# Ten Cloudy Questions

## to ask before migrating your SQL Server

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## About David Klee

Microsoft® MVP Most Valuable Professional

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**Specialties / Focus Areas / Passions:**

- Performance Tuning
- Business Continuity
- Virtualization & Cloud
- Infrastructure Architecture
- Health & Efficiency
- Capacity Management

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Founder & Technical Exorcist



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## Public Cloud

- Someone else's datacenter
- Virtualization
- Serious automation
- Self-service
- Applications as-a-service & not just IaaS




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## Service Definitions

- Infrastructure-as-a-Service (IaaS)
  - SQL Server in an Azure VM
- Platform-as-a-Service (PaaS)
  - Azure SQL Managed Instance
- Database-as-a-Service (DBaaS)
  - Azure SQL Database




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## Major Cloud Players

Azure

*(My personal pick because they … uhh… own the code.)*

amazon web services

Google Cloud Platform

Alibaba Cloud



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## Where is the cloud?

- It's on land!


(Image source: https://azure.microsoft.com/en-us/global-infrastructure/geographies/)



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why are you

**CONSIDERING**

moving to the cloud



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## CLOUD!

- NOW!
- Drop everything!
- We're all in!
- Do it!
- GO!
- *Uh-oh.*



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## Why move to the cloud?

- Did the CEO read about it in a trade mag (SkyMall)?
- Compare & contrast
- Public cloud
- Regional co-lo
- Cloud services
- Great automation




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## Competitive Advantage

- Does cloud bring competitive advantage?
- Business, not just tech
- Quantify the advantages
- Monetize the advantages




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## Not just a tech change

- Cloud is not all IT-driven
- Business must be aligned
- Cloud is a ***means***, not an ***end***
- How to systematically measure the value
- Platform modernization




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## Cloud Migration Myths

- It's all or nothing
- It's cheaper
- It's "better"
- No maintenance required
- It's easy
- Makes things faster
- Guaranteed available
- Everyone's doing it




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## Cloud Migration Facts

- Flexibility
- Security / data protection / compliance
- Application and data modernization
- Speed of performing IT operations
- Scalability
- Automation
- Efficiency in staff time to manage key systems
- Financial model shift – CAPEX to OPEX
- You're probably not in the datacenter business




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how do you

**WANT**

to use the

cloud






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## Use Cases

- Not always “all-in”
- Understand the offerings
- Define strategy before migrations start




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## Off-site storage for backups

- Start small
- Replicate VMs & DB backups
- Hot / warm / cool standby XaaS
- Usually cheaper than DIY disaster recovery




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## Burst scalability

- Cloud moves faster than your IT department
- Scale outwards with right app architecture
- Scale to cloud when needed
- Scale back when completed




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## Specific services

- System integrations
- Data lakes
- Reporting / BI workloads
- Machine learning
- Geo-scale out data (CosmosDB)




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## All-In!

- Done being your own datacenter provider?
- Move everything
- What is *needed* to move everything?
- How will users / apps connect?




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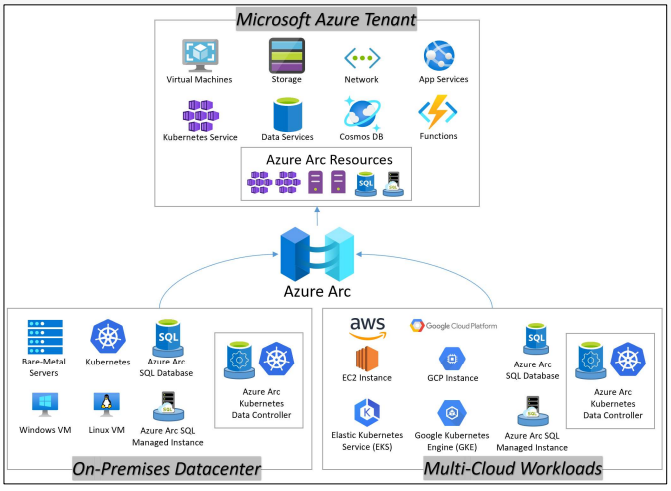
## Azure Arc

- Cloud automation and provisioning
- …but in your on-premises datacenter
- Single management & telemetry interface
- azure.microsoft.com/en-us/services/azure-arc







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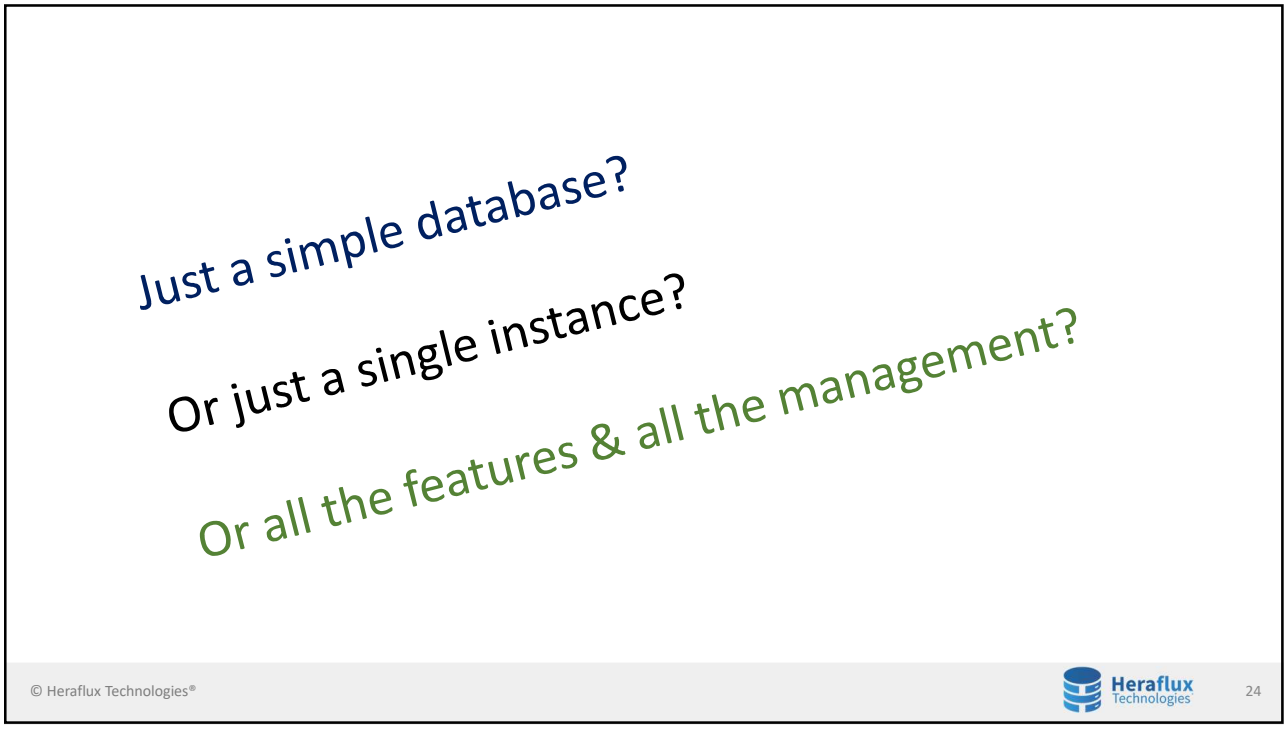


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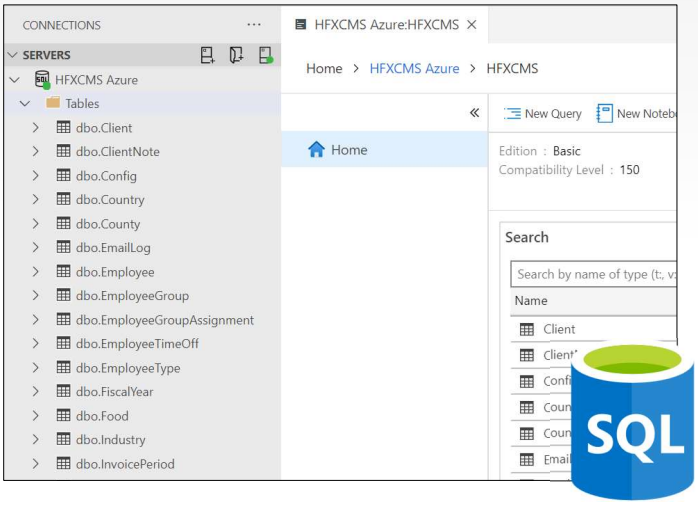
## Database Services in the Cloud - DBaaS

- Azure SQL Database
- Just a database
- No OS, instance access
- Availability & DR
- Criticality Tiers
  - General purpose
  - Business critical







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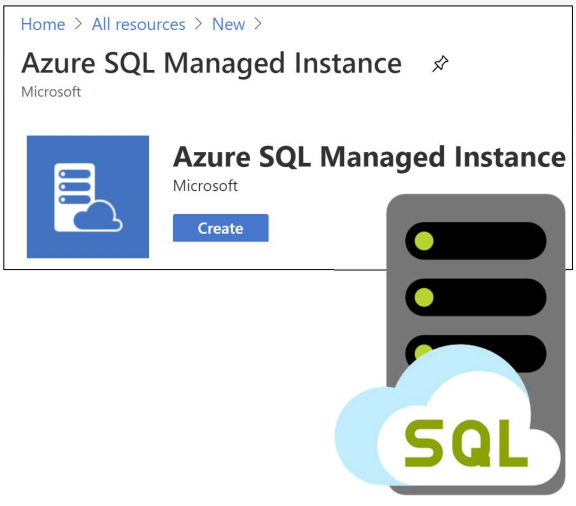
## Database Services in the Cloud - PaaS

- Azure SQL Managed Instance
- Amazon RDS
- Instance as a service
- Multiple databases
- Agent jobs
- No OS access
- Availability & DR
- Criticality Tiers







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## Database Services in the Cloud - IaaS

- SQL Server in a VM
- Full control
- Business as usual
- You patch it
- You HA it
- Cloud DR is easier… sort of.




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## Backup Replication

```
BACKUP DATABASE [ ] TO
URL = 'https://hfxstoragebackups.blob.core.windows.net/SQLServerBackups/toiletDB.bak'
WITH CREDENTIAL = 'AzureBlobCred',
STATS = 5;
```

- Backup to URL
- Copy FULL/DIFF/TRANLOG backup files to Azure BLOB
- Do not forget system DBs, OSE




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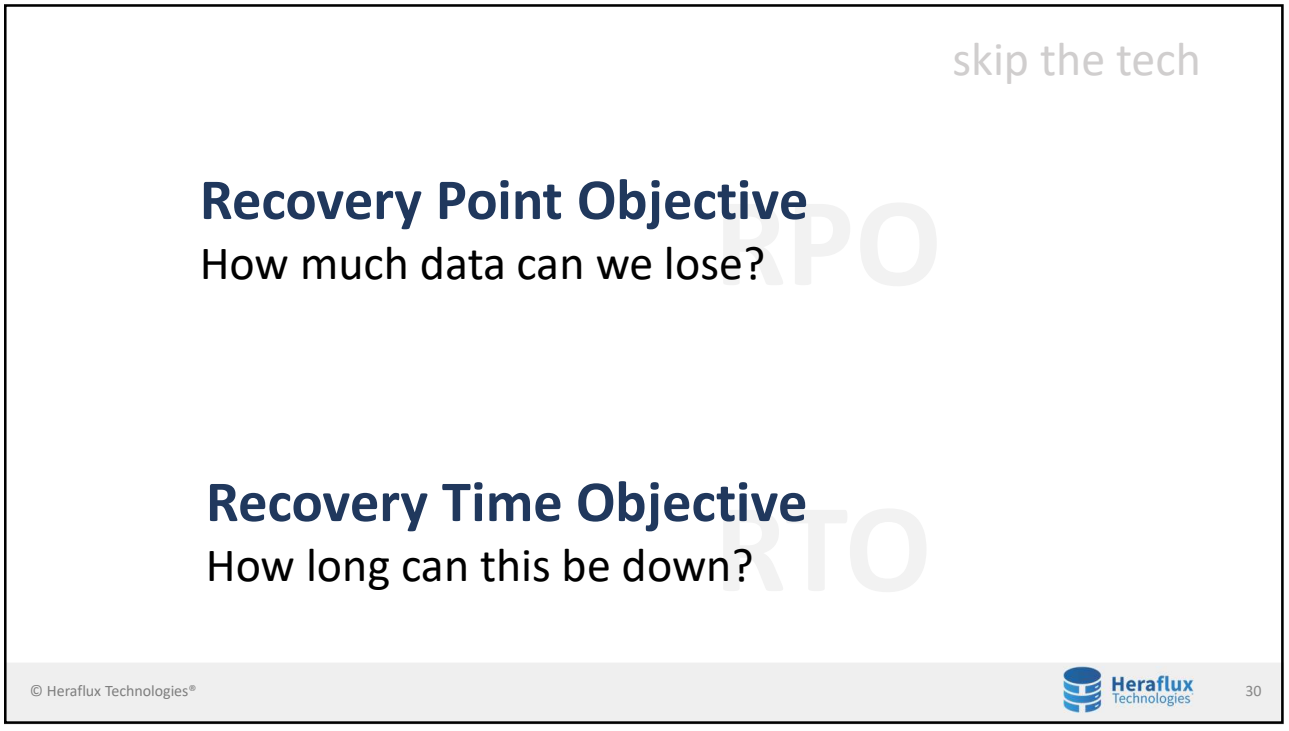


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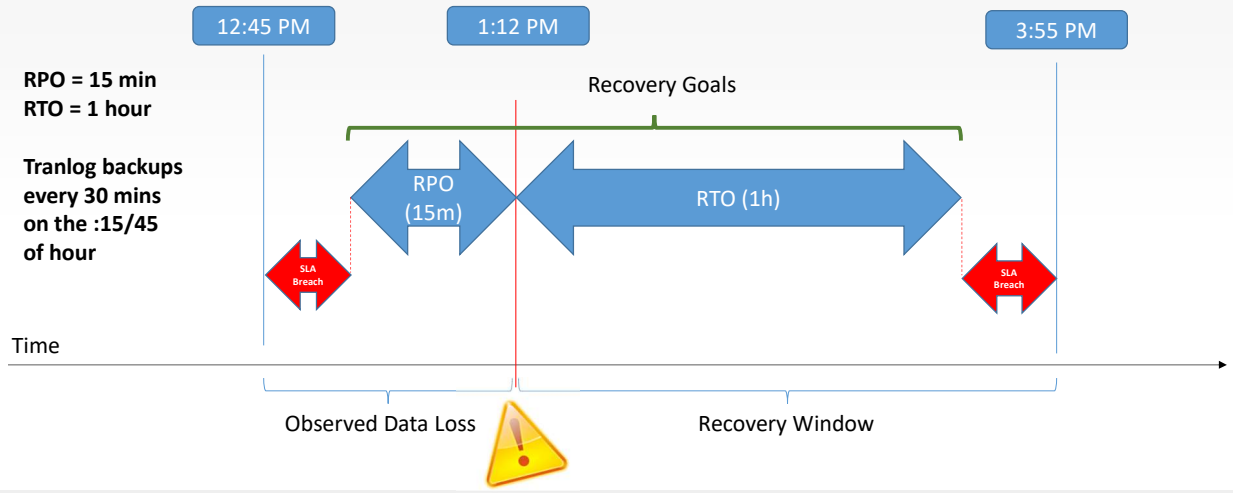
## Service Level Agreements







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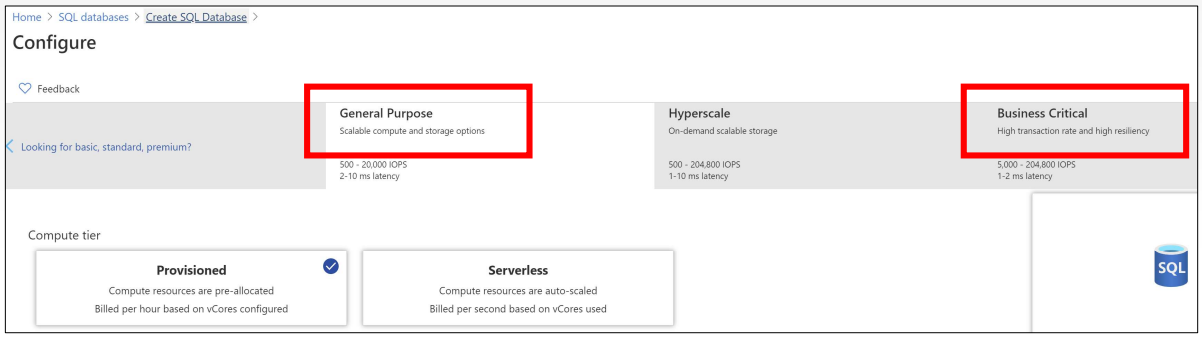
## Pick HA / Tier of Service




- SLAs listed at cloud service provider
- "Business critical" have improved SLAs

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## Availability Targets

- If availability requirements > platform options
- Re-review platform selection choice
- Complement platform HA with your own
- Ex: SQL Server Availability Group inside cloud IaaS
- Otherwise… reduce your expectations?




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what are your

**SECURITY**

requirements

?




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## Cloud Data Security

- What sort of data do you have?
- Any compliance required?
  - PCI / HIPAA / SOX / GDPR / etc.
- Who needs access to it?
- Your practices on-premises…
- Can you RTFM?
  - Can you read the funny manual?
  - Don't unlock cloud services beyond your needs!




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## Perspectives and Steps

- On-premises
  - Most things exposed to all other
- Cloud
  - Locked down by default
  - Have to open holes in firewalls
- Should have documented
  - Specific server access requirements
  - Ports too
  - What talks to what?




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how much

# PERFORMANCE

do you

# NEED

?



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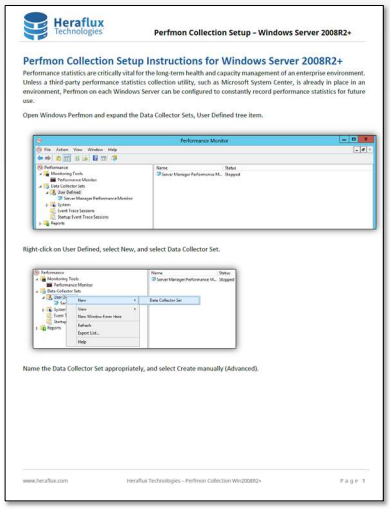
## What Are *Your* Servers Consuming?

- Do you have a good baseline?
- Third-Party Utilities
- Perfmon Setup Guide
  - hfxte.ch/perfmon
  - No contact info required
- Perfmon BLG to SQL Importer
  - github.com/heraflux/BLGtoSQL
- Server / Service / VM “Right-Sizing”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Perfmon Collection Setup – Windows Server 2008R2+

Perfmon Collection Setup Instructions for Windows Server 2008R2+

Performance statistics are critically vital for the long-term health and capacity management of an enterprise environment. Unless a third-party performance statistics collection utility, such as Microsoft System Center, is already in place in an environment, Perfmon on each Windows Server can be configured to constantly record performance statistics for future use.

Open Windows Perfmon and expand the Data Collector Sets, User Defined tree item.

Right-click on User Defined, select New, and select Data Collector Set.

Name the Data Collector Set appropriately, and select Create manually (Advanced).



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## Performance KPIs

- How much of each resource do you *need*?
- Reasonable collection granularity
- CPU consumption by core
- Memory usage for SQL Server
  - Not OS-level
  - PLE / memory grants pending / buffer cache hit ratio / etc.
- Storage IOPs / throughput




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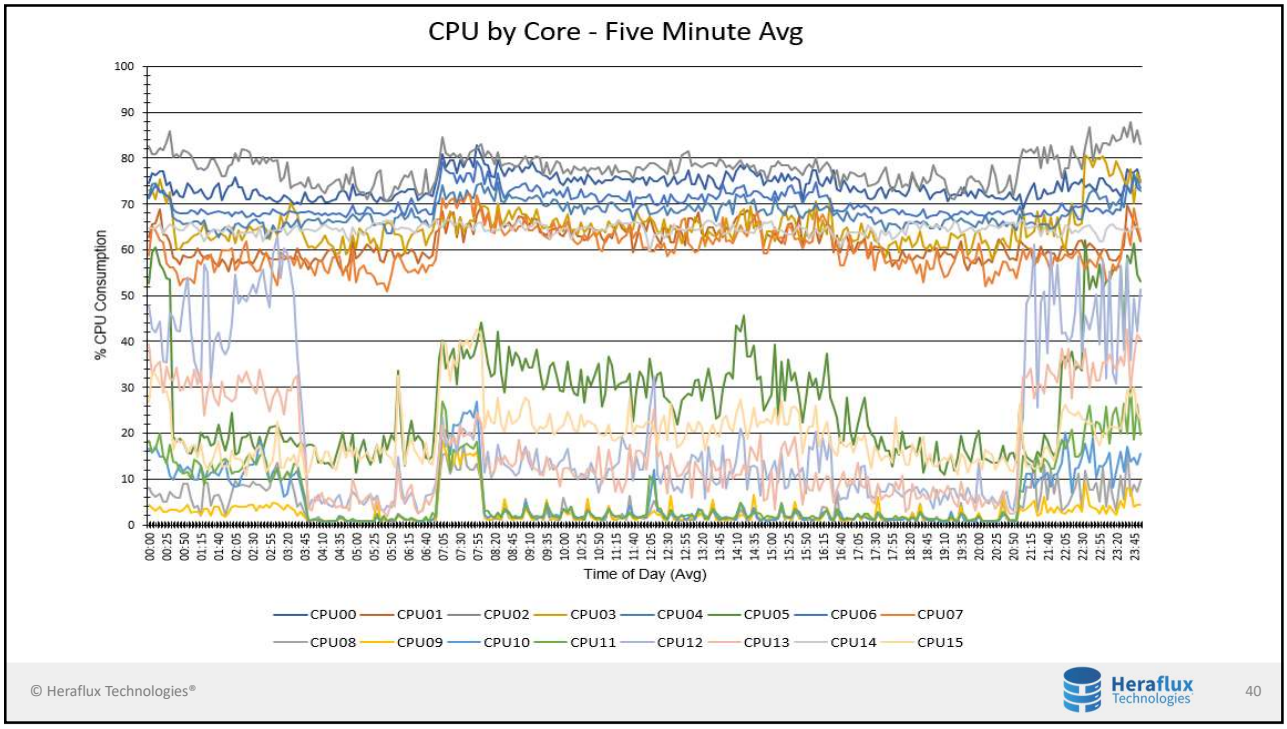





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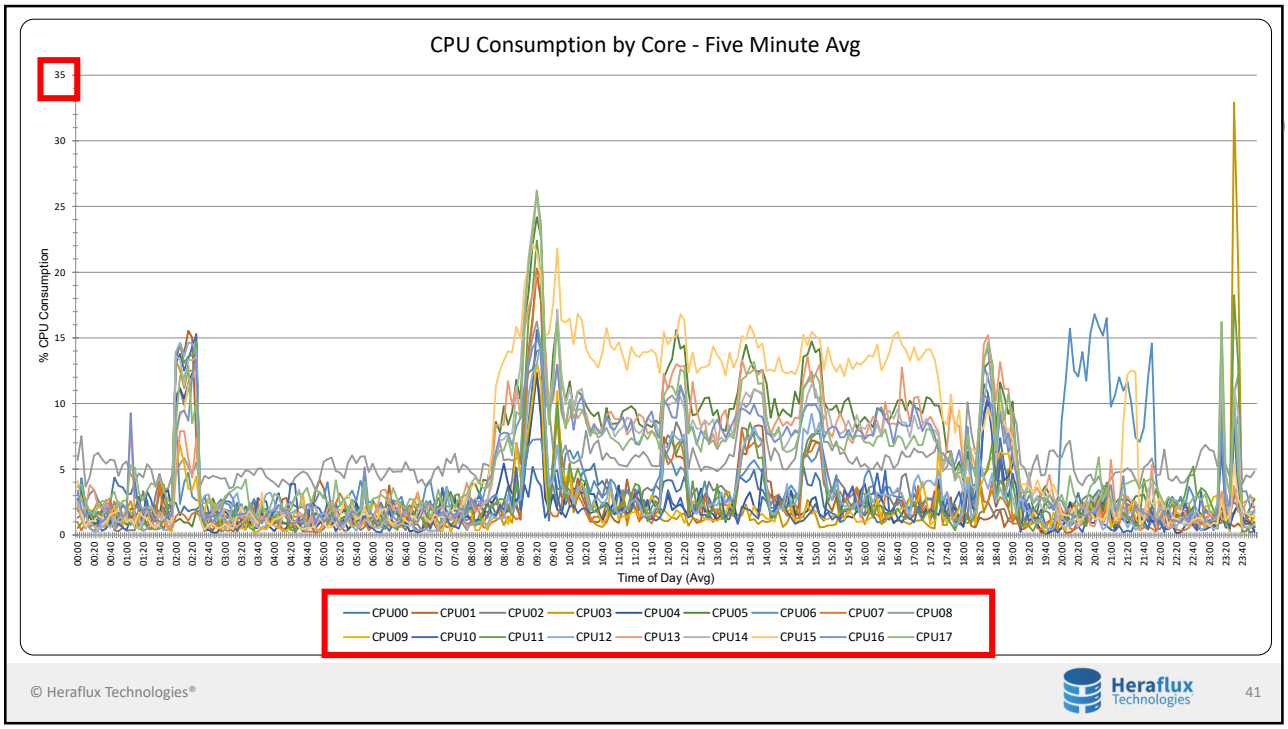


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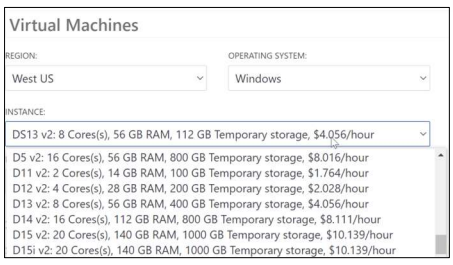
## Resource Allocations

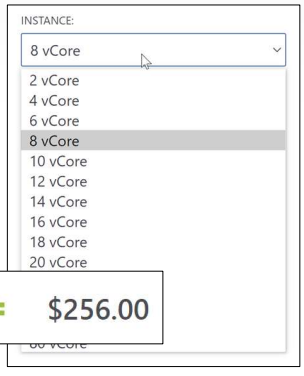
### Virtual Machines (IaaS)

- You select series (CPU / RAM)
- Attach managed disks




### DBaaS / PaaS

- vCore model
- RAM is automatic
- Configure storage space needed



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how are you

**MIGRATING**

your data



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## Migration Strategies

- Not always as simple as backup & restore
- Virtual Machine Destination
  - Backup & restore
  - Log shipping
  - Detach / attach files
  - Mirroring
  - Replication
  - Availability Groups
  - BACPAC export / import
  - Azure Data Migration Assistant
- Managed Instance Destination
  - Backup & restore (from URL)
  - BACPAC export / import
  - Azure Data Migration Assistant




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## Migration Strategies

- Azure SQL Database
- BACPAC export / import
- Azure Data Migration Assistant
- Azure Data Migration Services





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## Platform Constraints for Moving Out

- Includes tasks like database refreshes to lower tiers
- Cannot back up from Azure SQL DB to SQL Server
- Cannot back up from Managed Instance to regular SQL Server
  - CAN do this SQL Server 2022+
- Data extraction
  - BACPAC
  - SSIS




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## Existing Licensing

- How are you currently licensed?
- Does your existing licensing transfer?
- Azure Hybrid benefit
  - Migration of servers licensed on-prem to Azure
  - Requires Software Assurance
  - Can also transfer between on-prem VM licensing & DBaaS
- DR-specific licensing clauses




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## Existing Licensing

- Run the numbers ahead of your migration
- Make sure to “right-size” your destination!
- Azure Hybrid benefit
  - Migration of servers licensed on-prem to Azure
  - Requires Software Assurance
  - Can also transfer between on-prem VM licensing & DBaaS
- DR-specific licensing clauses




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have you
calculated the
**MONTHLY COST**
of your
cloud services




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# Allocation vs. Consumption

- Cloud myth!
- "Pay for what you use"
- Cloud is partially this model
  - Azure Blob, network throughput, DNS lookups, etc.
- Is partially pay by what you allocate
  - Database IaaS, PaaS, sometimes DBaaS, managed disks, etc.




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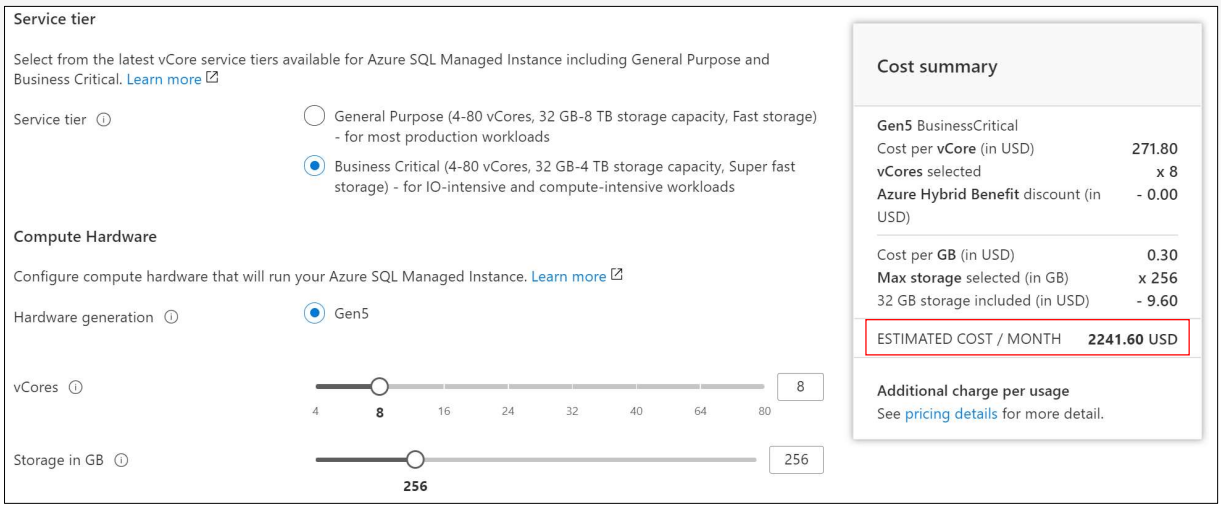
# Allocation







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## Cost Estimation (& Savings)

- Factors for sizing
- Estimated CPU consumption (peak & biz hours)
- Memory need
- Storage speed
- Storage space
- Bandwidth
- DR needs
- Azure Calculator
  - azure.microsoft.com/en-us/pricing/calculator/


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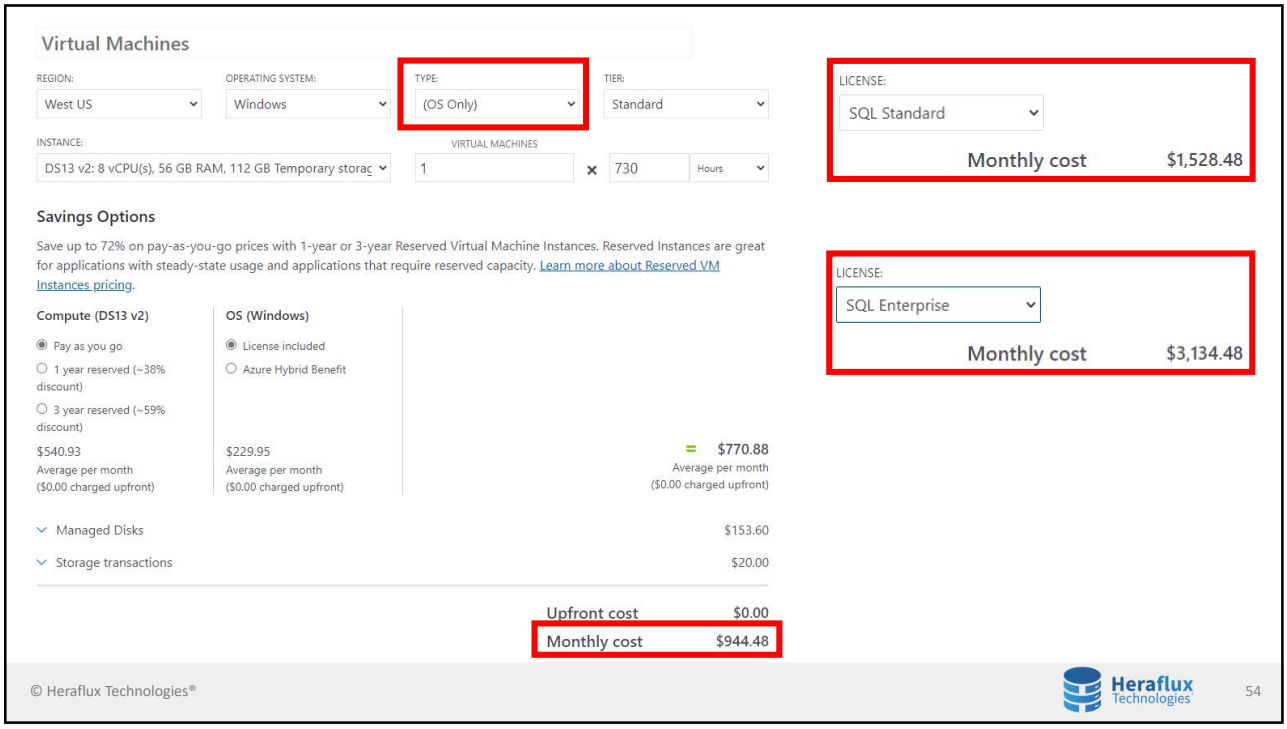



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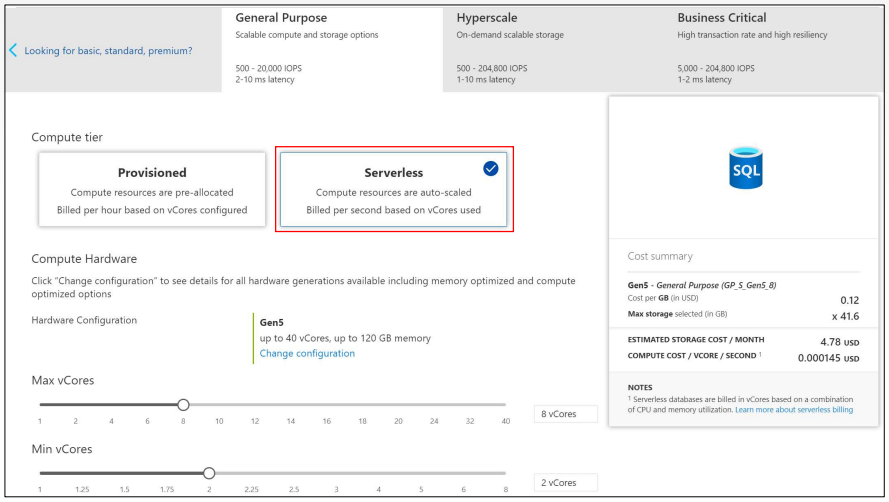
# "Serverless"



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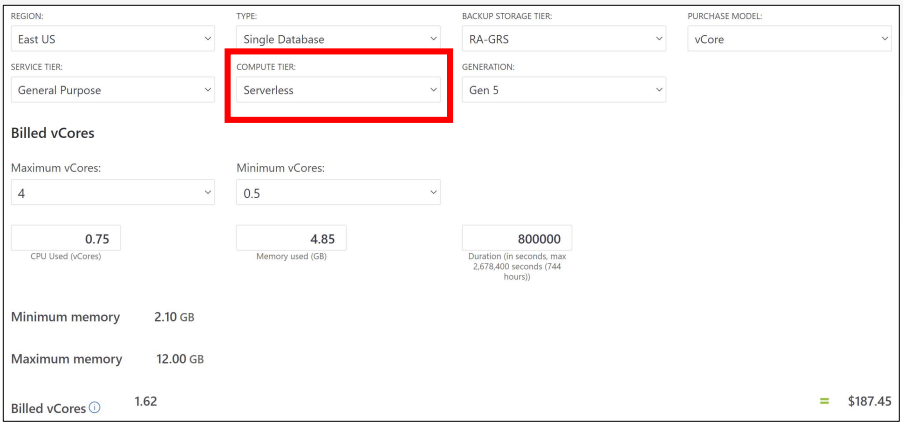
# Service Times

- "Serverless" option
- Shuts down after X time
- Billed for compute while on
- Billed for storage 24x7
- Save $$$



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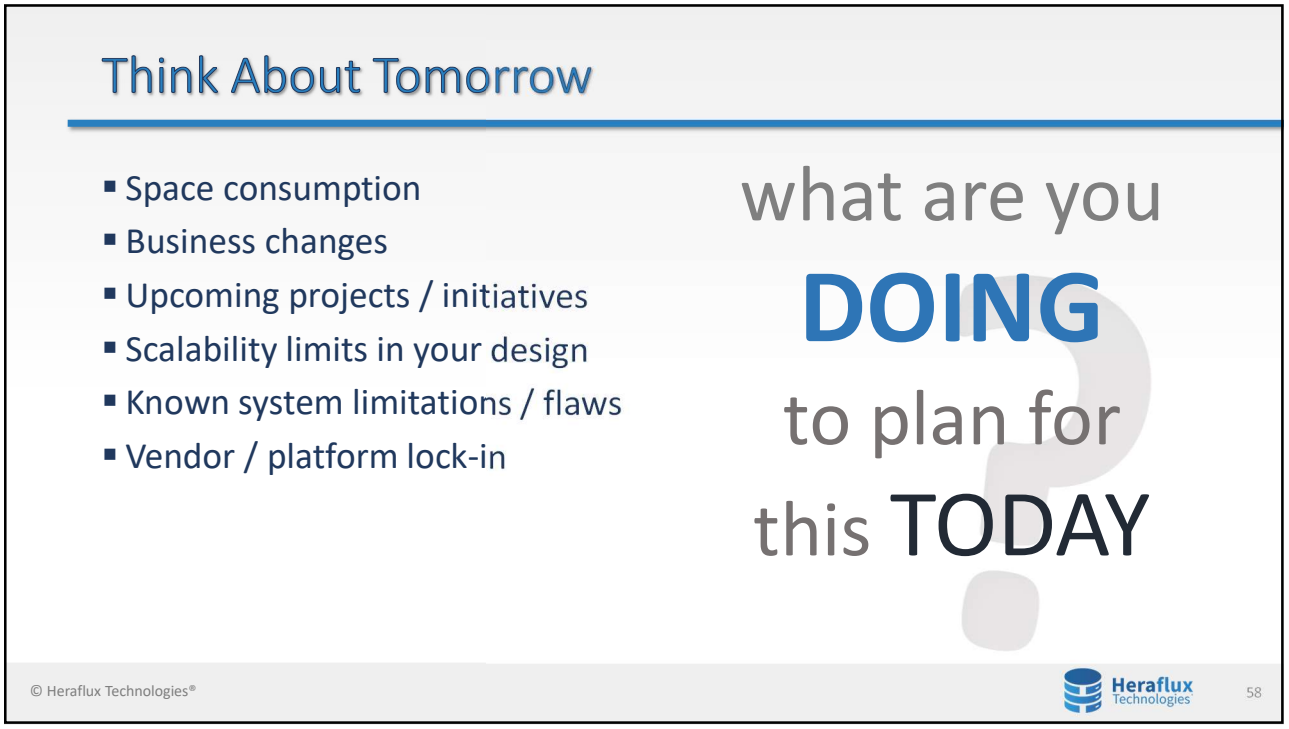


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## Put It All Together

- Cloud is a great tool in your toolbox
- It is not the ONLY tool
- Migrate services for real reasons
- Choose your path wisely
- Understand your cost model
- Plan for the future




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## Questions?

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