



Infrastructure Solution on Azure

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SPEKTRA SYSTEMS

Enable people and organizations to achieve more with the help of effective business and technology innovation.



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Agenda :

Windows Workloads on Azure

Module-1

Introduction to Azure

Module-2

Understanding Azure Storage and VM Storage

Module-3

Understanding Azure Networking

Module-4

Understanding Azure Compute , Windows on Azure

Module-5

Implementing RBAC(Role Based Access Control)

Module-6

Monitoring, Management and Automation(ARM Temp)

Module-7

Backup and recovery of Azure VMs

Module-1

Introduction to Azure

Platform Services

Security & Management

- Portal
- Azure Active Directory
- Azure AD B2C
- Multi-Factor Authentication
- Automation
- Scheduler
- Key Vault
- Store/ Marketplace
- VM Image Gallery & VM Depot

Services Compute

- Cloud Services
- Service Fabric
- Batch
- RemoteApp

Integration

- Storage Queues
- BizTalk Services
- Hybrid Connections
- Service Bus

Media & CDN

- Media Services
- Content Delivery Network (CDN)

Web and Mobile

- Web Apps
- API Apps

- Mobile Apps

- Logic Apps

- API Management

- Notification Hubs

Developer Services

- Visual Studio
- Azure SDK
- VS Online
- App Insights

Data

- SQL Database
- Data Warehouse
- DocumentDB
- Redis Cache
- Azure Search
- Storage Tables

Analytics & IoT

- HDInsight
- Machine Learning
- Stream Analytics
- Data Lake
- Data Factory
- Event Hubs
- Data Catalog
- IoT Hub
- Mobile Engagement

Hybrid Operations

- Azure AD Health Monitoring
- AD Privileged Identity Management
- Domain Services
- Backup
- Operational Analytics
- Import/Export
- Azure Site Recovery
- StorSimple

OS/Server Compute

- Virtual Machines
- Container Service

Storage

- BLOB Storage
- Azure Files
- Premium Storage

Networking

- Virtual Network
- Load Balancer
- DNS
- Express Route
- Traffic Manager
- VPN Gateway
- App Gateway

Azure Global Datacenter Infrastructure



Achieve global scale, in local regions



36

Announced regions

26

Live regions

Privacy and Compliance : Azure Trust Center



<https://azure.microsoft.com/en-in/support/trust-center/>



ISO 27001



SOC 1 Type 2



SOC 2 Type 2



PCI DSS Level 1



Cloud Controls
Matrix



ISO 27018



Content Delivery and
Security Association



Shared
Assessments



FedRAMP
JAB P-ATO



HIPAA/
HITECH



FIPS 140-2



21 CFR
Part 11



FERPA



DISA Level 2



CJIS



IRS 1075



ITAR-ready



Section
508 VPAT



European
Union Model
Clauses



EU Safe
Harbor



United Kingdom
G-Cloud



China
Multi
Layer Protection
Scheme



China
GB 18030



China
CCCPPF



Singapore
MTCS Level 3



Australia
Signals
Directorate



New
Zealand
GCIO



Japan
Financial
Services



ENISA
IAF

How to purchase Azure Cloud Services

Pay as you Go

Competitive pricing

No minimums or commitments.

Most popular and flexible payment plan

Cancel anytime

Enterprise Agreements

Large organizations with an Enterprise Agreement that make an upfront monetary commitment to Azure earn great benefits, including flexible billing options and our best prices.

Microsoft Open Licensing

Buy Azure through the Open Licensing programme, which provides a simple, flexible way to purchase cloud services from your Microsoft reseller.

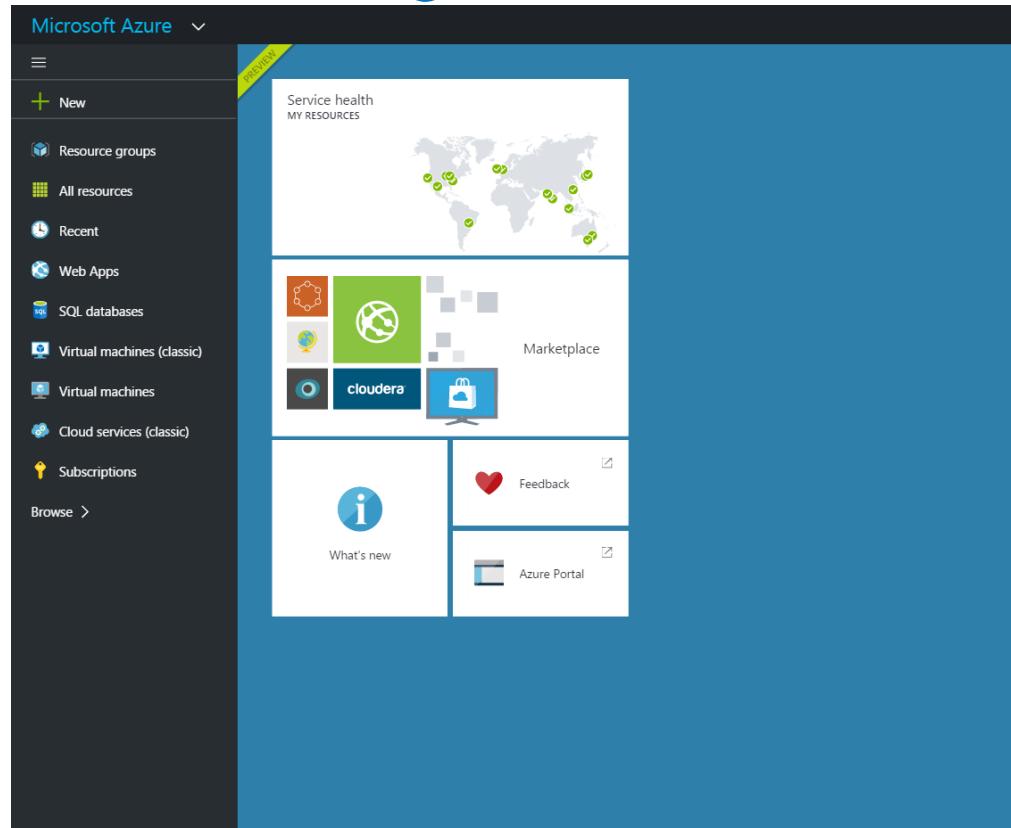
CSP Partner

Complete end to end customer engagement handled by Partner

Partner controls access and provides support

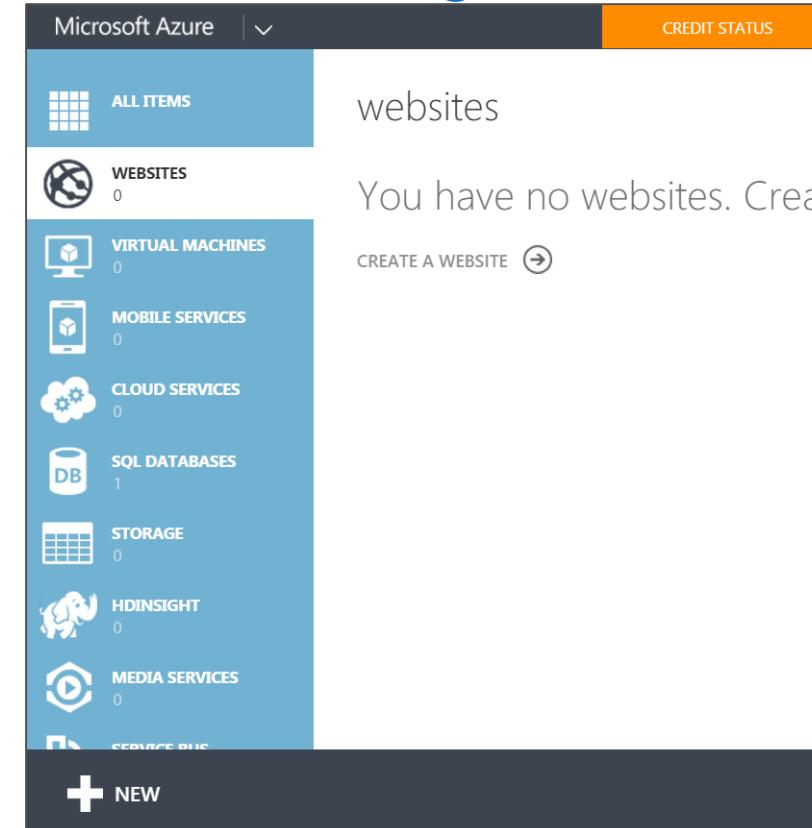
The Azure Management Portal

Azure Management Portal



<https://portal.azure.com>

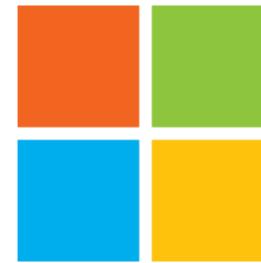
Classic Management Portal



<https://manage.windowsazure.com>

Azure Authentication Accounts

Microsoft Account



- Account that is created and linked to your existing non-org email
- Created by you

Work Account(Azure AD Account)



- Link subscription to an Azure Active Directory or Office 365 tenant (they are the same behind the scenes)
- Created by your IT Administrator
- Manage access to Azure with existing identities

Azure Support

Microsoft offers a range of support options for customers from developers starting their journey in the cloud to enterprises deploying business critical, strategic applications on Microsoft Azure.

Developer Support

Azure Support Twitter
@azure support

Standard Support

Included Free Support-Billing/Subscription etc

Professional Direct Support

Premier Support

Azure Pricing calculator

Price and configure Azure features for your scenarios

<https://azure.microsoft.com/en-in/pricing/calculator/>

– Add items

Products

- Featured
- Compute**
- Networking
- Storage
- Web + Mobile
- Databases
- Intelligence + Analytics
- Internet of Things
- Enterprise Integration
- Security + Identity
- Developer Tools

X

 **Virtual Machines**
Provision Windows and Linux virtual machines in minutes

 **Virtual Machine Scale Sets**
Create highly available, auto scalable Linux or Windows virtual machines

 **Azure Container Service**
Use Docker based tools to deploy and manage containers

 **Functions**
Process events with serverless code

 **Batch**
Run large-scale parallel and batch compute jobs

 **Service Fabric**
Build and operate always-on, scalable, distributed applications

 **Cloud Services**
Create highly available, infinitely scalable cloud applications and APIs

DEMO- Azure Portal Walkthrough

Module-2

Understanding Azure Storage and VM Storage

Azure Storage Services

IaaS



Storage



Virtual
machines



Networking

PaaS



Existing
frameworks



Web
and mobile



Microservices



Serverless
Compute

Disks

Persistent disks for Azure IaaS VMs

Premium Storage Disks option: SSD based, high IOPS, low latency

Files

Fully Managed File Shares in the Cloud

SMB and REST access
“Lift and shift” legacy apps

Objects

Highly scalable, REST based cloud object store

Block Blobs: Sequential file I/O
Cool Tier Available
Page Blobs: Random-write pattern data
Append Blobs

Tables

Massive auto-scaling NoSQL store

Dynamic scaling based on load
Scale to PBs of table data
Fast key/value lookups

Queues

Reliable queues at scale for cloud services

Decouple and scale components
Message visibility
timeout and update message to protect against unreliable dequeuers

Built on a unified Distributed Storage System

Durability, Encryption at Rest, Strongly Consistent Replication, Fault Tolerance, Auto Load-Balancing

Azure Storage Durability

Locally Redundant Storage (LRS)

Stores 3 replicas of the data within a single zone (facility) in a single region

Provides data durability for disk, node and rack failures

Geo Redundant Storage (GRS)

Stores 6 replicas of the data across two regions (3 in each region)

Provides additional durability to protect data against major regional natural disasters (e.g., tornado, hurricane, fire, etc, destroying a whole region)

Updates across regions are performed asynchronously

Read-Access Geo Redundant Storage(RA-GRS)

Stores 3 replicas of the data across multiple zones (facilities) within a single region or across regions

Provides additional durability to protect data against zone failures (e.g., fire burning down a facility)

Virtual Machine Storage

- Virtual Machine OS and Data Disks are stored in a Microsoft Azure Storage Account (blob endpoint)
- Supported format is Fixed VHD
- Up to 1TB Disks
 - Most Azure Images have System volumes that range from 30GB to 127GB
 - Non-OS Volumes larger than 1TB can be created via OS Supported Software RAID

Storage Account Details

<https://<storageaccountname>.blob.core.windows.net>

Must be located in the same region as VM



Azure Storage



C: OS Disk (1 TB)

D: Local Temporary Storage

F: Data Disk (500 GB)

G: Data Disk (1 TB)

Beware: Data on the D:\ Drive
can/will be lost when a machine
is moved or deallocated

Azure Disks: Overview

What are Azure Disks?

Persistent data disks for Azure IaaS VMs

Two types of durable storage: Premium Disks (SSD) & Standard Disks (HDD)

Backed by Page Blobs in Azure Storage

Capabilities

High I/O performance and low latency (>80,000 IOPS and >2,000 MB/sec disk throughput per VM)

Currently available in 26 Azure Regions

Server Side Encryption at Rest, Azure Disk Encryption (BitLocker/DMCrypt)

Specialized VMs with Blob Cache technology

Enterprise grade durability with three replicas

Snapshots for backup

Ability to expand Disks in place

REST Interface for developers

Storage Options

Premium storage

Optimized for low latency or high bandwidth

Up to 64,000 IOPS and 64Gbps per storage account

Billing based on provisioned size (not actual writes)

Blobs only (at least for now)



Standard storage

Optimized for general purpose storage

Up to 20,000 IOPS and 20Gbps per storage account

Billing based on actual bytes written to storage

Blobs, Files, Tables and Queues support



Premium Storage Performance

IOPS and Throughput

Are separate limits, enforced independently

Throttling kicks in when either of the limits are reached

Limits	IOPS	Throughput
P30 (1 TiB) Disk	5,000	200 MB/sec
DS3 VM	12,800	128 MB/sec

VM Size and Disk Size

Enforce independent limits on VM and Disk

Choose the right configuration based on workload needs

Optimal Traffic Patterns

Larger IO sizes for higher Throughput. Smaller IO sizes for higher IOPS.

Use multiple parallel operations / threads to push more traffic

Avoid heavy bursts by reducing the IO buffer to <5% of the IO limits

Azure Files: Overview

What is Azure Files?

Fully Managed Cloud File Storage for use with IaaS and On Premise instances

Scenarios Covered

Lift and Shift

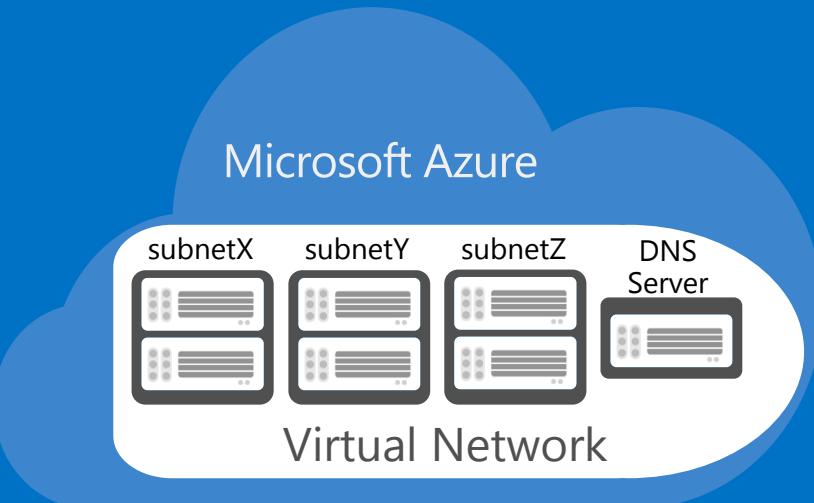
Host high availability workload data

Enable backup and disaster recovery

Module-3

Understanding Azure Networking

Virtual Network



Logical isolation with control over the network

Create subnets and isolate traffic with network security groups

Your own custom IP Range

Support for Internal/External Load Balancing

DNS options – BYO or Microsoft Azure-provided

Connect with your Datacenter using Hybrid Connectivity

User defined networking, 3rd Party NW Appliances

Network Security Group

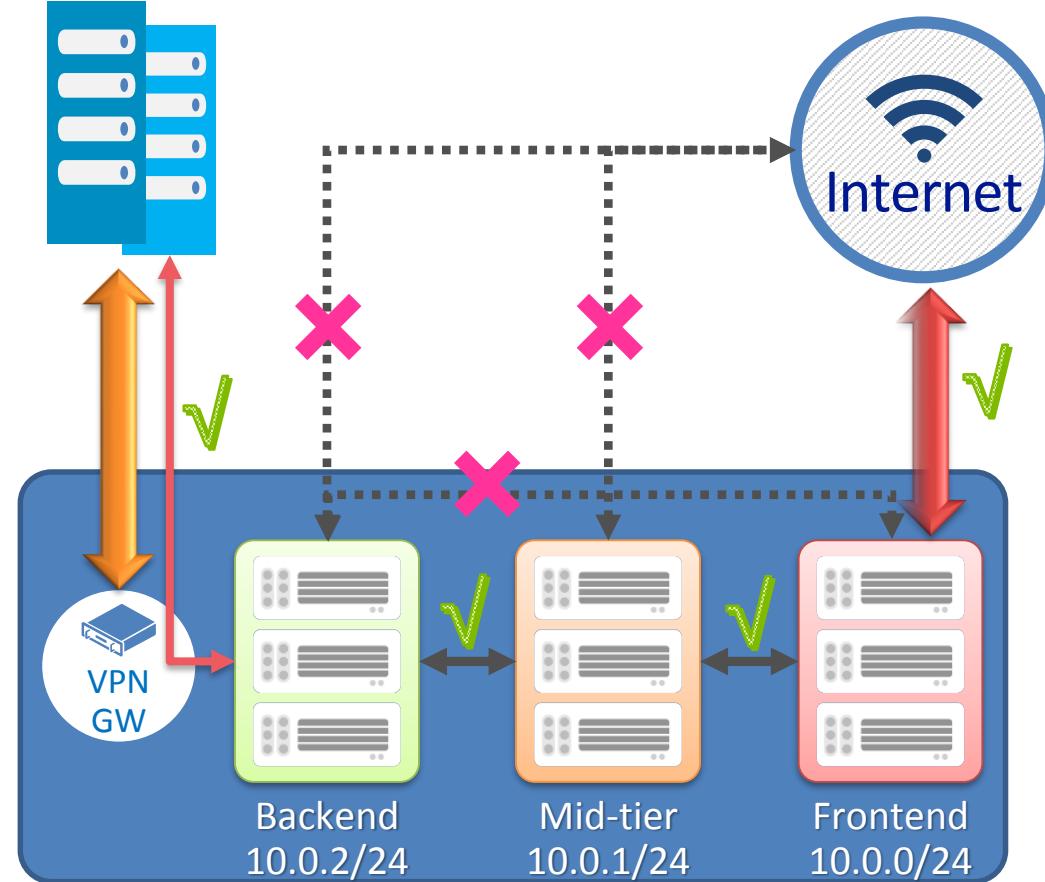
Enables network segmentation & DMZ scenarios

Filter conditions with Allow/Deny Rules, Individual IP/CIDR/Wildcards

Associate with VMs or subnets

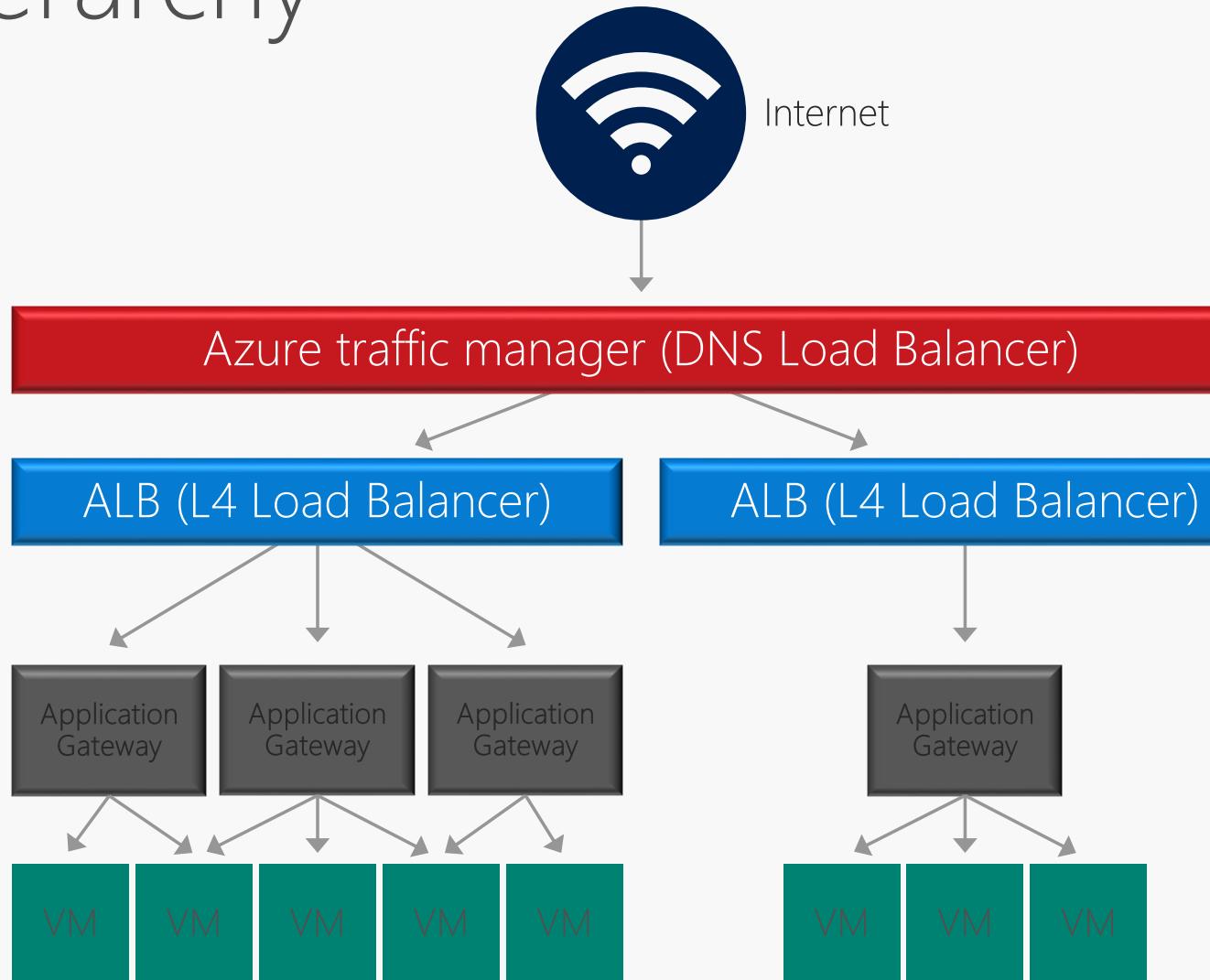
Configure via CLI/Portal/Template

VNET 10.0/16

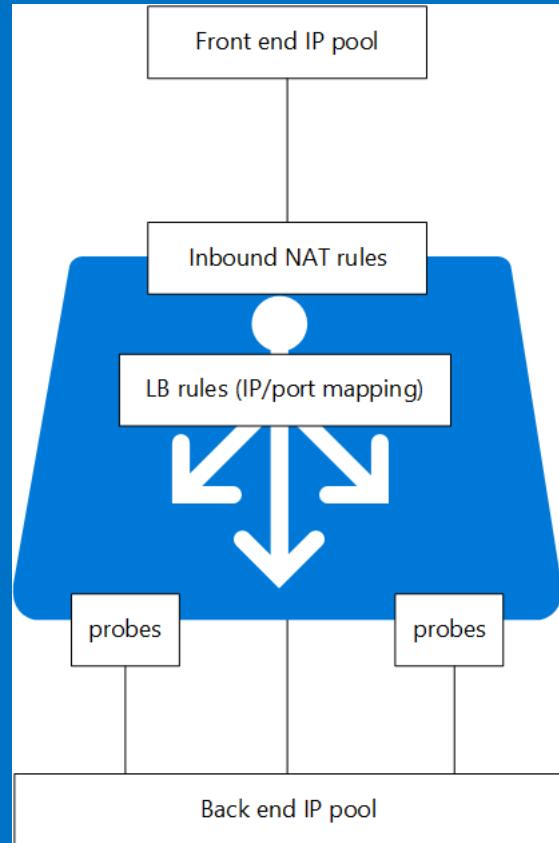


Azure Load Balancer Hierarchy

Azure Service	What	Example
Traffic Manager	Cross-region redirection & availability	http://news.com → apac.news.com → emea.news.com → us.news.com
Azure Load Balancer	In-region scalability & availability	emea.news.com → AppGw1 → AppGw2 → AppGw2
Azure Application Gateway	URL/content-based routing & load balancing	news.com/topnews news.com/sports news.com/images
VMs	Web Servers	IIS, Apache, Tomcat



Load Balancer



Distributes traffic across multiple VM's

Can be internet facing or Internal(VNET VIP)

Multiple Virtual IP's

Health Probe for HTTP and TCP Traffic

Inbound NAT Rules

Round robin Load Balancing Method

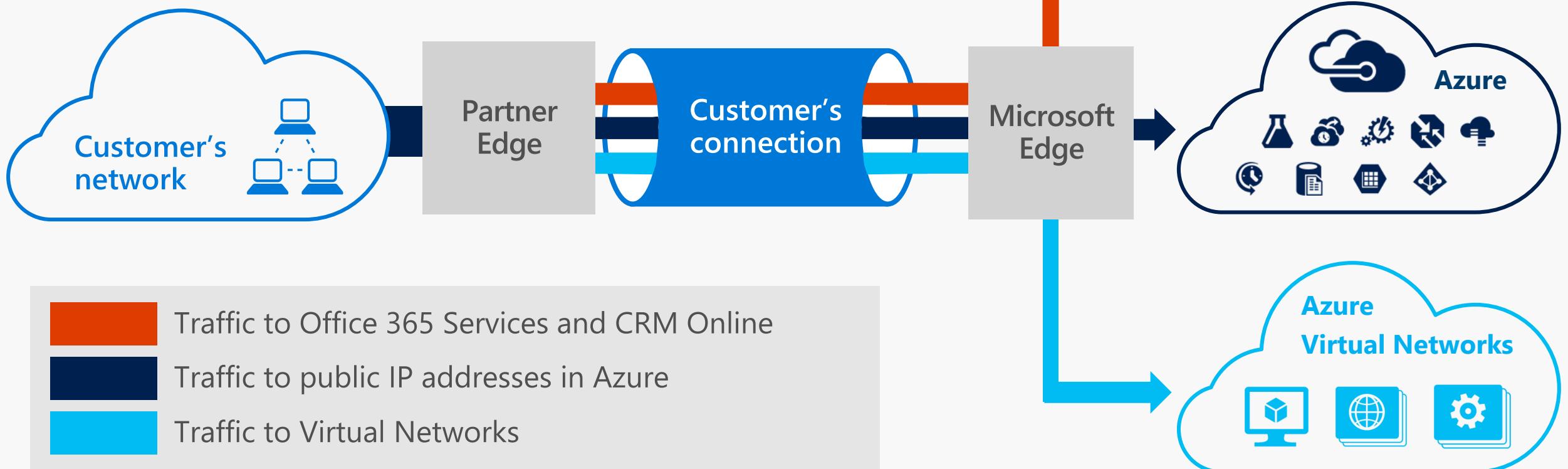
Hybrid Connectivity

Azure provides flexible ways to connect your on-prem datacenter or remote users/developer to connect Azure VNET in a secure manner

	Bandwidth	Security	Management	Workloads
ExpressRoute	10 Mbps – 10 Gbps Committed Bandwidth	Private isolated network between provider and Azure. Control over routing and traffic.	Configure once, simple to add new virtual networks	Enterprise Connectivity Mission Critical Disaster Recovery Hybrid Applications
Site-to-Site	~80 Mbps – ~200Mbps No performance commitment	Encrypted tunnel over the Internet	Configuration of IPSEC VPN device for each Virtual Network Created	Hybrid Applications Dev/Test Secure Management
Point-to-Site	~80 Mbps – ~200Mbps No performance commitment	Encrypted tunnel over the Internet	Configuration with each individual client machine.	Dev/Test Secure Management

ExpressRoute

- ✓ Unified connectivity to Microsoft Cloud Services
- ✓ Predictable performance
- ✓ Enterprise-grade resiliency and with 99.95% availability SLA
- ✓ Large and growing partner ecosystem



Module-4

Understanding Azure Compute

Virtual Machines with Azure

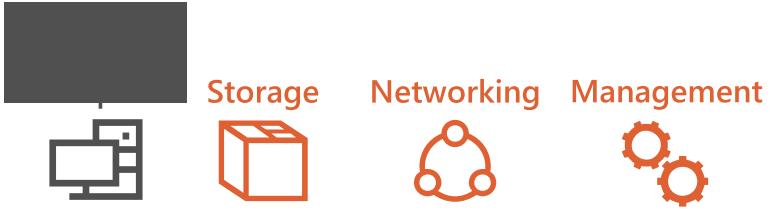
- Choose your language, workload, operating system



- Hybrid Connectivity to on-premises network
- Flexible options for compute:
From: 1 core, 768 MB Memory, 1 TB storage
To: 32 cores, 448 GB Memory, 64 TB
- Pay only for what you use



Compute families



Entry Level

Dev/Test and entry-level workloads

Earliest generation, HDD

100 ACU/core
\$0.44/kACU



General Purpose VMs

Good combination of memory, SSD for most common production applications

Memory-intensive variants
210 ACU/core
\$0.30/kACU



Compute Optimized VMs

Compute-intensive apps like Gaming, Analytics

More CPU to memory ratio
210 ACU/core
\$0.27/kACU

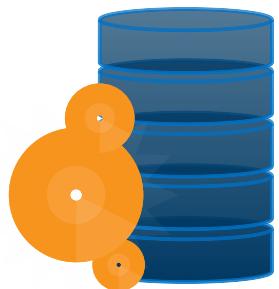


Large Memory VMs

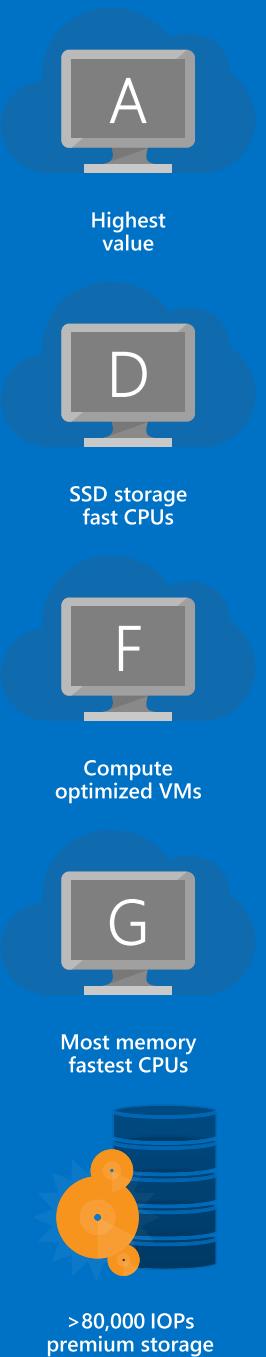
Large VMs for large databases requiring fast Storage

Intel Haswell processor with 0.5TB RAM

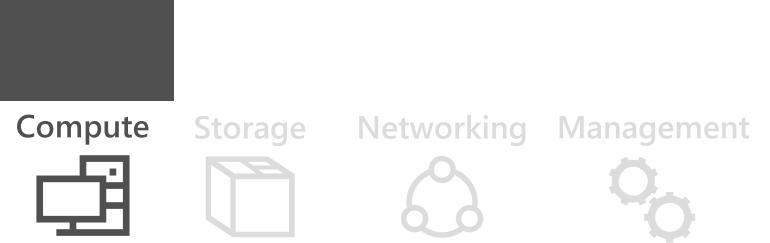
180 ACU/core
\$1.53/kACU



80,000 IOPs Premium Storage



New compute sizes



High performance VMs

- Fastest VMs on Azure with Intel Haswell E5 processor
- Supports RDMA and high memory
- For high performance, fluid dynamics, CAD/CAM, crash testing
- 290 ACU/core
- \$0.38/kACU



Storage optimized VMs

- Based on Intel Haswell E5 processor
- Supports up to 6TB SSD
- For low latency, storage optimized workloads
- Pricing coming soon



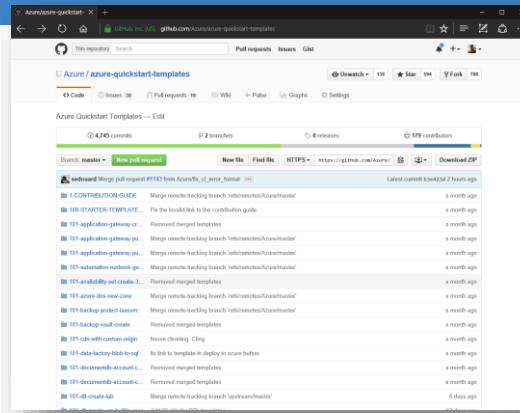
GPU-enabled VMs

- NVIDIA Tesla accelerated platform highest end graphics support available in the cloud
- Supports RDMA
- For compute and graphics intensive workloads, remote visualization, deep learning, predictive analytics

Discover, Deploy & Build

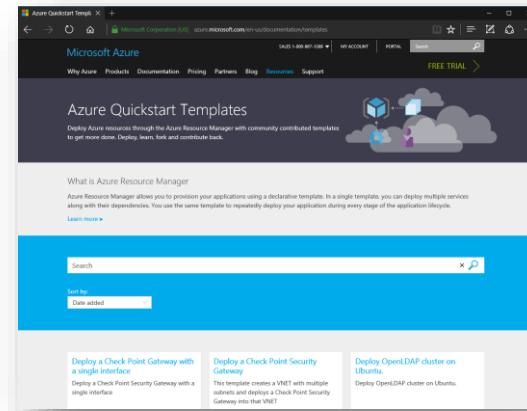
The screenshot shows the Azure Marketplace interface. At the top, there's a search bar labeled "Search Everything". Below it, a large orange card for the "SharePoint 2013 HA Farm" by Microsoft is displayed. The card features a cityscape icon and a lightbulb icon. The text describes it as a highly available SharePoint server farm. A green "Create" button is at the bottom. Below the card, a section titled "Users interested in Network security group also viewed" lists six services with icons: Network security group (Microsoft), Virtual network (Microsoft), Windows Server 2012 R2 (Microsoft), Storage account (Microsoft), Web App (Microsoft), and Cloud service (Microsoft). At the bottom, a section titled "Recommended for you" lists six more services: Ubuntu Server 14.04 LTS (Canonical), Windows Server 2012 R2 (Microsoft), Automation (Microsoft), Network interface (Microsoft), SQL Database (Microsoft), and Storage account (Microsoft).

Marketplace



Github

<https://github.com/Azure/azure-quickstart-templates>



Azure.com*

<https://azure.microsoft.com/en-us/documentation/templates/>

What is Azure Marketplace

Virtual Machines



Windows Server
2012 R2
Microsoft



Hortonworks
Data Platform
Hortonworks



Barracuda Web
Application
Barracuda Networks...



VCC for Service
Providers
Veeam



LoadMaster Load
Balancer ADC
KEMP Technologies...



CoreOS Alpha
(976.0.0)
CoreOS

See all

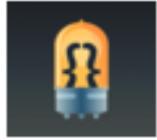
Developer services



SendGrid
SendGrid



New Relic
New Relic, Inc.



Mongolab
MongoLab



Signiant Flight
Signiant



Alert Logic Log
Manager-Security
Alert Logic, Inc.



Face APIs
Microsoft

See all

API Apps



Office365
Connector
Microsoft



SharePoint Server
Connector
Microsoft



HDInsight
Connector
Microsoft



Salesforce
Connector
Microsoft



SAP Connector
Microsoft



QuickBooks
Connector
Microsoft

See all

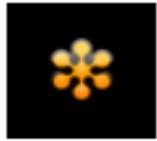
Azure Active Directory applications



Box
Integration by Micro...



Citrix
Integration by Micro...



Citrix
GoToMeeting



MyDay
By Collabco



Concur
Integration by Micro...



Docusign
Integration by Micro...

Online store for Applications

Certified 3rd party applications

Linux and Windows based
solutions

Easy to deploy

Virtual Machine Extensions

IaaS Anti-malware

Reset password

Docker

Backup

BGInfo

RDMA Drivers

Bash Script

PowerShell

PowerShell DSC

Symantec

Trend Micro

Chef

Puppet

SQL IaaS Agent

Visual Studio

Monitoring Partners

New resource

Leverage Azure's powerful capabilities to build, deploy, and manage applications faster.



Chef Client
By Chef Inc.



Custom Script
By Microsoft Corp.



BgInfo
By Microsoft Corp.



IaaS Antimalware
By Microsoft Corp.



Symantec Endpoint Protection
By Symantec.



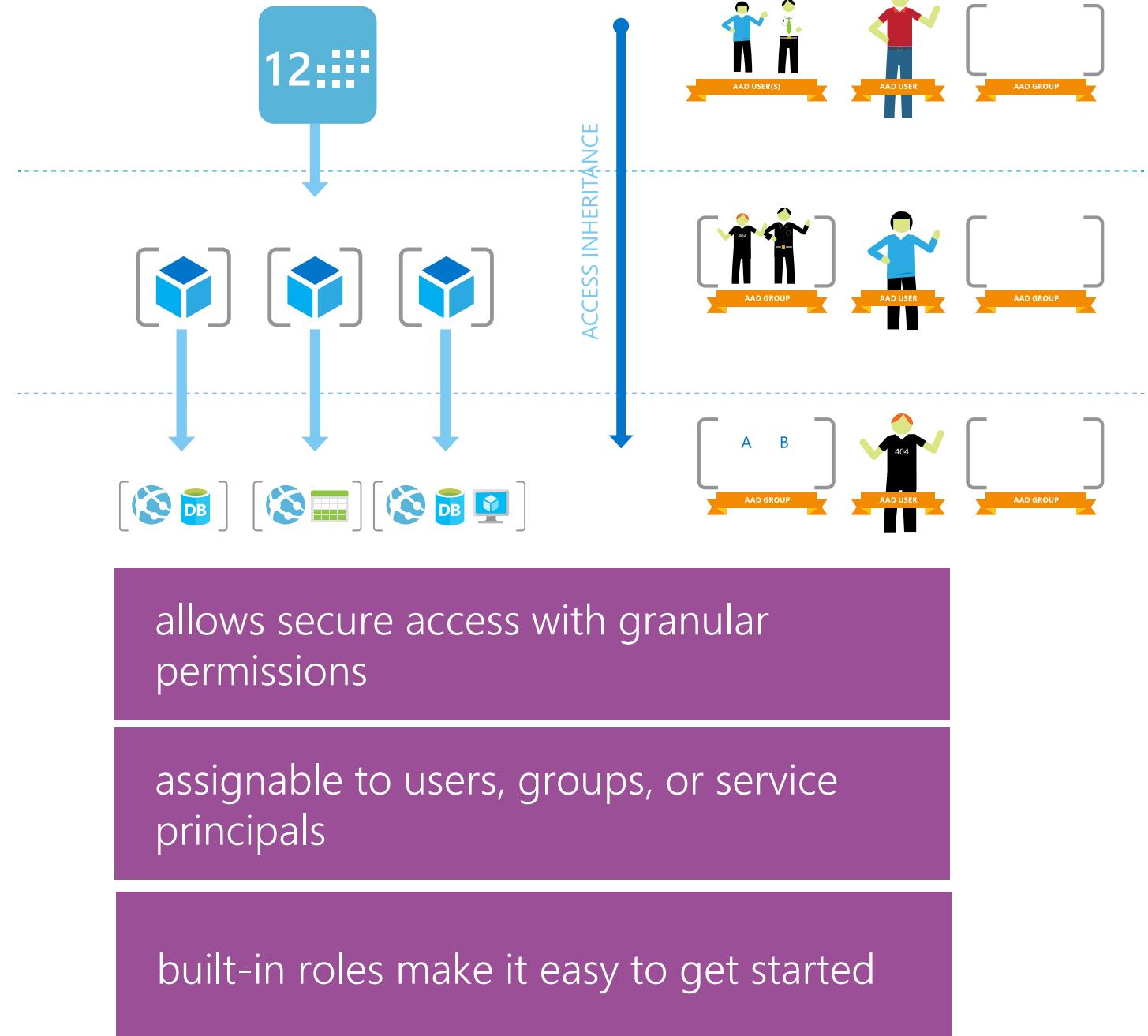
TrendMicro DSA
By TrendMicro DeepSecurity

Module-5

Role Based Access Control

ARM- RBAC: Role based access control

Azure Role-Based Access Control (RBAC) enables fine-grained access management for Azure. Using RBAC, you can grant only the amount of access that users need to perform their jobs. This article helps you get up and running with RBAC in the Azure portal



Built-in Roles

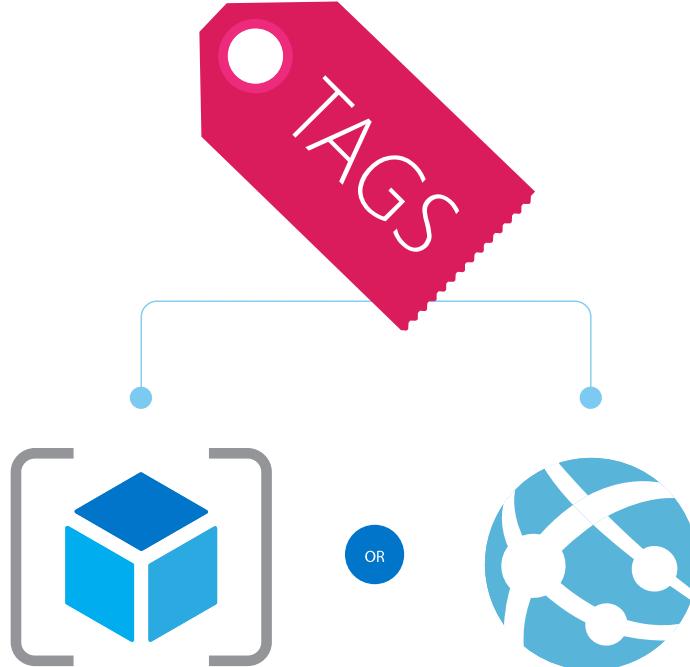
- Offer rich set of built-in roles to select from (40+)
- Assignable to users, groups or services at different scopes
- Can't be modified
- Top Used built-in roles – Reader, Contributor, Reader, DevTest Labs User, Virtual Machine Contributor

Custom Roles

- Enhanced flexibility
- Assignable to users, groups or services at different scopes
- Can be shared across multiple subscriptions in the same tenant

Resource Manager Tagging

Assign tags to your resource to analyze cost in a better way.



name-value pairs assigned to resources or resource groups

each resource can have up to 15 tags

flow through to billing

Module-6

Management, Monitoring and Automation

ARM Templates

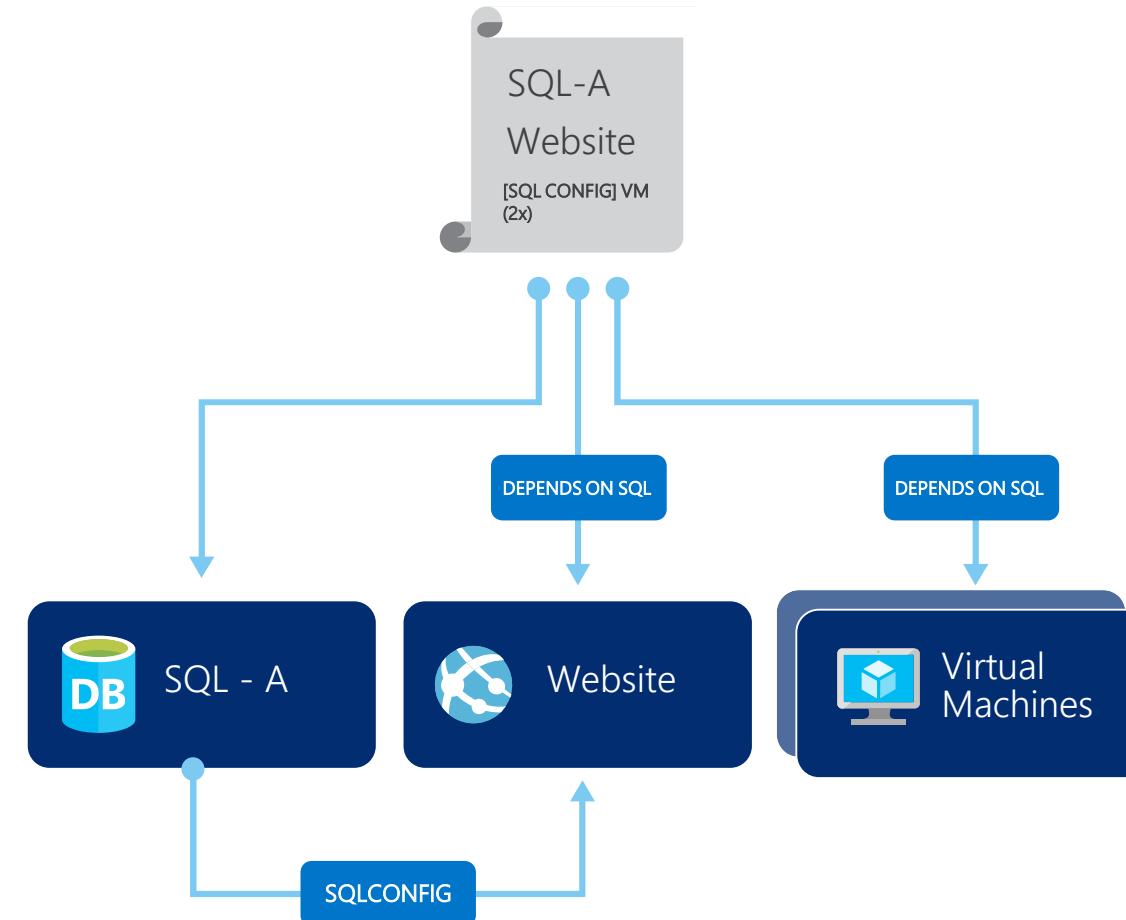
JSON Based template to automate deployment of Azure Resources

specify resources and dependencies

simple orchestration

repeated deployment and consistent state.

Build Using Visual Studio or any other text editor



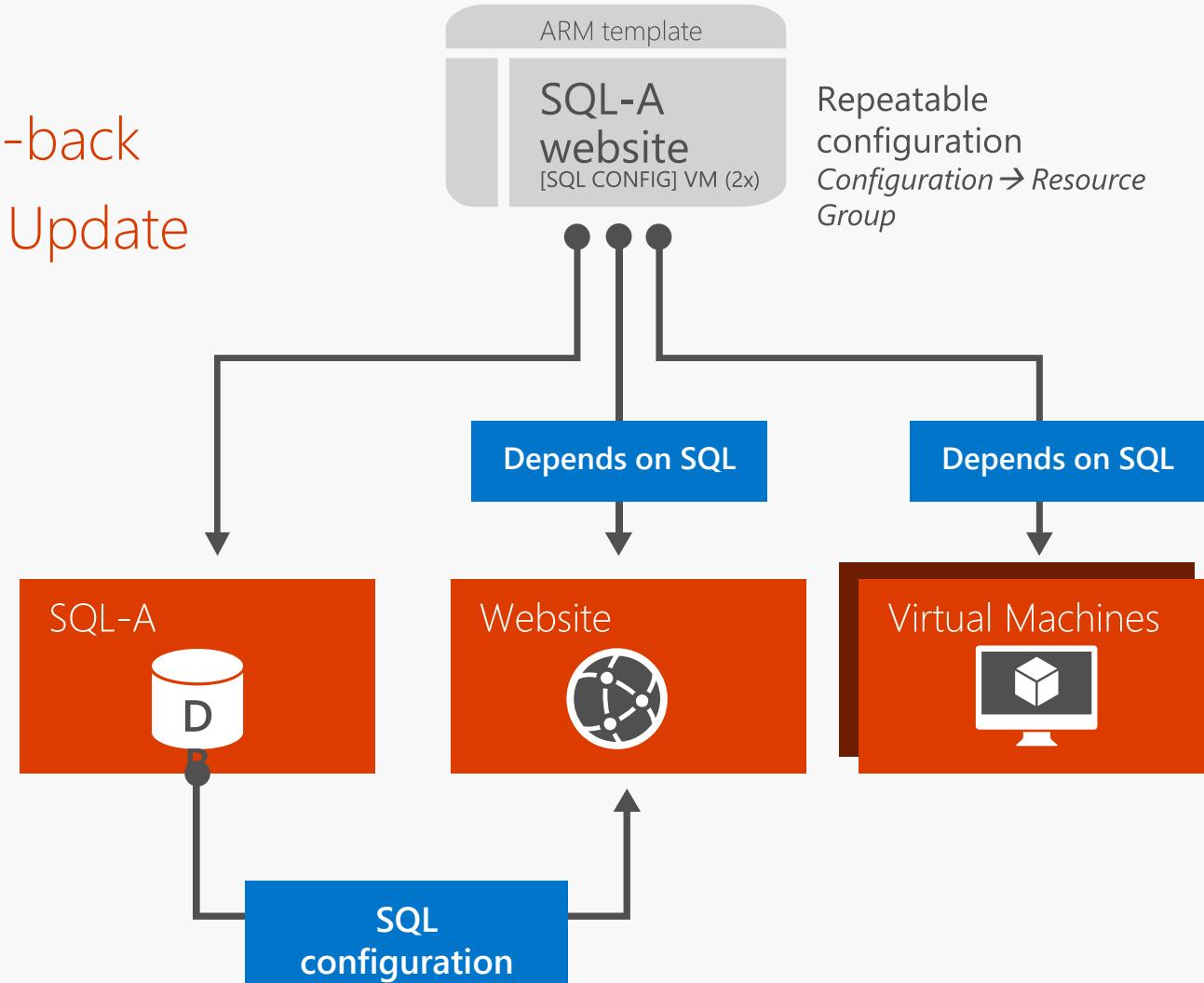
Azure Resource Manager templates

Why ARM Templates?

- Ensure Idempotency
- Simplify orchestration, deployment and roll-back
- Provide Cross-Resource Configuration and Update Support

ARM Templates are:

- Source file, checked-in
- Specifies resources and dependencies (VMs, websites, DBs) and connections (configuration, LB sets)
- Configurable parameters for input/output



Template Structure

Schema and version

Parameters

Variables

Resources

Output

```
{  
  "$schema":  
    "https://schema.management.azure.com/schemas/2015-01-  
    01/deploymentTemplate.json#",  
  "contentVersion": "<version-number-of-template>",  
  
  "parameters": { <parameter-definitions-of-template> },  
  "variables": { <variable-definitions-of-template> },  
  "resources": [ { <definition-of-resource-to-deploy> } ],  
  
  "outputs": { <output-of-template> }  
}
```

Template Language Functions

Full list of template functions
@
<https://azure.microsoft.com/en-us/documentation/articles/resource-group-template-functions/>

```
parameters('parameterName')
variables('variableName')
concat('string1', 'string2', 'string3')
copyIndex(offset)
listKeys(storageAccountResourceId, apiVersion)
reference(resourceId, apiVersion)
resourceId('namespace/resourceType', 'resourceName')
base64encode('stringtoencode')
uniqueString('stringForCreatingUniqueString', ...)
```

Template vs REST API

Full list of template functions
@
<https://azure.microsoft.com/en-us/documentation/articles/resource-group-template-functions/>

```
"resources": [
  {
    "name": "myStorageAccount",
    "type": "Microsoft.Storage/storageAccounts",
    "location": "westus",
    "apiVersion": "2015-06-15",
    "properties": {
      "accountType": "Standard_LRS"
    }
  }
]
```

API

```
PUT
/subscriptions/{subId}/resourceGroups/{rgName}/providers/Microsoft.Storage/storageAccounts/
  myStorageAccount?api-version=2015-06-15
{
  "location": "westus",
  "properties": {
    "accountType": "Standard_LRS"
  }
}
```

Monitoring

Azure IaaS monitoring involves collecting and tracking metrics, analyzing log files, defining custom metrics and logging generated by specific applications or workloads running in Virtual Machines.

Follow Guidance document to try out

Enable VM monitoring by enabling Diagnostics

Configuring Azure Alerts based upon metric threshold – email notifications

Customizing and configuring Utilization and Performance Charts

Using Boot Diagnostics

Enabling and using Load balancer Diagnostics for LB Monitoring

Activity Logs

The **Azure Activity Log** is a log that provides insight into the operations that were performed on resources in your subscription. The Activity Log was previously known as "Audit Logs" or "Operational Logs," since it reports control-plane events for your subscriptions. Using the Activity Log, you can determine the 'what, who, and when' for any write (PUT, POST, DELETE) operations taken on the resources in your subscription, plus understand the status of the operation and other relevant properties. The Activity Log does not include read (GET) operations.

Contains log of management operations on resources

Consume via portal or REST API

90-day data retention

Export to Blob storage or stream to Event Hub

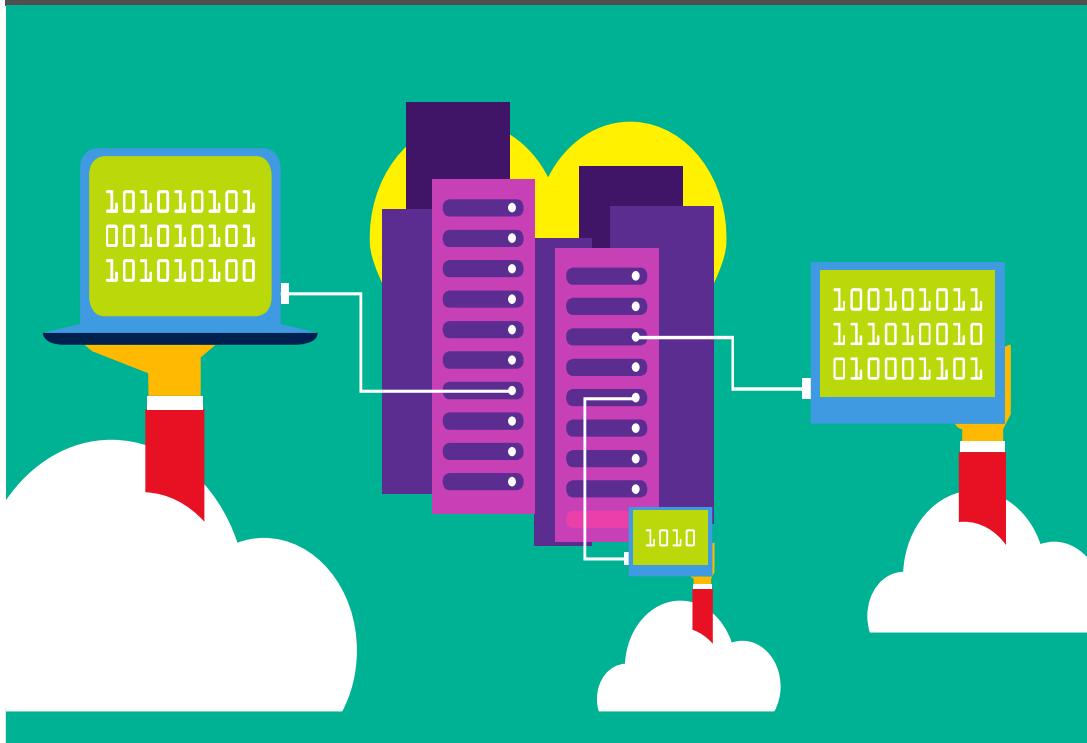
In-built analytics via Log Analytics – (Discussed in later sections)

Module-7

Backup and Recovery of Azure VM's

Introducing Azure Backup

Cloud First Backup Service in Azure DC



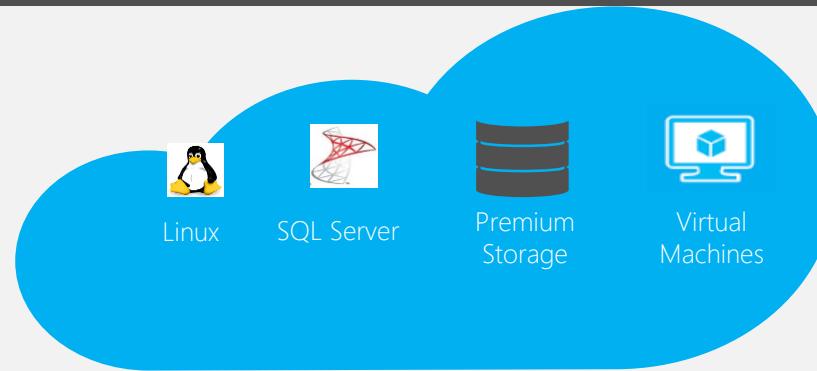
Cloud as Data Plane



Cloud as Management Plane

Azure Backup Scenarios

Cloud Backup

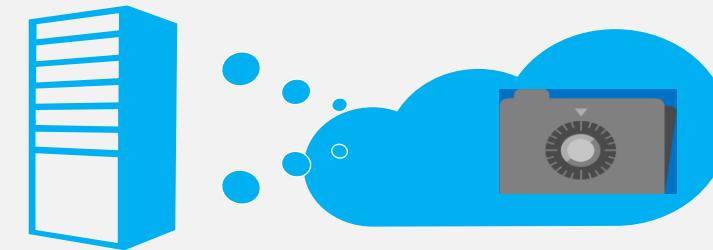


Backup of Cloud Workloads

Azure VM Backup

Azure SQL Backup

Hybrid Cloud Backup



Backup to Cloud

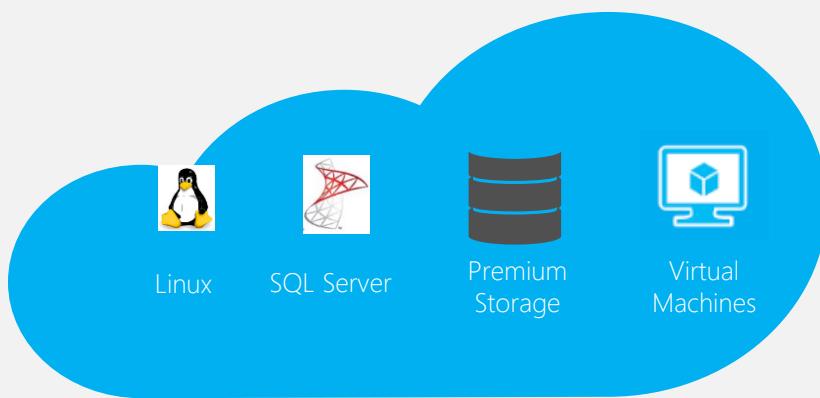
Hyper-V and VMware Protection

Offsite and Long Term Retention

Protection from Malware

Azure IaaS VM Backup

"Optimally protect your cloud data"



Customer Need:

- Protection from deletion/corruption
- Application consistent backup
- Backup without shutting down VM
- Data Retention for Compliance

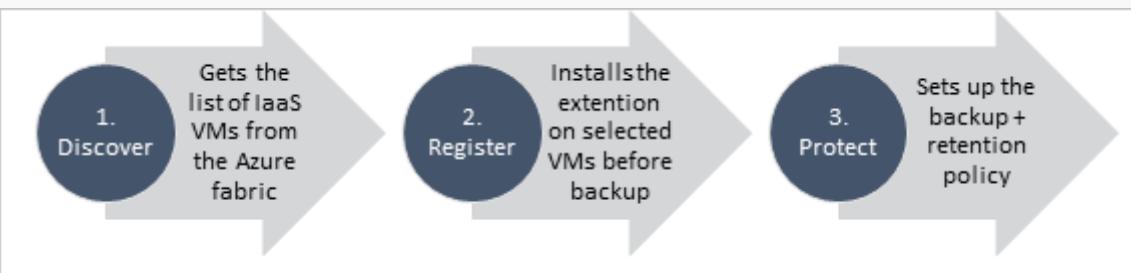
No backup infrastructure

Self Service Backup/Restore

Backup as a Service

Pay as you go

Azure Backup – IaaS Virtual Machine Backup



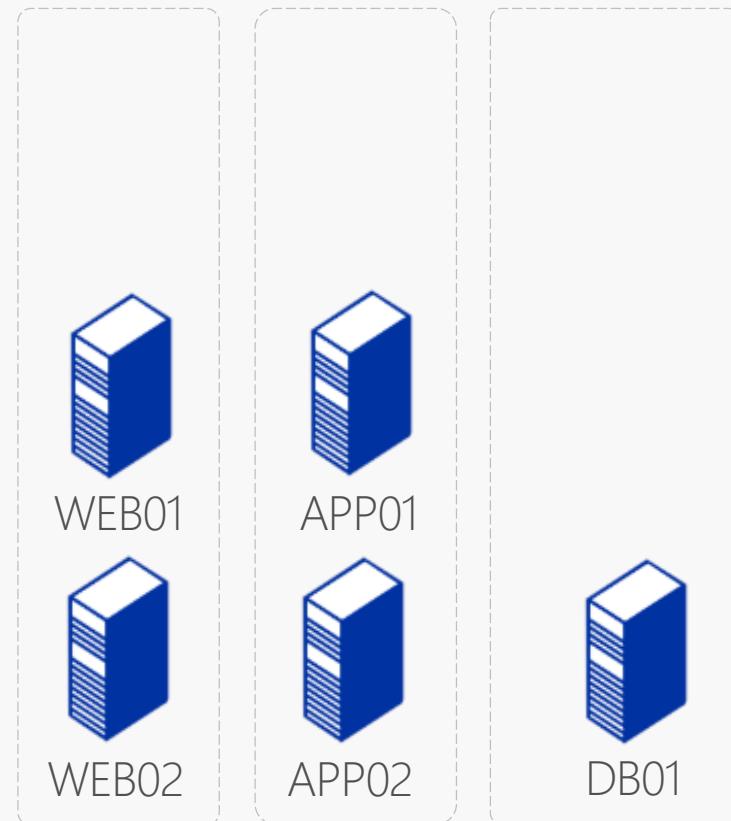
Microsoft's *born in the cloud* backup solution

Virtual machines are protected with a policy and scheduled backups created.

Azure Backup service creates a backup job for each virtual machine that needs to be backed up.

As a part of the backup operation, the Azure Backup service issues a command to the backup extension in each virtual machines to flush all writes and take a consistent snapshot.

Customer Virtual Network



Got questions?
<http://bit.ly/2oyeur1>

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