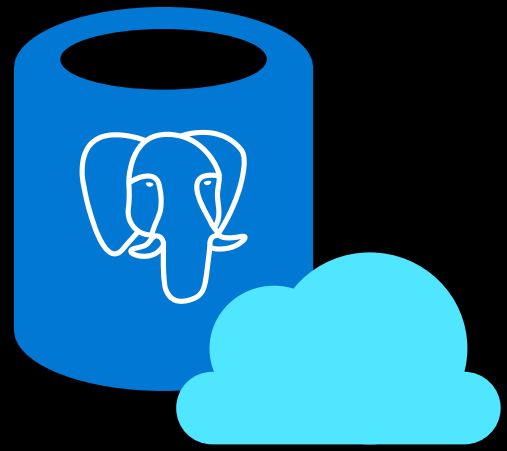
Microsoft

Oracle to PostgreSQL – Match made in heaven

IMPT NOTICE:

- If you choose to participate in this session using Microsoft Teams, your name, email address, phone number, and/or title may be viewable by other session participants.

- **Please note that the training will not and cannot be recorded in alignment with Microsoft's policies**

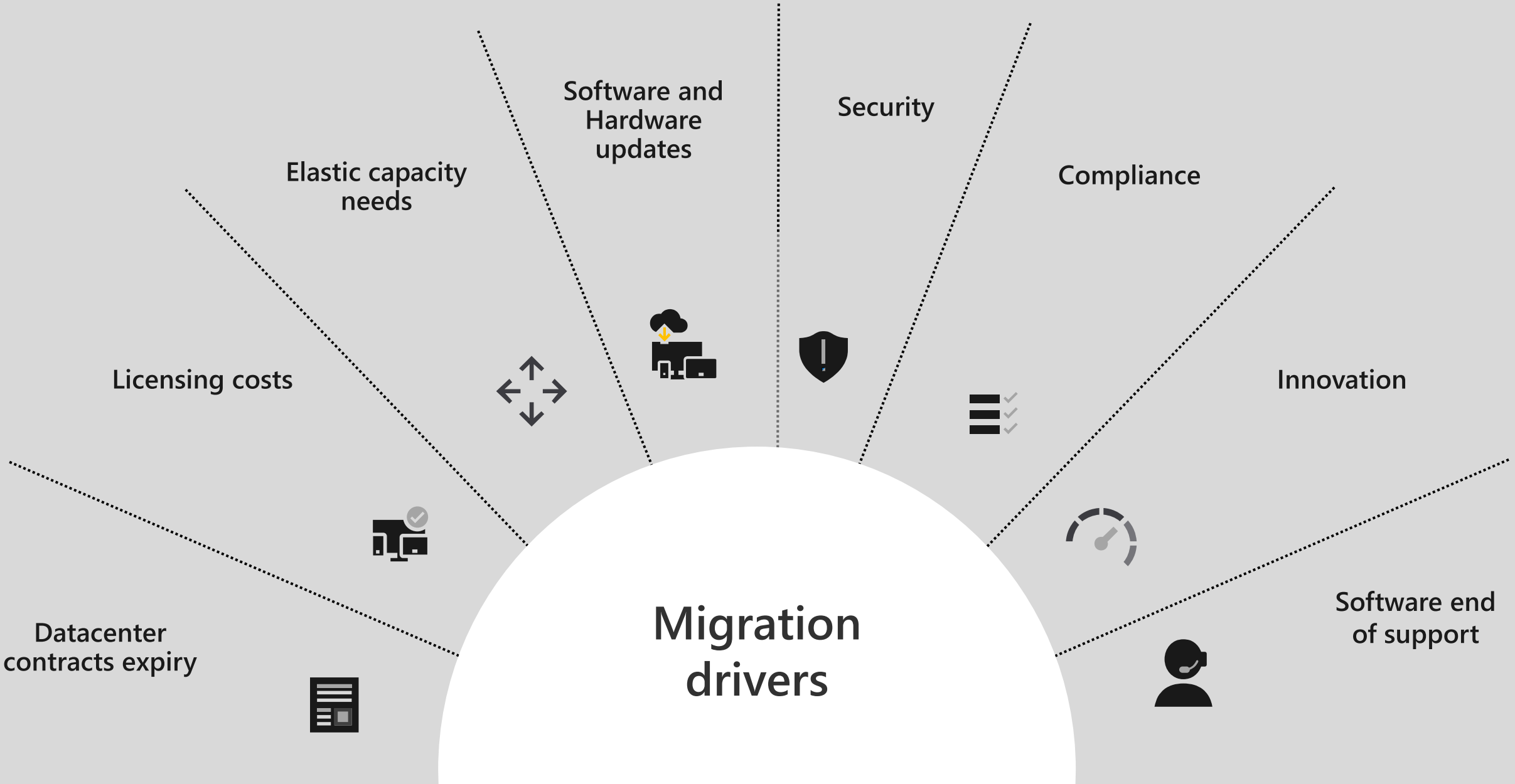


Check In

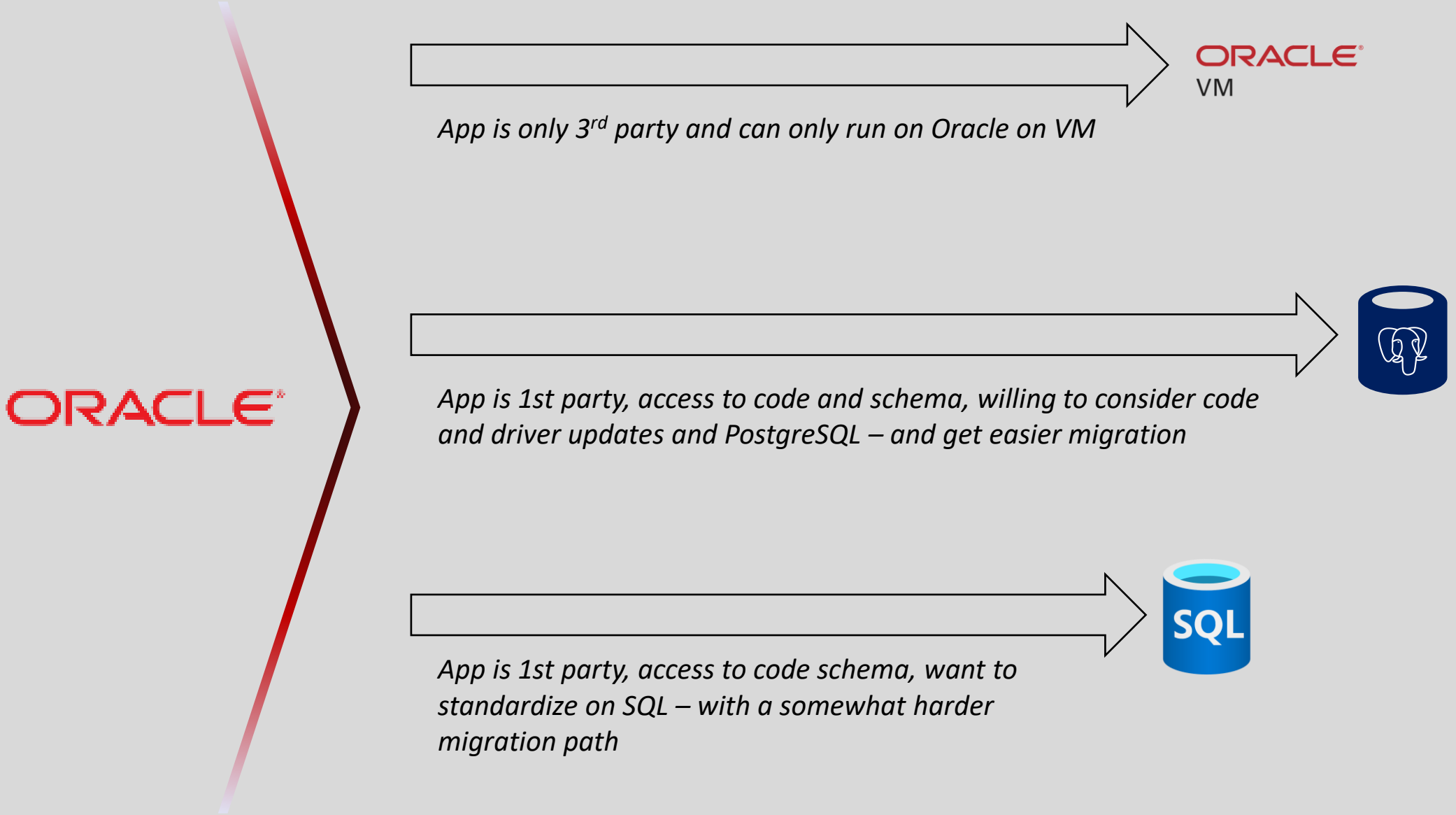
Agenda

Why migrate
Why cloud/postgresql
Why azure
Service details
Migration path
DMS
Demo
Feedback

Why Migrate to the cloud? | Triggers



Oracle Migration | Pathways



Oracle to PostgreSQL | Why

- Over the last two years, we are seeing more and more customers **moving away from hosting applications in Oracle and migrate to other RDBMS datastores**
- Not surprisingly, **savings in licensing cost and support cost are some of the main triggers** why customers are moving away from Oracle
- PostgreSQL is an **open platform with wide-ranging cost benefits** (See Slide 6) compared to Oracle workloads

---

There are 5 reasons* we generally recommend PostgreSQL as the replacement database of Oracle:

I. PostgreSQL has gained credibility of enterprise ready and feature-rich database

II. Reduce total cost of ownership (TCO)

III. Shifting to adopt open source

IV. Similarities between Oracle and PostgreSQL to ease effort of migration

V. Azure offers elastic scaling and built-in HA with Azure Database for PostgreSQL

---

*See notes section for more detail on each reason

Oracle to PostgreSQL | Cost of Ownership

Customers migrate from Oracle to Azure database for PostgreSQL to reduce overall cost of ownership by *up to 95% in savings**

Configuration is based on a 4 socket, 32 core x86 processer
Oracle Cloud Service editions are based on virtual machines

- *Oracle licensing for Enterprise Edition is based on number of processors which is derived by multiplying the number of cores by a factor. In the case of this example it is 32 cores multiplied by .5 for x86 resulting in 16 processors.
- **Annual maintenance and support for Oracle is 22% of the annual license cost.
- ***Oracle standard terms for Enterprise Edition is 50% of list pricing for 3 years. This example accounts for the 50% list pricing for 3 years in the total.

Project Size? > $200K ADS in FY20-21

***See Notes Section**

Estimates Only	**Oracle** Database Cloud Service Enterprise Edition	**Oracle** Database Cloud Service Enterprise Edition High Performance	**Oracle** Enterprise Edition	**Azure** Database for PostgreSQL
Database	$9,599 / month	$19,801 / month	$47,500* / per CPU	$2,046.34 / month
Virtual Private Database	Included	Included	Included	Row level security
Partitioning	Not included	Included	$11,500* / per CPU	Included
Data Guard	Not included	Not included	$11,500* / per CPU	Included
Spatial	Not included	Included	$17,500* / per CPU	Included
Diagnostics	Included	Included	$7,500* / per CPU	Included
Tuning Pack	Included	Included	$5,000* / per CPU	Included
Lifecycle Management Pack	Not included	Included	$12,000* / per CPU	Included as part of OSS tool suite
Total Capex	$0	$0	$1,800,000*	$0
Annual Support / Maintenance per Server (Opex)	Included	Included	$396,000**	Included
Total 3 Year Cost of Ownership	**$345,564**	**$712,836**	**$3,294,000*** **	**$73,668**
Savings with Azure (approx.)	**80%**	**90%**	**95%**	**NA**

Azure Databases for PostgreSQL, MySQL and MariaDB

Brings Azure innovation to your favorite community database

Fully managed community database

Take advantage of a fully managed service with support for latest versions

Built-in high availability for lowest TCO

Ensure your data is always available without the need for additional configuration or cost

Intelligent performance and scale

Improve performance with built-in intelligence and up to 16TB storage and 20K IOPs

Industry-leading security and compliance

Protect your data with enhanced security features including Advanced Threat Protection

Integration with the Azure ecosystem

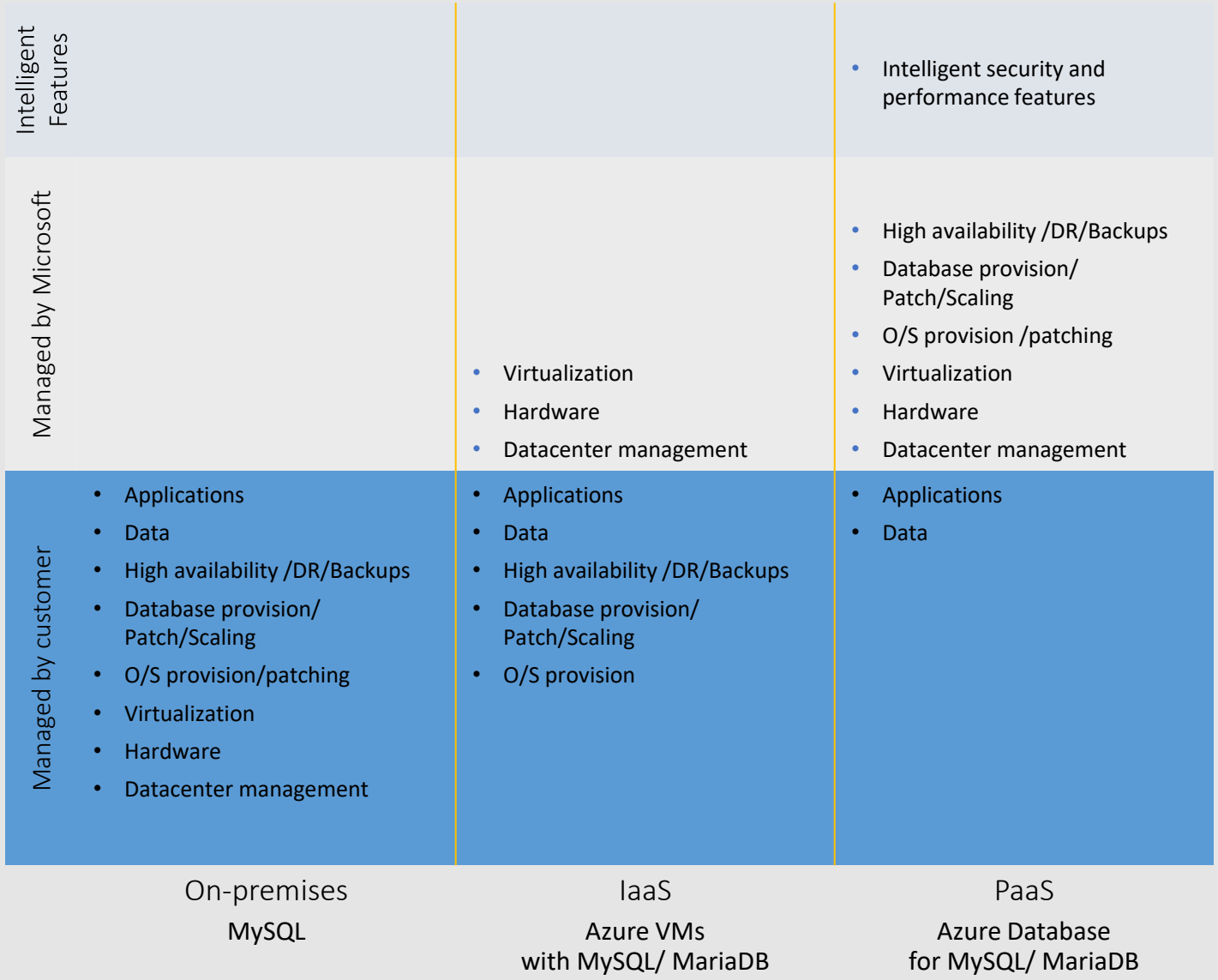
Build apps faster with Azure services and safeguard your innovation with Azure IP Advantage

Pay for only what you use and reduce TCO with built-in features for performance, HA and security

Azure takes the admin out of OSS DBs

- Azure Databases for PostgreSQL, MySQL and MariaDB are fully managed, enterprise-ready community databases-as-a-service to help you focus on your app, not your database

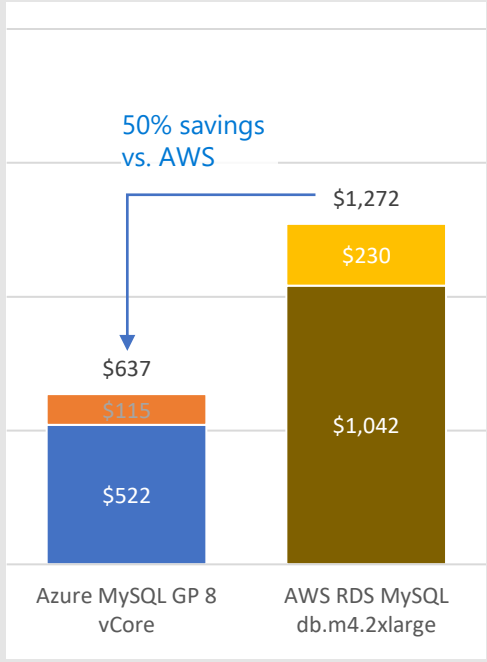
  - Protect data with greater manageability and security
  - Speed queries and insights with better performance and intelligence
  - Deploy apps globally in minutes
  - Save time with built-in tools and resources
  - Improve TCO with built-in features for HA, performance and security

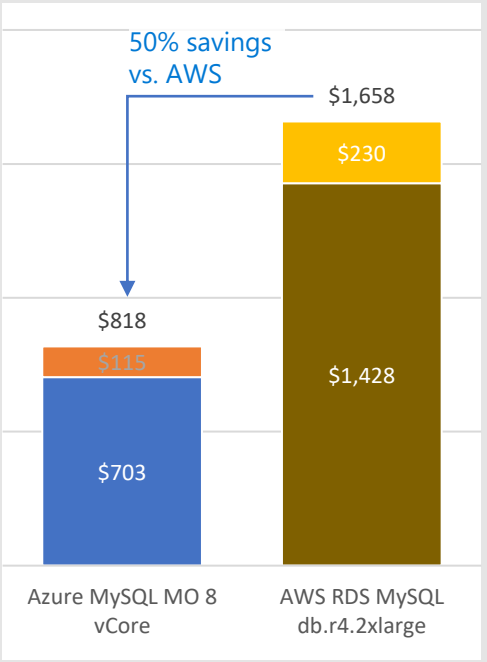


Lowest TCO with built-in high availability

- Take advantage of the global reach and enterprise-ready features of Azure to maintain business continuity at 50% cost savings compared to AWS RDS
- Get high availability backed with 99.99% SLA guarantees without the need to create a replica, compared to AWS' 99.95% HA with multi-availability zones
- Optimize your infrastructure cost by right-sizing your instances based on workload demands
- Reduce development and DBA costs associated with performance troubleshooting and alerting

High availability price comparison of Azure Database for MySQL and AWS RDS MySQL





Enterprise-grade Features for OSS DB:

Security

- Azure AD authentication
- Customer-managed key encryption
- Infrastructure double encryption
- Minimum TLS version requirements

Performance

- Read replicas
- Intelligent Performance

Manageability

- RI for all GA services
- Storage auto grow

50
regions

Trusted by companies of all sizes

HSBC

T··Mobile·

JFrog

Existing deployment options for MySQL & Postgres

Single Server

Enterprise-ready, fully managed community OSS engines

Hyperscale (Citus)

Worry-free PostgreSQL in the cloud with an architecture built to scale out

MySQL & Postgres deployment options being announced

Single Server

Enterprise-ready, fully managed community OSS engines

Flexible Server (Preview) NEW

Maximum control with a simplified developer experience

Hyperscale (Citus)

Worry-free PostgreSQL in the cloud with an architecture built to scale out

Azure Arc enabled Postgres Hyperscale NEW

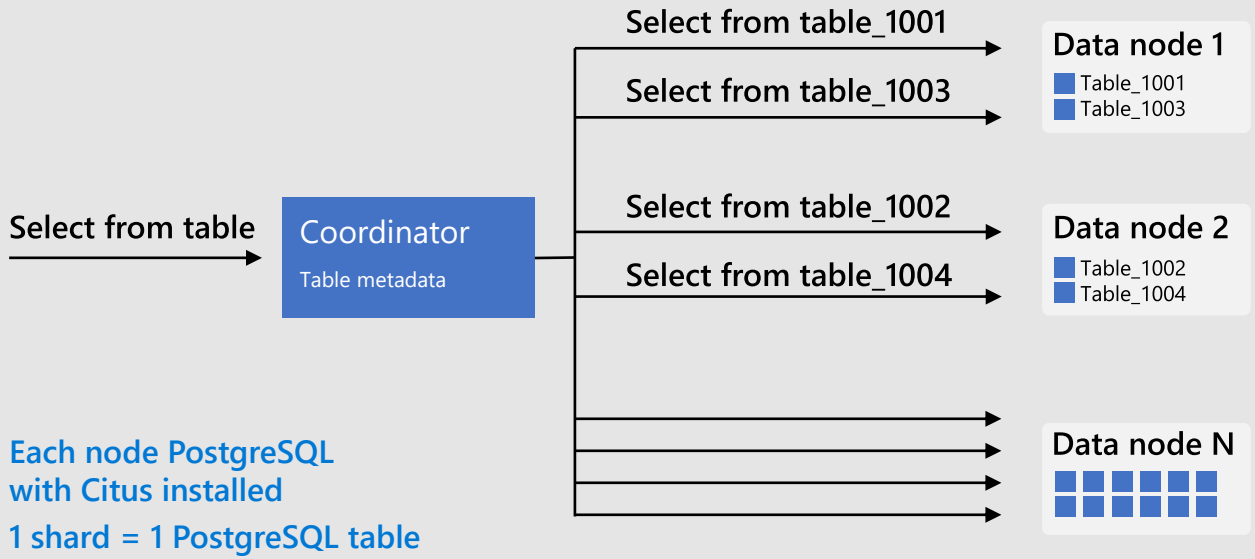
Scale out PostgreSQL in environment of your choice

Citus Architecture

Shard your PostgreSQL database across multiple nodes to give your application more memory, compute, and disk storage

Easily add worker nodes to achieve horizontal scale, while being able to deliver parallelism even within each node

Scale out to 100s of nodes



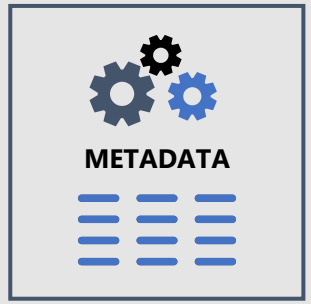
Scaled-out aggregate

Aggregating data before transactions avoids rewriting each row and can save write overhead and table bloat

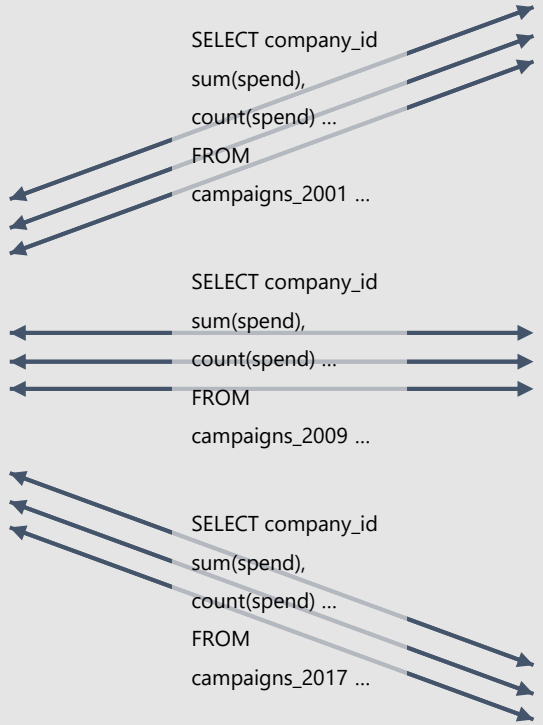
Bulk aggregation avoids concurrency issues

- **APPLICATION**

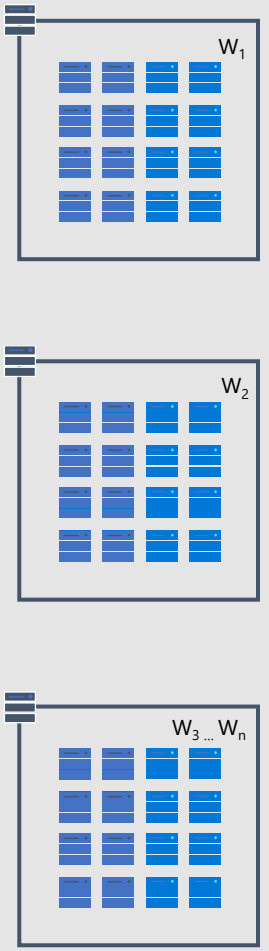
```
SELECT  company_id,
        avg(spend) AS avg_campaign_spend
FROM    compaigns
GROUP BY company_id;
```

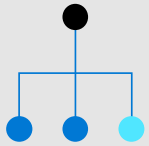
COORDINATOR NODE



WORKER NODES



Key uses cases for Hyperscale (Citus)



Multi-tenant & SaaS applications

Scale beyond single node

Minimize hotspots by spreading out tenants

Rebalance data fully online

Isolate large tenants to their own hardware

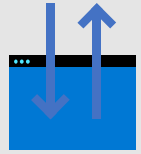
Real-time operational analytics

Ingest terabytes of data per day

Enable sub-second query responses

Parallelize across nodes for 100x performance

Simplify complex ETL processes



Transactional/OLTP applications

Ensure high performance with concurrent users

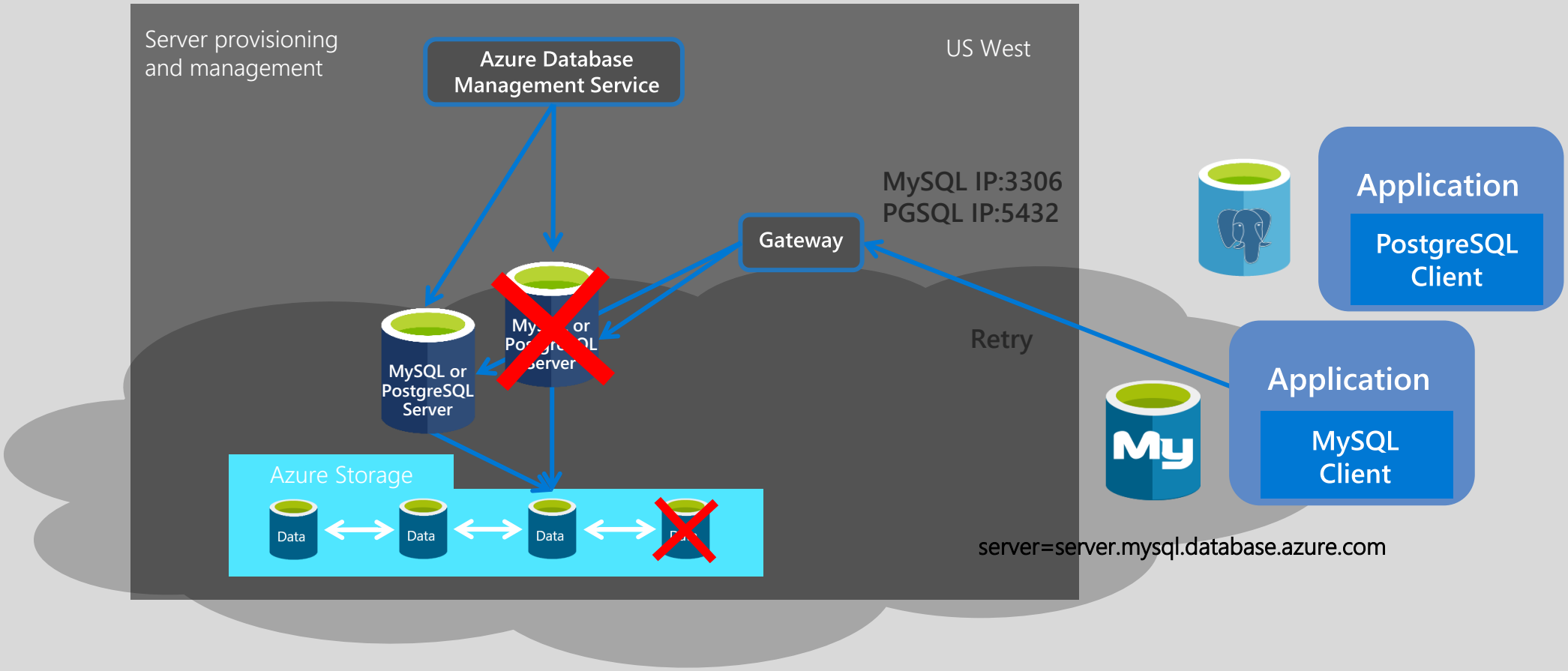
Avoid single points of failure

Distribute transaction processes across multiple nodes

Manage high volumes of transactions

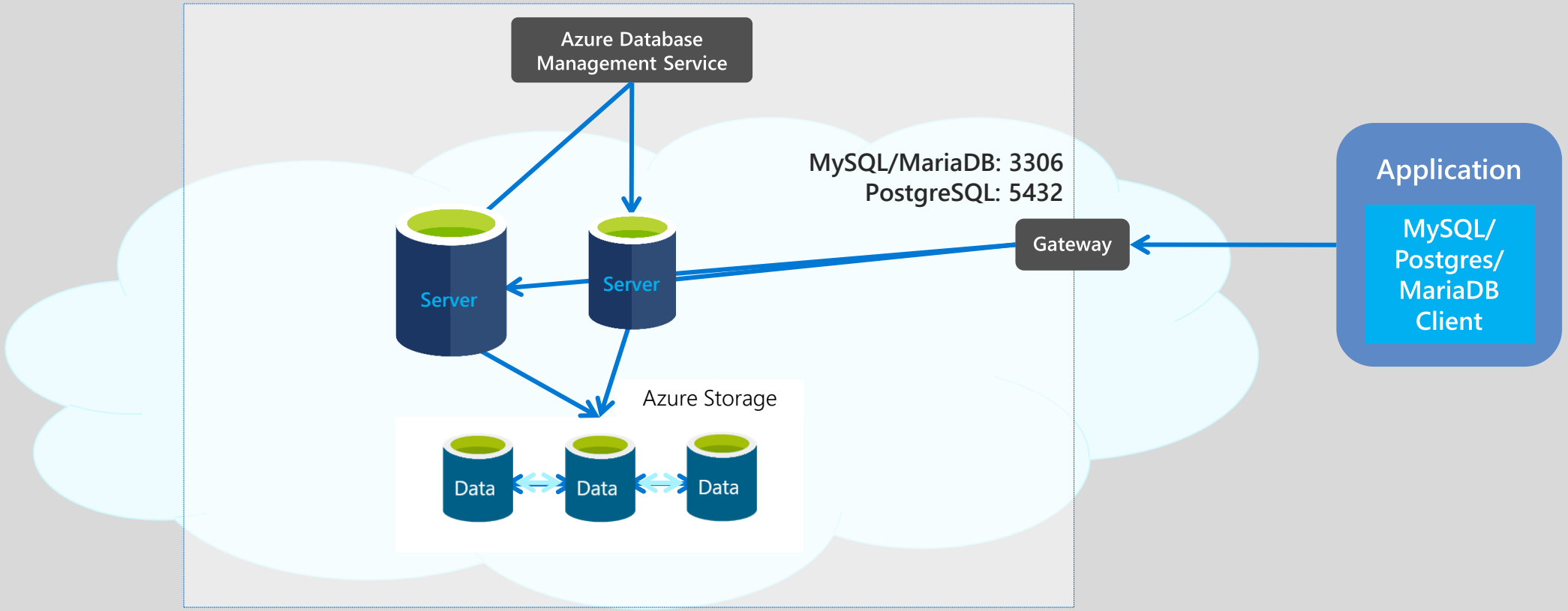
BUILT-IN HIGH AVAILABILITY

3 copies of data for data reliability
Compute redundancy

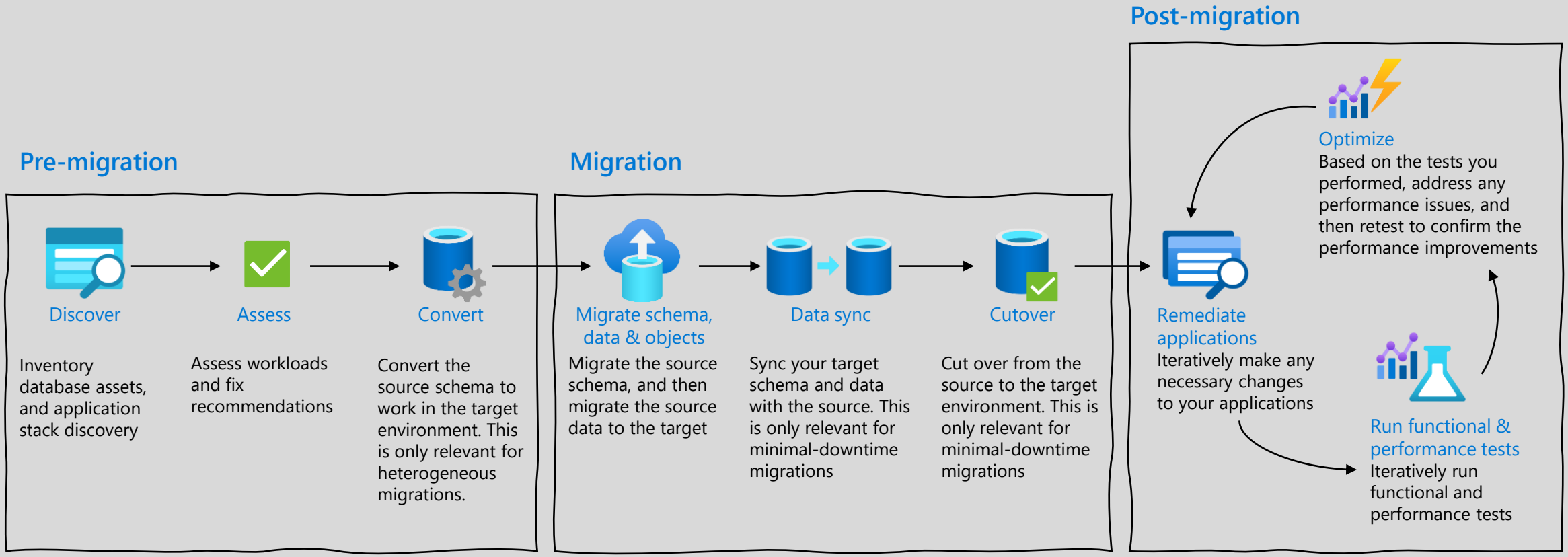


ELASTIC SCALING WITH BUILT-IN HIGH AVAILABILITY

Scale compute up or down in seconds
Scale storage instantaneously
High availability without the need for replicas



Migration | Migrating a database



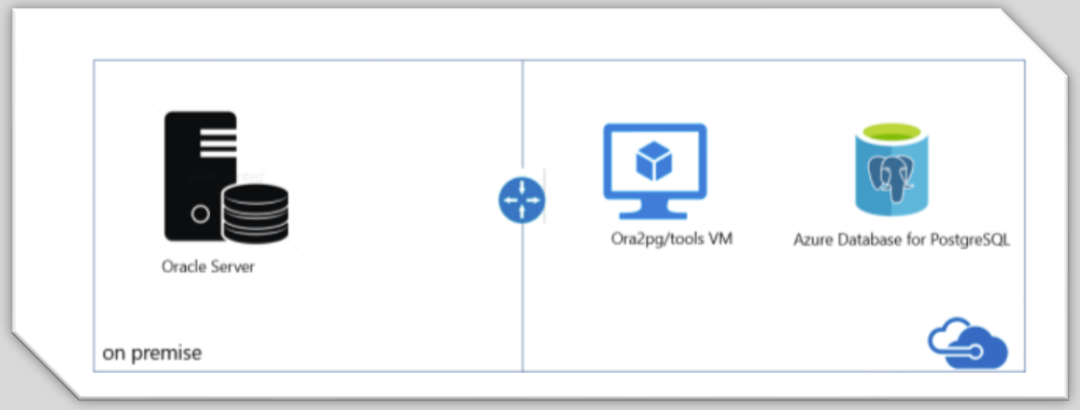
Details on migration phase

	Activity	Exit criteria	Customer involvement	MSFT involvement	Partner?	timelines
Premigration	Discover	Inventory of the DBs with their hardware specs and versioning. Application dependencies with downstream and upstream identified	Access to the infra, Business attestation	Provide partner tools to be executed	Need basis – unifycloud, movere	2-3 days
	Assess	Identified App architecture. Defined RTO, RPO. DB Features identified with Business reason. Resource utilization, concurrent users etc details identified	Business, App and DB team interview. High Level architecture to be provided	Provide questionnaires, reference architectures, Case studies	Need basis. Application vendor needed for app details	1-2 days
	Schema Assess and convert	Schema Objects, Data types and feature identified with target types. Converted the schema and remediate issues	DB team	None if partner involved, else Provide resources to execute	None if being done by own self or with MS support	1 week
Migration	Migrate Objects & Data	Migrated data and programming objects like procedures, functions etc.	DB team	None if partner involved, else Provide resources to execute	None if being done by own self or with MS support	1 week
	Data Sync	Decide Offline or Online migration and data sync procedure identified	DB team	Data migration service	Striim, attunity	1-2 days setup
	cutover	Application changed to target DB. Smoke testing done. Data validation and checksum done.	DB team, App team	If applicable	If applicable	1 day
Post Migration	Remediate Applications	App code has better or same performance and efficiency	DB team, App team	Product team needed for service related	If applicable	2-3 days
	Testing	Business testing done and UAT signoff given	End Users, DB team, App team	Product team needed for service related	If applicable	2-3 days
	Optimize	Bugs and issues resolved, improve and utilize features in the target DB like extensions,partitioning or indexes	End Users, DB team, App team	Product team needed for service related	If applicable	2-3 days

Migration | Ora2pg for e2e assess/migration

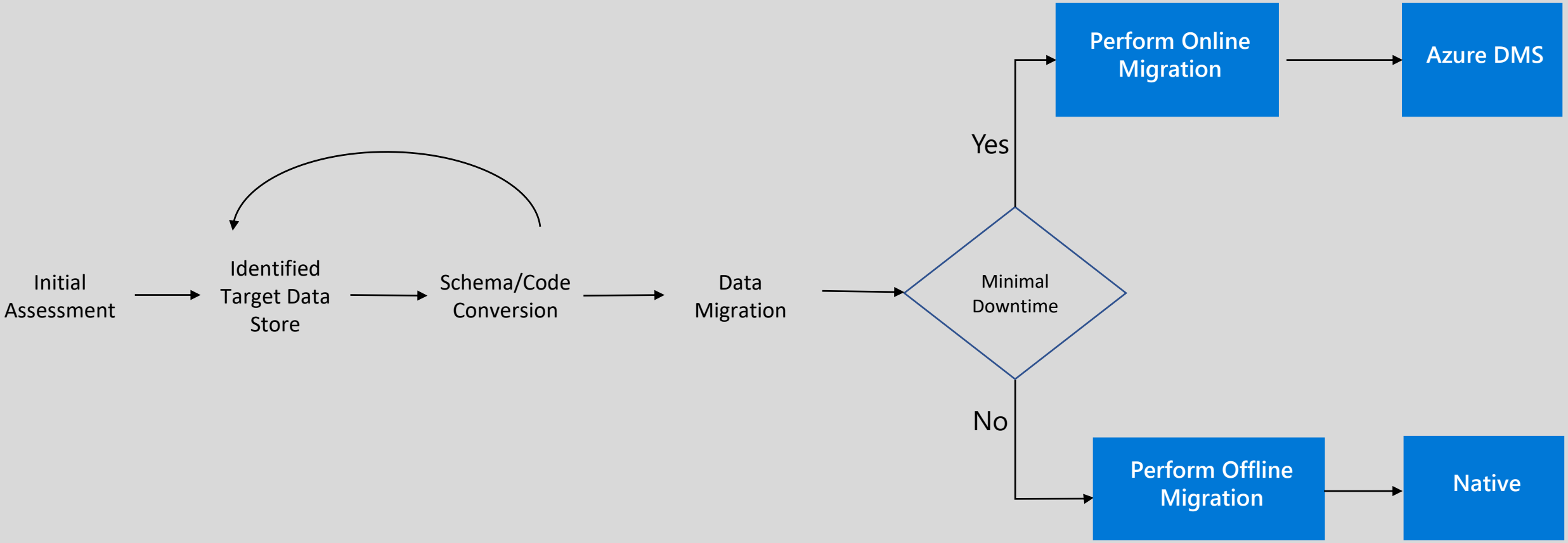
- Ora2pg tool migrates Oracle to Postgres
- ora2pg reads the Oracle catalog and creates the equivalent Postgres objects (tables, views, sequences, indexes), with unique, primary, foreign key and check constraints without syntactic pitfalls
- If using also for data migration, ora2pg connects to Oracle and dumps data in a Postgres-compatible format (highly configurable and connects to Postgres and migrate everything on the fly)
- Azure DMS is another data migration option
- Ora2pg provides a migration assessment report
- Ora2pg creates migration projects
- All triggers, functions, procedures and packages are exported and converted to PLPGSQL
- More complicated procedures may need to be translated manually
- Oracle specific code always need to be rewritten
  - `External modules (DBMS, UTL, ...)`
  - `CONNECT BY (use CTE “WITH RECURSIVE”)`
  - `OUTER JOIN (+)`
  - `DECODE`
- Oracle Spatial to PostGis export
- Ora2Pg Installation steps and config sample

ora2pg



http://ora2pg.darold.net/

Data Migration – Offline vs Online



*Enable Database Archivelog

Data Migration – Offline

- Export to a CSV file and use \COPY to Import into Destination

```
\copy VLDRAWDATA_US.RAWDATA_10 from '/datadrive10/fullexport/VLDRAWDATA_US.RAWDATA_10.csv' WITH (FORMAT CSV,delimiter E'\x1e', HEADER FALSE)
```

- Export to a flat file and use Ora2PG to Import

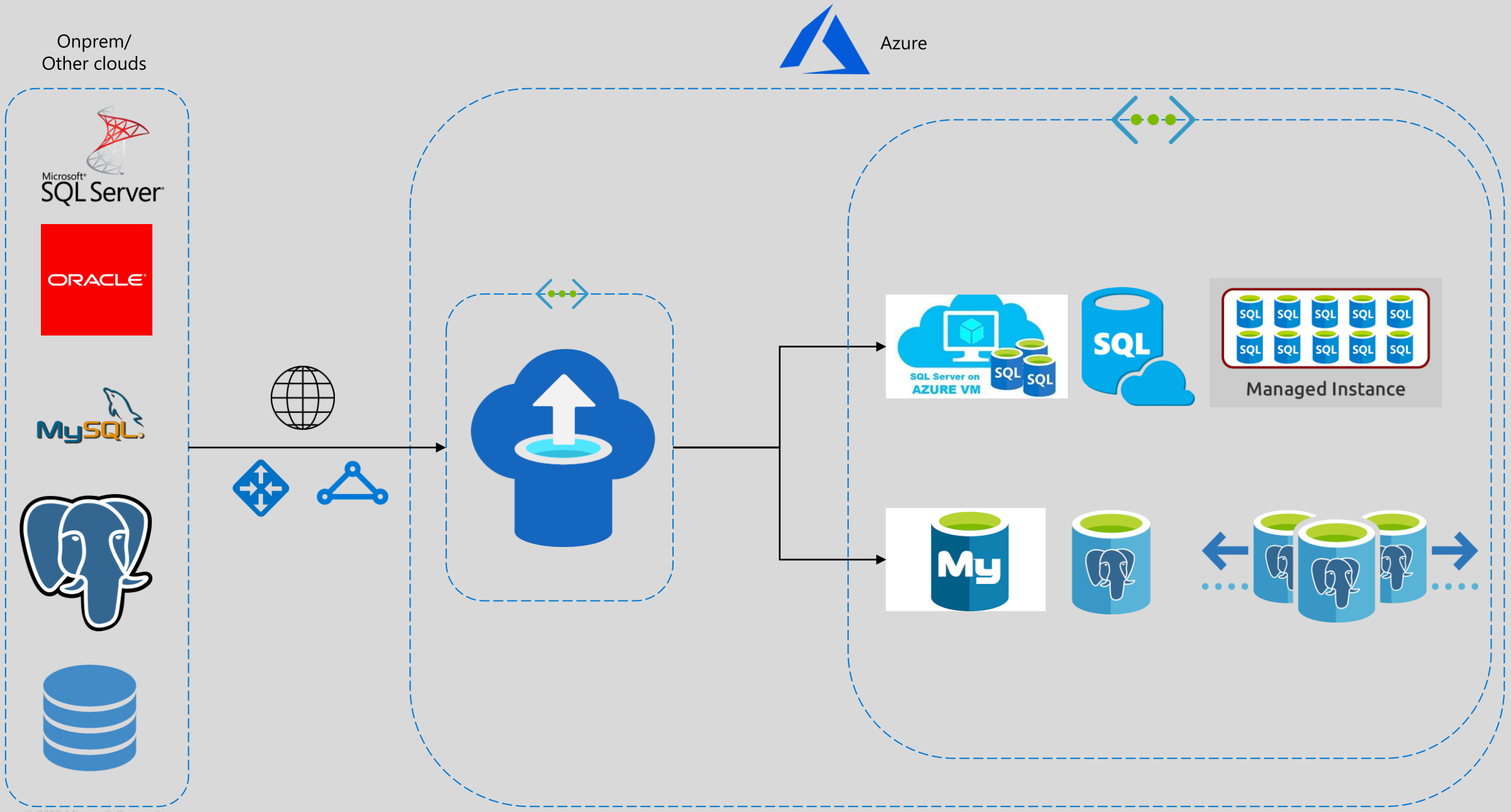
```
ora2pg -c ora2pg.conf -t COPY -o data.sql -b data/
```

- Export to a flat file, split into smaller files and use PSQL to Import (for large files)

```
for i in `ls -1 P*.sql`; do psql -h sirvalhyper-c.postgres.database.azure.com -d citus -U citus -c "set search_path=loadtest_162" -f $i; done
```

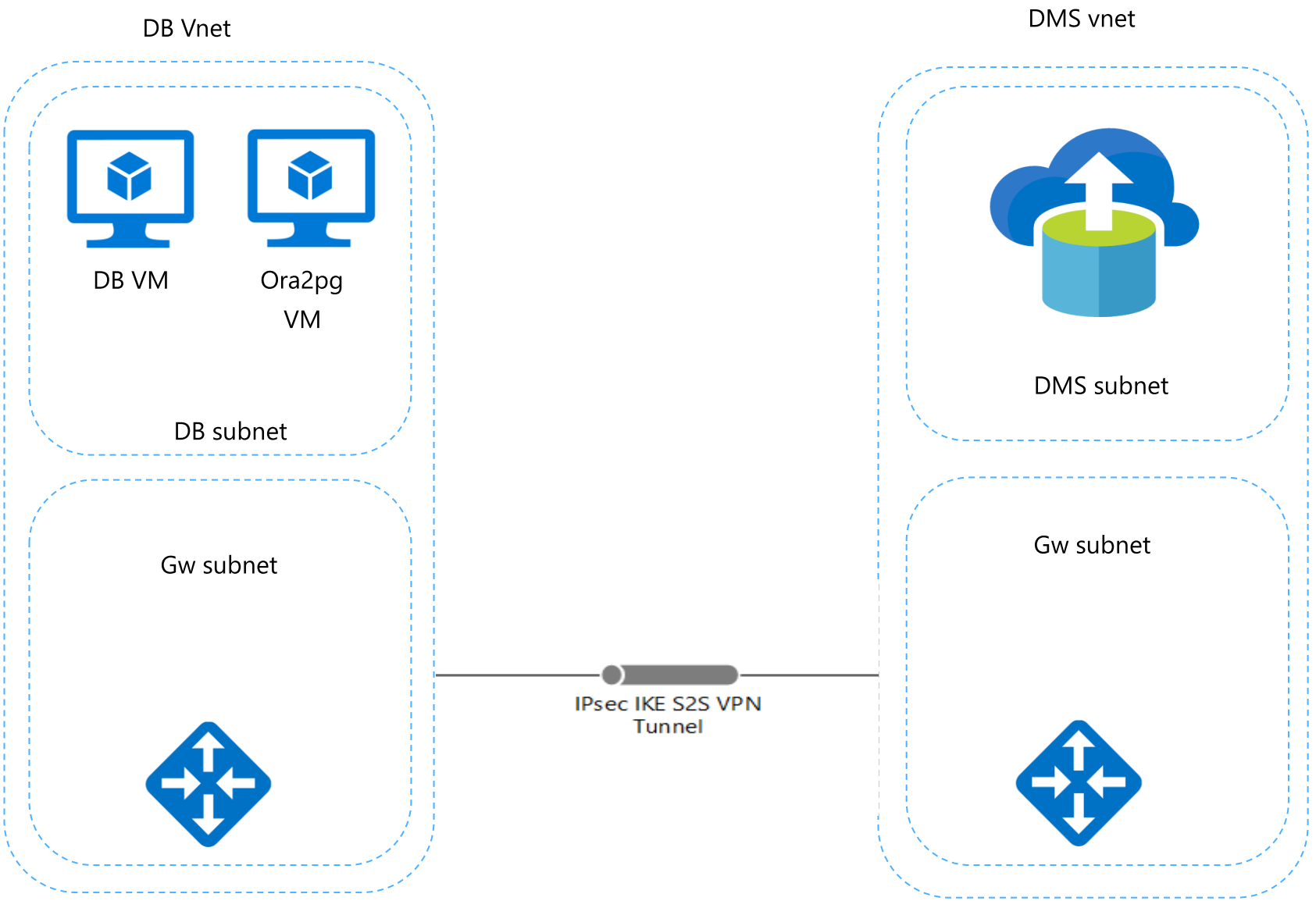
- In-memory Export and Import using Ora2PG

```
ora2pg –c ora2pg.conf -t COPY
```



Demo

Migrate using Ora2PG and DMS


DB Vnet
DB VM
Ora2pg VM
DB subnet
Gw subnet
IPsec IKE S2S VPN Tunnel
DMS vnet
DMS subnet
Gw subnet

QUIZ

https://kahoot.it/

Summarizing| Getting Started…

Reduces your Oracle OPEX while unblocking innovation through:

Evaluating your Oracle deployment and licensing upfront. Providing detailed TCO and business value

Demonstrate the proposed business impact with a proof of concept; showing the technology in action.

Drive and support the migration to production

What's next?

Technical assessments to understand your Oracle deployment

Migration Tools to minimized downtime and business impact

TCO Analysis prioritize migration scenarios

Partners experts to help with licensing and migration

Co-funding your migration

Feedback Please!

Microsoft

Thank You!