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Tulsa Tech Fest & Tulsa School of Dev

July 20 & 21 2017

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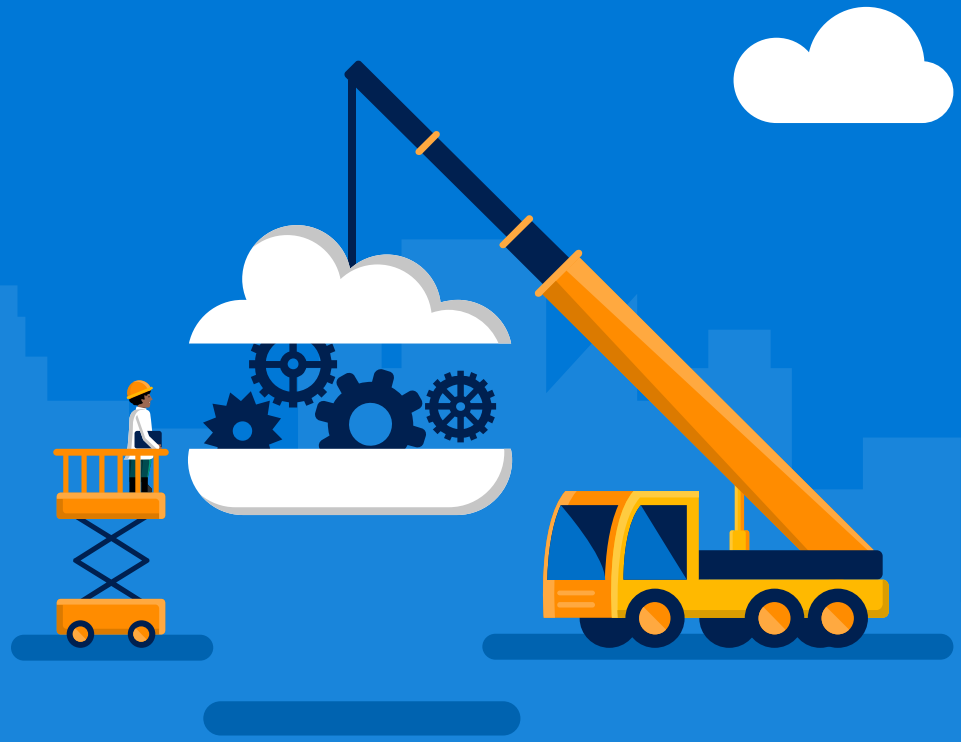

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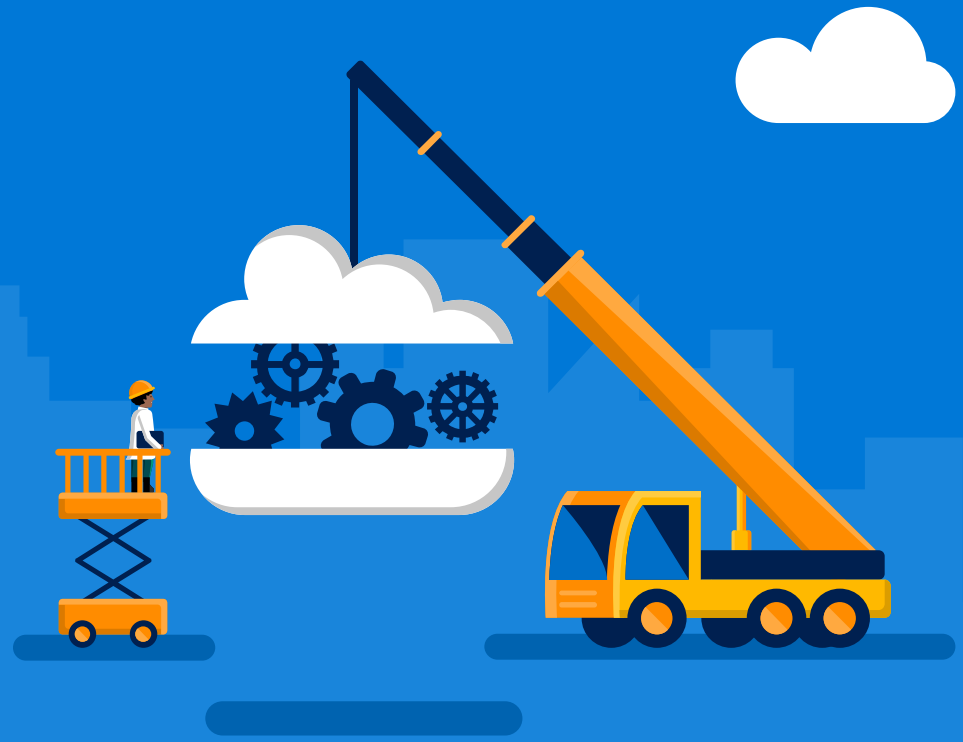
Microsoft

SAIIK: PaaS v IaaS

Navigating the Decision Tree: Azure SQL vs SQL Server in a VM

Shawn Weisfeld



About Me

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woot!

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SQL Server on Azure IaaS Implementation Kit

aka "SAIIK"

Brian Hitney, Peter Laudati, Keith Mayer, Bart Czernicki
Azure Technical Architects
Microsoft US DX ISV Team

SAIIK: PaaS v IaaS

Navigating the Decision Tree: Azure SQL vs SQL Server in a VM

Brian Hitney, Peter Laudati, Keith Mayer, Bart Czernicki
Azure Technical Architects
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SAIIK: *SQL Server on Azure IaaS Implementation Kit*

Agenda & Goals

- PaaS vs IaaS
- Review pre-planning elements
- Understand Availability Requirements
- Understand relational database options in Azure
- Takeaway: What database type in Azure should I use?

Cloud Computing Jargon

IaaS

Infrastructure-as-a-Service

host

PaaS

Platform-as-a-Service

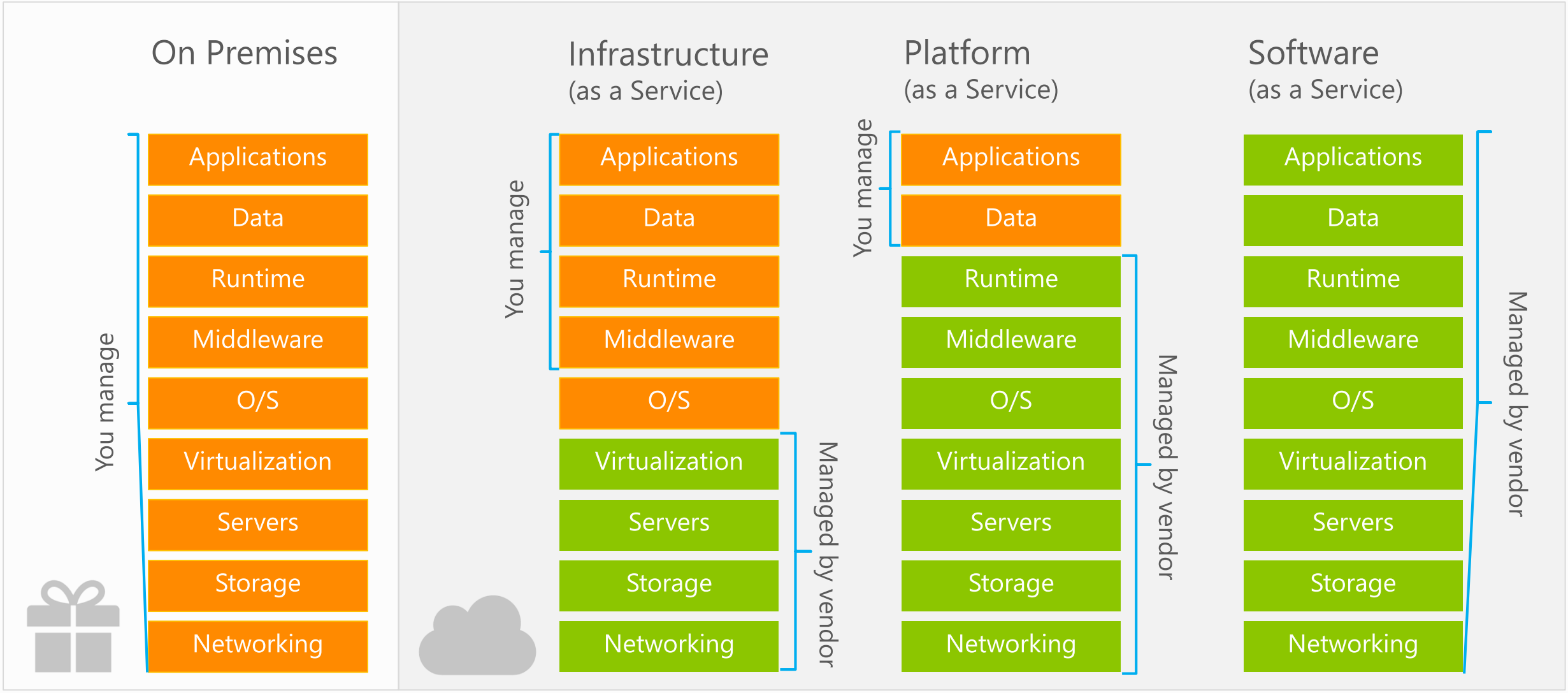
build

SaaS

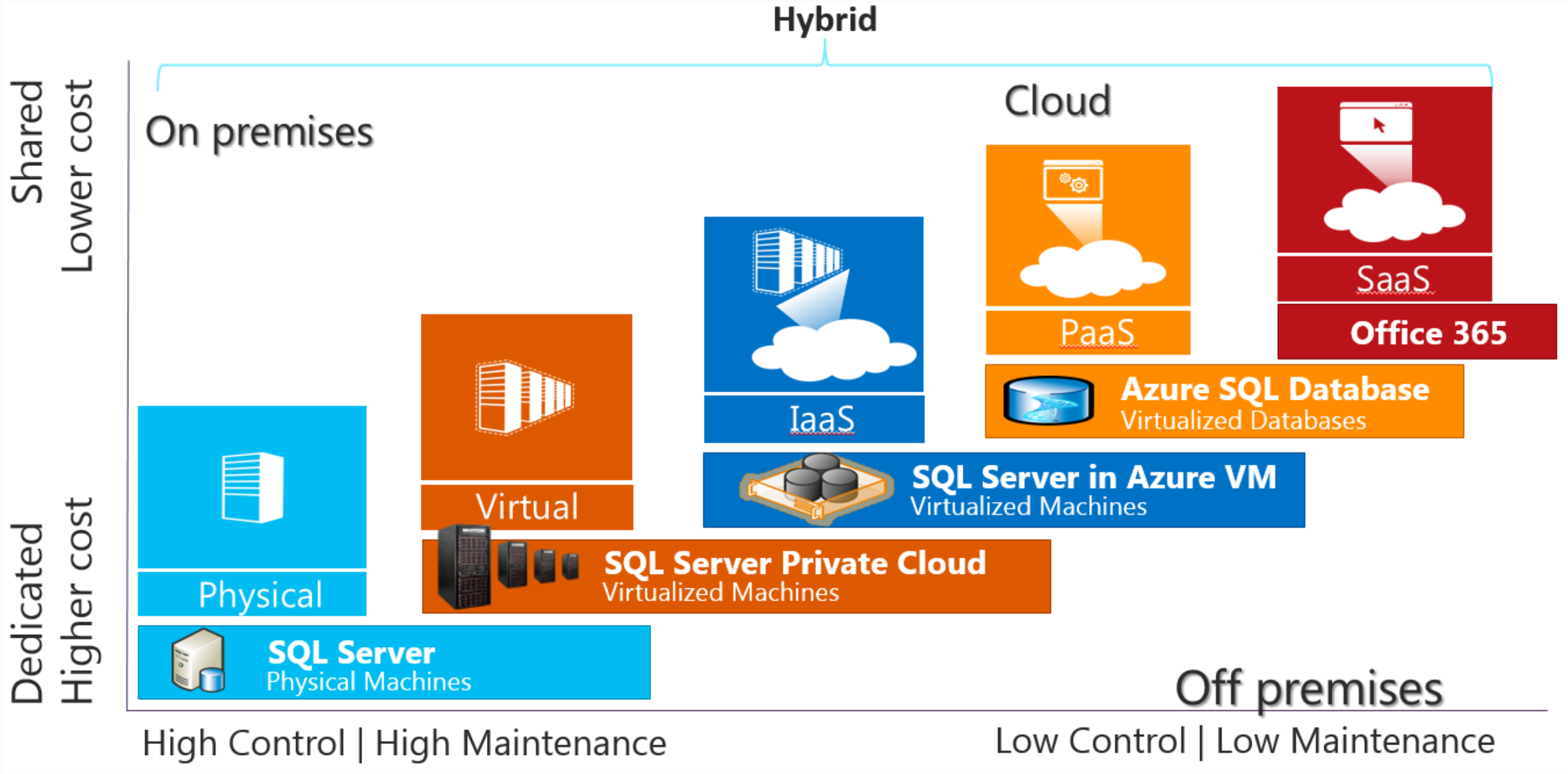
Software-as-a-Service

consume

Defining these things…

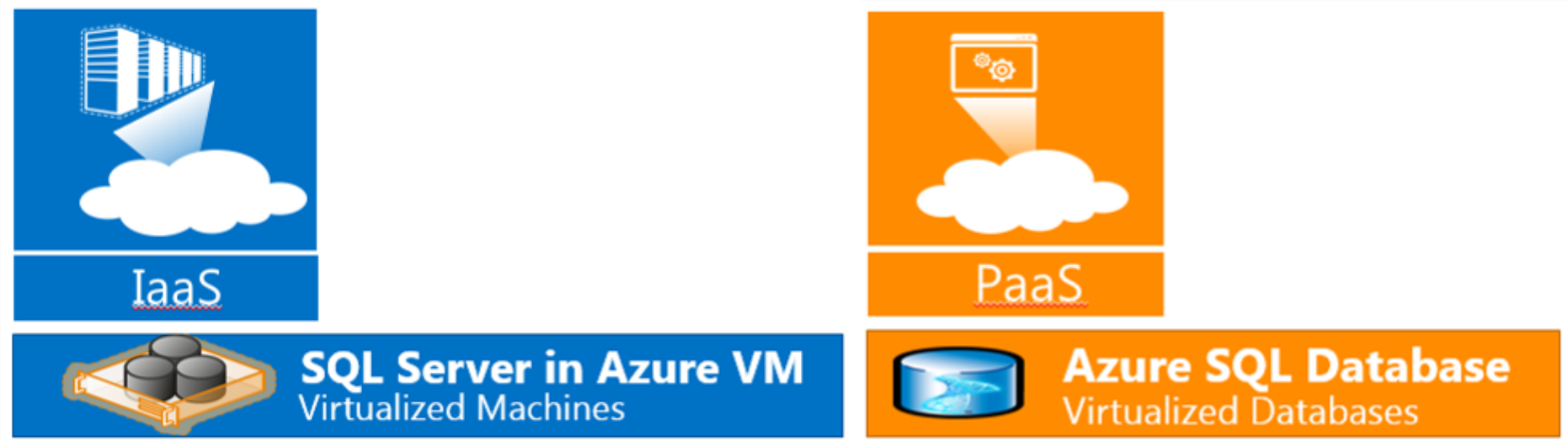


SQL Server Cloud Continuum



SQL Server Cloud Continuum

Cloud



High control | High maintenance

Low control | Low maintenance

Azure: The Power Of Choice

Which one do I choose?

The classic Microsoft answer…

It Depends!

So let's navigate this decision tree together…

Enough about Azure, let's talk about YOU!

- Do you have a Database Administrator (DBA)?

Enough about Azure, let's talk about YOU!

What are you trying to do?

- Are you creating a database to support a new application?
- Are you moving an existing database workload to the cloud?
- Do you need to access on-premises resources?
- Do you need a customized IT environment with full admin rights?
- Are you looking to keep secondary database replicas in the cloud for disaster recovery?

Enough about Azure, let's talk about YOU!

What is *your* database's profile?

- Current resource utilization
- CPU/Memory/Networking/Disk
- Size & structure of database
- Single or multi-tenant
- Few large DBs or multiple small DBs
- What is your app's current data access layer like?
  - Tightly coupled?
  - Retry logic?
  - Transient fault handling?

Enough about Azure, let's talk about YOU!

What are your Availability Requirements?

- How much downtime can you afford?
- Do you offer your users an SLA?
- Do you have maintenance windows?
- What are your RPO and RTO goals?

Defining High Availability & Disaster Recovery in Azure

Defining (High) Availability
within Azure

- Most Azure services have a Service Level Agreement (SLA)
- SLAs define availability within a region/datacenter
- "High"* - an adjective most of us apply to the availability of a service backed by an SLA.

* - The presenter is not a lawyer and is merely offering a human friendly translation ☺

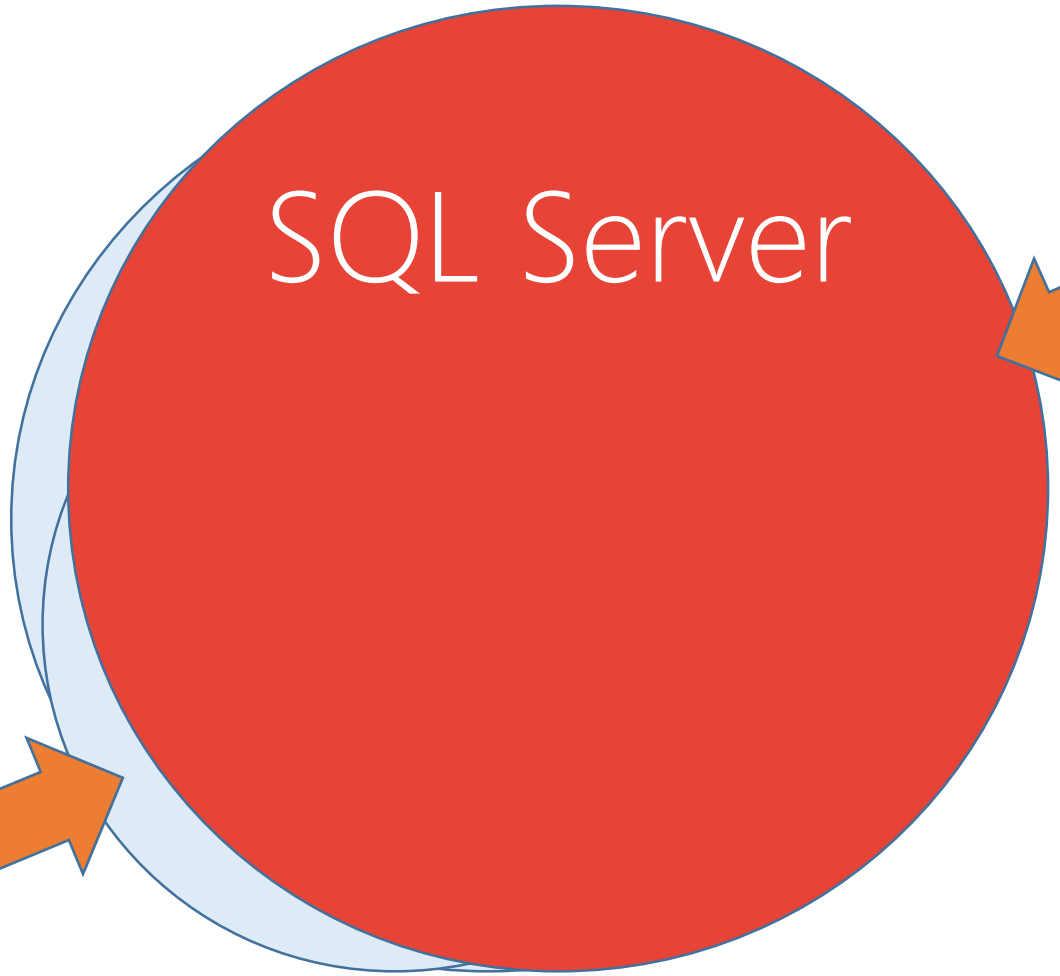
Defining Disaster Recovery
within Azure

- Disaster recovery is being able to recover your application into another Azure datacenter
- Keywords:
  - RTO: Recovery Time Objective
  - RPO: Recovery Point Objective
- Options range from:
  - Active deployment in one datacenter, with backups stored in 2nd datacenter
  - Active/Passive deployment in multiple datacenters
  - Complete active/active deployment in multiple datacenters

Azure  Database

vs.

Azure SQL Database vs SQL Server



What's the gap???

http://bit.do/azure-sql-unsupported

Yummy PaaS goodness!

Keep up with the latest Azure SQL Database Service Updates here: http://aka.ms/azure-sql-updates

Azure SQL Database

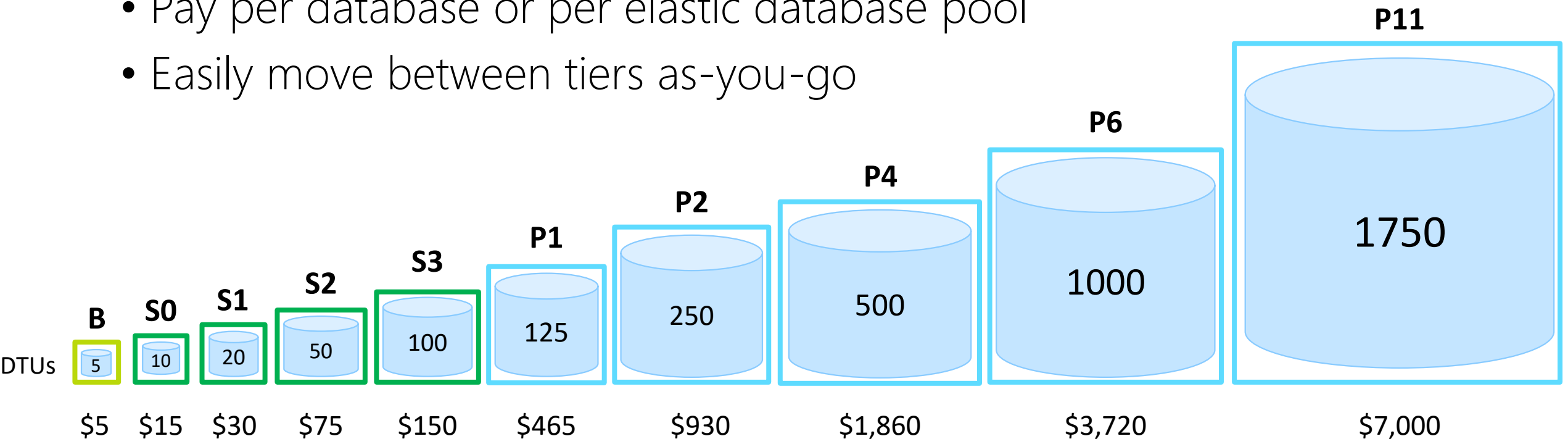
The "easy" way…

- Provision a database in the portal
- Connect with existing SQL tools
- Migrate your schema and data to the cloud!
- High Availability built in by default
- Disaster Recovery available as a "check in the box" via Active Geo-Replication
  - RTO – max time interval of database service uptime (can be as low as ~30s)
  - RPO – max time interval of lost database transactions (can be as low as 5s)

Azure SQL Database

Billing: A new way to pay!

- Pay-by-performance-level
  - Introducing the DTU (database throughput unit)
  - DTU Calculator: http://aka.ms/dtucalculator
- Pay per database or per elastic database pool
- Easily move between tiers as-you-go



Azure SQL Database

Take the off ramp now and get started with more information…

- See Ben Tabor's overview & Microsoft Virtual Academy Course:
  - http://aka.ms/azure-sql-mva
- Get Started: SQL Migration Cookbook:
  - http://aka.ms/SQLMigrationCookbook

SQL Server in an Azure VM

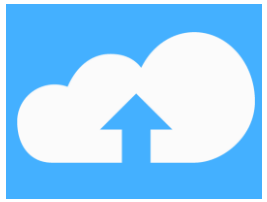
The "Other" way…

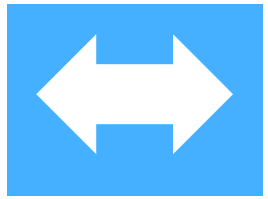
- Know what you are getting yourself into
- You will want to have a DBA on hand!!!
- Design and plan your infrastructure, high availability, & disaster recovery
- Install and manage Azure Windows VMs
- Install and manage the SQL Server software
- Migrate your data to the cloud!
- High availability & disaster recovery are YOUR responsibility

SQL Server in an Azure VM

Lots of flexibility…

- Choose your version of SQL Server
  - Azure Marketplace gallery images or your own images
  - SQL 2008R2, 2012, 2014, 2016
  - Web, Standard, or Enterprise Editions
- Elasticity
  - 1 core / 2GB Mem / 1 TB → 32 cores / 512GB mem / 32TB
- Infrastructure & SQL Security
  - Deployments are isolated in their own private networks
  - Encryption of Databases and Backups, Integrated with Azure Key Vault
  - Client Authentication (SQL/Windows)
  - Accessible via RDP & PowerShell





SQL Server in an Azure VM

Storage

- Standard Storage (spindle based)
  - 500 iops/disk
  - Can be virtually striped up to 8,000 iops
  - Pay-as-you-go (PAYG) – Not for allocated storage
- Premium Storage (SSD based)
  - 5000 iops/disk
  - Can be virtually striped up to 80,000 iops
  - Pay for allocated storage

SQL Server in an Azure VM

Maintaining Availability (and protecting your job)

- High Availability Options
  - Always On Availability Groups
  - Failover Cluster Instances (via 3rd party tools)
- Disaster Recovery Options
  - Always On Availability Groups
  - Database Mirroring
  - Backup and restore with storage blobs
  - Log shipping (hybrid scenarios only)

Understanding Azure VM Availability

Understanding Azure VM Availability

Single VM

- Azure provides data durability and a 99.9% SLA (with premium storage)
- Subject to un-planned maintenance events due to physical failures
  - If VM becomes unavailable, Azure migrates VM and restarts in another host
  - ~15 minutes to complete this process
- Subject to planned maintenance events due to host OS servicing
  - All VMs on host are shut down.
  - Host OS is serviced and rebooted
  - All VMs on host are restarted
  - ~15 minutes to complete this process
  - 7 days notice of maintenance window provided to VM owner

Understanding Azure VM Availability

2 or more Azure VMs

- Multiple VMs can be configured in an "availability set"
  - 2 or more VMs on separate fault domains
  - Workload typically load balanced across the VMs
- Azure SLA: 2 (or more) VMs in Availability Set:
  - 99.95% (<22 min downtime/month)
  - Includes
    - Unplanned downtime due to physical failures
    - Planned downtime due to host OS servicing
  - Doesn't include servicing of guest OS or software inside (e.g. SQL)
- For more info, see:
  - http://aka.ms/vm-availability
  - http://aka.ms/planned-maintenance

SQL Server in an Azure VM

High Availability Options

- Failover Cluster Instances
  - via Azure File Service? Not yet.
  - via 3rd party SIOS DataKeeper, StarWind, etc.
- Always On Availability Groups
  - If one SQL VM becomes unavailable, SQL fails over to another VM: ~20s
  - SQL Enterprise only
  - Basic Always On Availability Groups in SQL Standard 2016

SQL Server in an Azure VM

Disaster Recovery Options

- Always On Availability Groups
- Database mirroring
- Backup and restore with storage blobs
- Log shipping (hybrid scenarios only)

SQL Server in an Azure VM

Billing: How do you pay for this?

- PAYG – Pay-as-you-go
  - VM hourly rate includes Windows + SQL Server license cost
  - Cost depends on VM size
  - Must pay for SQL Server on all nodes (active & passive)
- PAYG + BYOL (bring-your-own-license)
  - Must have Software Assurance
  - VM hourly rate includes only Windows VM
  - Passive node included “for free” with BYOL license
  - Most cost effective for long running SQL workloads (>6 months)

SQL Server in an Azure VM

Billing: How much will this cost?

- Cost = Windows VM + SQL + Storage + Outgoing Bandwidth
- Running a SQL environment with HA & DR uses a lot of resources!!!

SQL Server in an Azure VM

Billing: Lessons learned

- Manage your instances carefully!
- Use your MSDN subscription to save costs
  - SQL license is included/free
  - VMs are Linux costs

SQL Server in Azure VM & Azure SQL Database

In summary: Which one to use?

SQL Server in Azure VM	Azure SQL Database
Need a specific version of SQL Server or Windows	Don't need a specific version of SQL Server or Windows
Need instance-level SQL features (e.g. Agent Job, Linked Servers, DTC)	Don't need instance-level SQL features
Ok configuring/managing SQL Server and Windows (patching, high availability, backups)	Don't want to configure and manage SQL Server or Windows
Great for migrating existing apps	Great for new apps

Many customers use both

SQL Server in Azure VM & Azure SQL Database

Recap

SQL Server in Azure VM

- You access a VM with SQL Server installed
- You manage SQL Server and Windows (patching, high availability, backups)
- You select the SQL Server and Windows version and edition
- Different VM sizes: A0 (1 core, 1GB mem, 100GB) to G5 (32 cores, 512GB mem, 32TB)
- VM availability SLA: 99.95% (No SQL SLA)

Azure SQL Database

- You access a database
- Database is fully managed
- Runs latest SQL Server version with Enterprise edition
- Different DB sizes: Basic (2GB, 5tps) to Premium (500GB, 735tps)
- DB availability SLA: 99.99%

What's Next?

- If you want to use Azure SQL Database, get started with the existing resources: http://aka.ms/azure-sql-database
- If you want to use SQL Server in Azure VMs, continue on to our next module, "SAIIK: High Availability with SQL Server 2014 in Azure: Always On Availability Groups"
  - http://aka.ms/SAIIK

Q&A

Questions…

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