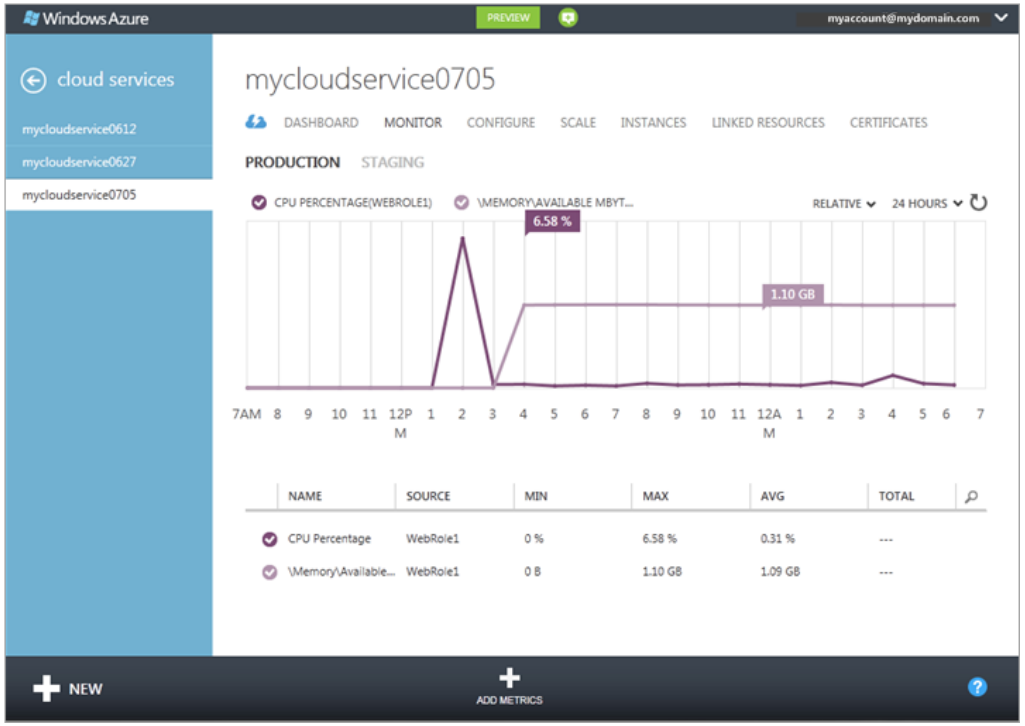


2012

Classic Portal
(https://manage.windowsazure.com)

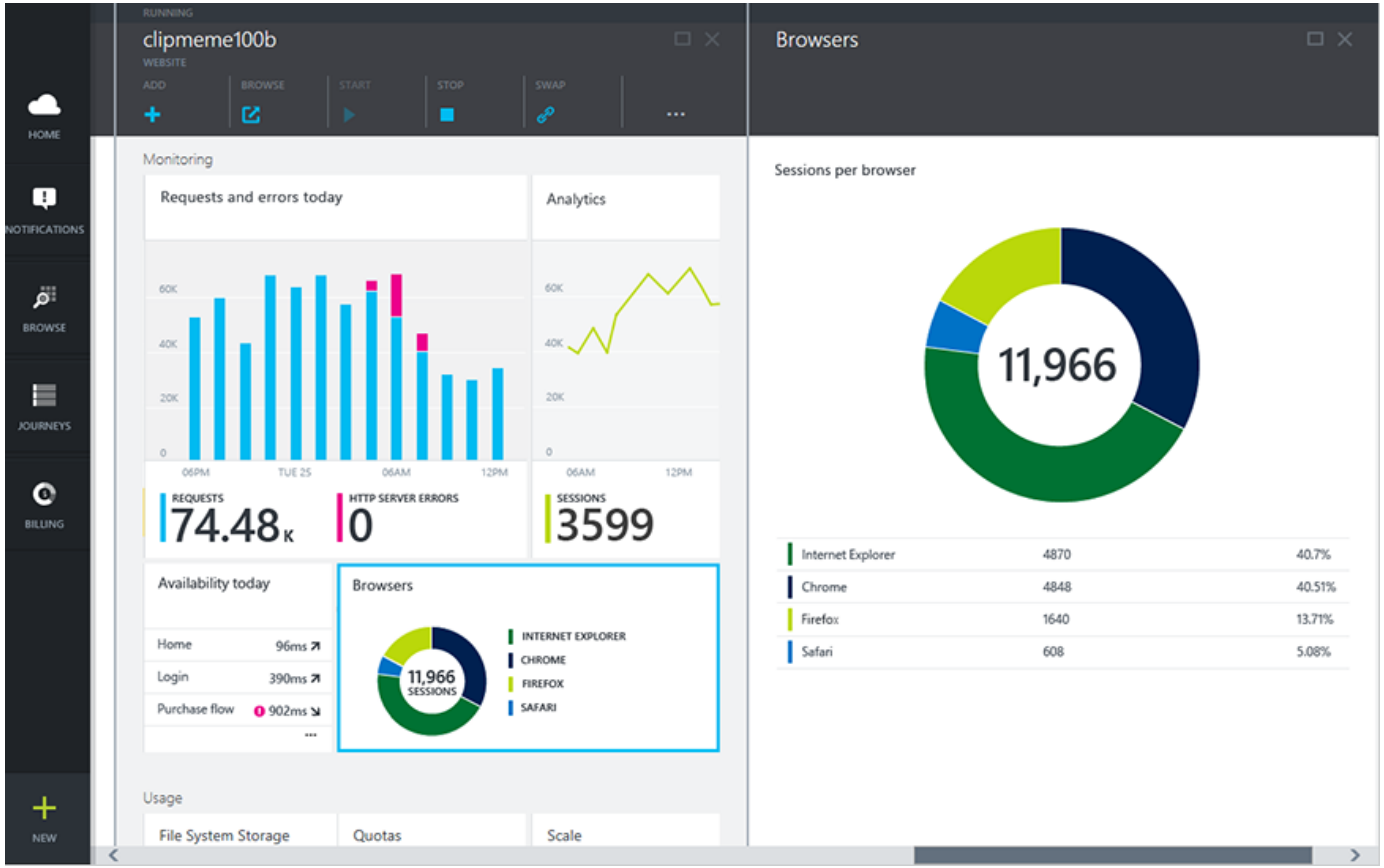
The Classic Portal

- The Classic Portal allows you to provision instances of services, infrastructure or apps instantly.



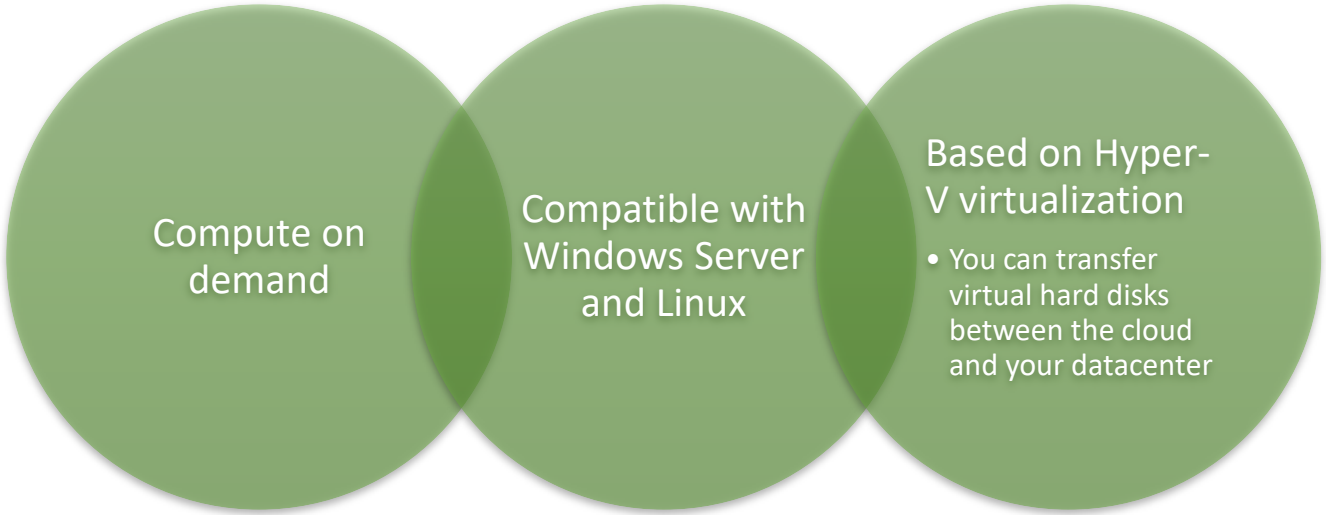
The Current (ARM) Portal

- The latest Azure Portal is designed for DevOps
- The portal makes it easy to monitor your services and applications.



Azure ARM Virtual Machines

Virtual Machines Overview



Using Images to Construct Virtual Machines

Many images are already provided by Microsoft:

- Microsoft SQL Server
- Microsoft SharePoint
- OpenSUSE
- Microsoft BizTalk Server

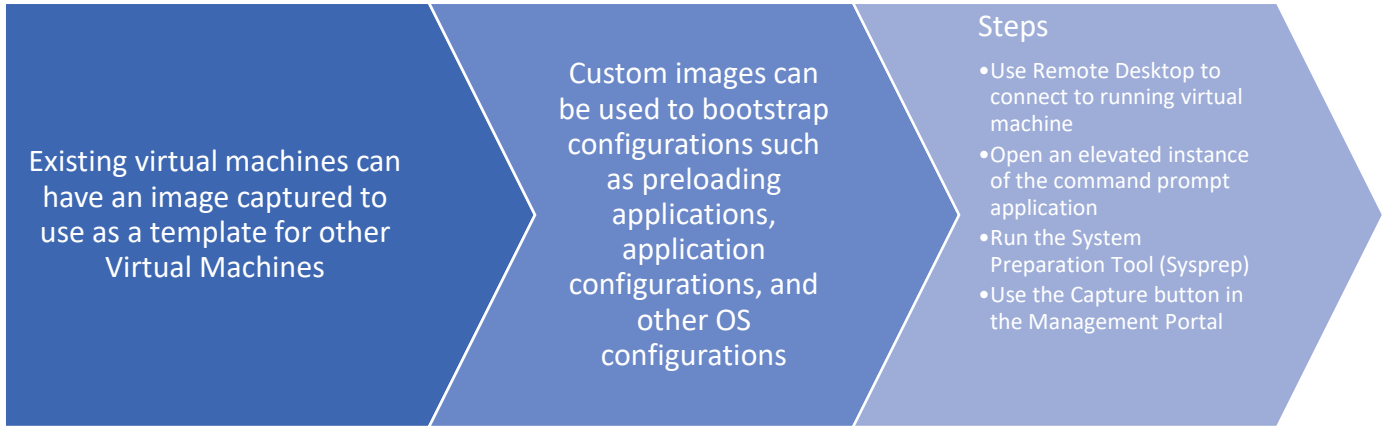
Your Azure subscription might have some custom images

- For example, MSDN subscriptions come with Windows 7 and Windows 8.1 images with Microsoft Visual Studio preinstalled

Using Images to Construct Virtual Machines (continued)

Open source and third-party images are also available in the Management Portal.

Using Images to Construct Virtual Machines (continued)



VM Depot

http://vmdepot.msopentech.com

VM Depot is a community-driven collection of templates for virtual machines running in Azure.

Virtual Machines can be created using an automated script or using the Management Portal

You can contribute new images to VM Depot

Comprehensive image search is available in the VM Depot.

Introduction to Azure Resource Manager templates

- Which resources you are going to deploy
- Where your resources will be located
- Which version of the resource provider API you will use
- Whether there are dependencies between resources
- When you will specify values of resource properties

```
{
  "$schema":
"http://schema.management.azure.com/schemas/2015-01-01/deploymentTemplate.json#",
  "contentVersion": "",
  "parameters": {  },
  "variables": {  },
  "resources": [  ],
  "outputs": {  }
}
```

Deploying Linux Workloads using Terraform

- Terraform allows you to define and create complete infrastructure deployments in Azure.
- Steps
  - Create Azure Connection and Resource group using *provider* section of Terraform template.
  - Define following sections in sequence within the Terraform template (sample attached):
    - Create Virtual Network
    - Create public IP address
    - Create Network Security group
    - Create virtual network interface card
    - Create storage account for diagnostics
    - Create virtual machine.
  - Build and deploy the infrastructure:
    - Use *terraform init* to check if Terraform has all the prerequisites required for your template.
    - Use *terraform plan* to review & validate the template.
    - Use *terraform apply* for deploying the infrastructure defined in Azure.

Demo: Creating a Virtual Machine

In this demo, you will see how to:

- Create a virtual machine by using the Preview Portal
- Use Remote Desktop to access the virtual machine

New

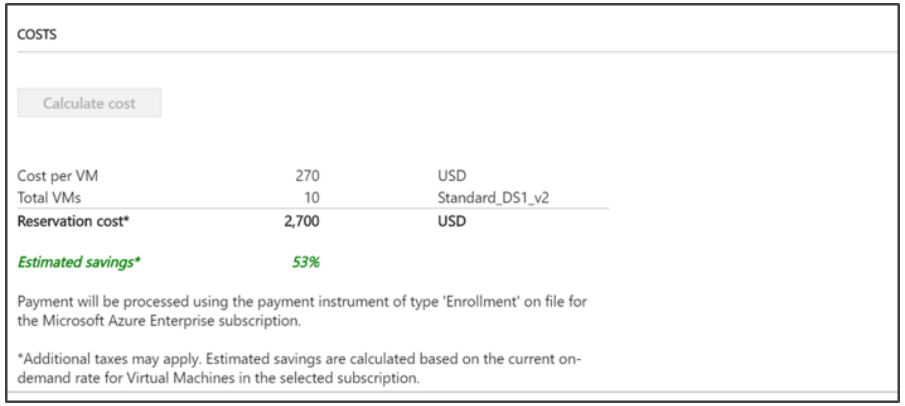
Save Money Reserved Virtual Machine Instances

- Significantly reduce costs - up to 72 percent compared to pay-as-you-go prices
- one-year or three-year terms on Windows and Linux virtual machines (VMs)
- Exchange RIs across any region and any series as your workload or application needs change.
- Cancel your RIs if you no longer need the capacity you purchased. Cancel at any time in the reservation term for an adjusted refund.
- RIs can be assigned at the enrollment or subscription level
- can manage RI usage at an organizational or individual department level

Azure RI

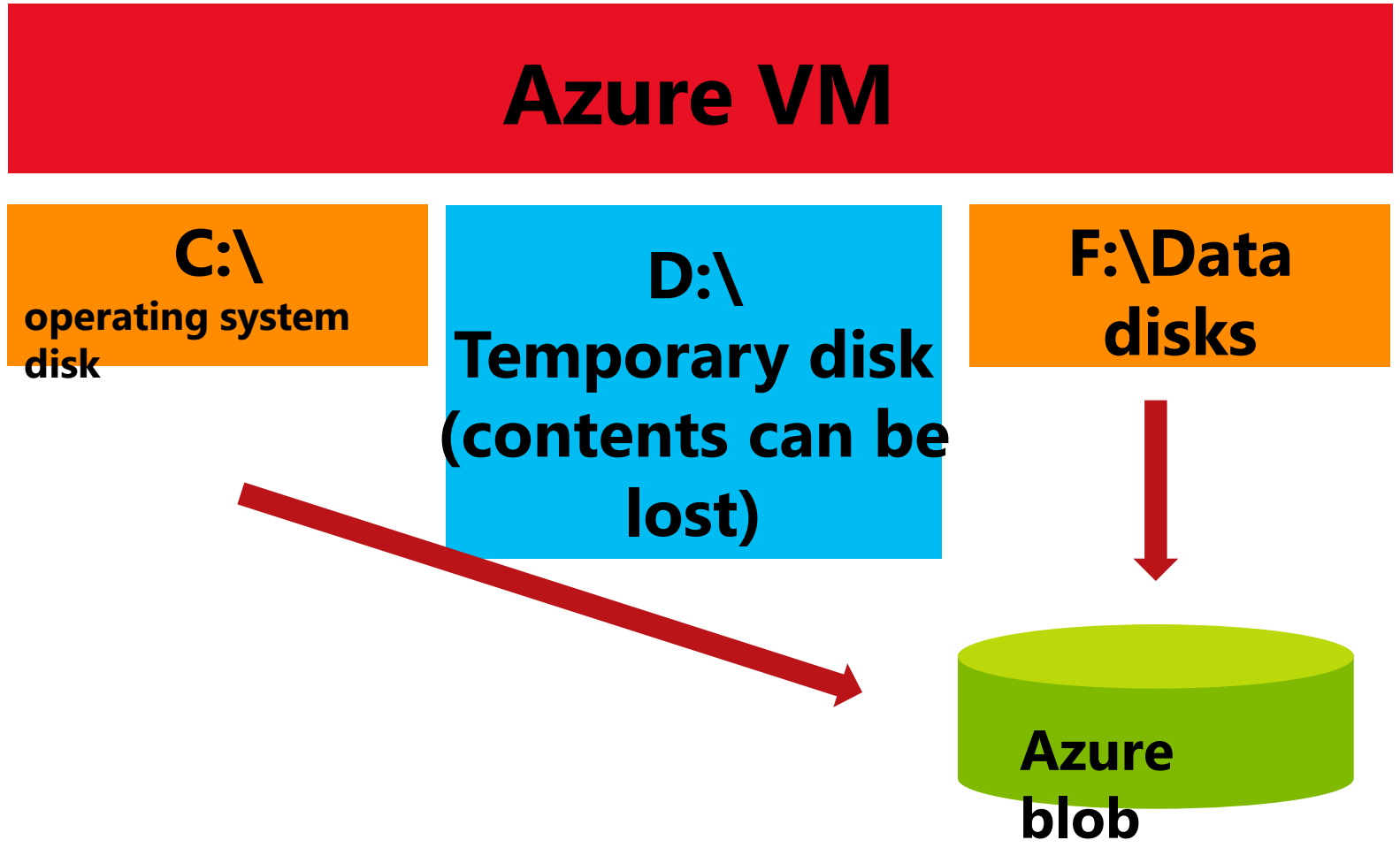
Provide

- Name
- Subscription
- Scope
- Location
- VM Size
- Term
- Quantity

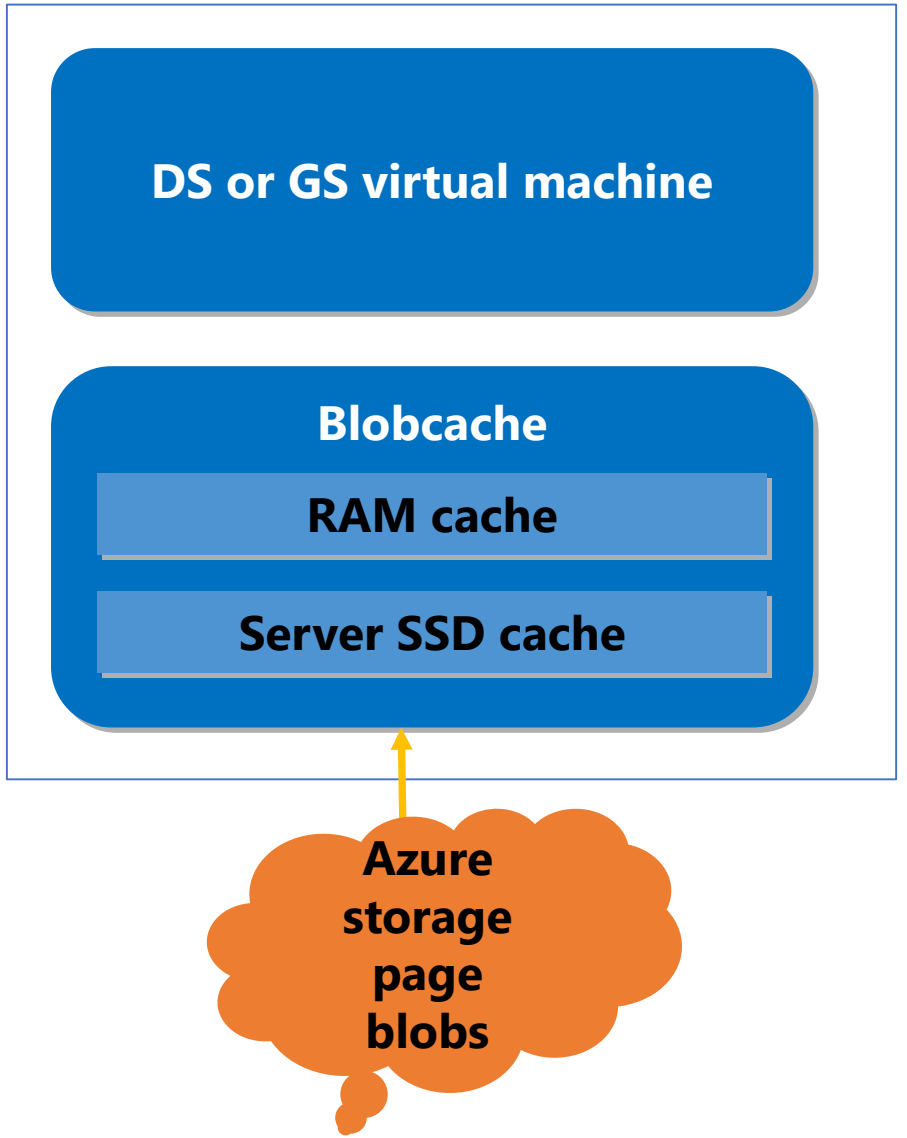


Design and Implement ARM VM Storage

Virtual machine storage



Planning for Azure Premium Storage



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

Azure Disk Encryption

What:

- Windows and Linux IaaS VM's
- Enables migration of encrypted VHDs from on-premises to cloud
- Enables encryption on running VM's and new VM's
- Key management integrated in customer key vault using HSM

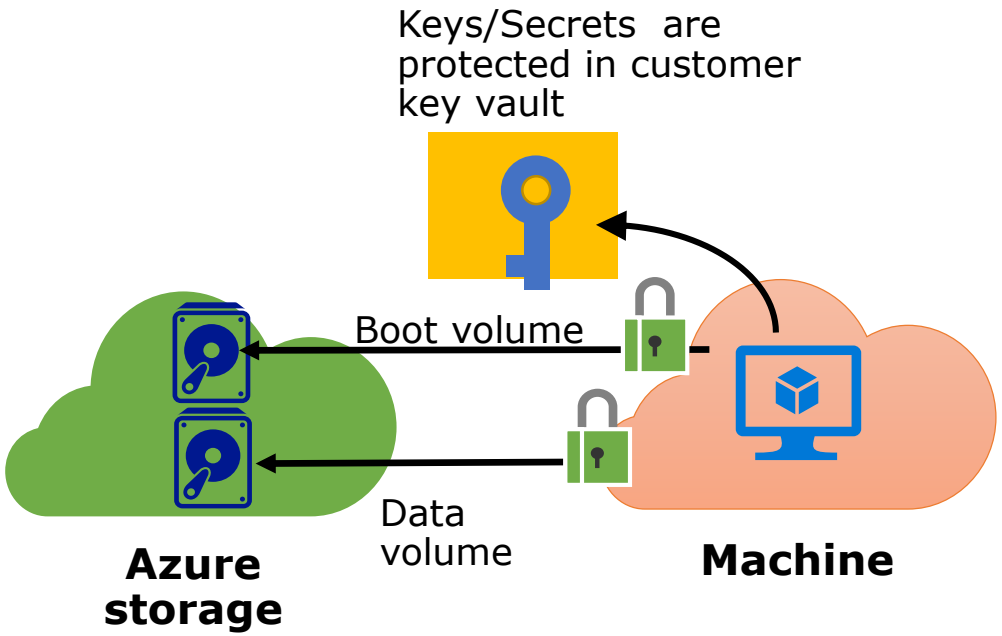
Value Proposition:

- VM's are secured at rest and theft of an image is meaningless
- VM's boot under the policies and keys controlled by organization CSO/CISO, and they can audit their usage in Key Vault.

Threats Addressed:

- Data breach -> Loss of Disks, Loss of storage account keys

Azure Disk Encryption Scenarios



Encryption Scenarios

- New VM's from Customer Encrypted VHD's
- New VMs from Azure Gallery
- Running VM/s in Azure

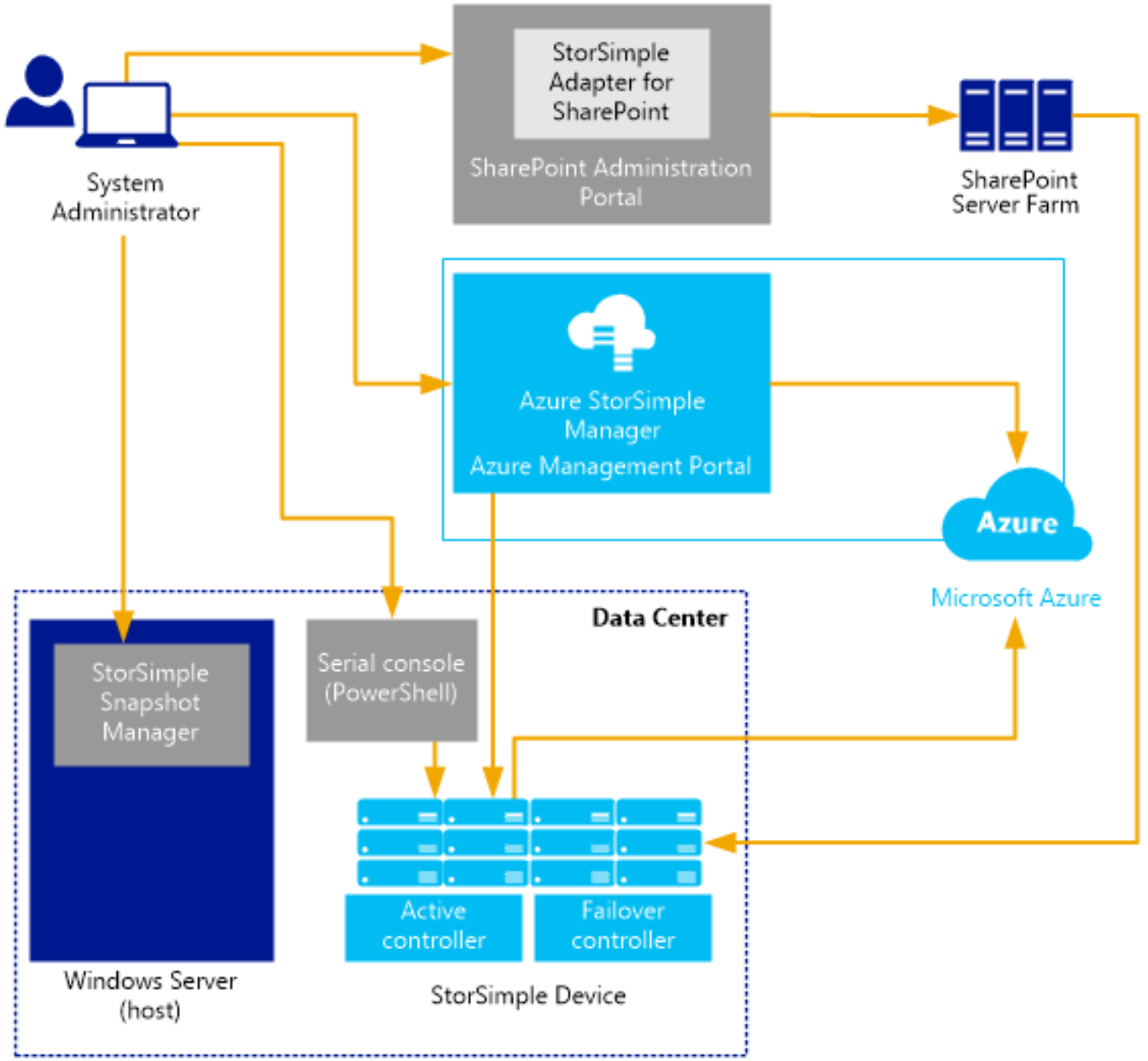
Protection elements

Access control: Customer control access to the keys/secrets in their key vault

Monitoring and Logging: Customer collect logs in their storage account

Data Security and Availability: Disks are stored encrypted in customer storage account and are automatically replicated by Azure storage

StorSimple


StorSimple Adapter for SharePoint
SharePoint Administration Portal
SharePoint Server Farm
System Administrator
Azure StorSimple Manager
Azure Management Portal
Azure
Microsoft Azure
Data Center
StorSimple Snapshot Manager
Serial console (PowerShell)
Active controller
Failover controller
Windows Server (host)
StorSimple Device

Windows Workloads

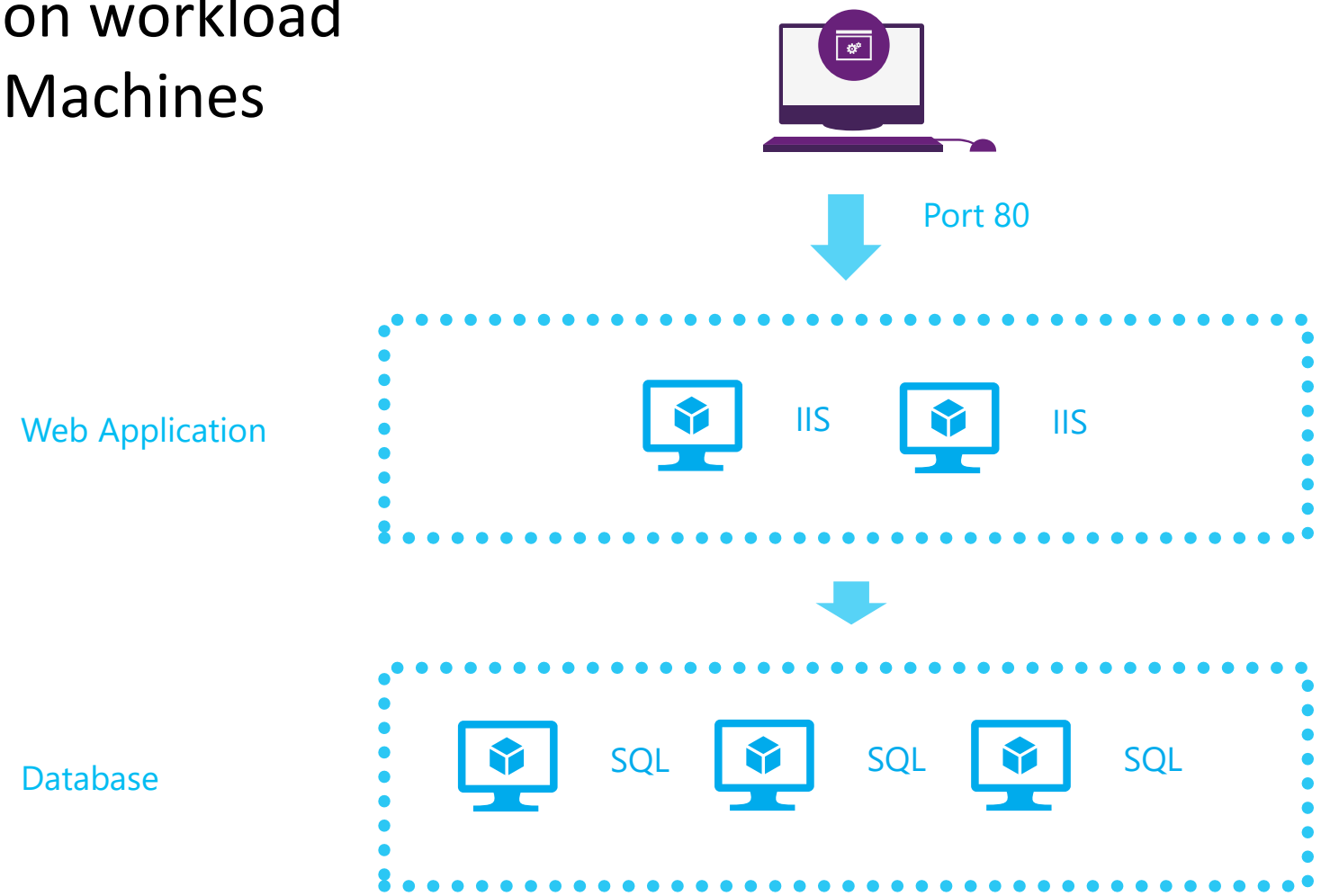
You can use virtual machines and virtual networks for many workload scenarios that mimic the way you structure enterprise on-premises applications.

Examples:

Web Application	SharePoint
• Web Server (IIS) • SQL Server • State Server	• Web Front-Ends • SQL Server[s] • Application Services

Windows Workloads (continued)

Custom application workload
on Azure Virtual Machines



Linux Workloads

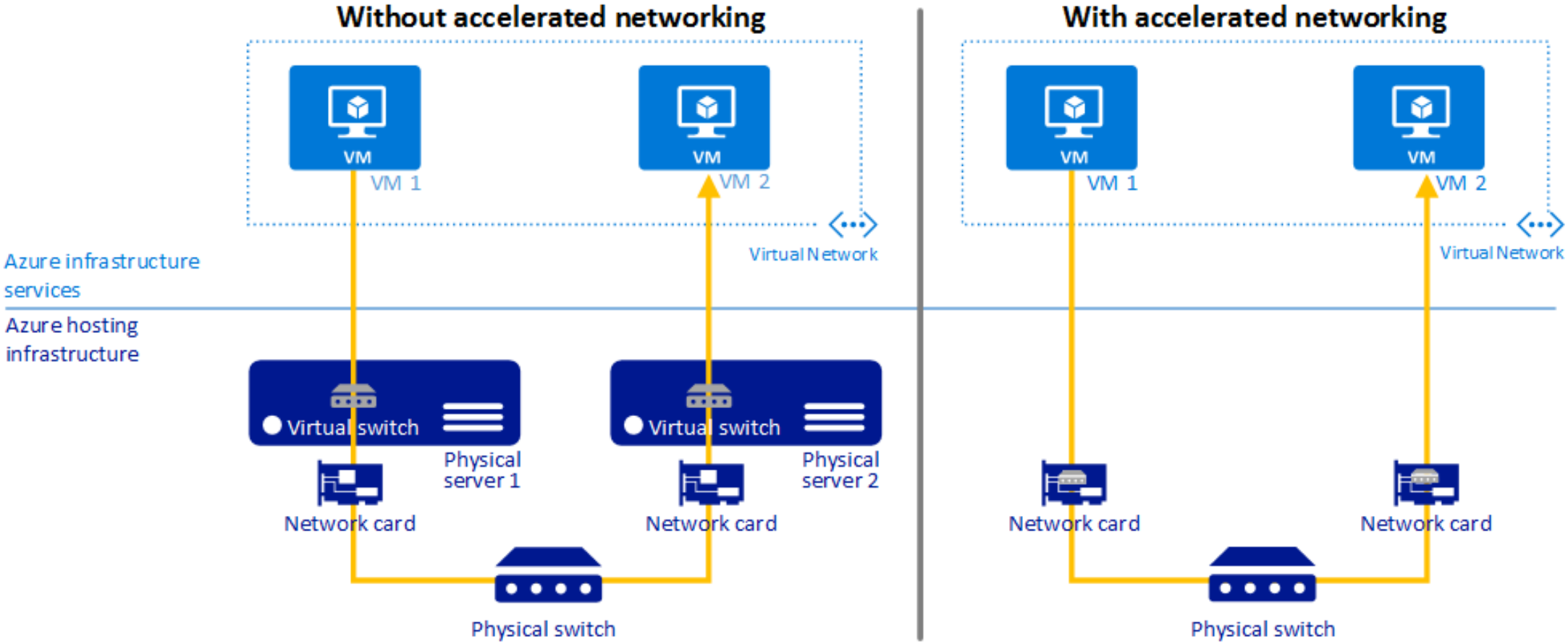
You can use the Linux–based virtual machines that are available in Azure enable to deploy common Linux workloads

Examples:

- Apache Lucene
- LAMP (Linux, Apache, MySQL, PHP)
- Couchbase (distributed)
- Drupal
- Docker
- Chef or Puppet
- Docker

Virtual Machines with Accelerated Networking

New



Supported VMs

Operating Systems

Microsoft Windows Server 2012 R2 Datacenter and Windows Server 2016

VM Instances

supported on VM instances with 8 or more vCPUs

Supported Series

- D/DSv2,
- D/DSv3,
- E/ESv3,
- F/Fs/Fsv2,
- Ms/Mms

Regions

All public regions

Government cloud

Accelerated Networking - Limitations

Network interface creation:

- Accelerated networking can only be enabled for a new NIC. It cannot be enabled for an existing NIC.

VM creation:

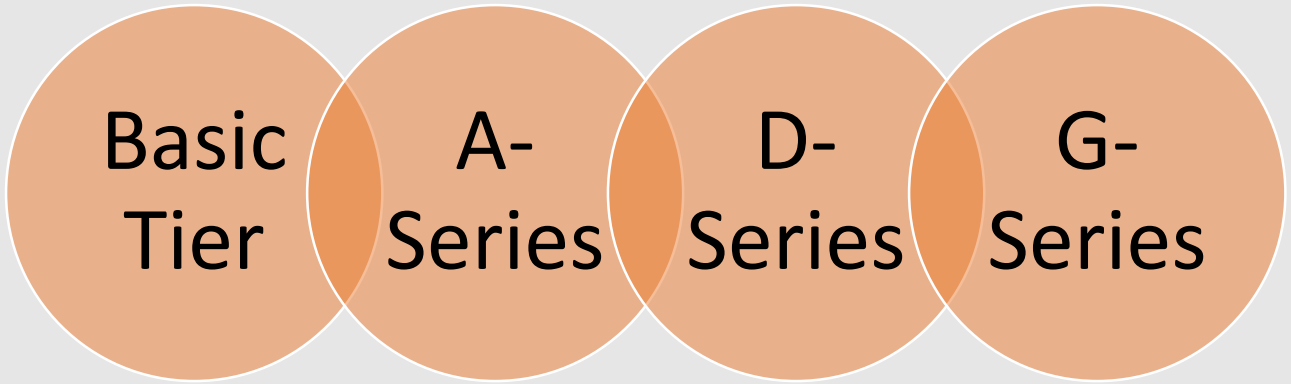
- A NIC with accelerated networking enabled can only be attached to a VM when the VM is created.
- The NIC cannot be attached to an existing VM. If adding the VM to an existing availability set, all VMs in the availability set must also have accelerated networking enabled.

Deployment through Azure Resource Manager only:

- Virtual machines (classic) cannot be deployed with Accelerated Networking.

Virtual Machine Sizes

- http://azure.microsoft.com/pricing/details/virtual-machines/



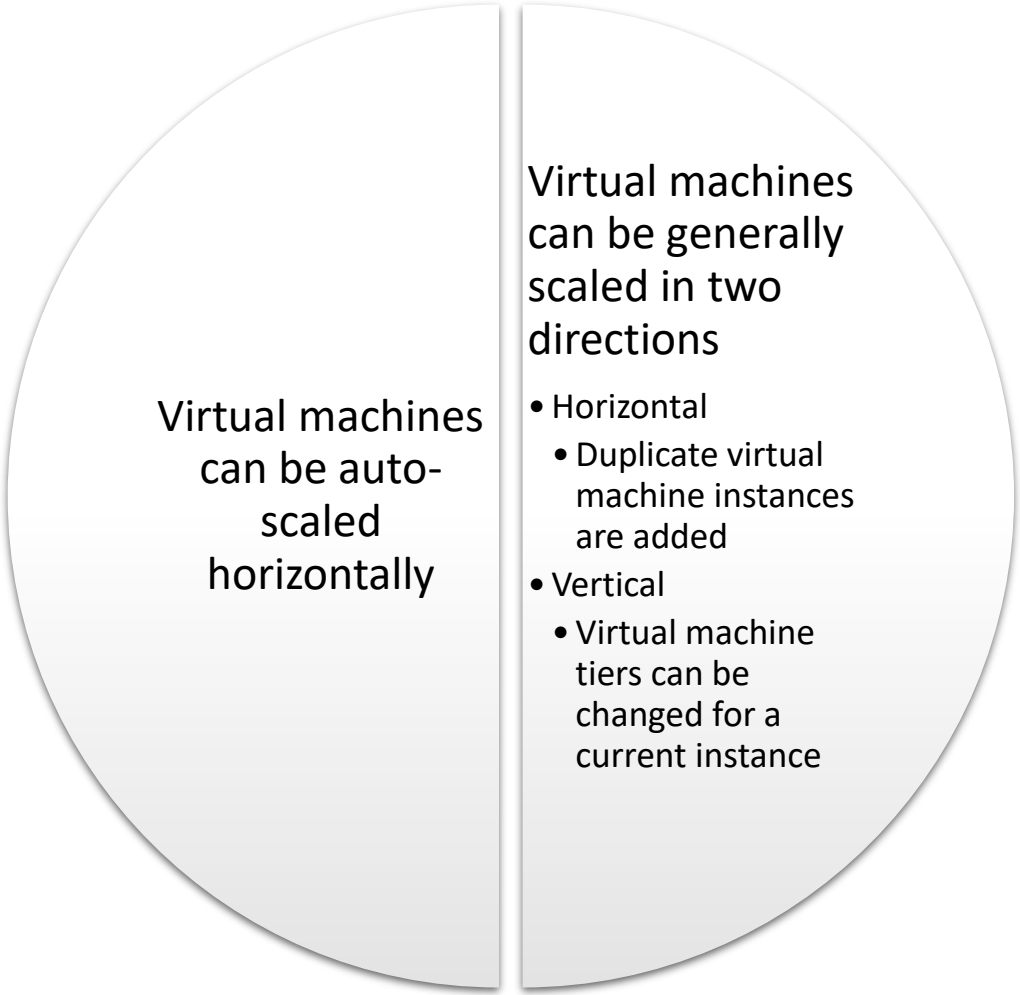
Availability Sets

Availability sets offers a mechanism to instruct Azure to place your virtual machines in separate fault or update domains

When a virtual machine goes down because of a fault (or for regular maintenance), at least one instance of your load balanced virtual machines remains available

Multiple virtual machine instances are required in order to be compatible with the Service Level Agreement (SLA)

Scaling Virtual Machines



Scaling Virtual Machines (cont.)

- Virtual machines can automatically scale horizontally by monitoring certain metrics:
  - Scale by target CPU – When the average utilization of the CPU is above a certain threshold, new instances are created. When it is low, instances are removed
  - Scale by schedule – Virtual machines can scale to static instance counts based on time
  - Scale by queue message count – You can establish a target amount of queue messages per instance. New instances will be created to handle additional messages

Windows PowerShell Desired State Configuration

- Desired State Configuration (DSC)
  - Is an extension of PowerShell
    - New language features
    - New cmdLets
    - Extra resources
  - Focuses on the configuration of software environments
  - Can be used to maintain existing configurations or manage new configurations

VM Agent

VM Agent is a very lightweight background process that provides an entry point for Microsoft and partners to configure and manage virtual machines

- Installed on a virtual machine by default (but can be disabled)
- Allows VM Extensions to be installed on an Azure virtual machine

VM Extensions are software components that can extend an existing virtual machine

- Multiple VM Extensions can be installed on the same virtual machine
- The BGInfo desktop tool is a VM Extension

Configuration Management Tools

Configuration management is the process of maintaining consistency among different physical or virtual machines

Two of the most popular configuration management utilities are available for use with Microsoft Azure Virtual Machines

- Puppet
- Chef

Monitoring Azure VMs

Metrics:

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

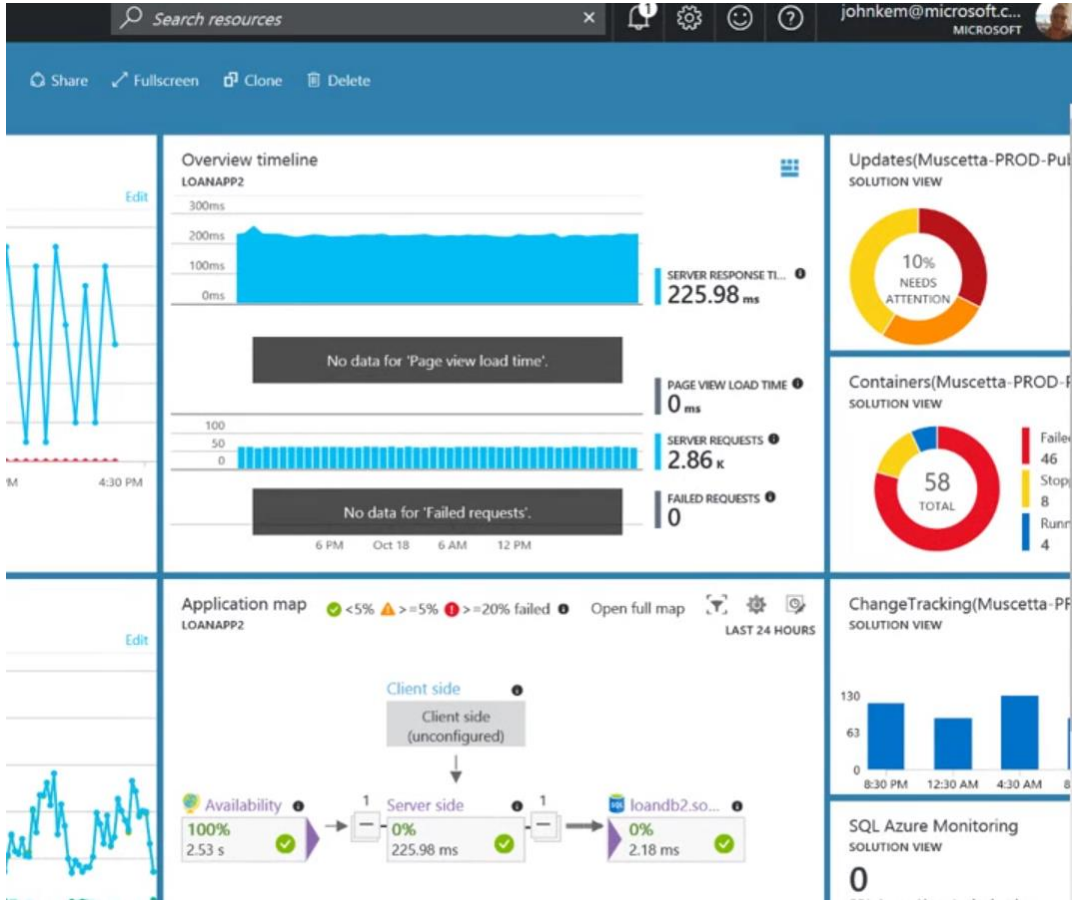
Diagnostics:

- 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

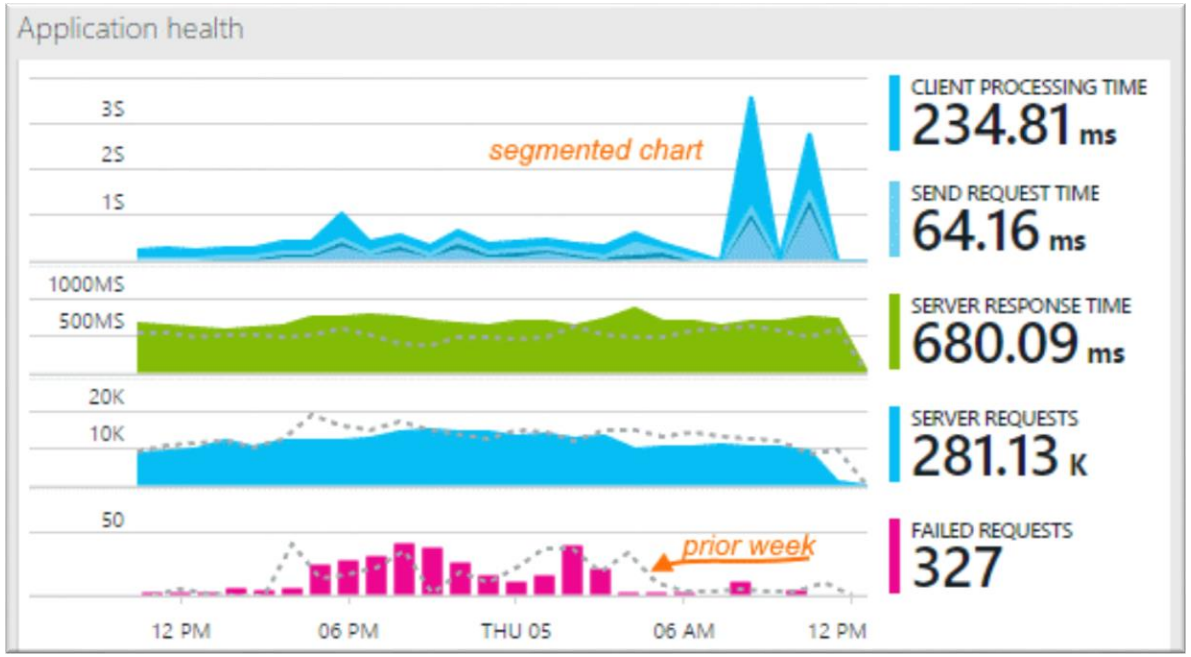
Azure Monitor



- Azure Monitor is the platform service that provides a single source for monitoring Azure resources.
- Azure Monitor is a monitoring data pipeline for your Azure environment, and offers that data directly into Log Analytics as well as 3rd party tools where you can gain insight into that data and combine it with data from on premises or other cloud resources.

Azure Application Insights

- Azure service that offers application performance monitoring and user analytics.
- It provides powerful tools for analysing this application telemetry while developing and operating your application.
- It deeply integrates with Visual Studio to enable you to get right to the problem line(s) of code so you can fix it, and offers usage analytics to analyse customer usage of your applications for product managers as well.



- Log Analytics is a service in **Operations Management Suite (OMS)** that monitors your cloud and on-premises environments to maintain their availability and performance. It collects data generated by resources in your cloud and on-premises environments and from other monitoring tools to provide analysis across multiple sources.

Azure Log Analytics

Dev-Test is first step in the journey to the cloud

DEV-TEST ENVIRONMENTS › **PRE-PRODUCTION** › **PRODUCTION ENVIRONMENTS**

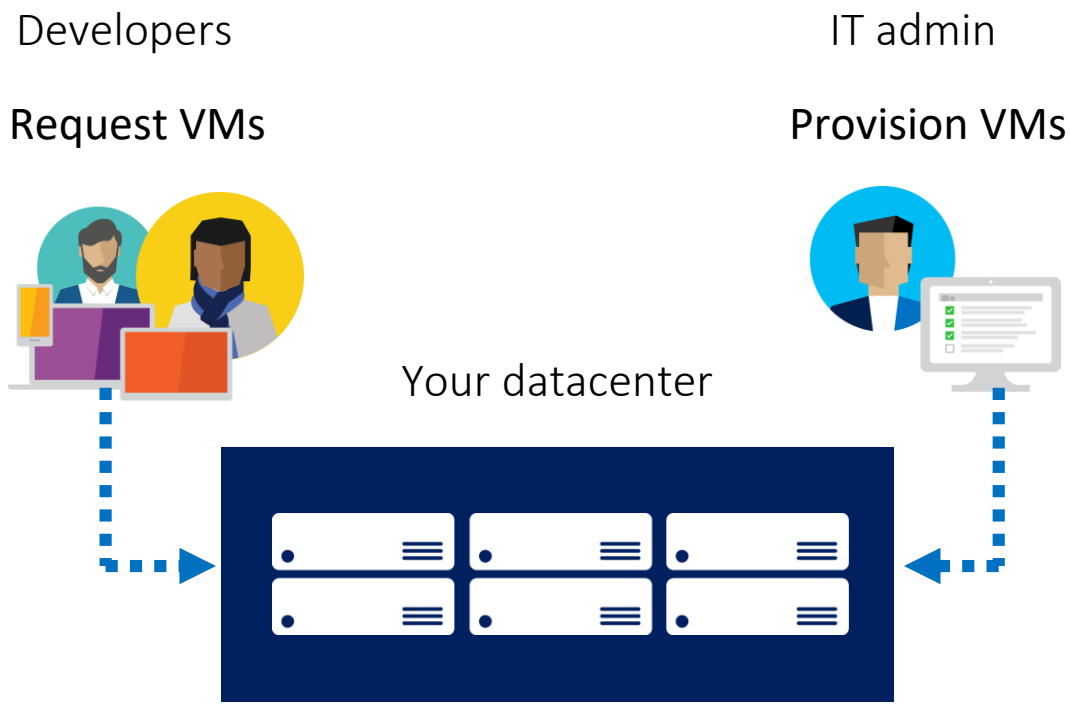
Leverage Azure for dev-test needs with Dev-Test Labs and VMs.

Move pre-production and production workloads seamlessly to Azure with Azure Site Recovery.

Azure supports multi-tier applications spanning premises for production environments.

Challenges in On-Premises World

- Compromised agility
- Limited hardware budget
- Resource contention with VMs
- Realistic scale tests often challenging
- Procurement delays



Different Roles Different Priorities

Developers

Build modern apps, for any platform, any device

Deliver apps quickly

Adjust easily to changing corporate needs and scale

Leverage familiar tools

IT admin

Integrate on-prem, cloud, and hybrid infrastructure

Manage to shrinking IT budgets

Support new business processes, products and services

Maintain security & compliance

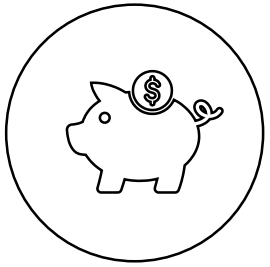
What are benefits of running dev-test in Azure?

Fast and easy provisioning

- Simplify and speed the process of running a dev-test environment.
- Provision virtual machines in minutes, whether its self-provisioning by developers or centralized control.

Test at realistic scale

- Replicate real-world usage scenarios and gain a precise view into how applications will behave at scale and in production.



Minimize waste and cost

- Gain visibility and control for usage of computing resources.
- Eliminate waste and implement chargebacks to internal customers.
- Use pay-as-you-go model without additional licensing for existing tools.

Demo: Azure DevTest Labs

In this demo, you will see how to:

- Creating and Managing custom images & formulas
- Configuring Lab policies
- Configuring cost management
- Configuring access to labs
- Using environment in a lab

Student Reference

https://tinyurl.com/532S01ARM