Accelerate Your Azure SQL Platform for Optimal Performance and Costs

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Disclaimer

Your on-premises performance is not the same as the Cloud

Questions to Ask

What problem are you solving with the Cloud?

How much data are you retrieving?

How much data are you putting in?

Do performance metrics cross over?

Architecture

Azure SQL

Infrastructure-as-a-Service

SQL Server on Azure Virtual Machines

Best for lift and shift of workloads requiring 100% SQL Server compatibility and OS-level access

Platform-as-a-Service

Azure SQL Managed Instance

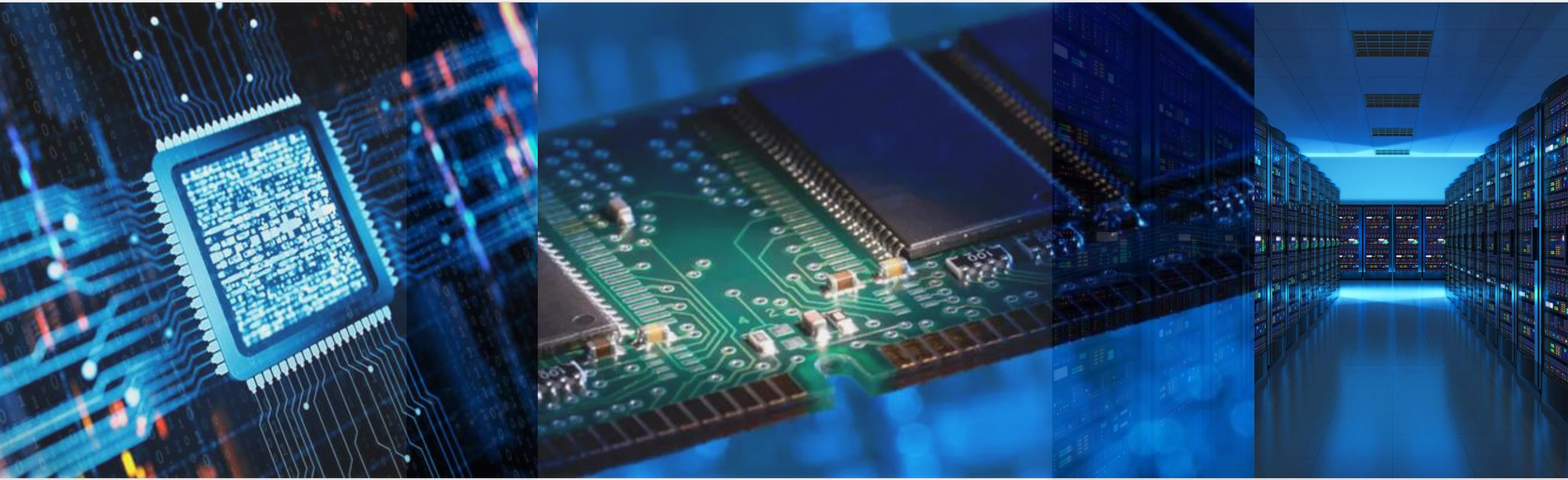
Best for modernizing existing apps

Azure SQL Database

Best for modern cloud applications

Azure Virtual Machines

Azure VM Variations



Processing Power

Memory

Storage Compacity

Determine the Size of the VM

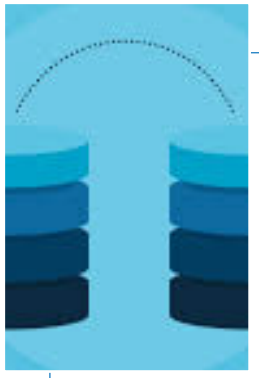
Option	Description
General purpose	Balanced CPU-to-memory ratio. Ideal for testing and development, small to medium databases, and low to medium traffic web servers.
Compute optimized	High CPU-to-memory ratio. Suitable for medium traffic web servers, network appliances, batch processes, and application servers.
Memory optimized	High memory-to-CPU ratio. Great for relational database servers, medium to large caches, and in-memory analytics.
Storage optimized	High disk throughput and IO. Ideal for VMs running databases.
GPU	Heavy graphics rendering and video editing. These VMs are ideal options for model training and inferencing with deep learning.
High performance compute	The fastest and most powerful CPU with optional high-throughput network interfaces.

Managed Disks

Like the disks in your data center, only virtualized

Block level storage volumes

Different performance characteristics



Striping disks on VMs for increased IOPS/throughput

Managed Disk Performance Aspects

	Ultra Disk	Premium SSD v2	Premium SSD	Standard SSD	Standard HDD
Disk type	SSD	SSD	SSD	SSD	HDD
Max throughput	10,000 MB/s	1,200 MB/s	900 MB/s	750 MB/s	500 MB/s
Max IOPS	400,000	80,000	20,000	6,000	2,000, 3,000*

COSTS

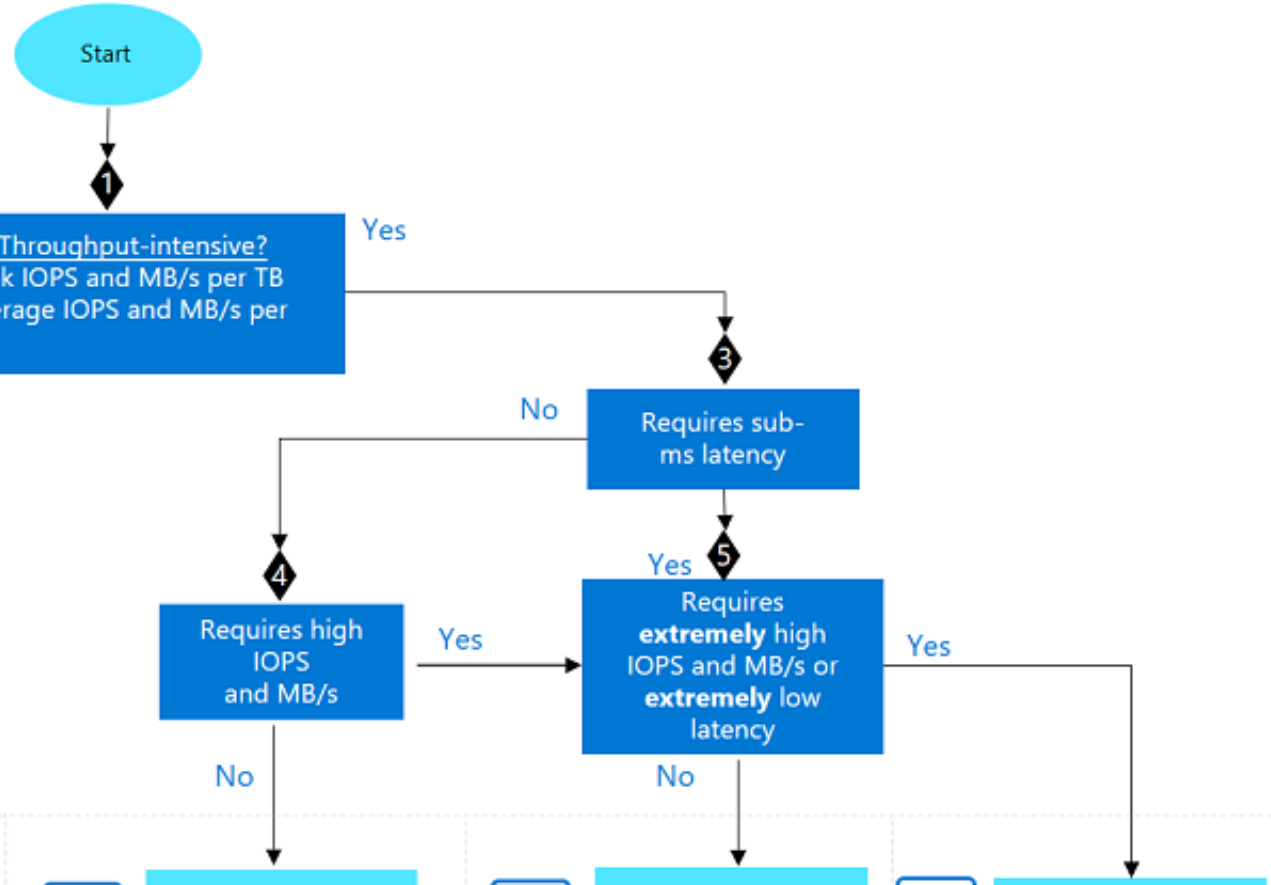
Performance Characteristics

Size	Capacity	IOPS	Throughput
P1	4 GiB	120	25 MB/second
P2	8 GiB	120	25 MB/second
P3	16 GiB	120	25 MB/second
P4	32 GiB	120	25 MB/second
P6	64 GiB	240	50 MB/second
P10	128 GiB	500	100 MB/second
P15	256 GiB	1,100	125 MB/second
P20	512 GiB	2,300	150 MB/second
P30	1 TiB	5,000	200 MB/second

Choose Azure Disk type for performance

Primary Considerations:

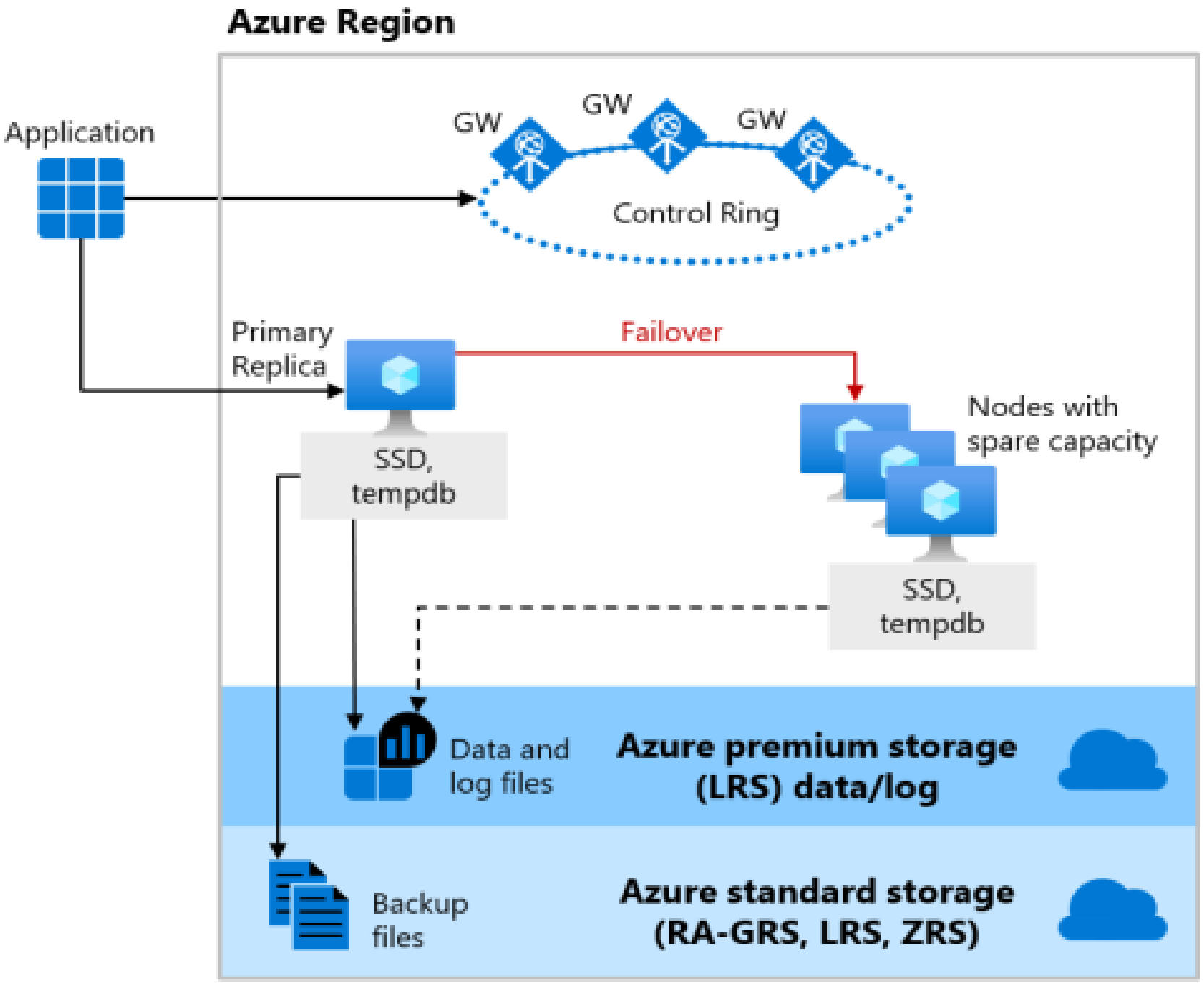
- Latency
- IOPS
- Throughput



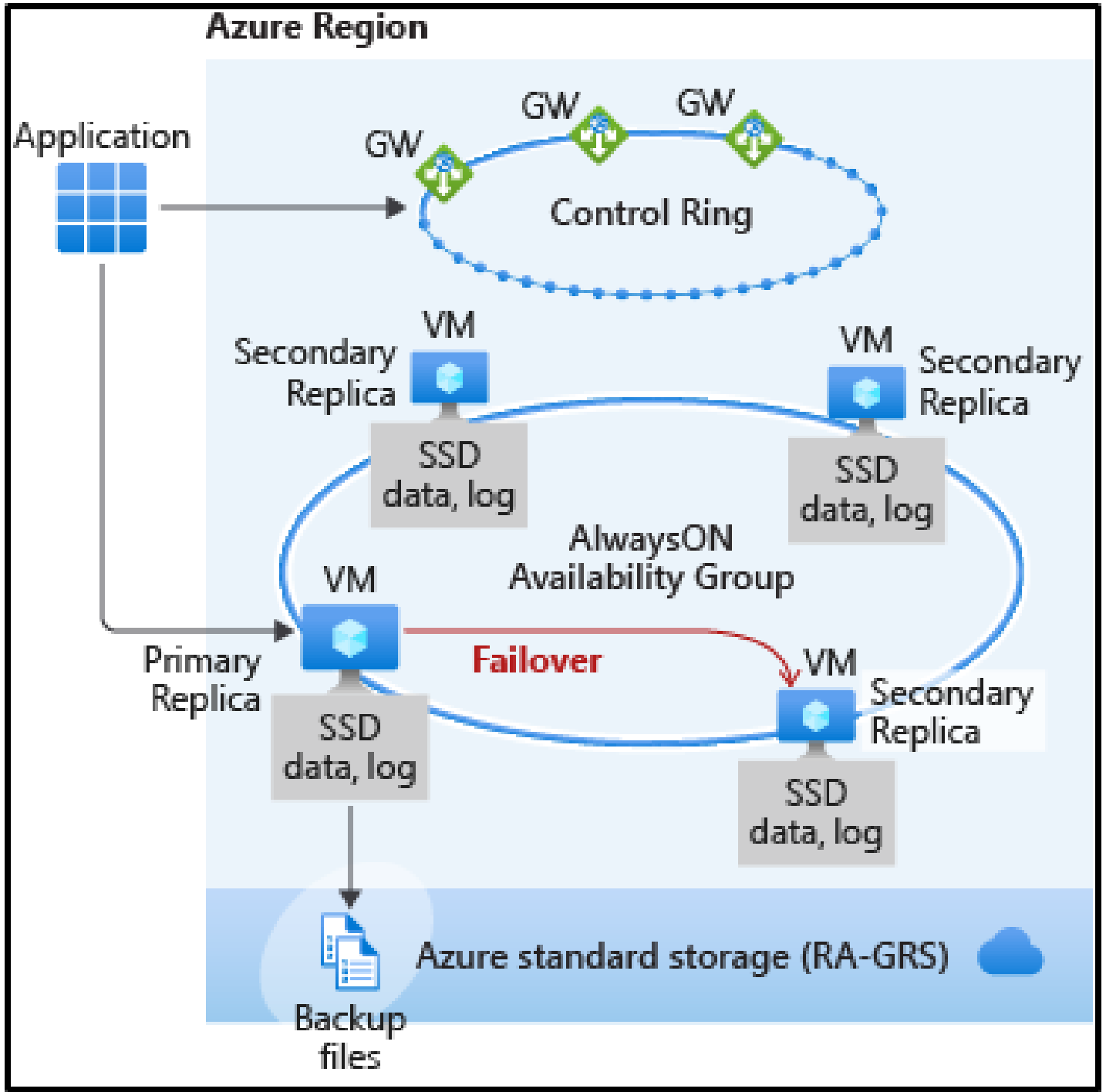
Disk Types	Standard HDD	Standard SSD	Premium SSD	Premium SSDv2	Ultra Disk
Disk Characteristics	Most cost-efficient storage on HDD	Entry level SSD with lowest GiB cost on Cloud	Great balance for cost and performance	Best price performance on Azure	Highest performing disk offering
Disk Sizes	Per IOPS, capacity & throughput requirements.				

Azure SQL Database

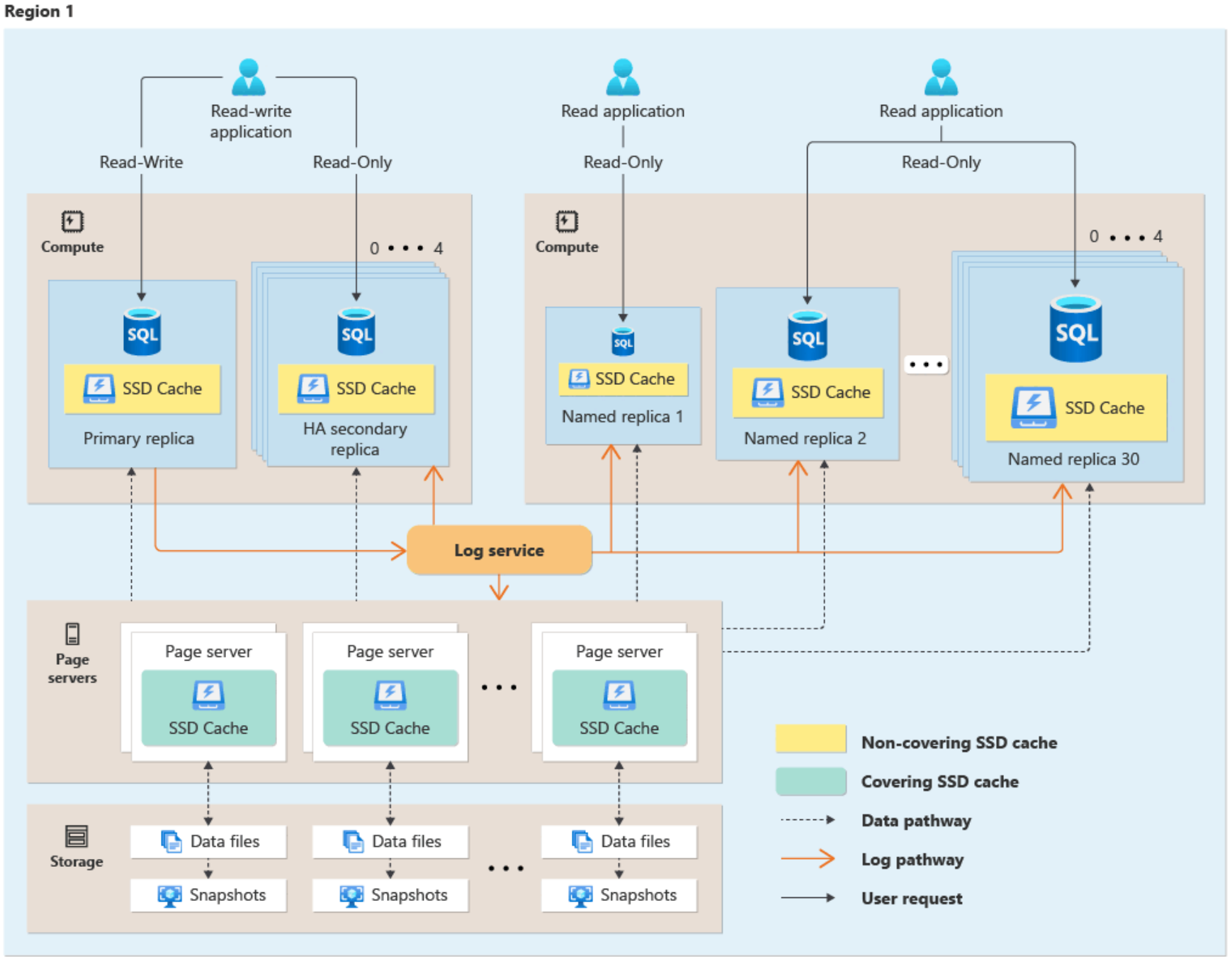
General Purpose



Business Critical



Hyperscale


Region 1
Read-write application
Read-Write
Read-Only
Read application
Read-Only
Read application
Read-Only
Compute
0 • • • 4
SSD Cache
Primary replica
SSD Cache
HA secondary replica
Compute
SSD Cache
Named replica 1
SSD Cache
Named replica 2
0 • • • 4
SSD Cache
Named replica 30
Log service
Page servers
Page server
SSD Cache
Page server
SSD Cache
Page server
SSD Cache
Storage
Data files
Snapshots
Data files
Snapshots
Data files
Snapshots
Non-covering SSD cache
Covering SSD cache
Data pathway
Log pathway
User request

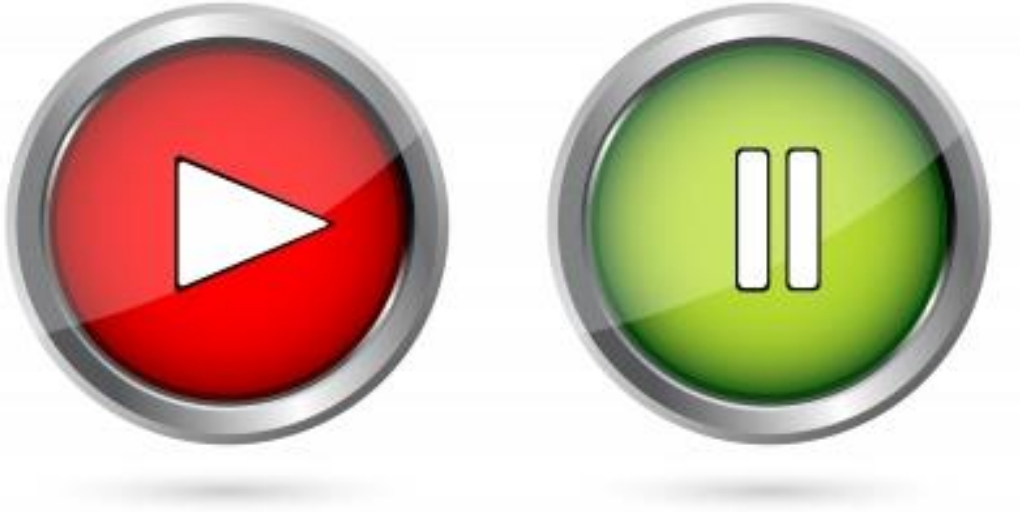
Where Did the Server Go? Serverless?

Auto-pause delay

The database automatically pauses if it is inactive for the time period specified here, and automatically resumes when database activity recurs. Alternatively, auto-pausing can be disabled.

☑ Enable auto-pause

Days	Hours	Minutes
0	1	0



Auto Pausing

Not Too Fast, Gotchas?

(It needs time to wake up, move, or failover)

When it sleeps…POOF!

Bye bye…

Statistics

DMVs

Waits Stats

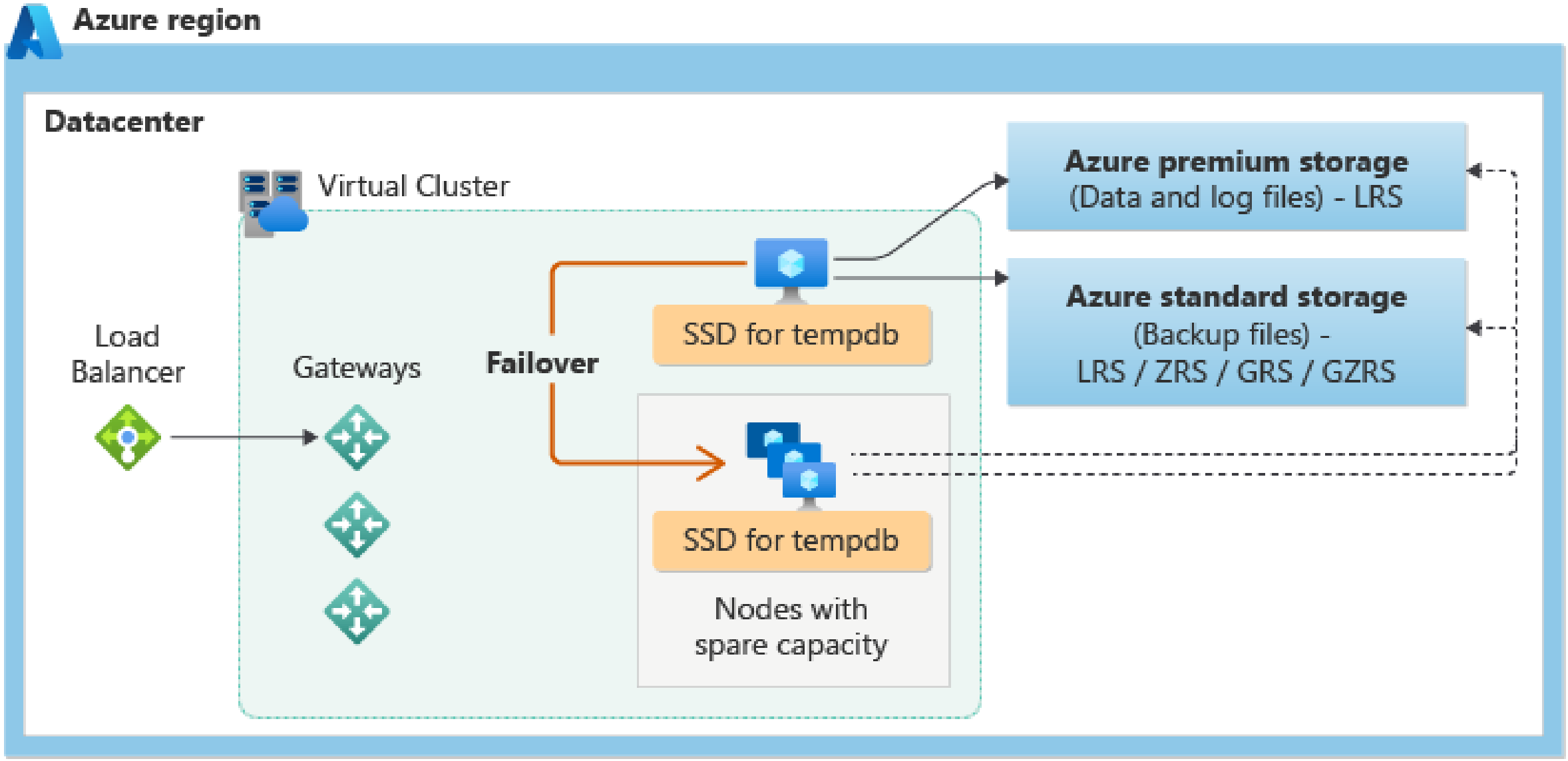
Execution Plans

Cache

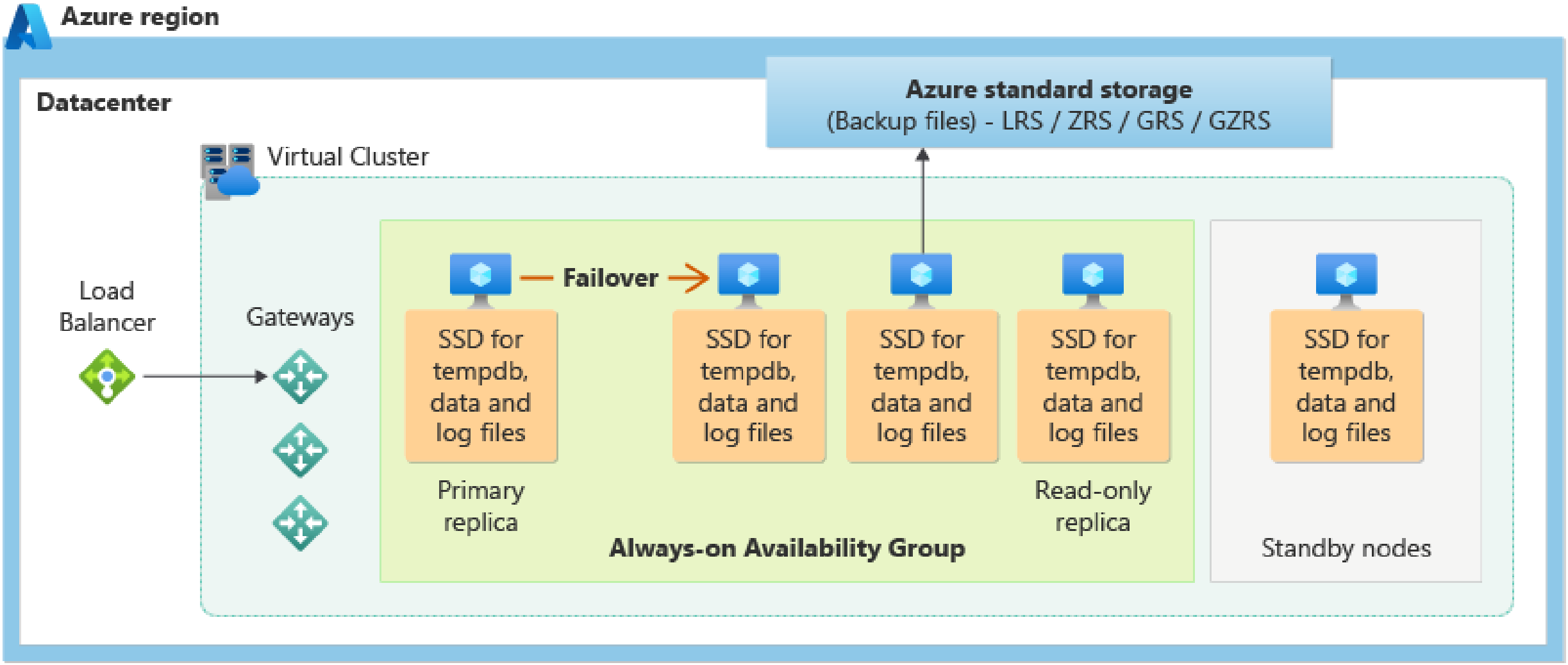
We Lose the Good Stuff

Azure SQL Managed Instance

Managed Instance – General Purpose



Managed Instance – Business Critical



Gotcha

The size of the database determines the size of the disk.

Performance Characteristics

Size	Capacity	IOPS	Throughput
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P30	1 TiB	5,000	200 MB/second
P80	32 TiB	20,000	900 MB/second

NextGen Hardware MI

Updated General Purpose architecture

Utilizes Elastic SAN Storage

Increased storage latency, IOPS, and throughput

Better granular control on IOPS and Memory

SQL in Fabric

Capacity Units

Saas vs PaaS – It’s all about control

Azure SQL Database – General Purpose & Serverless

Capacity Units (CU) & vCores

1CU = 0.383 vCores (F64 = ~24 vCores)

Split capacity units to prevent throttling

Capacity Units Pricing

SKU	Cores	Capacity unit (CU)	Pay-as-you-go
F2	0.766	2	$262.80/month
F4	1.532	4	$525.60/month
F8	3.064	8	$1,051.20/month
F16	6.128	16	$2,102.40/month
F32	12.256	32	$4,204.80/month
F64	24.512	64	$8,409.60/month
F128	49.024	128	$16,819.20/month
F256	98.048	256	$33,638.40/month
F512	196.096	512	$67,276.80/month
F1024	392.192	1024	$134,553.60/month
F2048	784.384	2048	$269,107.20/month

Workload Throttling

Did you just THROTTLE me!

API Call Limits
Storage Limits
Compute Limits
Region Limits

How To Mitigate Throttling

Performance Tune

Scale Up

Ask for limit increase from provider

Monitor and adjust application APIs

Additional Cost Saving Measures

Dev/Test Subscriptions

Reservations / Savings Plans

Azure Hybrid Licensing

DR Replica Licensing

Pause Fabric Capacity

THANK YOU!!!

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