The Evolution of SQL Server as a Service

Azure SQL Managed Instance

Javier Villegas

PASSMN – Data Saturday #13 – Oct 16, 2021

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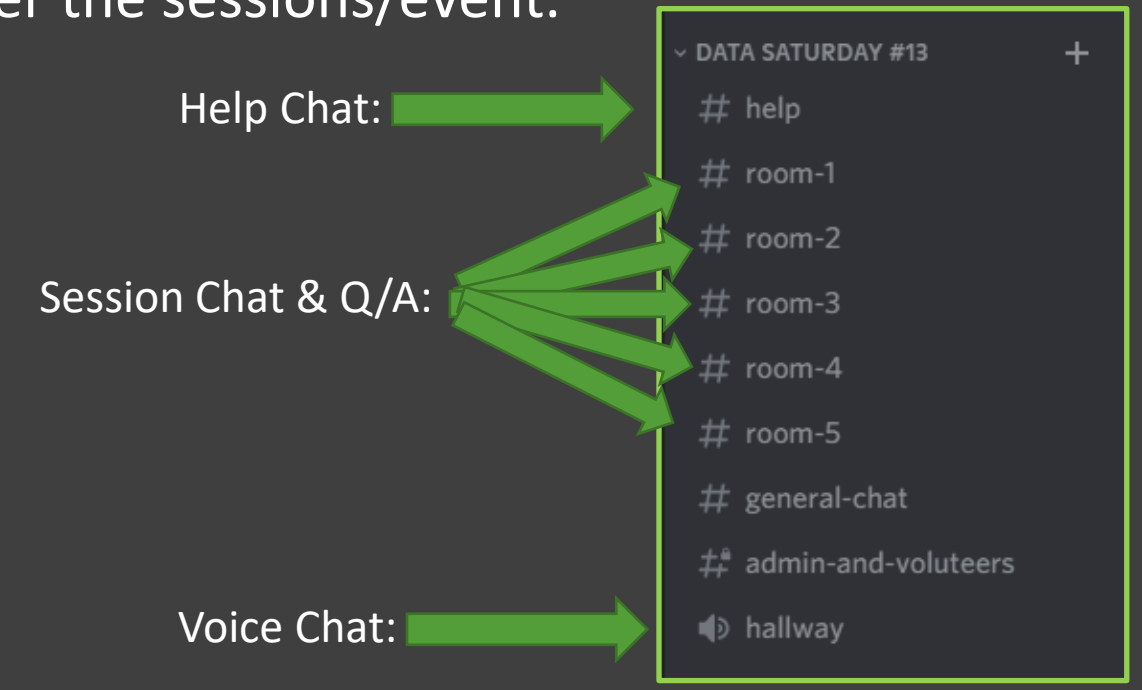

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Agenda

- Introduction
- PaaS and SaaS
- Azure SQL DB
- Azure SQL Managed Instance
- Migration
- Updates & Roadmap

Microsoft SQL Server

Why modernize by moving to the cloud?

- Want to increase productivity and decrease costs
  - Data center is too costly and complex to manage
  - Hosting solution is high maintenance
- Want to accelerate your growth
  - Easily get new features to get that competitive edge
  - Expand your reach globally

How to choose between PaaS and IaaS?

If you:

- Need control over / access to the operating system
- Have to run the app or agents side-by-side with the DB

…then **IaaS** is the right solution for you

Otherwise, recommendation is **PaaS**

- Better total cost of ownership
- Focus on your business, and put your DBs on autopilot

Azure SQL

A unified SQL portfolio built on the industry-leading SQL Server engine

SQL Server on Azure Virtual Machines

Best for re-hosting and apps requiring OS-level access and control

Automated manageability features and OS-level access

Azure SQL Managed Instance

Best for modernizing existing apps

Offers high compatibility with SQL Server and native VNET support

Azure SQL Database

Best for building new apps in the cloud

Pre-provisioned or serverless compute and Hyperscale storage to meet demanding workload requirements

Infrastructure as a Service

Platform as a Service

IAAS vs PAAS

SQL Server in Azure VM

- It's a VM!
- Management of OS and SQL Server
- Select Version, OS, Edition
- Single VM availability SLA: 99.9%
  (<43 min downtime p/month)
  Multi-VM availability SLA: 99.95%
  (<21 min downtime p/month)

Azure SQL Database Managed Instance NEW*

- Migrate Fleet of Databases
- Security Isolation with Azure VNet
- Application Surface Compatibility
  SQL Agent, Profiler
  Cross DB querying, CLR, Replication,
  CDC, Service Broker
- Database sizes up to 35TB
- Minimize Migration Downtime
- All Azure SQL Database features

Azure SQL Database

- Fully managed Database
- Active Learning and Optimization
- End to End Integration
- Intelligent Data Protection & Security
- Application & Data Modernization
- Up to 4 TB single Databases
  > using Elastic Scale
- Geo-DR
- Database availability SLA: 99.99%

SQL Server vs Azure SQL PaaS

Business continuity

Scale

High availability

Advanced security

Automated backups

Version-less

Long term backup retention

Built-in monitoring

Geo-replication

Built-in intelligence

What is a Managed Instance

Azure SQL Database Managed Instance is a new capability of Azure SQL Database, providing near 100% compatibility with SQL Server on-premises, providing a native virtual network (VNet) implementation that addresses common security concerns, and a business model favorable for on-premises SQL Server customers. Managed Instance allows existing SQL Server customers to lift and shift their on-premises applications to the cloud with minimal application and database changes. At the same time, Managed Instance preserves all PaaS capabilities (automatic patching and version updates, backup, high-availability), that drastically reduces management overhead and TCO.

Focus on your business…

Your work so far	How PaaS helps?
Hardware purchasing and management	**Built-in** Scales on-demand
Protect data with backups (with health checks and retention)	**Built-in** Point-In-Time-Restore
High availability implementation	**Built-in** 99.99% SLA and auto-failover
Disaster recovery implementation	**Built-in** Geo-redundancy and geo-replication
Ensure compliance with standards on your own	**Built-in** / easy to use features
Secure your data from malicious users and mistakes	**Built-in** / easy to use features
Role out updates and upgrades	**Built-in**
Monitor, troubleshoot and manage at scale	**Built-in** / easy to use features
Tune and maintain for predictable performance	**Built-in**/ easy to use features

Easy migration: nearly 100% like SQL Server

Data migration
- Native backup/restore
- Log shipping (DMS)

Security
- TDE
- SQL Audit
- Row level security
- Always Encrypted

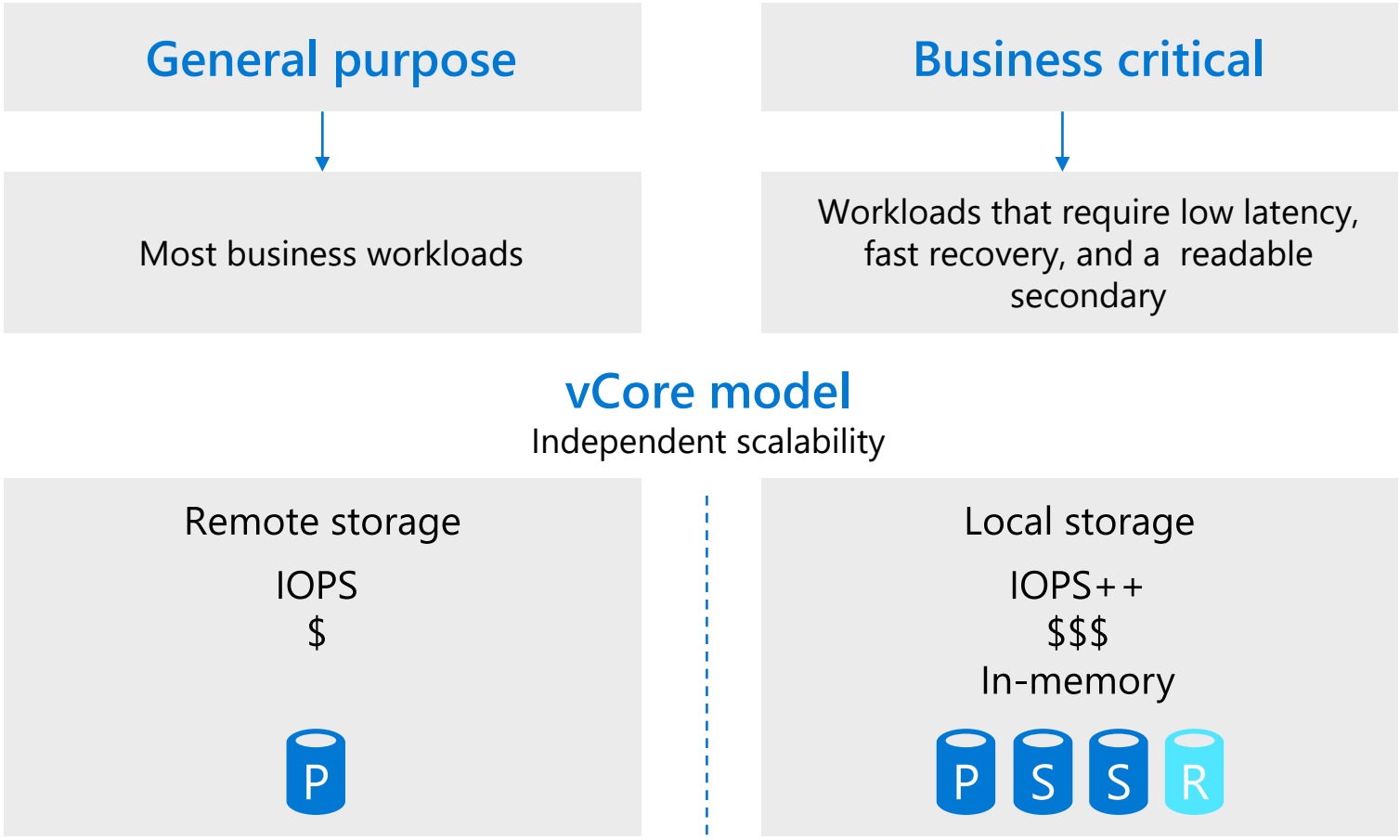
Programmability
- Global temp tables
- Cross-database queries and transactions
- Linked servers
- CLR modules

Operational
- DMVs & XEvents
- Query Store
- SQL Agent
- DB Mail (external SMTP)

Scenario enablers
- Service Broker
- Change Data Capture
- Transactional Replication

Supports compatibility modes (SQL Server 2005+)

Managed Instance service tiers



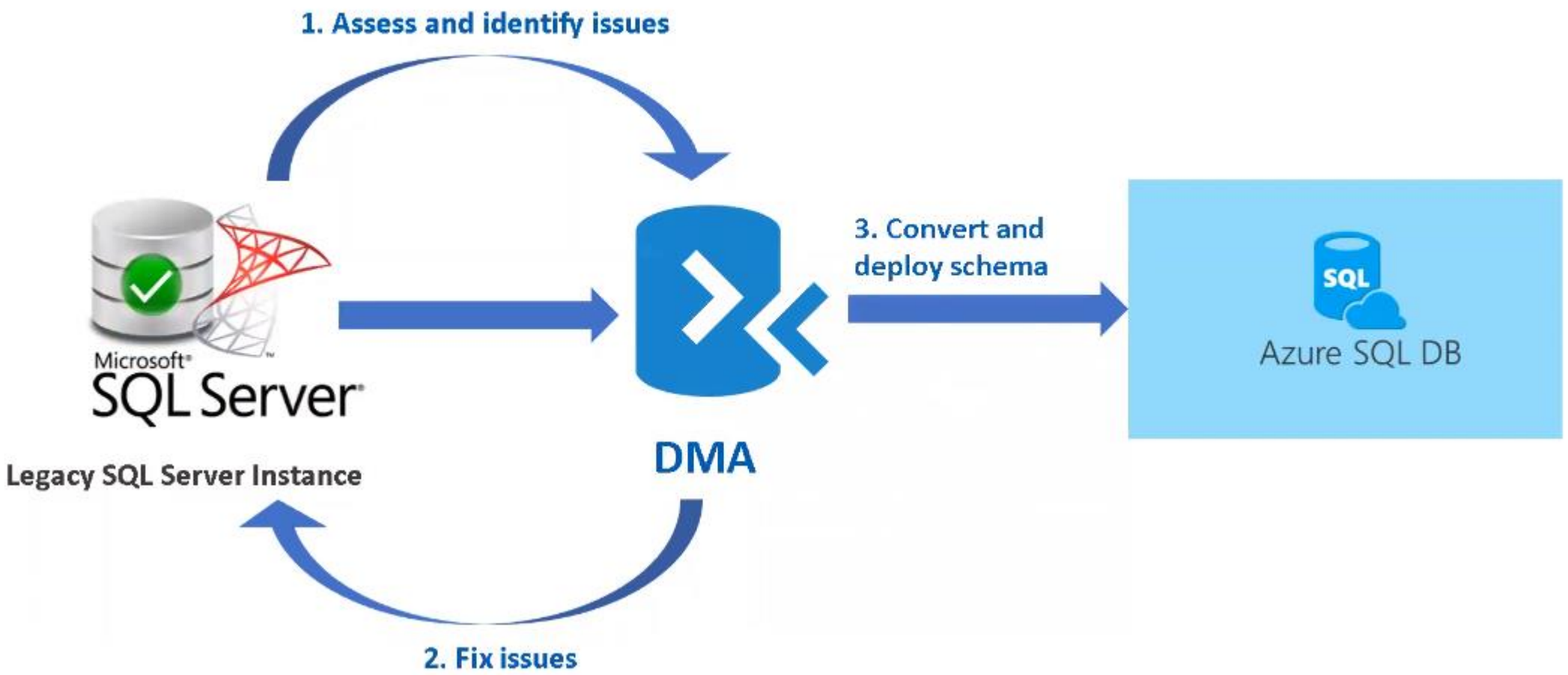
Both service tiers guarantee 99.99% availability and enable you to independently select storage size and compute capacity.

Service Tier Comparison

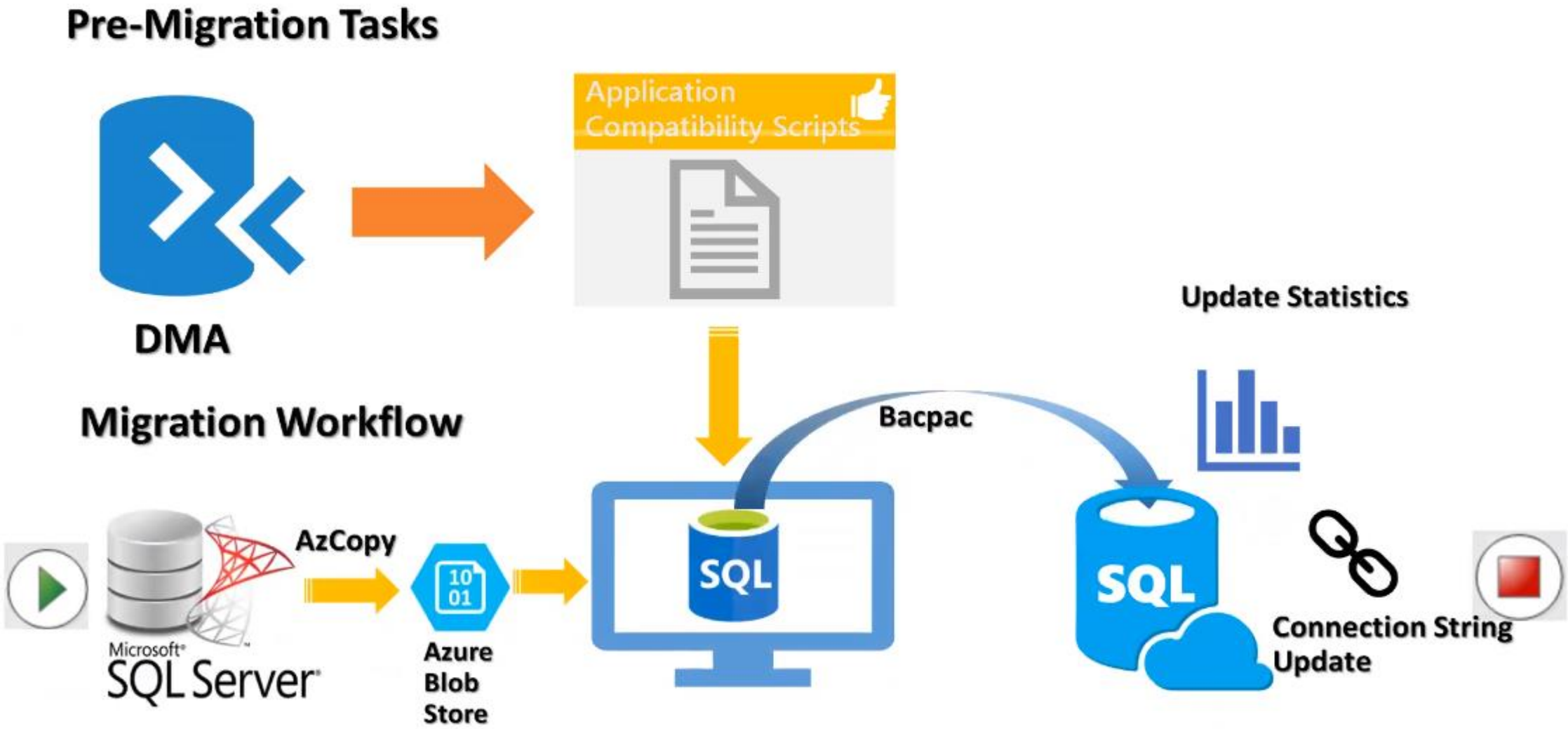
	General Purpose	Business Critical
vCores	4*-80	4-80 + 4-80 (replica)
Memory (GB/vCore)	5.1	5.1 + 5.1 (replica)
Availability SLA	99.99%	
Storage	8 TB	4 TB
IO latency	5-10 ms	1-2 ms
IOPS	Up to 30K	Up to 110K
Log throughput	22MB/s	48 MB/s
TempDB size	24 GB/vCore	No specific limit
Log file size	Up to 2 TB	
In-memory OLTP	No	Yes
Read-only replica	No	Yes
Price	1	~2.5

* 2 vCores is a minimal size for General Purpose in an instance pool

Assess and Convert



Migration Workflow



Migration Tools & Services

Data Migration Assistant

Rich assessments at scale

Feature recommendations

Schema conversions

Azure Database Migration Service

MS and non-MS source support

Built for scale and reliability

Built with enterprise security and privacy

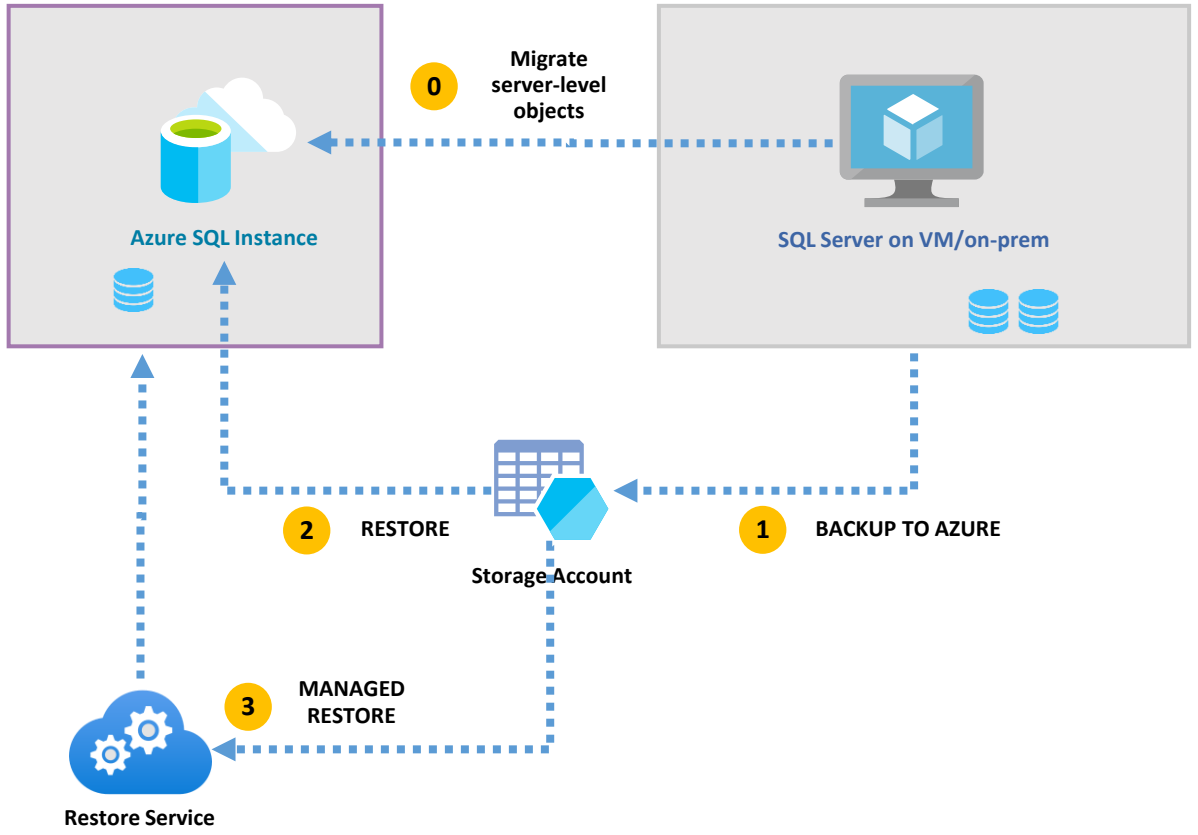
Easy Database Migration

Offline

- Native backup/restore
- BACKUP WITH CHECKSUM

Online

- Data Migration Service
- Replication
- Log shipping



SSAS / SSIS / SSRS

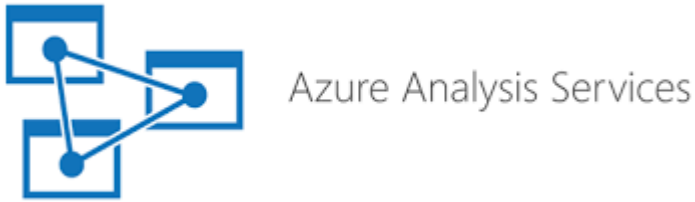
Will **not be installed** side-by-side with Managed Instance

Recommendation: **move to PaaS model**

SQL Server Analysis Service - SSAS

For Tabular Model

Migrate your OLAP models to Azure Analysis Services



… or run these services in Azure virtual machines

SQL Server Integration Service - SSIS

Migrate your SSIS packages to new SSIS on Azure Data Factory

… or run these services in Azure virtual machines

SQL Server Reporting Service - SSRS

Migrate your reports to Power BI

… or run these services in Azure virtual machines

Why Azure SQL DB Managed Instance?

Instance-level features

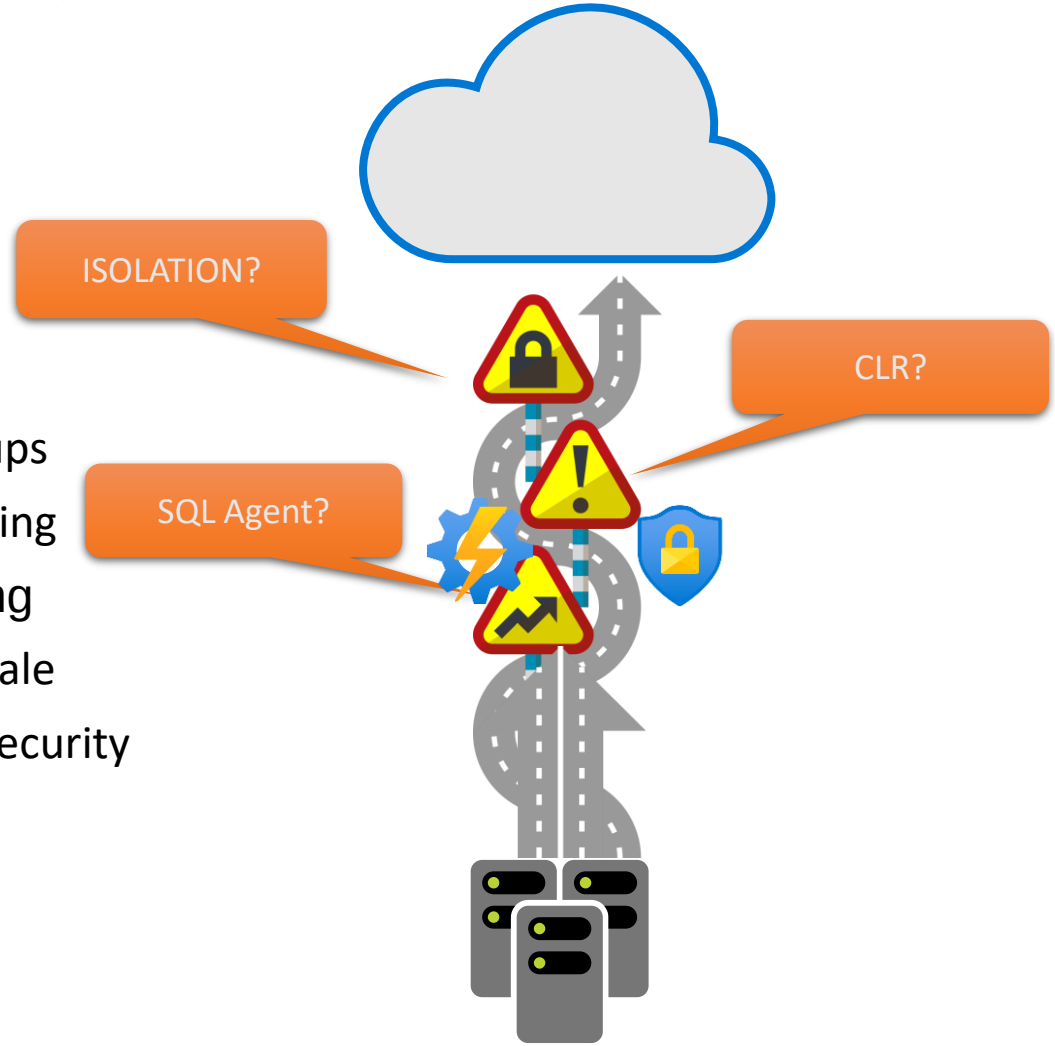
- Cross-DB queries
- Linked servers
- CLR
- SQL Agent
- Restore
- Service Broker
- Server-level objects
- Database mail
- Server collations
- Time zone choice

Network isolation

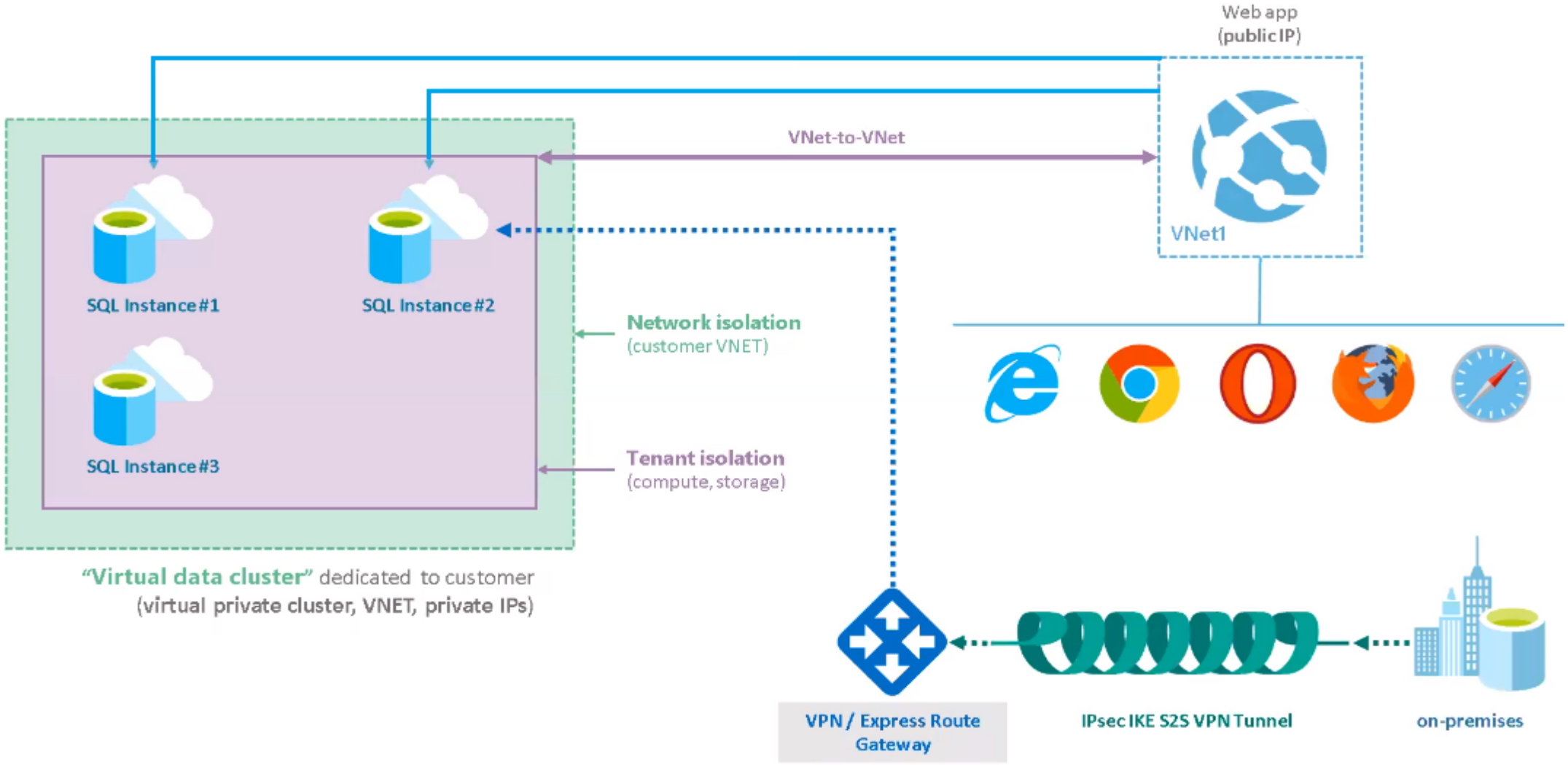
- Deployed in a VNet
- Private IP address

PaaS ++ features

- High availability
- Automatic backups
- Automatic patching
- Automatic tuning
- Monitoring as scale
- Advanced data security



Full Security & Isolation



Features obsolete in the cloud (or have a better alternative)

- **Always-On Availability Groups** – SQL Database Managed Instance includes build-in HA and supports geo-replication for cross-region disaster recovery or read scale scenarios
- **All "flavors" of native backup/restore** (differential backup, copy-only log backup, etc.) – SQL Database Managed Instance includes automated backup and point in time restore. Additionally, copy-only full backup will be available
- **Windows Authentication** – Azure Active Directory (AAD) is the alternative in the cloud
- **Managed Data Warehouse** – OMS (Operations Management Suite) integration is the alternative in the cloud
- **Policy Based Management** – Majority of common DBA tasks are preformed automatically in SQL Database

Features that have been retired

- Database Mirroring – Built-in HA / geo-replication are better alternatives
- Extended stored procedures – Customers should use CLR

Features that are considered

- ~~Filestream~~
- ~~Filetable~~
- Cross-instance distributed transactions (and other transactions types that require MS DTC) (Preview)
- Master Data Services (MDS)
- Data Quality Services (DQS)
- Stretch Database
- Policy based management

https://feedback.azure.com/forums/915676-sql-managed-instance/suggestions/35659075-add-support-for-filestream-filetable

How to programmatically identify a Managed Instance

The following table shows several properties, accessible through Transact SQL, that you can use to detect that your application is working with Managed Instance and retrieve important properties.

Property	Value	Comment
@@VERSION	Microsoft SQL Azure (RTM) - 12.0.2000.8 Jul 3 2019 10:02:53 Copyright (C) 2019 Microsoft Corporation	This value is same as in SQL Database.
SERVERPROPERTY ('Edition')	SQL Azure	This value is same as in SQL Database.
SERVERPROPERTY('EngineEdition')	8	This value uniquely identifies Managed Instance.
@@SERVERNAME, SERVERPROPERTY ('ServerName')	Full instance DNS name in the following format:..database.windows.net, where is name provided by the customer, while is auto-generated part of the name guaranteeing global DNS name uniqueness (“wcus17662feb9ce98”, for example)	Example: my-managed-instance.wcus17662feb9ce98.database.windows.net

Key features and capabilities of a Managed Instance

PaaS benefits	**Business continuity**
No hardware purchasing and management No management overhead for managing underlying infrastructure Quick provisioning and service scaling Automated patching and version upgrade Integration with other PaaS data services	99.99% uptime SLA Built in high availability Data protected with automated backups Customer configurable backup retention period (fixed to 7 days in Public Preview) User-initiated backups Point in time database restore capability
Security and compliance	**Management**
Isolated environment (VNet integration, single-tenant service, dedicated compute and storage Encryption of the data in transit Azure AD authentication, single sign-on support Adheres to compliance standards same as Azure SQL database SQL auditing Threat detection	Azure Resource Manager API for automating service provisioning and scaling Azure portal functionality for manual service provisioning and scaling Data Migration Service

Latest features

4 vCores on Gen5 hardware generation

Support for subscriptions with Azure monthly credit for Visual Studio subscribers

Support for SharePoint 2016 and SharePoint 2019 and Dynamics 365 Business Central

Configure time zone during instance creation.

Create instances with server-level collation of your choice.

Geo-restore functionality enables you to restore your database to another data center using PowerShell.

(Preview) Re-create dropped databases using PowerShell

Managed instances are protected with built-in firewall.

Latest features

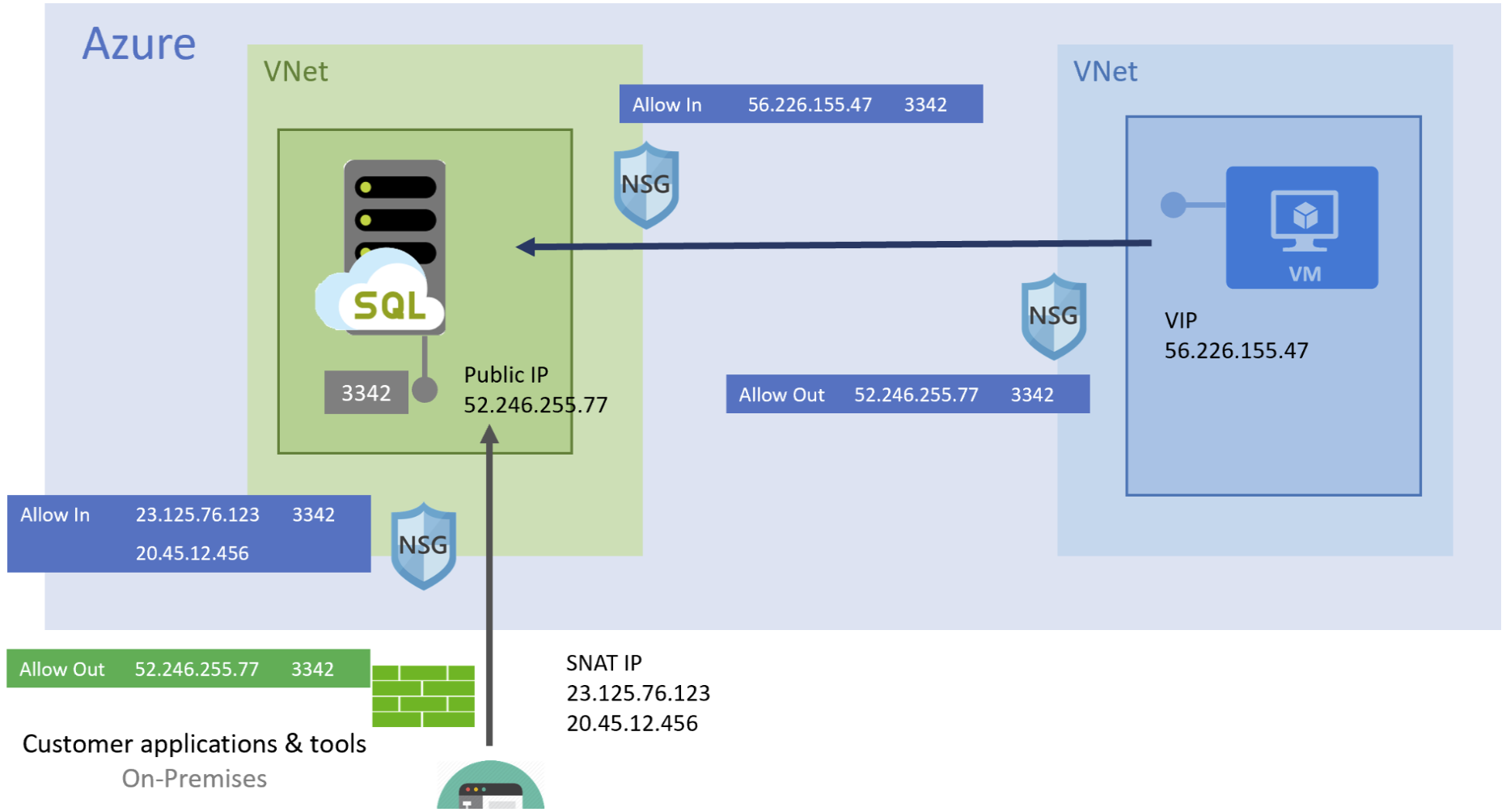
(Preview) Bring your own encryption keys while migrating on-premises databases that already have enabled Transparent Data Encryption (TDE).

(Preview) Use Geo-distributed failover groups to keep a copy of the instance in the another region and ensure that your data will be available even in the regional disaster scenario.

Configure backup retention up to 35 days for Point-in-time restore. Long-term backup retention (up to 10 years) is still not enabled so you can use Copy-only backups as an alternative.

(Preview) Create Instance-level Azure AD server principals (logins) using CREATE LOGIN FROM EXTERNAL PROVIDER .

Public Endpoint

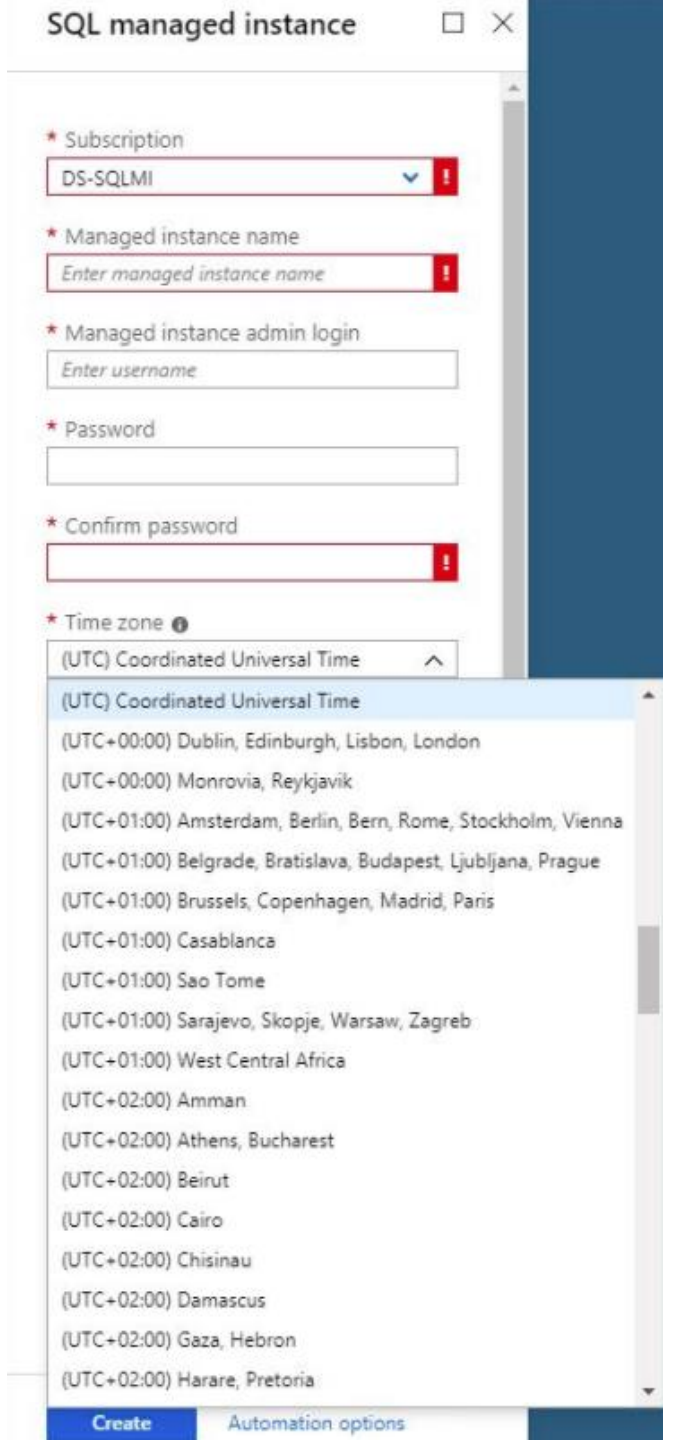


Time zones in Azure SQL Database Managed Instance

08/13/2019 • 8 minutes to read •

Coordinated Universal Time (UTC) is the recommended time zone for the data tier of cloud solutions. Azure SQL Database Managed Instance also offers a choice of time zones to meet the needs of existing applications that store date and time values and call date and time functions with an implicit context of a specific time zone.

T-SQL functions like GETDATE() or CLR code observe the time zone set on the instance level. SQL Server Agent jobs also follow schedules according to the time zone of the instance.



Global trace flags are now available in Azure SQL Database Managed Instance

Posted on Wednesday, August 21, 2019

You can now enable trace flags in Azure SQL Database Managed Instance using DBCC TRACEON Transact-SQL statement.

Trace flags are commonly used to customize and alter behavior of the SQL Server Database Engine. Enabling trace flags can help improve compatibility of your Managed Instance Database Engine and SQL Server Database Engine.

Managed Instance supports a subset of trace flags that cannot affect availability or stability of Managed Instance. In the first release, the following trace flags are supported: 460, 2301, 2389, 2390, 2453, 2467, 7471, 8207, 9389, 10316, and 11024 The list of supported trace flags will be expanded in the future based on customer requests.

You can enable or disable global trace flags at the instance level using the DBCC TRACEON Transact-SQL command, as shown in the following example:

```
dbcc traceon(11024, -1)
```

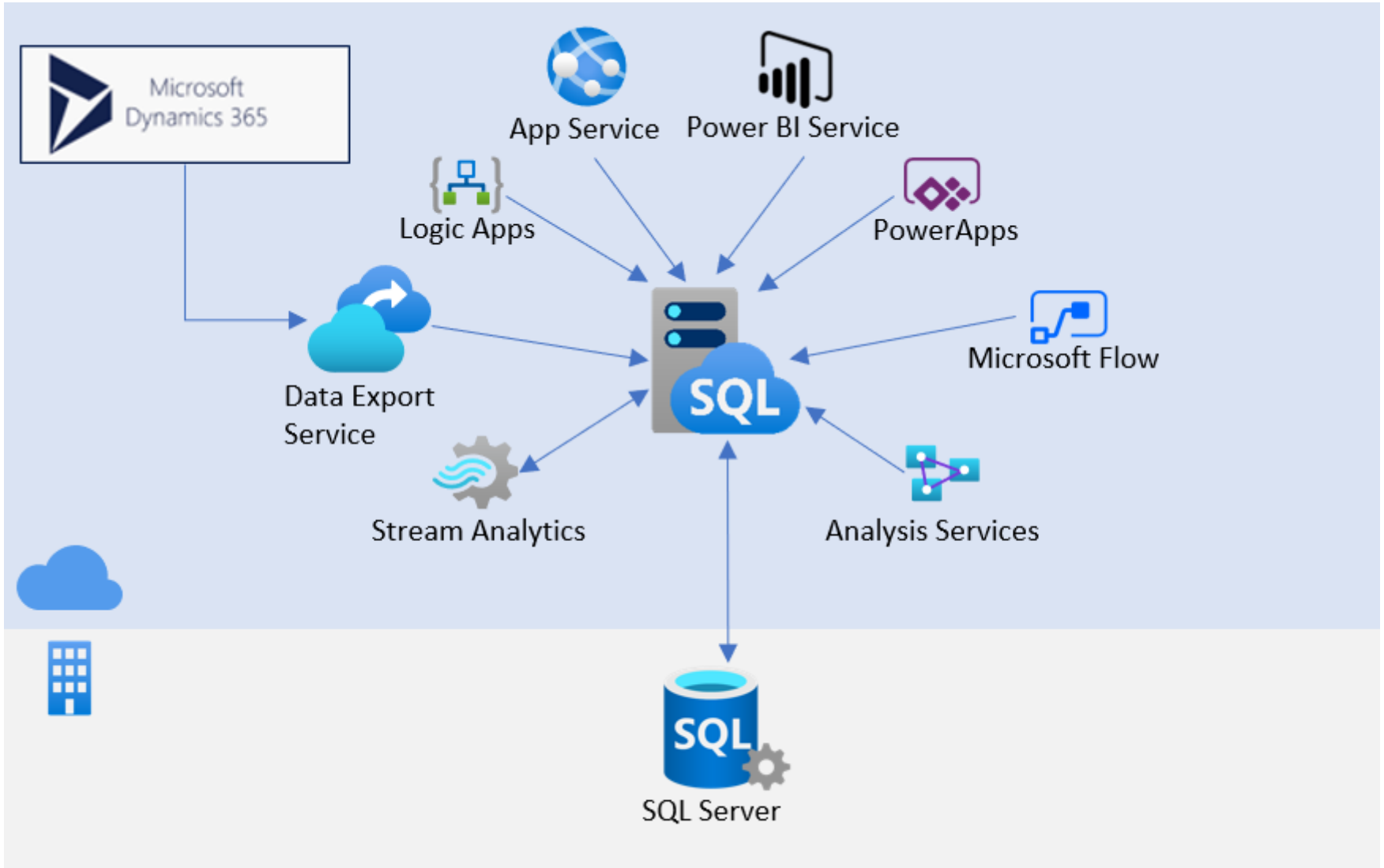
Be sure to thoroughly test these options before rolling into a production environment.

To learn more, see Trace Flags in SQL Server and Azure SQL Managed Instance.

DEMO

Azure SQL Database Managed Instance

Integration with Cloud Services



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All about MI

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Azure SQL Fundamentals

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Questions ?

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Azure SQL Database Managed Instance

THANK YOU!!!

GRACIAS!!!