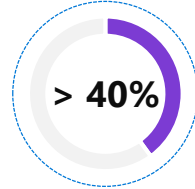


Azure Database Services for MySQL, PostgreSQL, and MariaDB

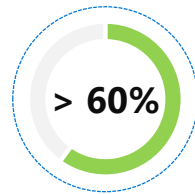
Andrei Fateev
Cloud Solution Architect
Microsoft



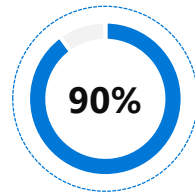
WHY OPEN SOURCE?



>40% of CIOs **have open source** as primary software **strategy**



>60% of developers **want** to see **cloud providers involved in OSS**



90% of enterprises **deploy open source** in some form

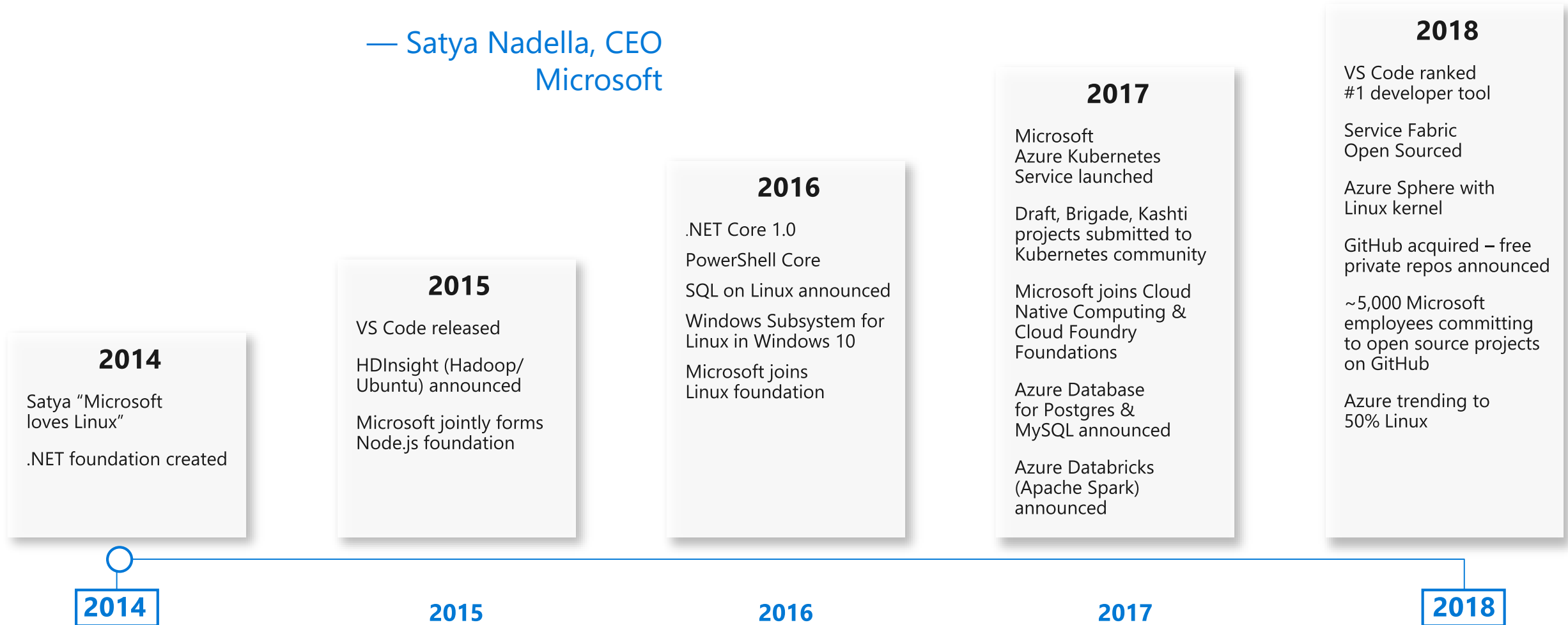
Azure









Open Source

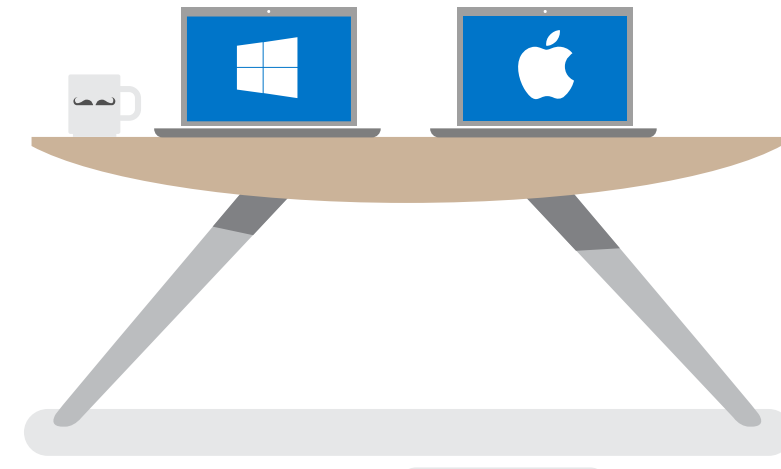
“Judge us by the actions we have taken in the recent past, our actions today and in the future.”

— Satya Nadella, CEO
Microsoft



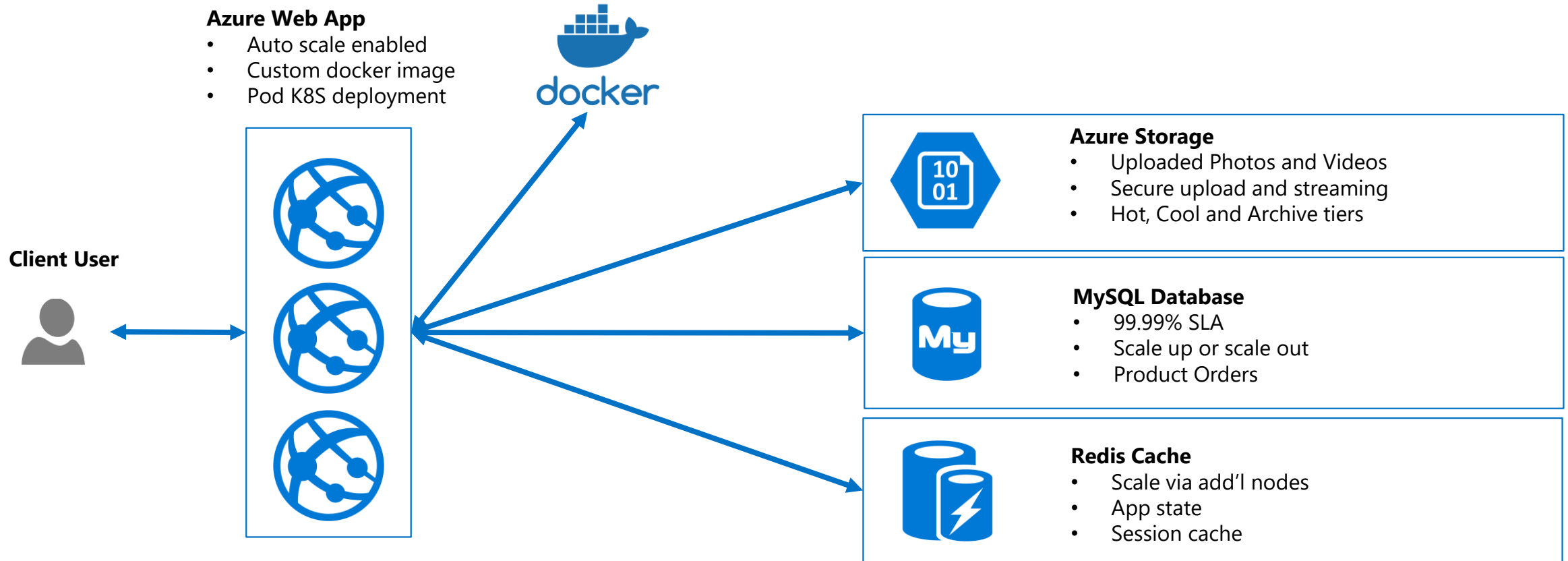
Cloud App OSS Data Backend

When you need...	Because...	But not for...	Use ...
Web frameworks, transactions	Transactions, joins, structured data, familiar SQL query	Quickly changing data schemas	MySQL, PGSQL, MariaDB 
Key-value pair store for heavy read-write, events	Low-cost, fast, massive scale	Rich query	Tables 
Hierarchical, web, mobile	Flexible schema, familiar SQL query, low latency	Complex joins	CosmosDB 
Heavy read-write, events, IoT	Open-source, integration with Hadoop analytics	Operational simplicity	HBase on HDInsight 
Game state, User Sessions	Increasing speed of an app	Primary data store	Redis Cache 
Search service	Integrating search into an app	Primary data store	Azure Search 



Demo Wordpress on K8S and MySQL

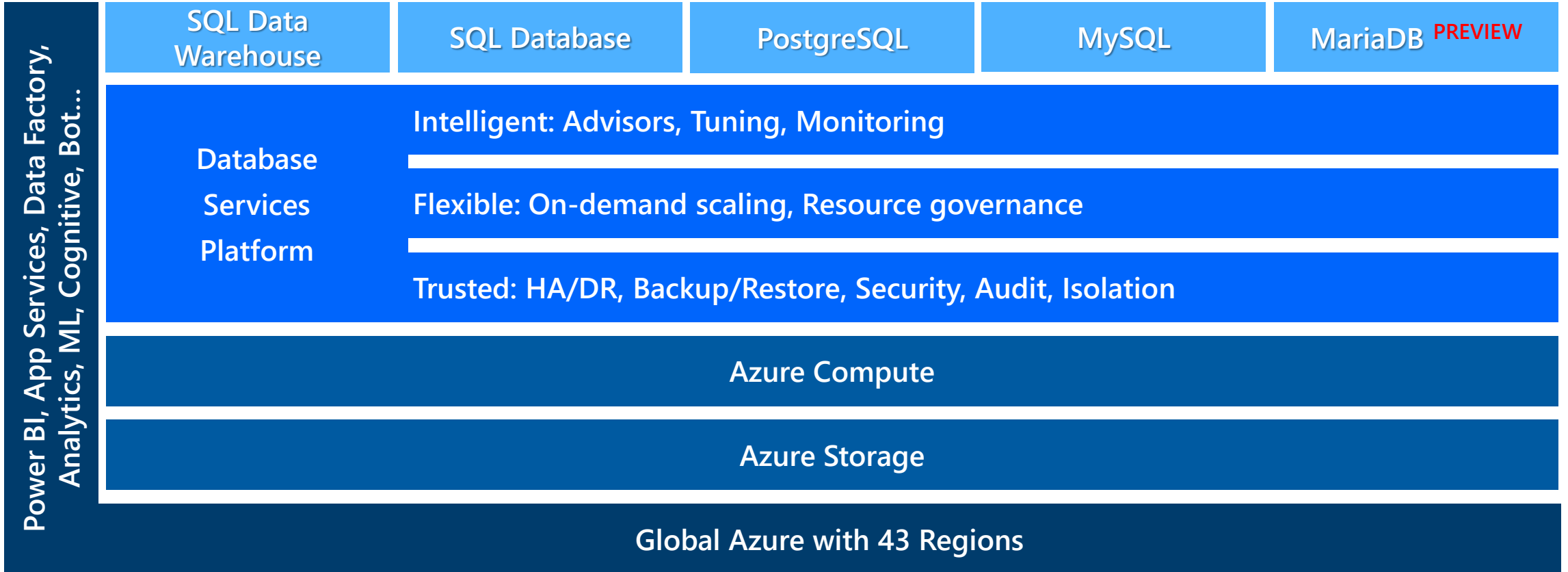
<https://docs.microsoft.com/en-us/azure/app-service/containers/tutorial-multi-container-app#connect-to-production-database>



The journey deepens...



AZURE RELATIONAL DATABASE PLATFORM



Service tiers and offerings

SERVICE TIERS

Service Tier	Basic	
Intended Use Case	Built for workloads with light compute needs and variable IO performance	
vCore	1	2
Compute Generation	Gen 4, Gen 5	
Storage	5 GB – 1 TB Magnetic Media	
IOPS	Variable	

SERVICE TIERS

Service Tier	Basic		General Purpose Balanced IO and Compute				
Intended Use Case	Built for workloads with light compute needs and variable IO performance		Ideal for most business workloads offering balanced and scalable compute and storage options				
vCore	1	2	2	4	8	16	32
Compute Generation	Gen 4, Gen 5		Gen 4, Gen 5				
Storage	5 GB – 1 TB Magnetic Media		5 GB – 4 TB Remote SSD				
IOPS	Variable		100-6000 IOPS				

SERVICE TIERS

Service Tier	Basic		General Purpose Balanced IO and Compute					Performance Optimized Memory Optimized				
Intended Use Case	Built for workloads with light compute needs and variable IO performance		Ideal for most business workloads offering balanced and scalable compute and storage options					Cache more data for faster transaction processing and higher concurrency				
vCore	1	2	2	4	8	16	32	2	4	8	16	
Compute Generation	Gen 4, Gen 5		Gen 4, Gen 5					Gen 5 only				
Storage	5 GB – 1 TB Magnetic Media		5 GB – 4 TB Remote SSD					5 GB – 4 TB Remote SSD				
IOPS	Variable		100-6000 IOPS					100-6000 IOPS				

Supported Versions

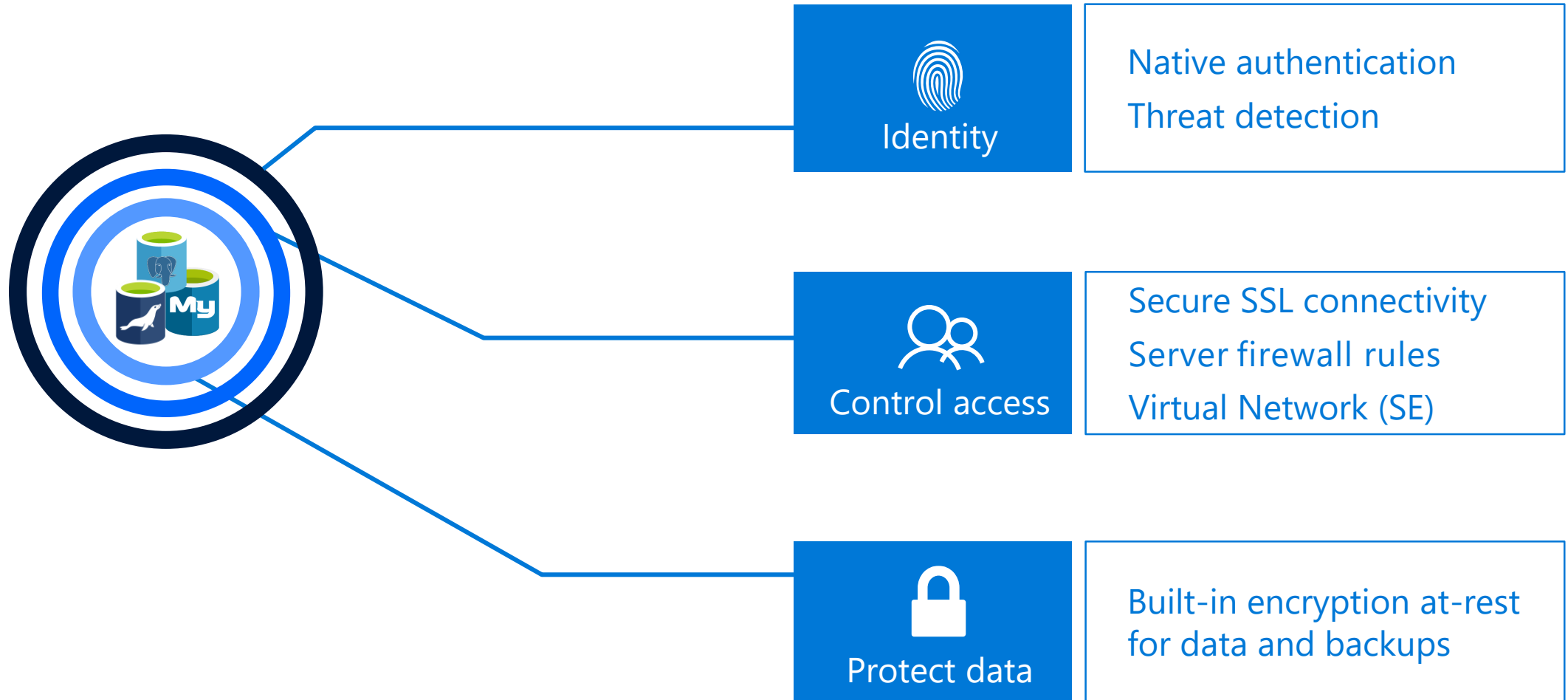
MySQL: 5.6, 5.7, 8.0 (coming soon)

PostgreSQL: 9.5, 9.6, 10

Service features

- Security
- High availability
- Scale up/down on-the-fly
- Backup and restore
- Monitoring and alerting
- MySQL replication
- Migration options

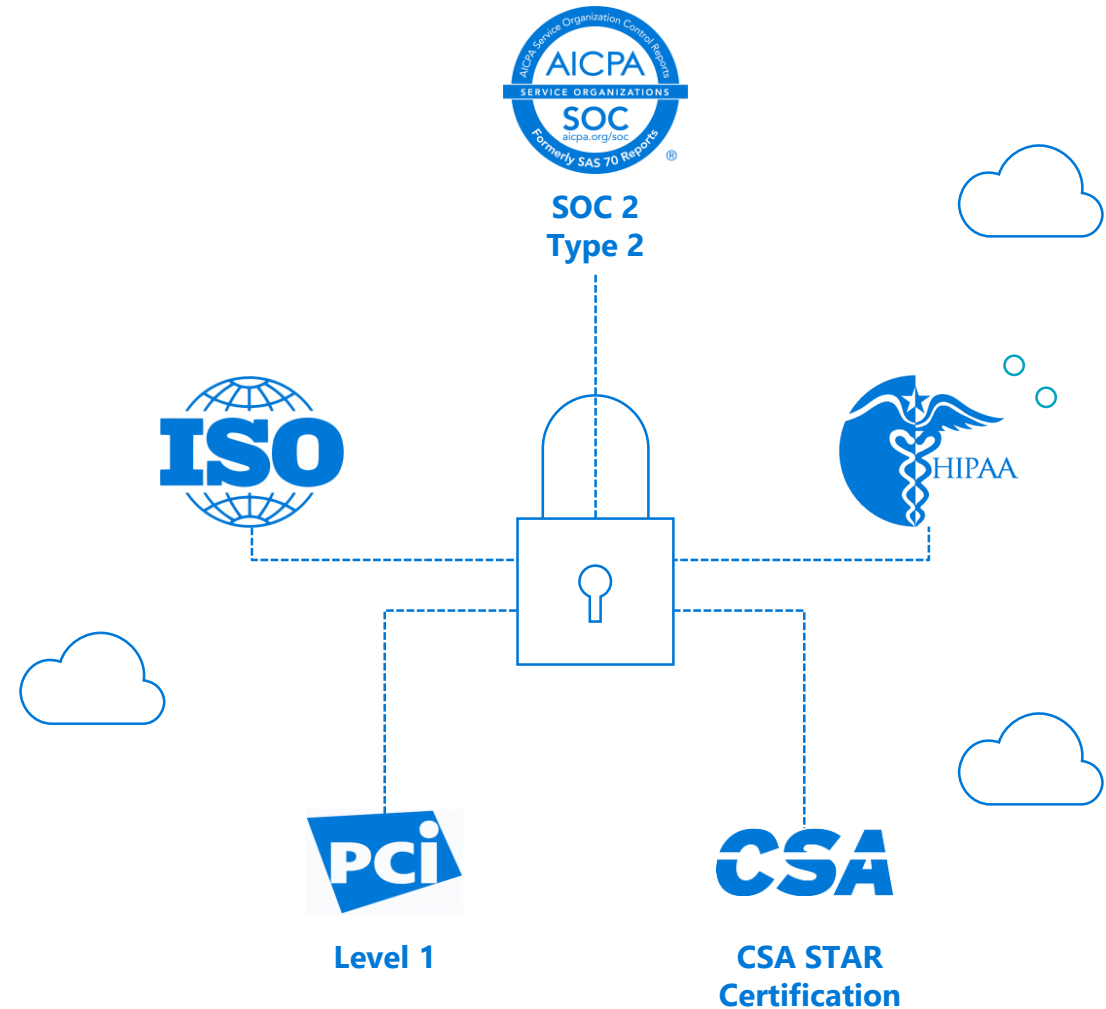
SECURITY BUILT IN



SECURE AND COMPLIANT

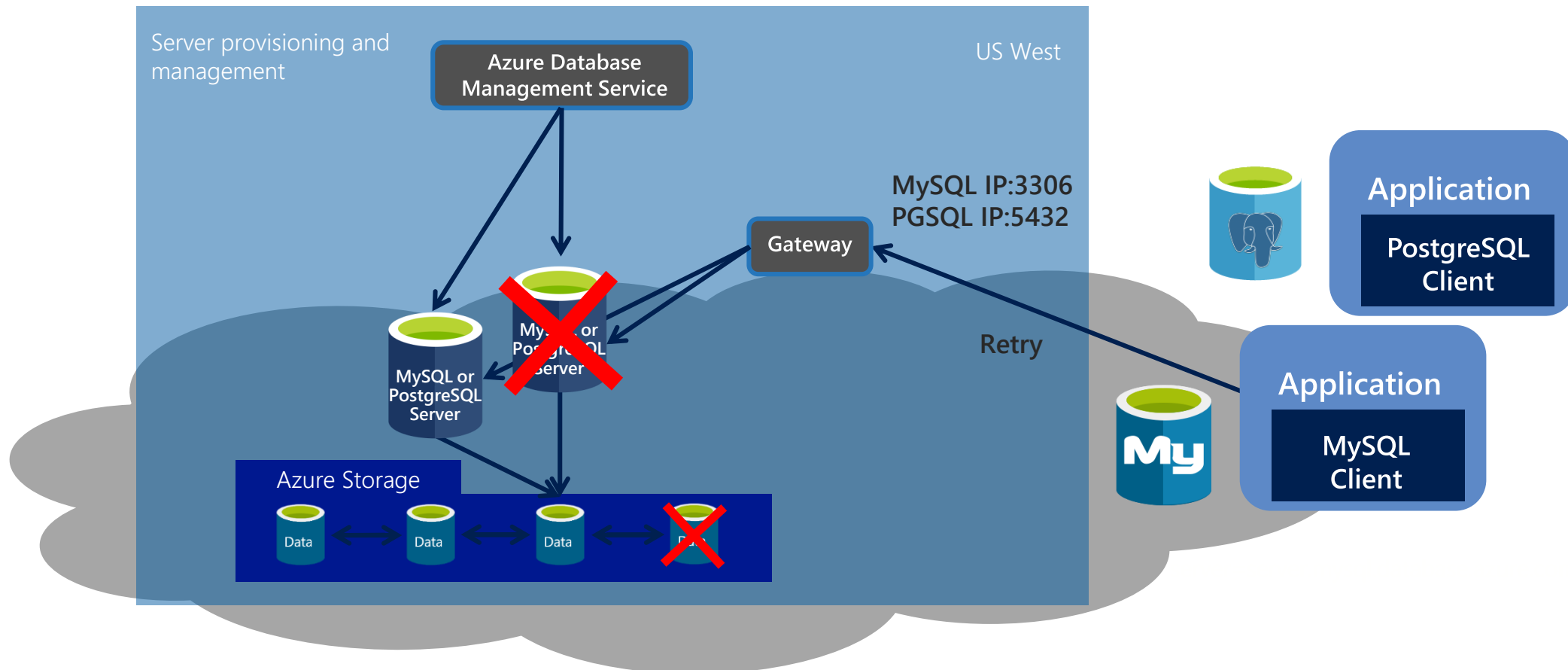
Protect your data with up-to-date security and compliance features with the [Azure IP Advantage](#).

- SOC1 – Compliant
- SOC2 – Compliant
- SOC3 – Compliant
- ISO 27001:2013 – Compliant
- ISO 27018:2014 – Compliant
- CSA STAR Certification – Compliant
- HIPAA / HITECH Act – Compliant
- PCI DSS Level 1 – Compliant
- ISO 27017:2015 – Compliant
- ISO 27018:2014 – Compliant
- ISO 9001:2015 – Compliant
- ISO/IEC 20000-1:2011 – Compliant
- ISO 22301:2012 – Pending



BUILT-IN HIGH AVAILABILITY

Elastically scale your compute up or down
Independently scale up storage as needed seamlessly
Use replicas only if you need to!



HIGH AVAILABILITY AND SCALE

High Availability

D4S_V3 Standard ★		D4S_V3 Standard ★	
4	vCPUs	4	vCPUs
16	GB	16	GB
8	Data disks	8	Data disks
8000	Max IOPS	8000	Max IOPS
32 GB	Local SSD	32 GB	Local SSD
Premium disk support		Premium disk support	
Load balancing		Load balancing	
142.85 USD/MONTH (ESTIMATED)		142.85 USD/MONTH (ESTIMATED)	

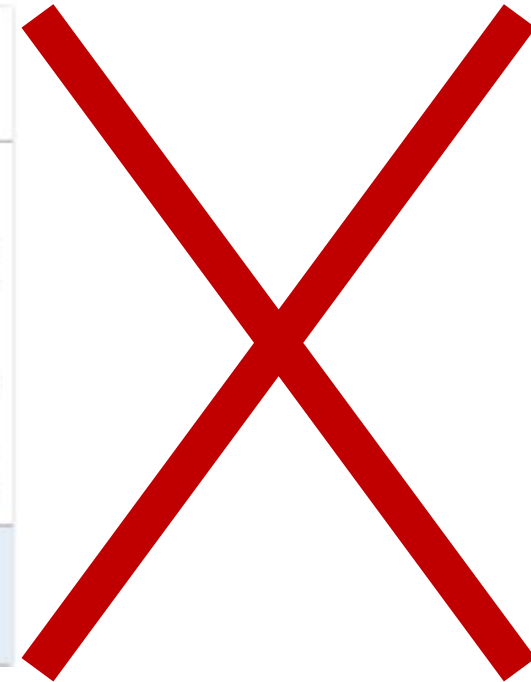
= \$285

vs

\$262 =

High Availability

PRICE SUMMARY	
Gen 5 server type	
Cost per vCore (in USD)	65.00
vCores selected	x 4
+	
Basic Storage	
Cost per GB (in USD)	.058
Storage amount selected (in GB)	x 32
EST. MONTHLY COST	261.84 USD
ADDITIONAL CHARGE PER USAGE	
0.05 USD / GB - backup storage -first 500 GB are free	
Standard outbound data transfer charges apply	



HIGH AVAILABILITY IN AWS RDS VS. ADS

Estimate of your Monthly Bill (\$ 129.48)

1 (Virginia) Inbound Data Transfer is Free and Outbound Data Transfer makes it easier to set up, operate, and scale a relational database in the cloud.

Instances:

Usage	DB Engine and License	Class and Deployment	Storage
100 % Utilized/Mc	MySQL	db.m4.large	General Pu
		Standard (Single-AZ)	32 GB

Estimate of your Monthly Bill (\$ 263.56)

1 (Virginia) Inbound Data Transfer is Free and Outbound Data Transfer makes it easier to set up, operate, and scale a relational database in the cloud.


Instances:

Usage	DB Engine and License	Class and Deployment	Storage
100 % Utilized/Mc	MySQL	db.m4.large	General Pu
		Multi-AZ	32 GB

High Availability

AWS RDS with a 99.95% SLA is 2x more expensive* than Azure Database for MySQL/PostgreSQL

High Availability



PRICE SUMMARY

Gen 5 server type

Cost per vCore (in USD) **65.00**

vCores selected **x 2**

+

Basic Storage

Cost per GB (in USD) **.058**

Storage amount selected (in GB) **x 32**

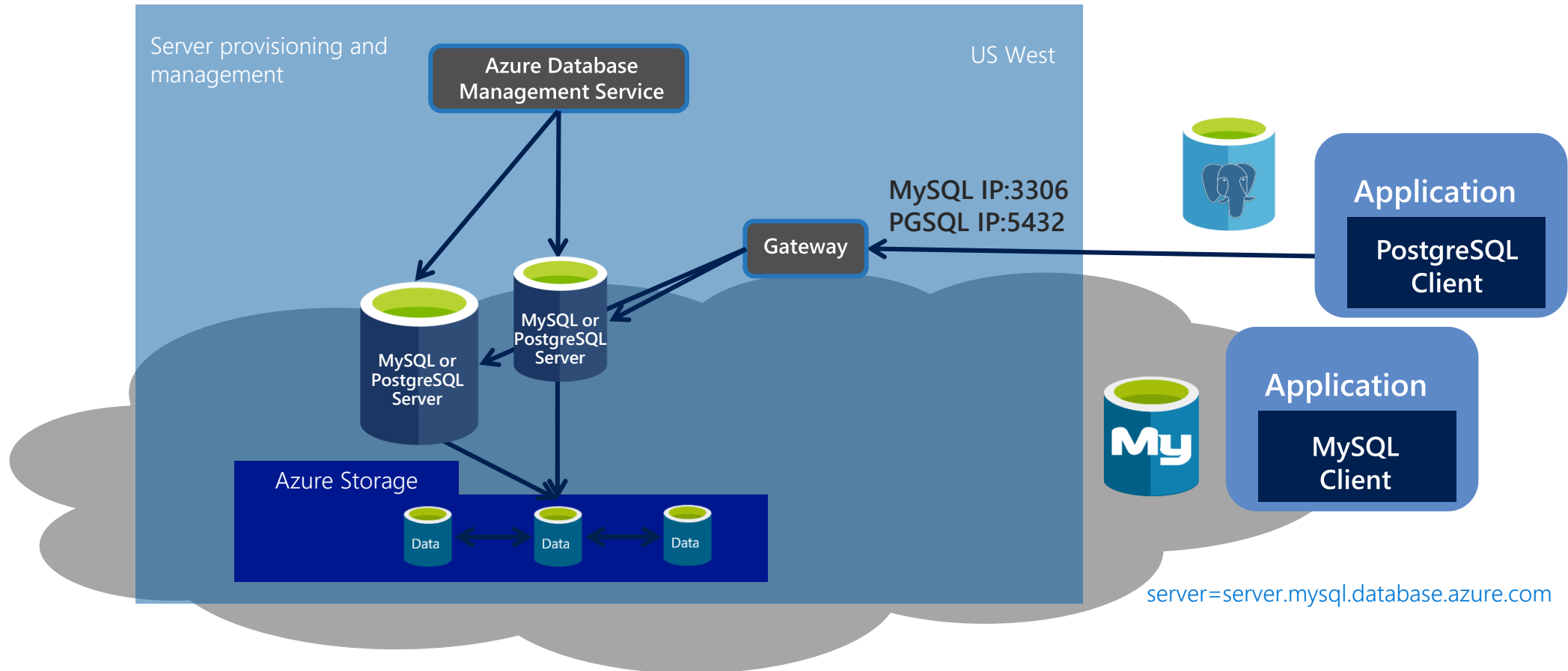
EST. MONTHLY COST **131.84 USD**

ADDITIONAL CHARGE PER USAGE

0.05 USD / GB backup storage -first 500 GB are free
Standard outbound data transfer charges apply

* as of June 2018

SCALE PERFORMANCE ON THE FLY



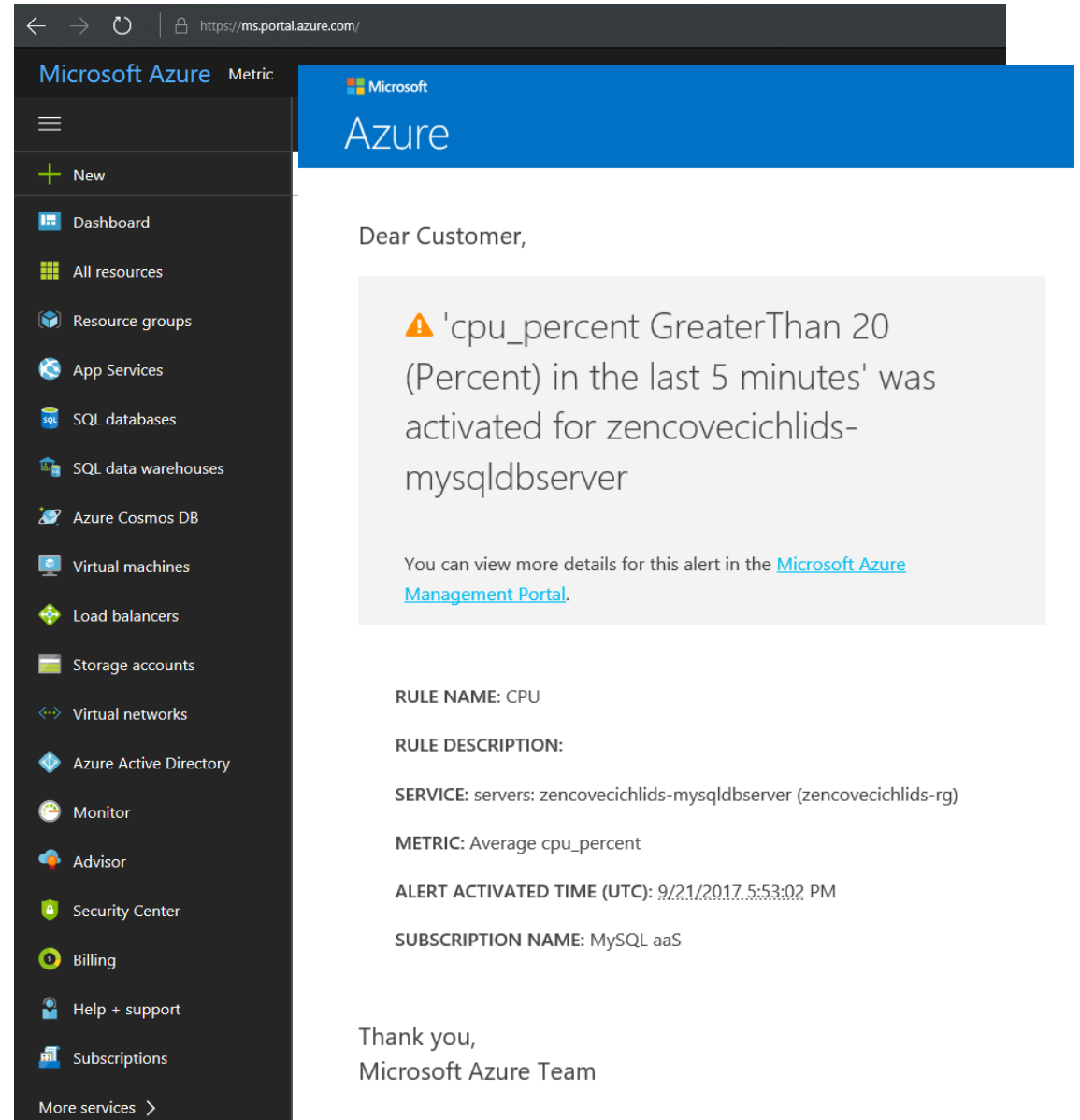
BACKUP AND RESTORE

- Built-in backups
- Choose LRS or GRS
- Restore from geo-redundant backups for disaster recovery (RPO \leq 1 hr)
- 1x Backup storage included
- PITR up to 35 days (min. 7 days)

The screenshot displays the Microsoft Azure portal interface for an Azure Database for MySQL server named 'africancichlids-mysqldbserver'. The top navigation bar includes the 'Restore' button, which is highlighted with a red box. Below this, the 'Backup Retention Period' is shown as a slider set to 14 days, with a range from 7 to 35 days. The 'Backup Redundancy Options' section shows two choices: 'Locally Redundant' (selected with a blue checkmark) and 'Geographically Redundant'. Below the options, a notification states 'Backups are maintained for 7 days.' The 'Restore point (UTC)' is set to 2017-06-13 at 12:17:17 AM. The 'Restore to new server' option is selected, and the server name 'africancichlids-restored-server' is entered in the text field, which is also highlighted with a red box. The 'Location' is set to 'West US' and the 'Pricing tier' is 'Basic, 100 Compute Units, 50 GB'. On the right side, a list of subscriptions is shown, with 'africancichlids-restored-server' highlighted in a red box.

MONITORING AND ALERTING

- Built-in monitoring
- Configurable alerts
- Auto notifications
- Enabled for database engine monitoring by default



The screenshot displays the Microsoft Azure Management Portal interface. On the left is a dark sidebar with a navigation menu including options like Dashboard, All resources, Resource groups, App Services, SQL databases, SQL data warehouses, Azure Cosmos DB, Virtual machines, Load balancers, Storage accounts, Virtual networks, Azure Active Directory, Monitor, Advisor, Security Center, Billing, Help + support, and Subscriptions. The main content area shows a blue header with the Microsoft Azure logo. Below the header, a message reads "Dear Customer," followed by an alert notification box. The alert contains a warning icon and the text: "'cpu_percent GreaterThan 20 (Percent) in the last 5 minutes' was activated for zencovecichlids-mysqldbserver". Below the alert, there is a link to view more details in the Microsoft Azure Management Portal. At the bottom of the alert details, the following information is provided: RULE NAME: CPU, RULE DESCRIPTION: (blank), SERVICE: servers: zencovecichlids-mysqldbserver (zencovecichlids-rg), METRIC: Average cpu_percent, ALERT ACTIVATED TIME (UTC): 9/21/2017 5:53:02 PM, and SUBSCRIPTION NAME: MySQLaaS. The message concludes with "Thank you, Microsoft Azure Team".

Microsoft Azure Metric

Dear Customer,

! 'cpu_percent GreaterThan 20 (Percent) in the last 5 minutes' was activated for zencovecichlids-mysqldbserver

You can view more details for this alert in the [Microsoft Azure Management Portal](#).

RULE NAME: CPU

RULE DESCRIPTION:

SERVICE: servers: zencovecichlids-mysqldbserver (zencovecichlids-rg)

METRIC: Average cpu_percent

ALERT ACTIVATED TIME (UTC): 9/21/2017 5:53:02 PM

SUBSCRIPTION NAME: MySQLaaS

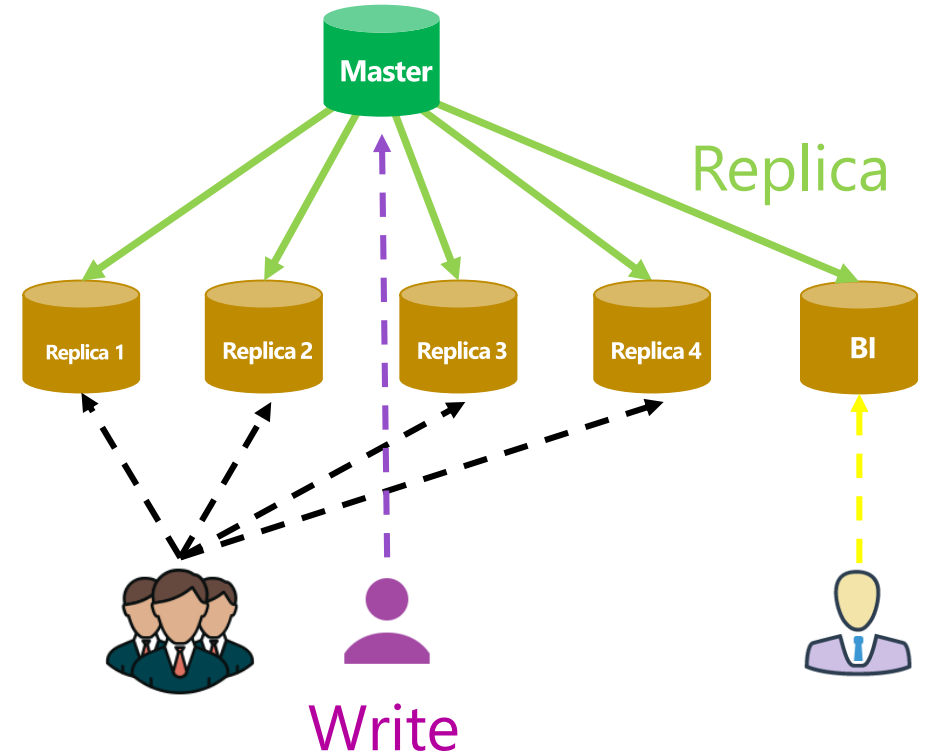
Thank you,
Microsoft Azure Team

MYSQL DATA-IN REPLICATION

- Data-in Replication (for migration scenarios)
 - Replica in Azure, master in VM, on-premises server or other cloud provider (with binlog replication)
 - For hybrid, multi-cloud synchronization or migration

MYSQL AND POSTGRESQL REPLICATION

- Same region replica (for read scale-out)
 - Up to 5 replicas - both master and replica in the same Azure region
- Each replica is a new MySQL/PostgreSQL server
- MySQL: Native replication
- PostgreSQL: In preview



MIGRATION METHODS

1. MySQL dump and PG dump

Native commands, no additional setup

2. Migration wizard

Native or 3rd party tools

3. Replication

[Attunity](#), near-zero down time migration

4. Azure Database Migration Service

- Native way, no additional setup
- Use when application can tolerate downtime
- Third-party solution, needs setup
- Use when application *cannot* tolerate downtime
- Fully-orchestrated migration service
- General Availability (H1 2018)
- Sign up for preview scenarios [here](#)

KEY LEARNINGS FOR ACHIEVING BEST PERFORMANCE

- Network latency
 - Measure with SELECT 1 tests from the client using mysql shell
 - Average should be < 2msec
- Best practices
 - Ensure application and database server is in the same region, created within the same resource group
 - Configure VM (hosting the application) with accelerated networking

KEY LEARNINGS FOR ACHIEVING BEST PERFORMANCE

- Storage
 - Monitor “IO Percent” and “Storage Percent” using Azure portal or Azure CLI
 - Use mysql (performance_schema) or [postgres \(pg_stat_statements\)](#) to determine queries taking longer times
- Best practices
 - Evaluate/tune indexes and queries as necessary.
 - Ensure adequate IOPS is provisioned for the instance.
 - IOPS scale at approximately 3 IOPS per GB.
 - Rule of thumb is to not exceed 80% of available IOPS (IO Percent) on average.
 - Configure alerts on “IO Percent” and “Storage Percent” as necessary using the Azure portal or CLI
 - Consider Memory Optimized tier

KEY LEARNINGS FOR ACHIEVING BEST PERFORMANCE

- CPU
 - Monitor “CPU percent” using Azure portal or Azure CLI.
 - Use mysql (performance_schema) or [postgres \(pg_stat_statements\)](#) to determine queries taking longer times
 - High CPU usage is not the only indicator of CPU bottleneck. Do you have a single-threaded app?
- Best practices
 - Strongly recommend using General Purpose
 - Validate/tune indexes and queries as necessary
 - Ensure server log parameters are tuned for production workload
 - Tune database connections from the application. Use connection pooling or front end or application caching (if suitable). Consider Memory Optimized.
 - Configure alerts on “CPU percent” as necessary using Azure portal or CLI

