Deploying SQL Server With Microsoft Azure Virtual Machine

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Based on actual customer experiences

Credits to Balakrishnan Shankar
Introduction

Objectives
- Understand our cloud database offerings
- Understand deployment options for Azure VM
- Configure for optimal performance and connectivity
- How to deploy AlwaysOn Availability Groups in the Cloud
- Learn hybrid cloud scenarios

Take Aways
- Deploying an Azure VM with SQL Server can be fast
- Some configuration required for optimal performance
- Think “SQL Box in a VM” in the Cloud
- Shared storage – Set some expectations
Introduction

Just do It!
Do you know Cloud?
How to provision SQL Server in Azure VM
What’s Next? Configuration for Success
Validating your deployment
Review AlwaysOn Availability Groups Deployment
Hybrid Cloud Scenarios
Watch out for these
Futures for Azure VM
Demo

Just do it!

Let’s spin up a SQL VM in Azure
Do you know the Cloud?

- **Infrastructure as a Service (IAAS) – SQL Server**
  - We host your virtual machines on our hardware
  - We provide services such as VM failover and redundant storage
  - You have complete control and ownership to manage your VM and SQL Server
  - You own your SQL HA solution using “box” technologies
  - We help automate deployment of the VM (Gallery Images)
  - **Microsoft Azure Virtual Machine** (SQL “box” runs inside the Guest OS)

- **Platform as a Service (PAAS) – SQL Database**
  - We abstract the VM and “physical” aspects of SQL Server
  - Build a database very quickly
  - Don’t worry about instance, physical files, and storage
  - Performance predictability, auto HA, geo-replication
  - Elastic scale-out
  - **Microsoft Azure SQL Database**
SQL Server in Azure VM - Provisioning

**Use the Azure Management Portal**
- Gallery images
- Provision Windows VM – SQL Setup on your own

**Bring your own VM**
- Sysprep a VM, install SQL, and upload the image to Azure storage

**Management Studio**
- Deploy Database to Azure VM Wizard

**Azure VM Template**
- Capture a Azure VM and use this under “My Images”

Azure Powershell **cmdlets**
The Gallery Images

SQL Server 2014
- RTM EE, Std, Web
- Windows 2012 R2
- Optimized for DW
- Optimized for OLTP

SQL Server 2012
- SP1 and SP2 EE, Std, Web
- Windows Server 2012
- SP2 Optimized for DW
- SP2 Optimized for OLTP

SQL Server 2008 R2
- SP2 and SP3 EE, Std, and Web
- Windows Server 2008 R2

We refresh using latest CU builds

VM includes media for multi-instance support
**VM Sizes**

**A Series**
- Don’t use basic tier
- A2 or higher for Standard SKU
- A3 or higher for EE SKU
- A4, A7-A9 for Optimized Images

**D Series**
- Faster CPUs
- Local SSD storage
- D4, D13-D14 for Optimized

Use the pricing [calculator](#)

Blog [post](#)

Made wrong choice? Change it
 Choices to Make

- **Administrator account**
- **Cloud Service** – Use new except for…
  - Use existing for AlwaysOn AG and Availability Sets
  - Use this for Load Balancing
  - Connect between VMs without a Virtual Network
- **DNS name**
  - Can be different than VM name. This is the “network name”
- **Virtual Network**
  - Use this [decision tree](#) to decide to create a virtual network
- **Storage Account**
  - 100 max storage accounts per subscription
  - Max IOPs for an account is 20,000
- **Availability Set**
  - Separate VMs from same [fault and update domain](#)
  - Required for AlwaysOn AG
- **TCP EndPoint**
  - Add in your TCP endpoint for MSSQL for port 1433
Bring you Own VM

Install and sysprep Windows in Hyper-V

Full SQL install or sysprep SQL install

Upload your “image”

Provision multiple new VMs with this image

Pick this under My Images

How? Read [here](#)
Demo

A Tour of the Gallery
Provisioning using SSMS Wizard

Quickly deploy a database to Azure VM

Use a Wizard to provide Azure VM details
What’s Next? – Configuration for Success

Connect with Remote Desktop

Make storage decisions
- 500 IOPs limit per disk
- Use storage pools (Windows Server 2012+) across many disks
- Separate log and data across 2 pools
- Do not use System Drive
- Do not enable caching
- Tempdb and BPE for local disk

Enable Instant file initialization

Enable Locked Pages

Turn off Geo-Replication

The checklist

Optimized images do this for you

Charged for storage not # disks

D-Series only. Steps

Doesn’t guarantee write ordering
More Configuration Fun

- **Copy of data (backup files, bcp import files, ...)**
  - Look at this [resource](#)
  - Use the azcopy tool. See this [resource](#)

- **Backup database**
  - Backup to Azure blog storage separately from your disks
  - 2012+ Supports Backup to URL

- **Consider RG I/O and –k for any I/O throttling**

- **Apply fix** for tempdb eager writes if SQL 2012

- **Turn off unused services (SSAS, SSRS, ...)**
Connectivity Configuration

Did you create a TCP endpoint for port 1433?

Enable SQL Authentication
- Unless you connect with VNet and domain authentication

Firewall considerations on Azure
- Just like box make exception for port 1433 in your VM

Consider Managing ACLs on your TCP SQL endpoint

Internal load balancing supported
Optimized Images for DW and OLTP

**Common settings**
- 15 data disks
- 1 12TB Storage Pool for Data of 12 disks
- 1 2TB Storage Pool for Log of 3 disks
- Startup Parameter –E
- Startup Trace flags 1117 and 1118 (and 8 tempdb files)
- ERRORLOG, Trace Files, System Databases, and Default Paths to Data Disks
- Instant file Initialization enabled
- Locked Pages in Memory enabled

**Optimized for DW**
- Storage Pool Stripe Size = 256Kb
- Recovery Model for model set to SIMPLE

**Optimized for OLTP**
- Storage Pool Stripe Size = 64kb

Blog post

Mount point used
Validating the deployment

Verify connectivity and network latency

Verify your IOPS

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<thead>
<tr>
<th>Tool</th>
<th>IOPS</th>
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<td>300-500</td>
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<td>CHECKDB WITH PHYSICAL_ONLY</td>
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Demo

Are our optimized Images really Optimized?
Deploying AlwaysOn AG

- **3 scenarios**
  - All in Azure in same data center
  - #1 + Secondaries across data centers
  - Hybrid – secondary on premise and in data centers

- **Do it yourself**
  - This is a fairly lengthy process but well documented
  - Remember you need a DC in Azure and a VNet

- **“AlwaysOn Template”** automates this (Preview Portal)

- **AG Listener** supported for both “all in cloud” and hybrid

- **Add Replica Wizard in SSMS**
  - Add secondary to Azure
  - You need to apply this fix

- **You cannot bring your own VM with AG already installed**

A very good resource

Async

Internal load balancer to control access

Failover Cluster Instance not supported (yet)
Hybrid Cloud Scenarios

Backups to Azure
- Backup path now a URL
- VDI application communicates to Azure
- Managed backups allow “auto backup to the cloud”

AG Secondary in Azure
- Requires multi-subnet cluster and VPN connectivity
- Make this async

SQL Database Files in Azure Storage
- Database/Log file path supports URL
- Uses HTTP REST API
- Some limitations
- Expectations with network latency

Check out ExpressRoute

SQL 2012 and 2014
Gotchas

I/O Performance Expectations
- Shared storage can have more latency
- Batching transactions are more important
- Set autogrow correctly

Licensing
- Can’t transfer your own license for gallery images

Upgrade
- Can’t upgrade a Std SKU gallery image to EE SKU

Support Restrictions
- Stay up to date with this KB article

SSRS
- SSRS Azure deprecated - Use SSRS in Azure VM

Autoscale for Azure
- Only for apps that don’t need I/O
- Not supported for SQL Server

Max Limits for Azure
- see here
Futures for Azure VM

- **The G Series VM**
  - Intel® Xeon® processor E5 v3 family.
  - Larger sizes (G5: 32 cores, 448Gb RAM, 6.5TB Local SSD)

- **Premium Storage**
  - High performance storage based on SSD

- **Azure Files (in Preview)**
  - Shared file system
  - SQL Support in progress

- **The New Portal**
References

- Getting Started with SQL Server in Azure Virtual Machines
- SQL Server Deployment in Azure Virtual Machines
- Provisioning a SQL Server Virtual Machine on Azure
- How to create a SQL Server virtual machine in Azure using the existing on-premises SQL Server virtual machine
- Performance Best Practices for SQL Server in Azure Virtual Machines
- High Availability and Disaster Recovery for SQL Server in Azure Virtual Machines
- Tutorial: AlwaysOn Availability Groups in Azure (GUI)
**Review**

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