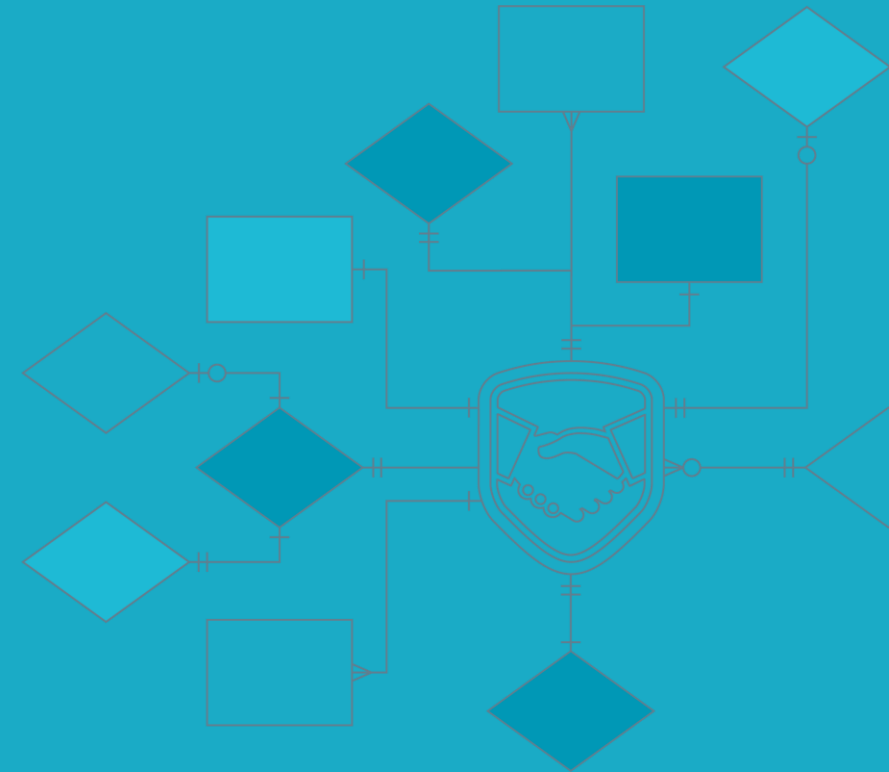




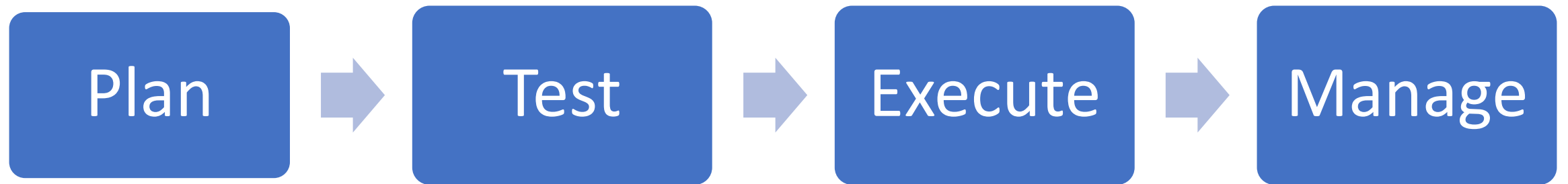
Procure SQL

Successfully migrate existing databases to Azure SQL Database

John Sterrett
Principal Consultant



Common Migration failures



Free Reference Material

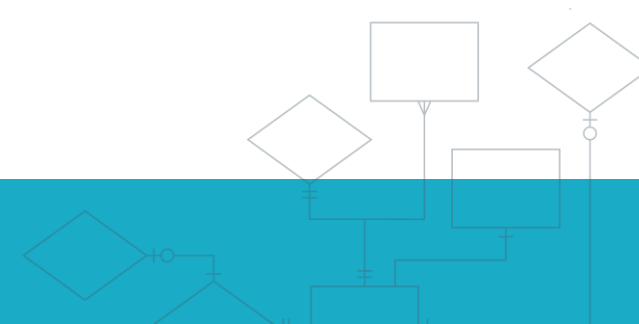
Videos, Reference Links, Tips, and slide deck
can be found at

<http://azuresqlresources.procuresql.com/>




Agenda

- Where Should My Data Go?
- How do I plan a successful migration?
- How to migrate my Data?
- How to leverage PaaS Benefits?
- What am I responsible for Post Migration?



About John Sterrett



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-  linkedin.com/in/johnsterrett



Microsoft
CERTIFIED

Solutions Expert

Data Platform

Microsoft
CERTIFIED

Solutions Expert

Data Management and
Analytics



ProcureSQL



Procure SQL



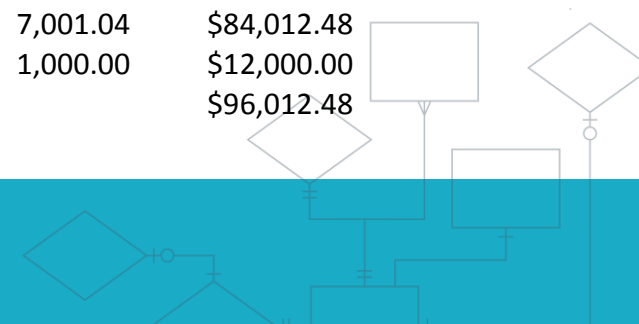
Three reasons people are migrating?



Cost Comparison

<u>Qty</u>	<u>Item</u>	<u>Cost</u>	<u>Total Cost</u>	<u>Five Years</u>	<u>Ten Years</u>
2	PowerEdge R930 2xE7-8893 v4 (16 cores)	54,224.05	\$108,448.10	\$21,689.62	\$10,844.81
8	SQL 2016 Enterprise Cores (2 Core Pack)	14,256.00	\$114,048.00	\$22,809.60	\$11,404.80
	Support				
	Power				
			\$222,496.10	\$44,499.22	\$22,249.61
4	PowerEdge R930 2xE7-8893 v4 (16 cores)	54,224.05	\$216,896.20	\$43,379.24	\$21,689.62
16	SQL 2016 Enterprise Cores (2 Core Pack)	14,256.00	\$342,144.00	\$68,428.80	\$34,214.40
	Support				
	Power				
			\$559,040.20	\$111,808.04	\$55,904.02

	<u>Monthly</u>	<u>Yearly</u>
Premium Elastic Database -eDTU 250	1,398.72	\$16,784.64
Support (Standard)	300.00	\$3,600.00
Power		\$0.00
		\$20,384.64
Premium Elastic Database - eDTU 1500	8,370.00	\$100,440.00
Support (Professional Direct)	1,000.00	\$12,000.00
		\$112,440.00
P11 Single Database	7,001.04	\$84,012.48
Support (Professional Direct)	1,000.00	\$12,000.00
		\$96,012.48



Security Enhancements



Azure SQL Features...

Security

Azure Data
Sync

Active Geo-
Replicas

Performance
Insight

Automated
Tuning

Adaptive
Query
Processing



Features Supported

SQL Server feature support in Azure SQL Database

The following table lists the major features of SQL Server and provides information about whether the feature is partially or fully supported and a link to more information about the feature.

SQL Feature	Supported by single databases and elastic pools	Supported by managed instances
Active geo-replication	Yes - all service tiers other than hyperscale	No, see Auto-failover groups
Auto-failover groups	Yes - all service tiers other than hyperscale	Yes, in public preview
Always Encrypted	Yes - see Cert store and Key vault	Yes - see Cert store and Key vault
Always On Availability Groups	High availability is included with every database. Disaster recovery is discussed in Overview of business continuity with Azure SQL Database	High availability is included with every database. Disaster recovery is discussed in Overview of business continuity with Azure SQL Database
Attach a database	No	No
Application roles	Yes	Yes

- <https://docs.microsoft.com/en-us/azure/sql-database/sql-database-features>



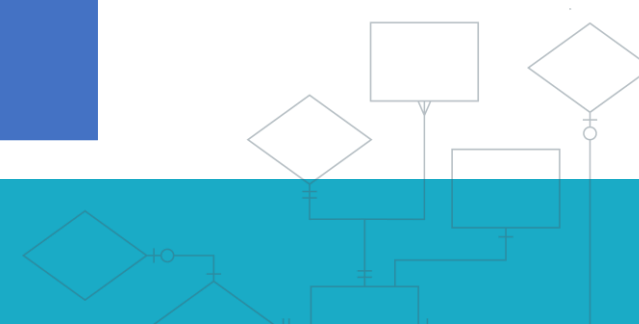
Where Should My Data Go?

Single
Database
(PaaS)

Elastic Pool
(PaaS)

Managed
Instance
(PaaS)

SQL VM (IaaS)



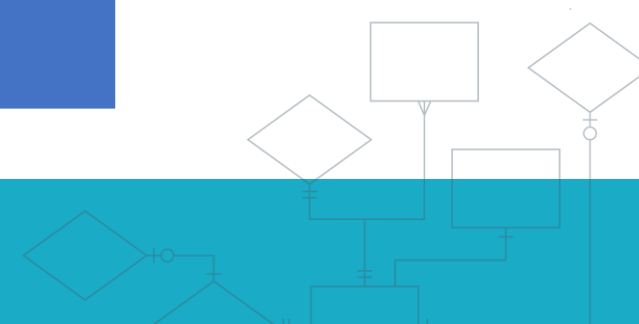
Pricing Models

DTU [single
database]

eDTU
[elastic pool]

vCore

Hyperscale
(Preview)



What is DTU?

Database Transaction Unit – DTU

Bounding box

Monitoring database workload utilization within bounding box

Represents the relative power (resources) assigned to the database

Blended measure of CPU, memory, and read-write rates

Compare the power across performance levels

Simplifies talking about performance, think IOPS vs. %

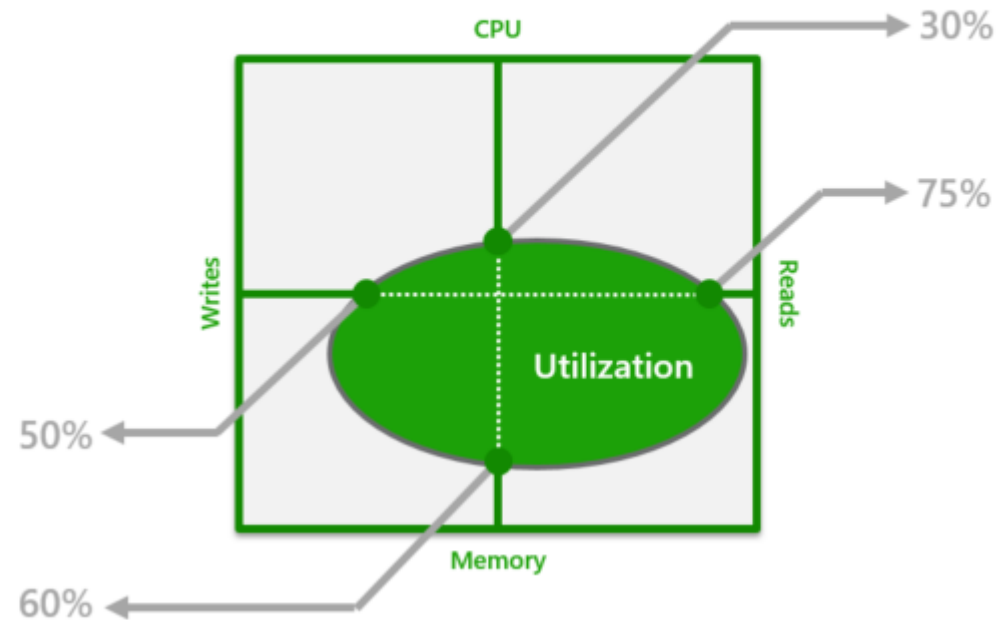
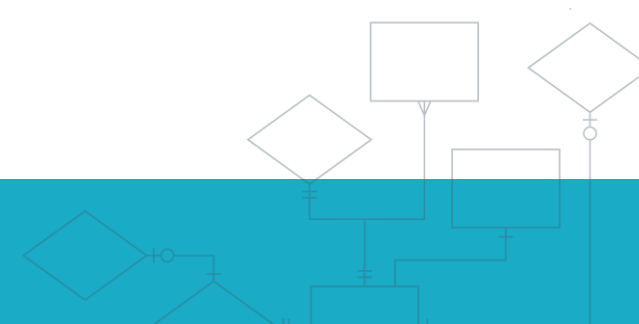


Image Source: [Microsoft Docs](#)



DTU vs vCore?

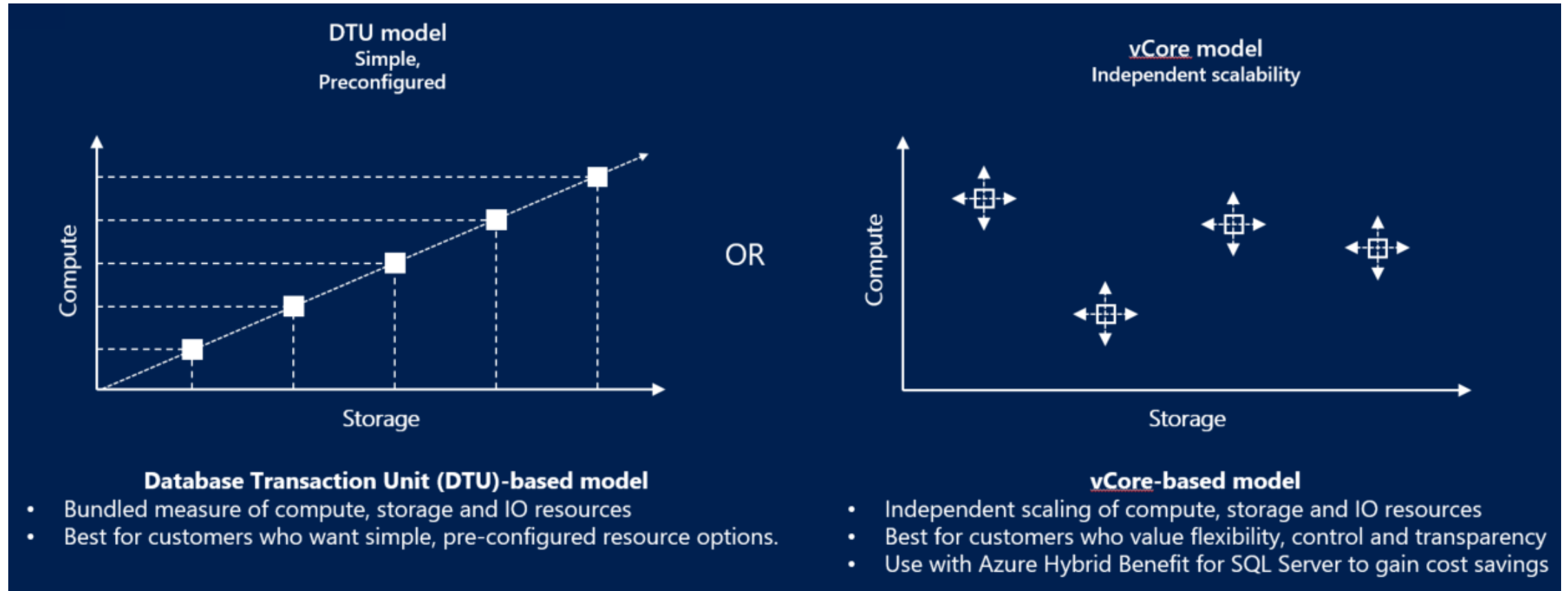
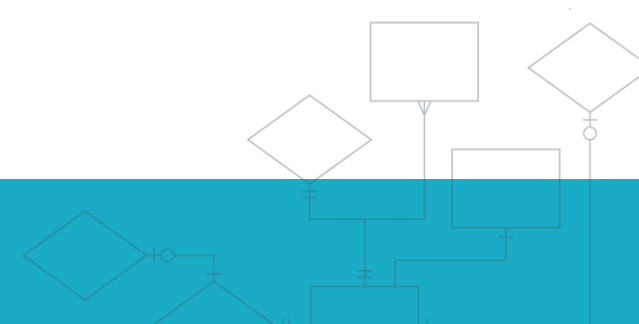
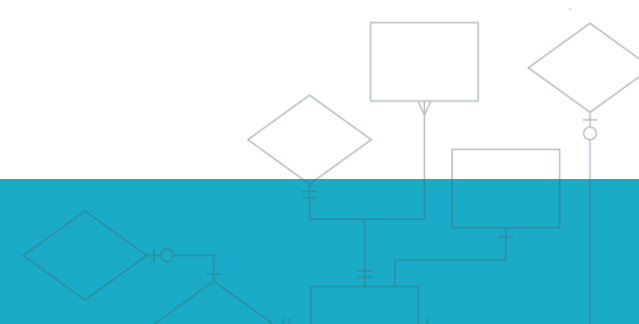


Image Source: [Microsoft Docs](https://docs.microsoft.com/en-us/azure/sql-database/sql-database-compare-dtu-vcore)



vCore to DTU ratio

- Each **100 DTU** in **Standard** tier requires at least **1 vCore** in **General Purpose** tier
- Each **125 DTU** in **Premium** tier requires at least **1 vCore** in **Business Critical** tier



Pricing DTU vs vCore

Basic For less demanding workloads Starting at 4.99 USD / month

Standard For workloads with typical performance requirements Starting at 15.00 USD / month

Premium For IO-intensive workloads. Starting at 465.00 USD / month


[vCore-based purchasing options](#)
Click here to customize your performance using vCores

DTUs [What is a DTU?](#)

10 20 50 100 (S3) 200 400 800 1600 3000

Data max size

100 MB 250 GB 1 TB 250 GB



Cost Summary

Cost per DTU (in USD)	1.50
DTUs selected	x 100
EST. COST PER MONTH	150.00 USD

[Looking for basic, standard, premium?](#)

General Purpose
Scalable compute and storage options
Up to 7,000 IOPS
5-10 ms latency
Starting at 136.80 USD / month

Hyperscale
On-demand scalable storage
Data up to 200,000 IOPS, 1-2 ms latency
Log up to 7,000 IOPS, 5-10ms latency

Business Critical
High transaction rate and high resiliency
Up to 200,000 IOPS
1-2 ms latency

Compute Generation

Gen4

up to 24 vCores

up to 168 GB memory

Gen5

up to 80 vCores

up to 408 GB memory


vCores [How do vCores compare with DTUs?](#)

1 2 3 4 5 6 7 8 9 10 16 24 1 vCore

Data max size

5 GB 250 GB 1 TB 250 GB

LOG SPACE ALLOCATED 75 GB



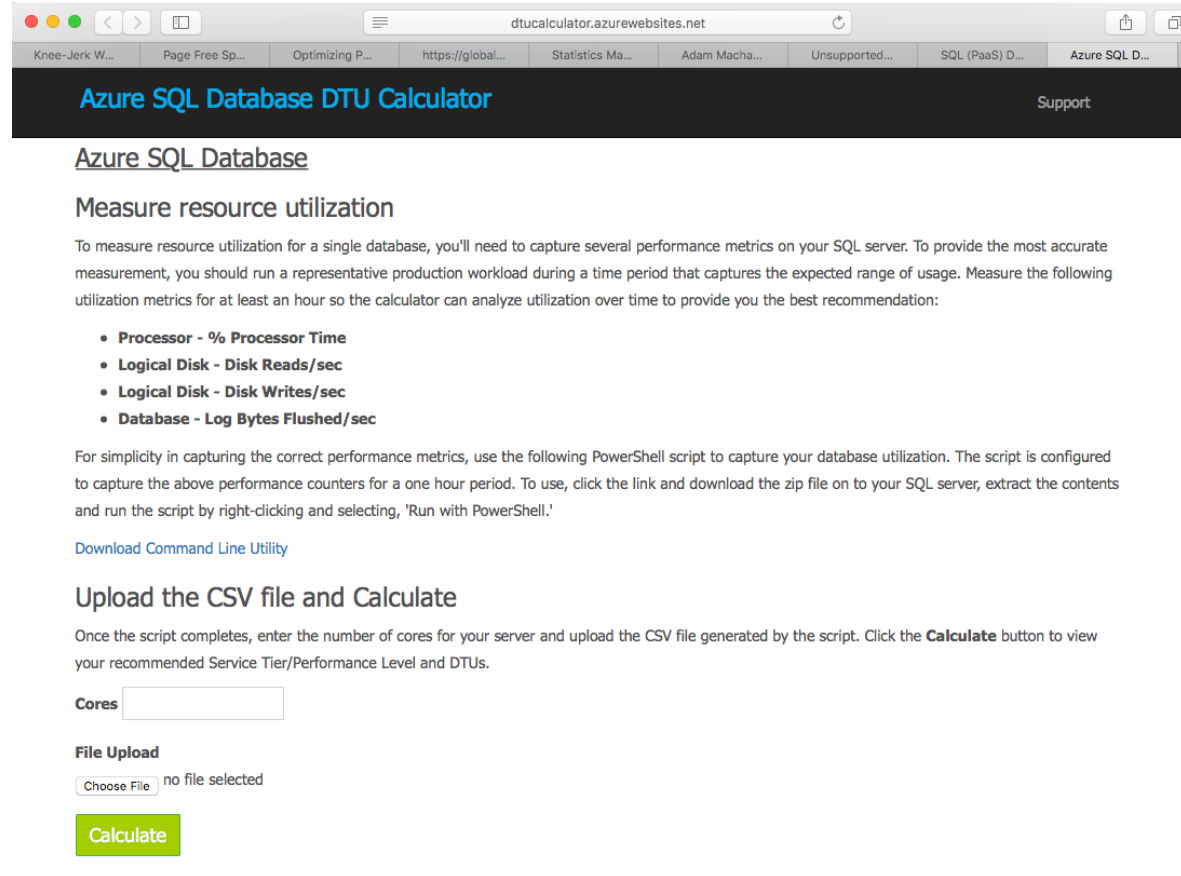
Cost Summary

Gen4 - General Purpose (GP_Gen4_1)

Cost per vCore (in USD)	135.90
vCores selected	x 1
Cost per GB (in USD)	0.14
Max storage selected (in GB)	x 325
EST. COST PER MONTH	180.75 USD



What performance tier should we use?



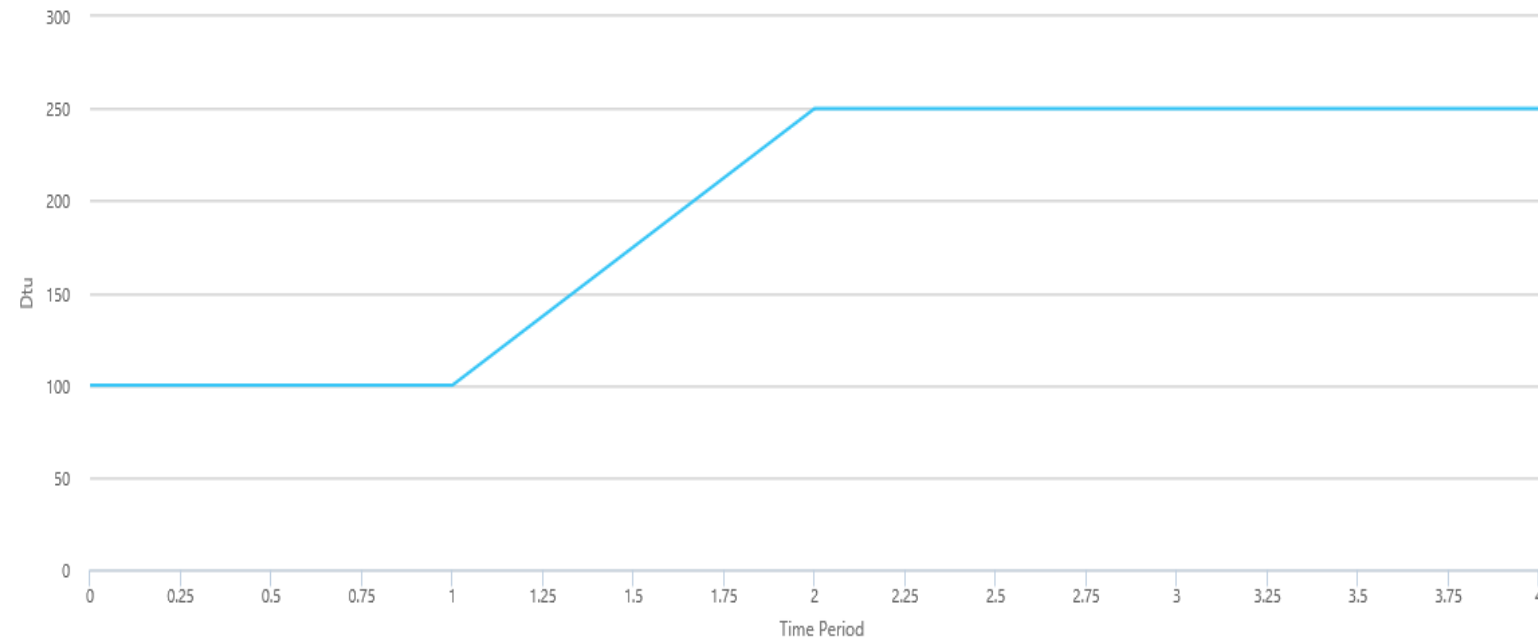
The screenshot shows a web browser window with the URL `dtcalculator.azurewebsites.net`. The page title is "Azure SQL Database DTU Calculator" and it includes a "Support" link. The main heading is "Azure SQL Database" followed by "Measure resource utilization". The text explains that to measure resource utilization, several performance metrics need to be captured over a representative production workload for at least an hour. A list of metrics includes: Processor - % Processor Time, Logical Disk - Disk Reads/sec, Logical Disk - Disk Writes/sec, and Database - Log Bytes Flushed/sec. A PowerShell script is provided for capturing these metrics. Below this, there is a section for "Upload the CSV file and Calculate" which includes a "Cores" input field, a "File Upload" section with a "Choose File" button and "no file selected" text, and a green "Calculate" button.

[Dtcalculator.azurewebsites.net](https://dtcalculator.azurewebsites.net)



DTU Calculator Results

DTUs Over Time

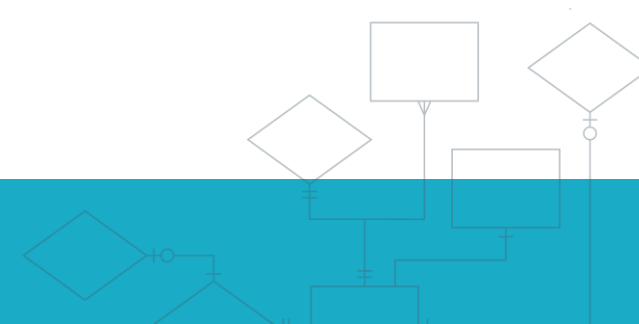
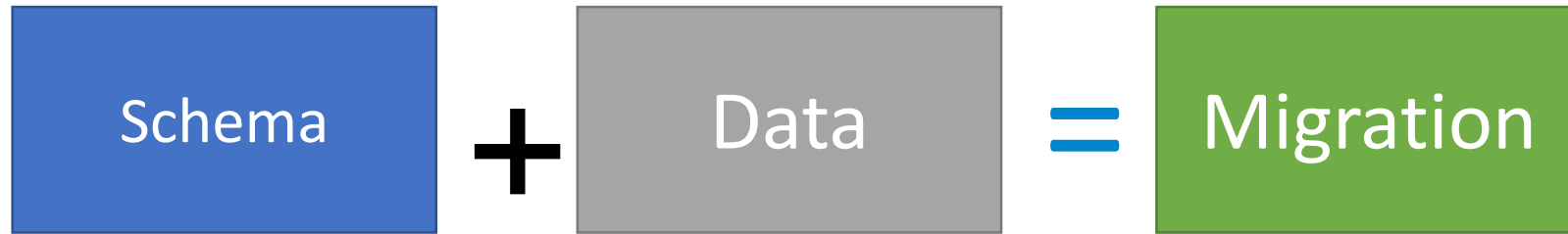


Based on your database utilization, we recommend you migrate your SQL Server workload to **Premium - P2**. This Service Tier/Performance Level should cover approximately **100.00 %** of your utilization.



How do you successfully
Migrate Databases?

Migrating Your Data To Azure SQL Database



Options to Move Your Data...

BACKPAC

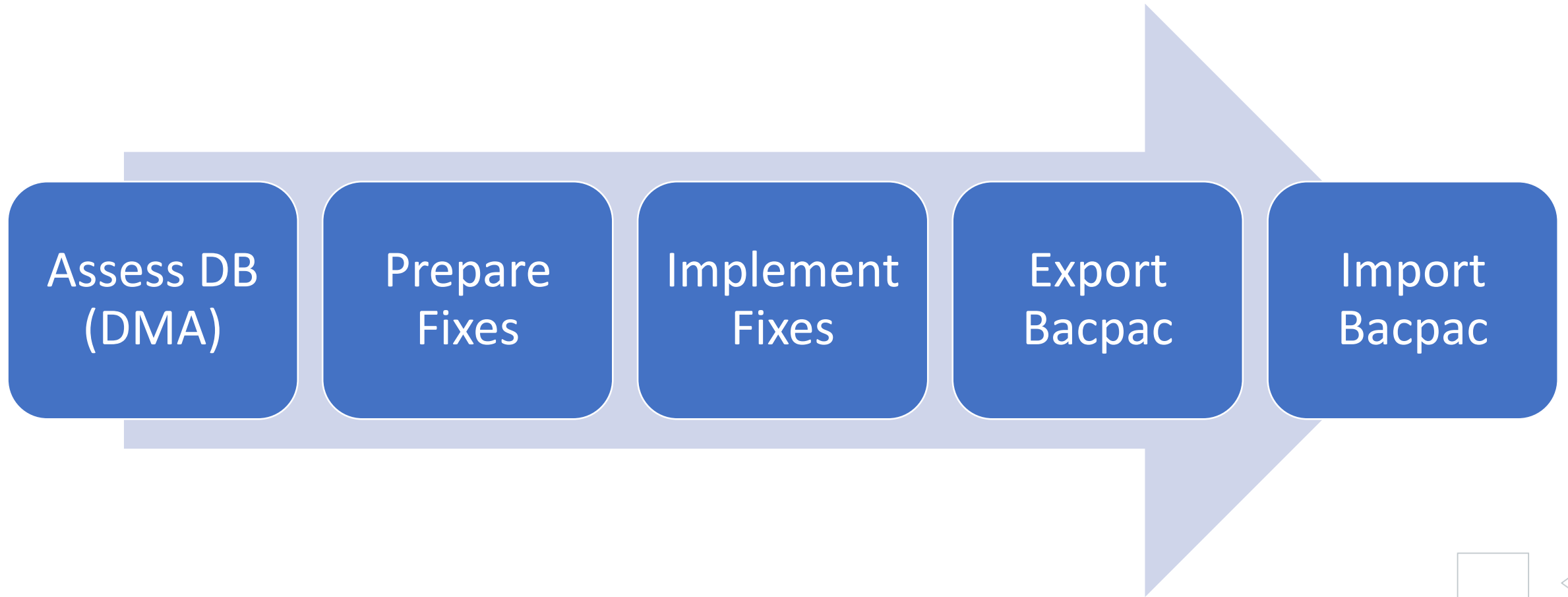
Transactional
Replication

Data Migration
Service

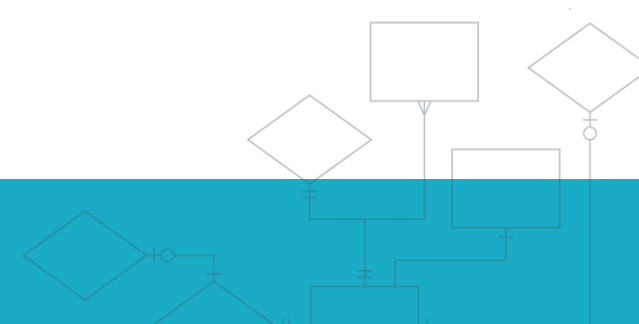
Restore Backup
(Managed
Instance)



Migrating to Azure SQL Database



<https://azure.microsoft.com/en-us/documentation/articles/sql-database-cloud-migrate/>



Migrate Schema with Data Migration Assistant

The screenshot displays the Data Migration Assistant (DMA) interface during the 'Script & deploy sql' step. The progress bar shows six steps: 1. Select source, 2. Select target, 3. Select objects, 4. Script & deploy sql (current), 5. Select tables, and 6. Migrate data. The summary table indicates the source database is AdventureWorksLTGOOD on localhost\rc3 and the target database is SQLSatNash on procuresql.database.windows.net. Assessment issues show no blocking or other issues. The generated script includes commands to create the SalesLT schema and set ANSI NULLS ON. The deployment results window shows three successful commands: creating indexes, creating the schema, and setting ANSI NULLS ON.

Source database	Target database	Assessment issues
AdventureWorksLTGOOD localhost\rc3	SQLSatNash procuresql.database.windows.net	No selected objects with blocking issues No selected objects with other issues

This script was generated for the selected schema objects. Review the script, make edits if necessary, and click "Deploy schema" to deploy to Azure SQL Database. Any selected users were not scripted; these will be migrated separately upon clicking "Deploy schema." SQL logins associated with selected users will be recreated with strong, random passwords. You will need to change these passwords and enable them again on the target.

Generated script

```
/****** DMA Schema Migration Deployment Script      Script Date: 1/12/18 10:49:38 PM *****/  
  
/***** Object: Schema [SalesLT]      Script Date: 1/12/18 10:49:38 PM *****/  
IF NOT EXISTS (SELECT * FROM sys.schemas WHERE name = N'SalesLT')  
EXEC sys.sp_executesql N'CREATE SCHEMA [SalesLT]'  
  
GO  
IF NOT EXISTS (SELECT * FROM sys.fn_listextendedproperty(N'MS_Description' , N'  
EXEC sys.sp_addextendedproperty @name=N'MS_Description', @value=N'Contains obje  
GO  
/***** Object: StoredProcedure [dbo].[uspPrintError]      Script Date: 1/12/18  
SET ANSI NULLS ON
```

Deployment results (383 commands execute...)

- Executed 381 of 383: /***** Indexes For Vi... Command executed successfully.
- Executed 382 of 383: IF NOT EXISTS (SELEC... Command executed successfully.
- Executed 383 of 383: IF NOT EXISTS (SELEC... Command executed successfully.

Schema migration completed. Duration: 0h 2m 52s

Buttons: Back, Redeploy schema, Migrate data



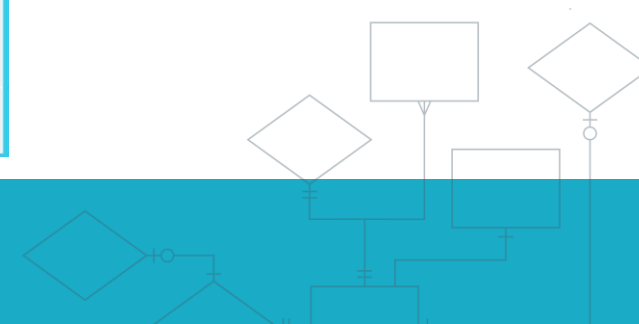
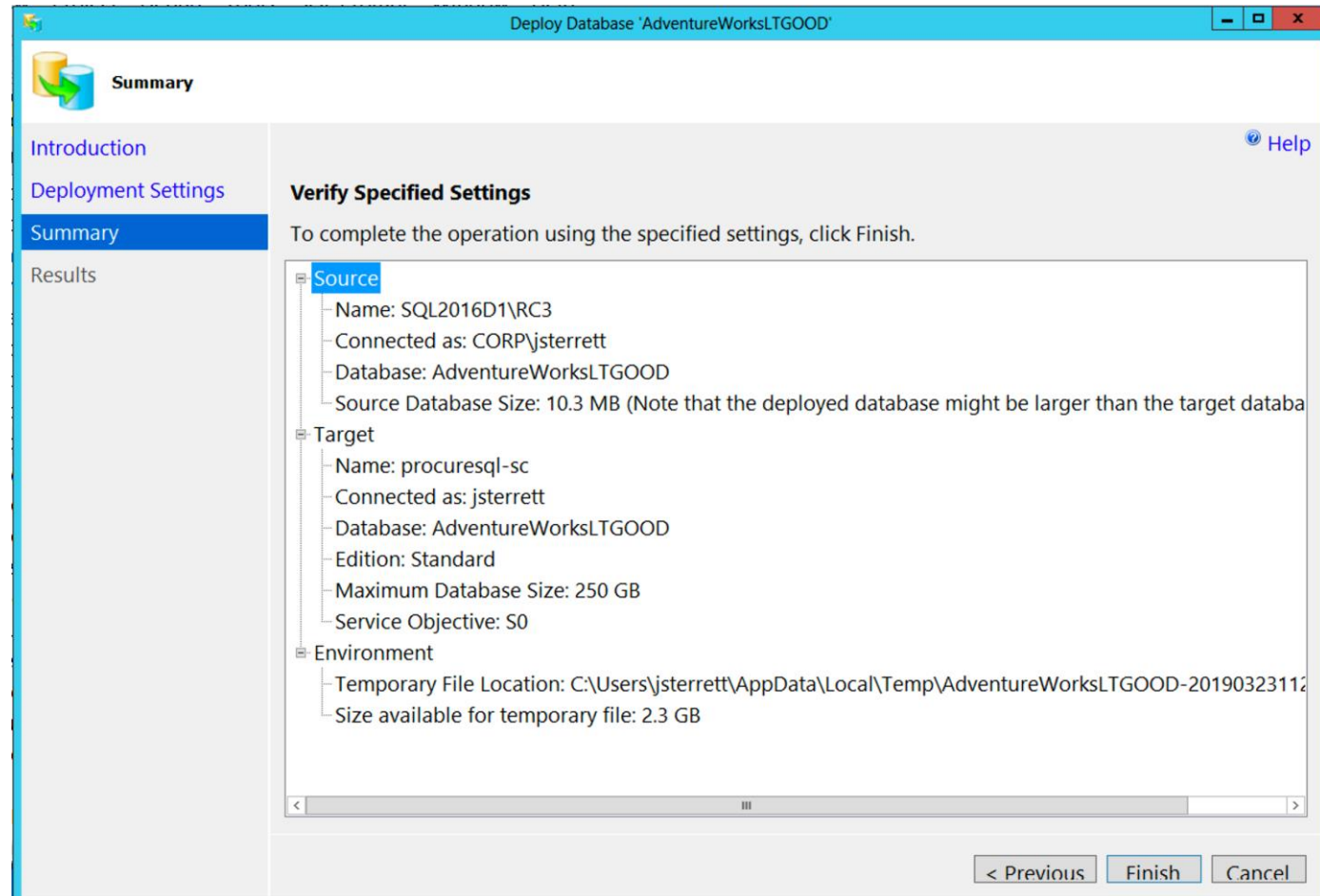
Select Tables to Move

The screenshot shows the 'Data Migration Assistant' window for a migration named 'test2'. The progress bar indicates that steps 1 through 4 are completed, and step 5, 'Select tables', is the current active step. The source database is 'AdventureWorksLTGOOD' on 'localhost\rc3', and the target database is 'SQLSatNash' on 'procuresql.database.windows.net'. A message advises changing the Azure SQL Database performance level to P15. A table below lists 12 selected tables, all of which are marked as 'Ready to move' with an 'OK' status.

<input checked="" type="checkbox"/>	Table name	Row count	Ready to move
<input checked="" type="checkbox"/>	[SalesLT].[Address]	450	OK
<input checked="" type="checkbox"/>	[SalesLT].[Customer]	847	OK
<input checked="" type="checkbox"/>	[SalesLT].[CustomerAddress]	417	OK
<input checked="" type="checkbox"/>	[SalesLT].[Product]	295	OK
<input checked="" type="checkbox"/>	[SalesLT].[ProductCategory]	41	OK
<input checked="" type="checkbox"/>	[SalesLT].[ProductDescription]	762	OK



Deploy with SSMS

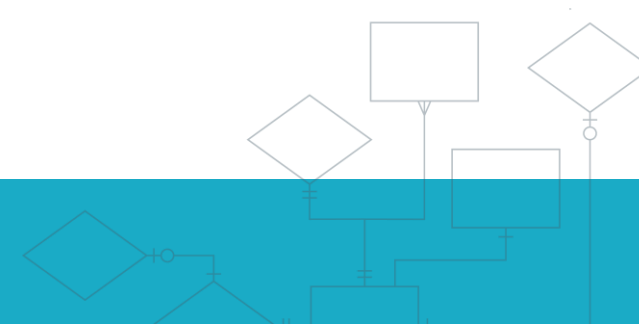


Migrate with SQLPackage.exe

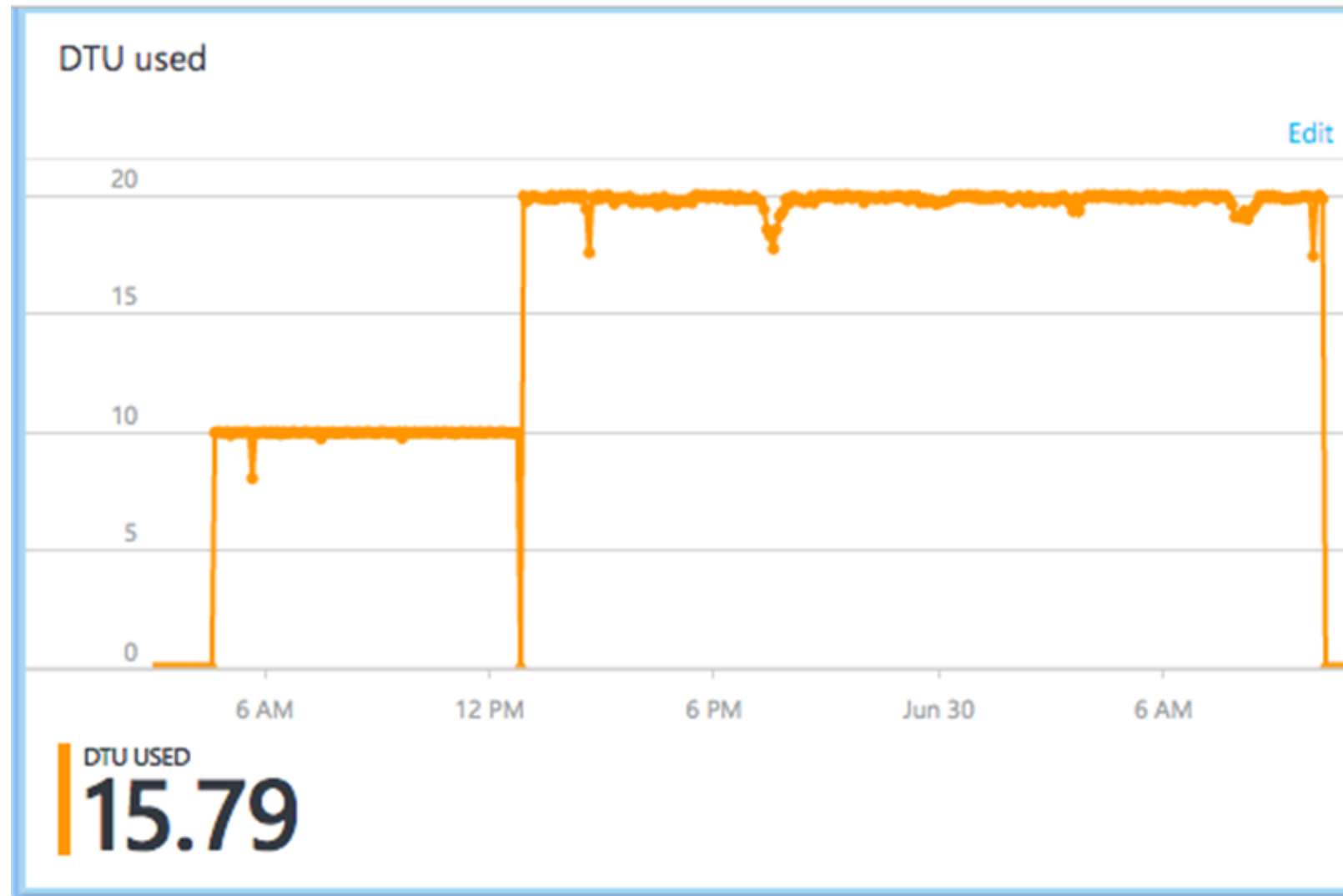
```
7  
5 #Import bacpac to Azure SQL DB  
6 .\SqlPackage.exe /a:import /tcs:"Server=tcp:procuresql-sc.database.windows.net,1433;Initial Catalog=TestDB;Persist  
7 /sf:C:\Demo\MigrateAzureSQLDB\AdventureworksLTGood.bacpac  
8 /p:DatabaseEdition=Standard /p:DatabaseServiceObjective=S1 /p:Storage=File  
9  
10  
Processing Table '[SalesLT].[ProductCategory]'.  
Processing Table '[SalesLT].[ProductDescription]'.  
Processing Table '[SalesLT].[ProductModel]'.  
Processing Table '[SalesLT].[ProductModelProductDescription]'.  
Processing Table '[SalesLT].[SalesOrderDetail]'.  
Processing Table '[SalesLT].[SalesOrderHeader]'.  
Enabling indexes.  
Enabling index 'IX_Address_AddressLine1_AddressLine2_City_StateProvince_PostalCode_CountryRegion'.  
Enabling index 'IX_Address_StateProvince'.  
Enabling index 'AK_Address_rowguid'.  
Enabling index 'IX_Customer_EmailAddress'.  
Enabling index 'AK_Customer_rowguid'.  
Enabling index 'AK_CustomerAddress_rowguid'.  
Enabling index 'AK_Product_Name'.  
Enabling index 'AK_Product_ProductNumber'.  
Enabling index 'AK_Product_rowguid'.  
Enabling index 'AK_ProductCategory_Name'.  
Enabling index 'AK_ProductCategory_rowguid'.  
Enabling index 'AK_ProductDescription_rowguid'.  
Enabling index 'AK_ProductModel_Name'.  
Enabling index 'AK_ProductModel_rowguid'.  
Enabling index 'AK_ProductModelProductDescription_rowguid'.  
Enabling index 'IX_SalesOrderDetail_ProductID'.  
Enabling index 'AK_SalesOrderDetail_rowguid'.  
Enabling index 'IX_SalesOrderHeader_CustomerID'.  
Enabling index 'AK_SalesOrderHeader_rowguid'.  
Enabling index 'AK_SalesOrderHeader_SalesOrderNumber'.  
Successfully imported database.  
  
PS C:\Program Files\Microsoft SQL Server\150\DAC\bin>
```



Easy Guide to Quickly Migrating Data



Migrating 60GB Database with S0



Overloading during Bulk Insert

Spid	command	Database	User	blocking_session_id	Status	Wait	sql_statement	Parent Query
51	BULK INSERT	StackOverflow	jsterrett	0	suspended	LOG_RATE_GOVERNOR	<?query -- insert bulk [dbo].[Posts] ([Id] Int...	insert bulk [dbo].[Posts] ([Id] Int, [AcceptedAns...
52	BULK INSERT	StackOverflow	jsterrett	0	suspended	LOG_RATE_GOVERNOR	<?query -- insert bulk [dbo].[Posts] ([Id] Int...	insert bulk [dbo].[Posts] ([Id] Int, [AcceptedAns...
53	BULK INSERT	StackOverflow	jsterrett	0	suspended	LOG_RATE_GOVERNOR	<?query -- insert bulk [dbo].[Posts] ([Id] Int...	insert bulk [dbo].[Posts] ([Id] Int, [AcceptedAns...
80	BULK INSERT	StackOverflow	jsterrett	53	suspended	LCK_M_IX	<?query -- insert bulk [dbo].[Posts] ([Id] Int...	insert bulk [dbo].[Posts] ([Id] Int, [AcceptedAns...
81	BULK INSERT	StackOverflow	jsterrett	0	suspended	LOG_RATE_GOVERNOR	<?query -- insert bulk [dbo].[Posts] ([Id] Int...	insert bulk [dbo].[Posts] ([Id] Int, [AcceptedAns...
82	BULK INSERT	StackOverflow	jsterrett	0	suspended	LOG_RATE_GOVERNOR	<?query -- insert bulk [dbo].[Posts] ([Id] Int...	insert bulk [dbo].[Posts] ([Id] Int, [AcceptedAns...
88	BULK INSERT	StackOverflow	jsterrett	0	suspended	LOG_RATE_GOVERNOR	<?query -- insert bulk [dbo].[Posts] ([Id] Int...	insert bulk [dbo].[Posts] ([Id] Int, [AcceptedAns...
89	BULK INSERT	StackOverflow	jsterrett	0	suspended	LOG_RATE_GOVERNOR	<?query -- insert bulk [dbo].[Posts] ([Id] Int...	insert bulk [dbo].[Posts] ([Id] Int, [AcceptedAns...



Migrating a 60gb Database to P1

Location
South Central US

Subscription name
[Visual Studio Ultimate with MSDN](#)

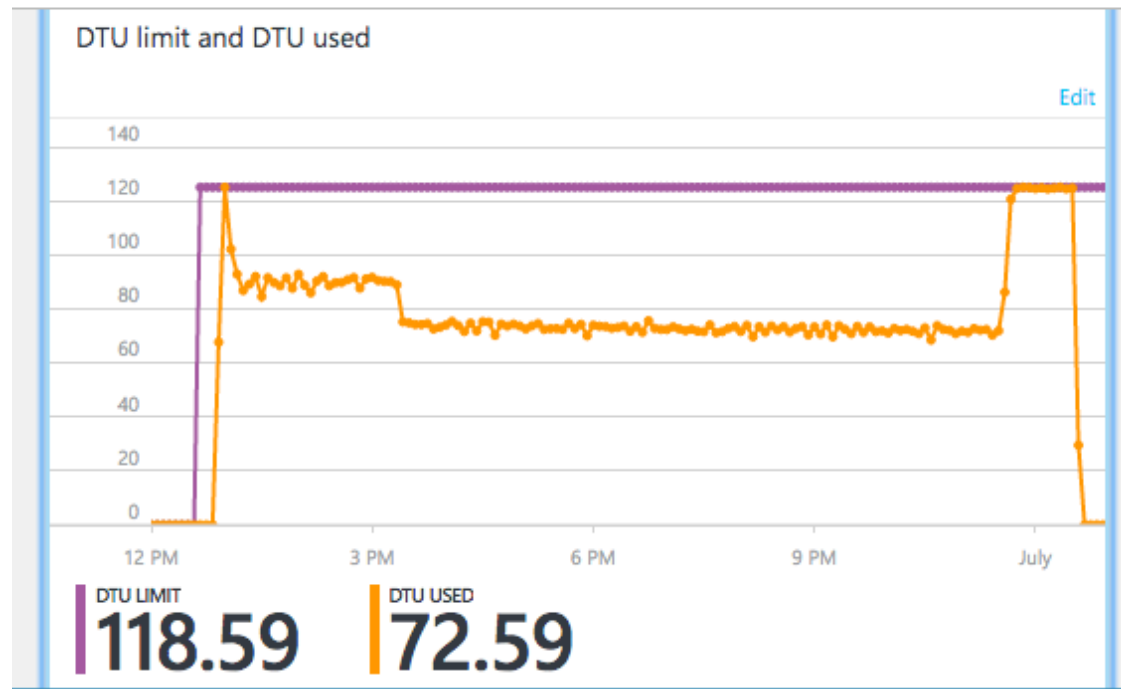
Subscription ID
6cc38609-b58b-48c4-ac4b-e68e778eafbb

Connection strings
[Show database connection strings](#)

Pricing tier
P1 Premium (125 DTUs)

Geo-Replication role
[Not configured](#)

[All settings →](#)



How do you manage Azure SQL Databases Today?



Biggest Database Management Mistake..

- Create it and forget it...



Manage Azure SQL DB Post Migration

Business
continuity

Disaster
Recovery

Security and
Compliance

Sync Data

Data Transfer

Monitor and
Improve
Performance



High Availability with Failover Groups

Dashboard > Resource groups > Databases > procuresql-sc - Failover groups > Failover group > Server > New server

Failover group

Create a failover group to automatically failover databases in it.

* Failover group name
procuresql-fg ✓
.database.windows.net

* Secondary server
Configure required settings >

Read/Write failover policy
Automatic ▾

Read/Write grace period (hours)
1 hours ▾

Database within the group
Select databases to add 🔒

Create

Server

Create a new server

procuresql-sc
South Central US Datab...

New server

* Server name
procuresql-nc ✓
.database.windows.net

* Server admin login
jsterrett ✓

* Password
..... ✓

* Confirm password
..... ✓

* Location
Central US ▾

Allow Azure services to access server ⓘ

Select



Failover group

Create a failover group to automatically failover databases in it.

* Failover group name

procuresql-fg ✓
.database.windows.net

* Secondary server

procuresql-nc (Central US) >

Read/Write failover policy

Automatic ▾

Read/Write grace period (hours)

1 hours ▾

Database within the group >
Select databases to add

Databases

for failover group

Select all

Selected/Eligible databases
1/3

Filter items...

	NAME	ROLE	SECONDARY SERVER	STATUS
	AdventureWorksLTGOOD			Online
<input checked="" type="checkbox"/>	SQLSatChicago			Online
	TestDB			Online

Summary			
Databases on secondary (excluding ones in Elastic Pools)			1
Elastic Pools on secondary server			0

Monthly cost **USD 15.00**



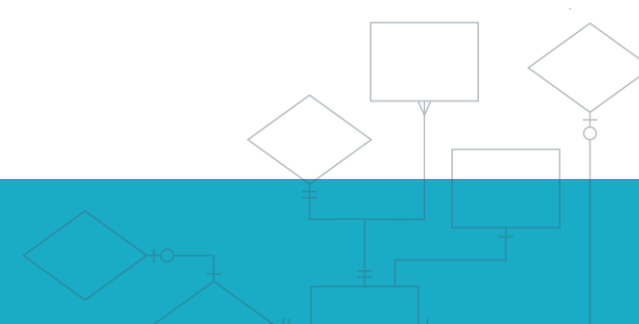
Azure Database Maintenance

- ~~Integrity Checks~~ [source](#)
- Backups ??
- Restores (you control)
 - Point in Time
 - Deleted Database
 - Geo Restore
- Index Maintenance
 - Ola Hallengren Solution Works ;-)
- Statistics Maintenance
- GEO Replication / Failover Groups



Automating Maintenance Tasks

- ~~Azure SQL Agent (Managed Instance Only)~~
- Linked Server
- PowerShell
- Azure
 - **Azure Automation**
 - Azure Elastic Jobs



Alerts

* Metric ⓘ

✓ Blocked by Firewall

Failed Connections

Successful Connections

CPU percentage

Deadlocks

DTU percentage

DTU limit

DTU used

Log IO percentage

Data IO percentage

Sessions percentage

Total database size

Database size percentage

Workers percentage

In-Memory OLTP storage percent

Microsoft

Azure

Dear Customer,

⚠ 'DTU percentage GreaterThan 90 (Percent) in the last 5 minutes' was activated for jsazuredb/sampledatabase

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

RULE NAME: DTU

RULE DESCRIPTION:

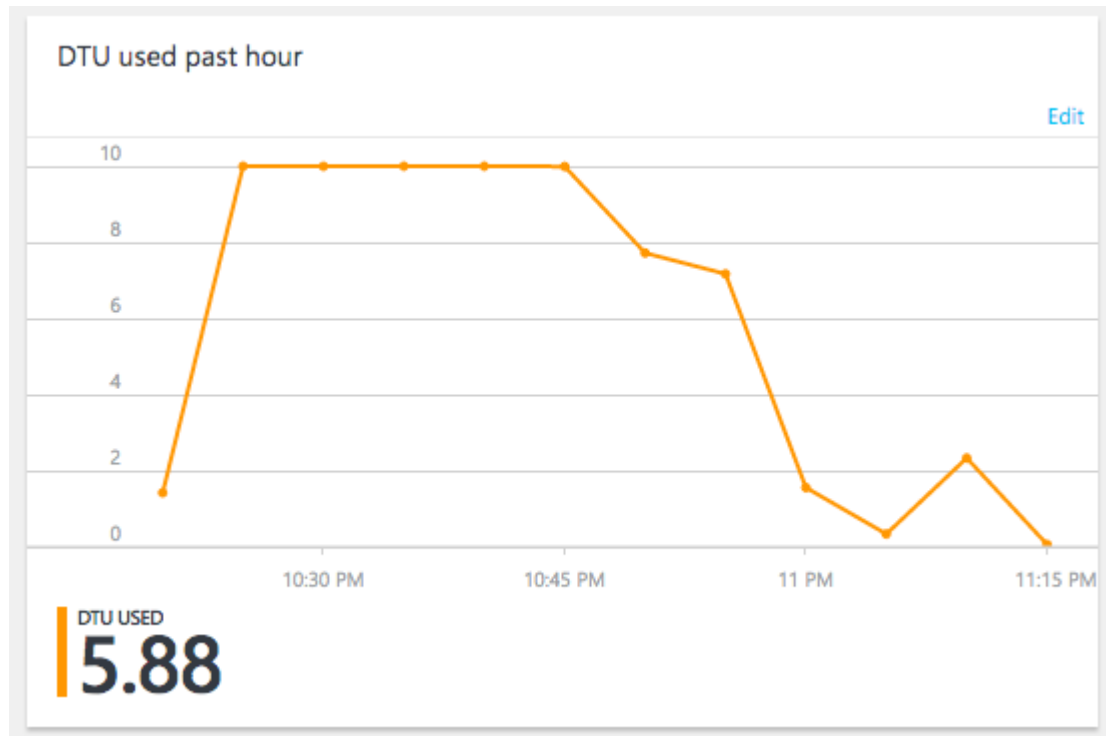
SERVICE: servers: jsazuredb (FirstAzureDB)



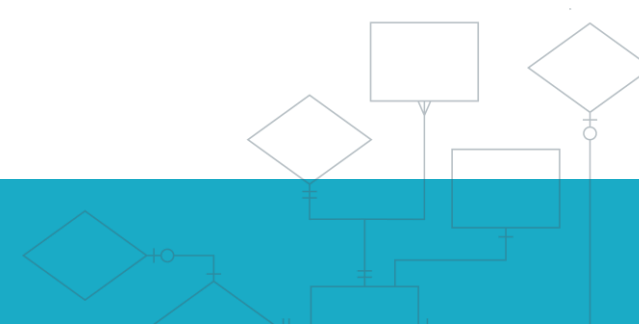
How do you monitor and improve performance?



DTU in Azure Portal



[Photo Credit](#)



What the DTU....

Did anyone understand what **DTU**
Means? What is **Power** of
database based on **real-world**
measure?



What Really is DTU?



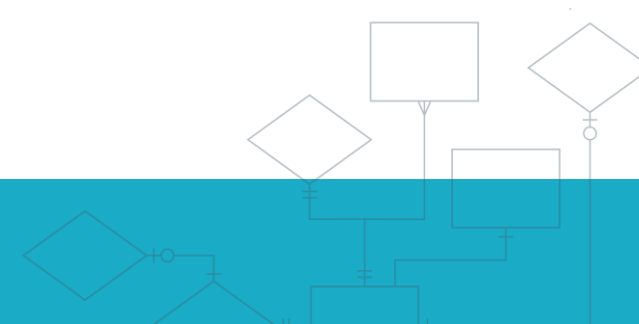
[Photo Credit](#)

<http://bit.ly/AzureDTU>



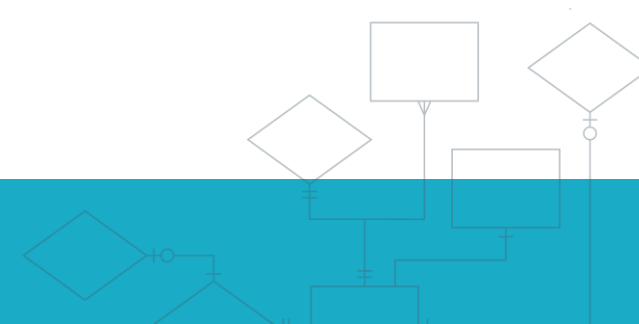
DTU Is.....

$$\text{DTU} = \text{DTU Percent} * \text{DTU Limit}$$



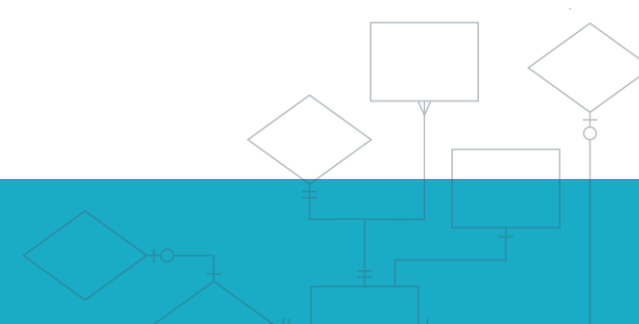
DTU Percent

```
(SELECT Max(v)
FROM (VALUES (avg_cpu_percent),
            (avg_data_io_percent),
            (avg_log_write_percent)) AS value(v)) AS
[avg_DTU_percent]
```



Calculating DTU

```
ISNULL(dtu_limit,0) *  
    (SELECT Max(v)  
        FROM (VALUES (avg_cpu_percent),  
                    (avg_data_io_percent),  
                    (avg_log_write_percent)) AS value(v)) / 100.0 AS DTU
```



SYS.DM_DB_RESOURCE_STATS

User Database

Captured Every Fifteen Seconds

One Hour Historical Data

Idle Database has Data



SYS.RESOURCE_STATS

Master Database

Every Five Minutes

14 Days Historical Data

Idle databases may not have rows



DTU DMV Example

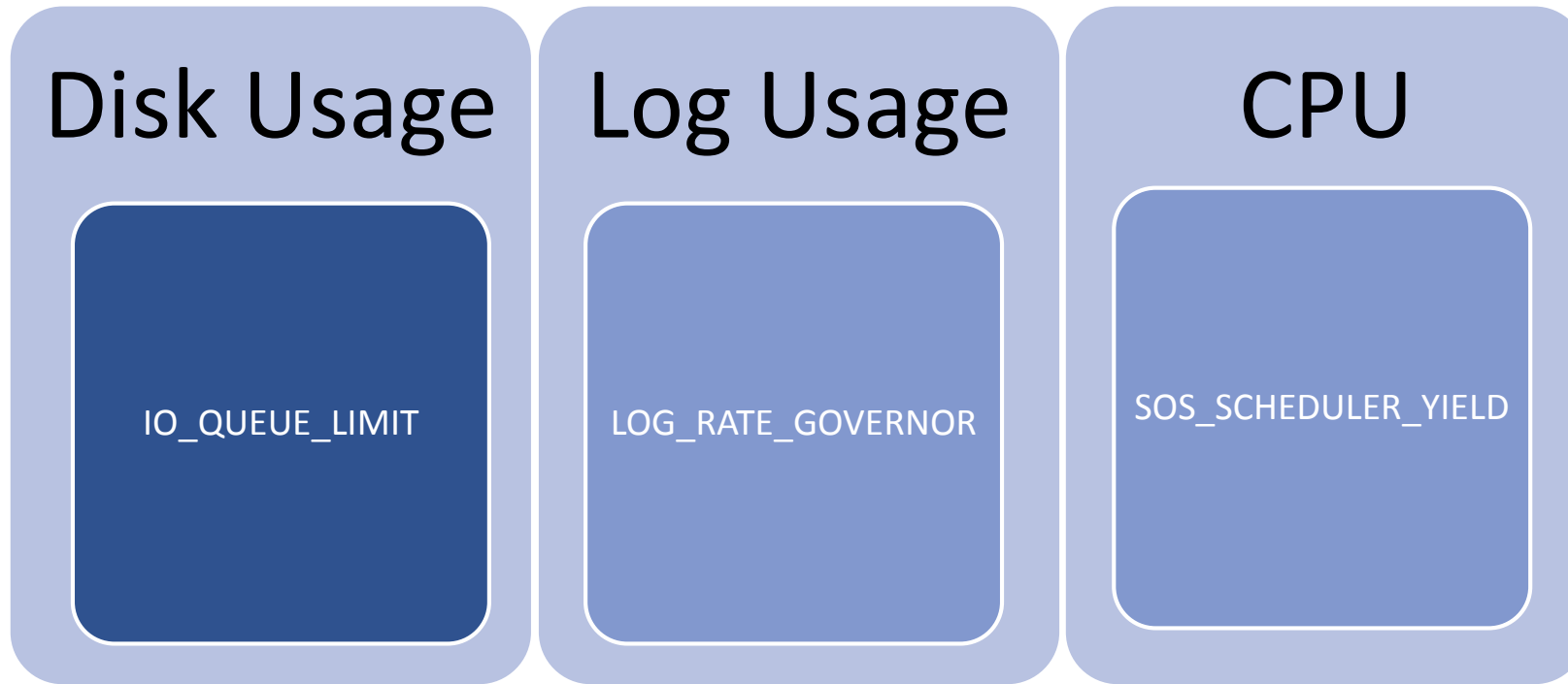
dtu_limit	avg_DTU_percent	DTU	avg_cpu_percent	avg_data_io_percent	avg_log_write_percent	avg_memory_usage_percent	xtp_storage_percent	max_worker_percent	max_session_percent
10	99.61	9.9610000	99.61	0.00	0.63	98.46	0.00	40.00	6.50
10	99.66	9.9660000	99.66	0.00	0.53	98.46	0.00	40.00	6.16
10	99.52	9.9520000	99.52	0.00	0.48	98.46	0.00	41.66	6.33
10	95.29	9.5290000	95.29	0.00	0.80	98.46	0.00	36.66	6.50
10	96.47	9.6470000	96.47	0.00	0.40	98.45	0.00	40.00	6.33
10	95.09	9.5090000	95.09	0.00	0.21	98.45	0.00	41.66	6.00
10	98.17	9.8170000	98.17	0.00	0.20	98.45	0.00	41.66	6.16
10	99.58	9.9580000	99.58	0.00	0.00	98.45	0.00	41.66	6.00
10	99.44	9.9440000	99.44	0.00	0.37	98.44	0.00	41.66	6.33
10	99.80	9.9800000	99.80	0.00	0.63	98.44	0.00	38.33	6.50
10	99.61	9.9610000	99.61	0.00	1.05	98.44	0.00	40.00	6.50



Azure Wait Stats



Azure SQL Database Waits



bit.ly/azureSQLWaits



Wait Statistics

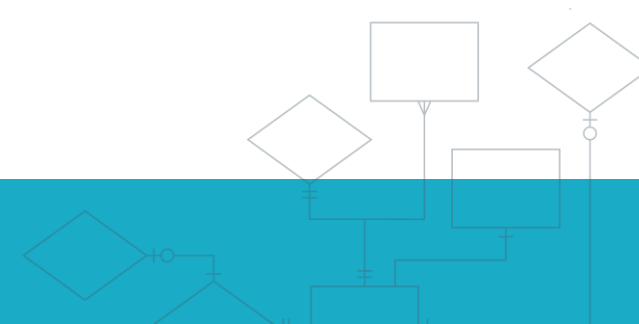
WaitType	wait_S	Resource_S	Signal_S	WaitCount	Avg_Wait_S	Avg_Resource_S	Avg_Signal_S	CaptureDate
LOG_RATE_GOVERNOR	119.20000	113.43100	5.76900	14587	0.008172	0.007776	0.000395	2016-06-30 19:12:15.160
LCK_M_IX	17.14000	17.13900	0.00100	3	5.713333	5.713000	0.000333	2016-06-30 19:12:15.160
PAGELATCH_EX	4.65200	4.49400	0.15800	822	0.005659	0.005467	0.000192	2016-06-30 19:12:15.160
SOS_SCHEDULER_YIELD	1.89200	0.00000	1.89200	310	0.006103	0.000000	0.006103	2016-06-30 19:12:15.160
PAGELATCH_SH	1.02300	0.90600	0.11700	44	0.023250	0.020591	0.002659	2016-06-30 19:12:15.160
ASYNC_NETWORK_IO	336.65800	335.51500	1.14300	10089	0.033369	0.033256	0.000113	2016-06-30 19:13:15.687
LOG_RATE_GOVERNOR	100.87600	95.99900	4.87700	13285	0.007593	0.007226	0.000367	2016-06-30 19:13:15.687
LCK_M_IX	19.12000	19.11900	0.00100	5	3.824000	3.823800	0.000200	2016-06-30 19:13:15.687
PAGELATCH_EX	9.14000	8.97200	0.16800	641	0.014259	0.013997	0.000262	2016-06-30 19:13:15.687
SOS_SCHEDULER_YIELD	1.91800	0.00000	1.91800	292	0.006568	0.000000	0.006568	2016-06-30 19:13:15.687
PAGELATCH_SH	1.21700	1.07000	0.14700	140	0.008693	0.007643	0.001050	2016-06-30 19:13:15.687



CPU Throttling

captureDate	Wait Type	Wait_S	Resource_S	Signal_S	WaitCount	Avg_Wait_S
2016-08-30 06:01:58.987	SOS_SCHEDULER_YIELD	2.35800	0.00100	2.35700	87	0.027103
2016-08-30 06:09:59.513	SOS_SCHEDULER_YIELD	5.42400	-0.00100	5.42500	16	0.339000
2016-08-30 06:10:59.553	SOS_SCHEDULER_YIELD	1.49800	0.00100	1.49700	5	0.299600

end_time	dtu_limit	avg_DTU_percent	DTU	avg_cpu_percent	avg_data_io_percent
2016-08-30 06:11:03.677	10	26.05	2.6050000	26.05	0.00
2016-08-30 06:10:48.647	10	99.28	9.9280000	99.28	0.00
2016-08-30 06:10:33.630	10	97.72	9.7720000	97.72	0.00
2016-08-30 06:10:18.613	10	99.50	9.9500000	99.50	0.00
2016-08-30 06:10:03.580	10	99.72	9.9720000	99.72	0.00
2016-08-30 06:09:48.580	10	99.52	9.9520000	99.52	0.00
2016-08-30 06:09:33.567	10	99.42	9.9420000	99.42	0.00
2016-08-30 06:09:18.563	10	99.58	9.9580000	99.58	0.00



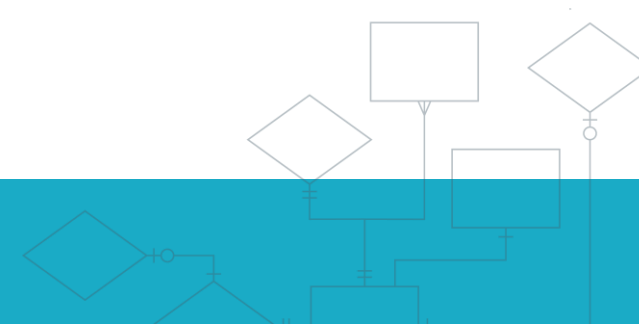
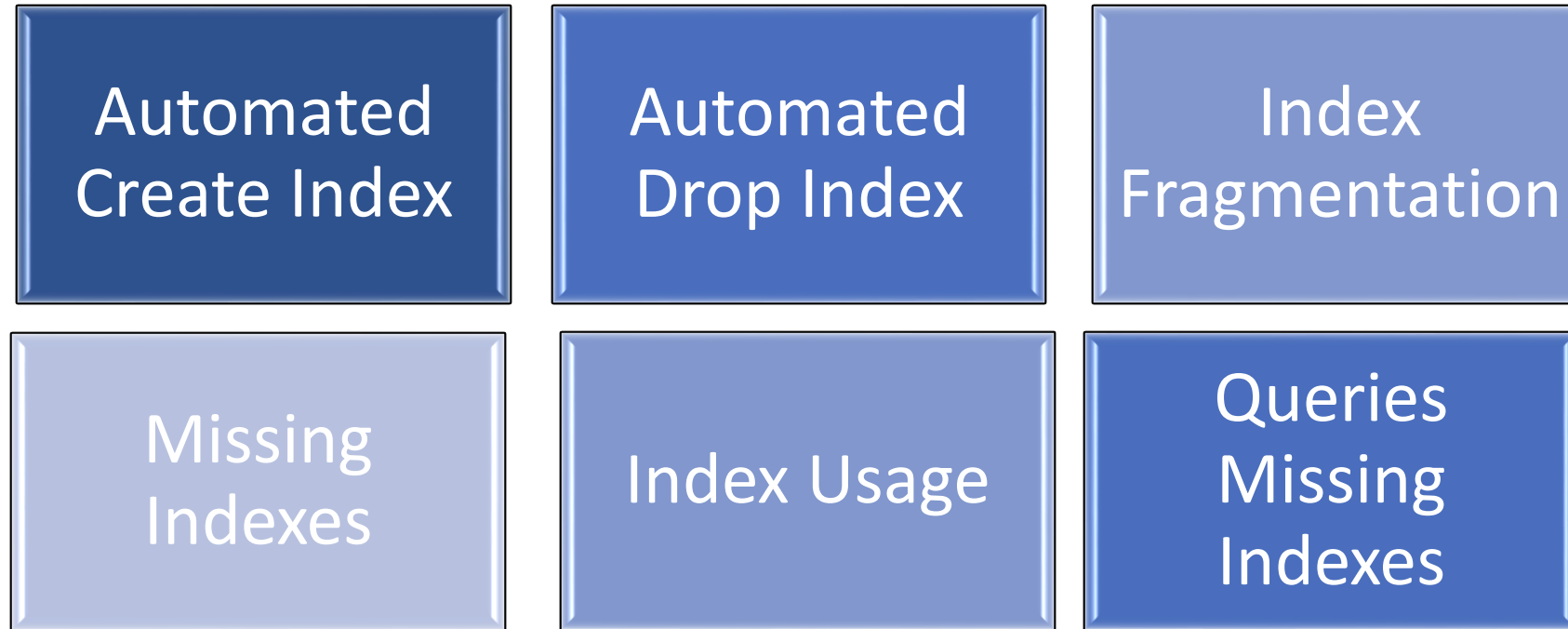
I/O Throttling

Spid	command	Database	User	blocking_session_id	Status	Wait	sql_statement	Parent Query
51	BULK INSERT	StackOverflow	jsterrett	0	suspended	LOG_RATE_GOVERNOR	<?query -- insert bulk [dbo].[Posts] ([Id] Int...	insert bulk [dbo].[Posts] ([Id] Int, [AcceptedAns...
52	BULK INSERT	StackOverflow	jsterrett	0	suspended	LOG_RATE_GOVERNOR	<?query -- insert bulk [dbo].[Posts] ([Id] Int...	insert bulk [dbo].[Posts] ([Id] Int, [AcceptedAns...
53	BULK INSERT	StackOverflow	jsterrett	0	suspended	LOG_RATE_GOVERNOR	<?query -- insert bulk [dbo].[Posts] ([Id] Int...	insert bulk [dbo].[Posts] ([Id] Int, [AcceptedAns...
80	BULK INSERT	StackOverflow	jsterrett	53	suspended	LCK_M_IX	<?query -- insert bulk [dbo].[Posts] ([Id] Int...	insert bulk [dbo].[Posts] ([Id] Int, [AcceptedAns...
81	BULK INSERT	StackOverflow	jsterrett	0	suspended	LOG_RATE_GOVERNOR	<?query -- insert bulk [dbo].[Posts] ([Id] Int...	insert bulk [dbo].[Posts] ([Id] Int, [AcceptedAns...
82	BULK INSERT	StackOverflow	jsterrett	0	suspended	LOG_RATE_GOVERNOR	<?query -- insert bulk [dbo].[Posts] ([Id] Int...	insert bulk [dbo].[Posts] ([Id] Int, [AcceptedAns...
88	BULK INSERT	StackOverflow	jsterrett	0	suspended	LOG_RATE_GOVERNOR	<?query -- insert bulk [dbo].[Posts] ([Id] Int...	insert bulk [dbo].[Posts] ([Id] Int, [AcceptedAns...
89	BULK INSERT	StackOverflow	jsterrett	0	suspended	LOG_RATE_GOVERNOR	<?query -- insert bulk [dbo].[Posts] ([Id] Int...	insert bulk [dbo].[Posts] ([Id] Int, [AcceptedAns...

Spid	command	Database	User	blocking_session_id	Status	Wait	sql_statement
109	SELECT	StackOverflow	jsterrett	0	suspended	IO_QUEUE_LIMIT	<?query -- CREATE PROCEDURE dbo.GetCommentsForP...








Indexes in Azure SQL Database







Automated Index Tuning

Recommendations

ACTION	RECOMMENDATION DESCRIPTION	IMPACT
 CREATE INDEX	Table: [test_table_0.430709] Indexed columns: [index_1],[index_2],[index_3]	HIGH IMPACT
 CREATE INDEX	Table: [test_table_0.914675] Indexed columns: [index_1],[index_2],[index_3]	HIGH IMPACT
 DROP INDEX (PREVIEW)	Index name: IR_[test_schema]_[test_table_0.112348]_CD2E5085881888FC9A4' Reason: Duplicate index	HIGH IMPACT
 DROP INDEX (PREVIEW)	Index name: IR_[test_schema]_[test_table_0.950691]_9A67D9E88A31B315D14' Reason: Duplicate index	HIGH IMPACT
 FIX SCHEMA ISSUES (PREVIEW)	Error code: 208 Error message: Invalid object name 'dbo.Companies'.	HIGH IMPACT

Tuning history

ACTION	RECOMMENDATION DESCRIPTION	STATUS	TIME
 DROP INDEX (PREVIEW) Initiated by: User	Index name: IR_[test_schema]_[test_table_0.182511]_1665B81581' Reason: Duplicate index	✓ Success	4/25/2016 4:28:05 PM
 CREATE INDEX Initiated by: User	Table: [test_table_0.138289] Indexed columns: [index_1],[index_2],[index_3]	✓ Success	4/25/2016 4:27:57 PM
 PARAMETERIZE QUERIES (PREVIEW) Initiated by: N/A	Scope: Entire database Reason: Non-parameterized queries are causing performanc	✓ Success	4/21/2016 4:40:30 PM
 DROP INDEX (PREVIEW) Initiated by: User	Index name: IR_[test_schema]_[test_table_0.574879]_C13F85C293' Reason: Duplicate index	✗ Error	4/25/2016 4:28:05 PM



Azure SQL Database Tuning Tools



Azure SQL Database Performance Tools

Query Store

DMVs

Extended
Events

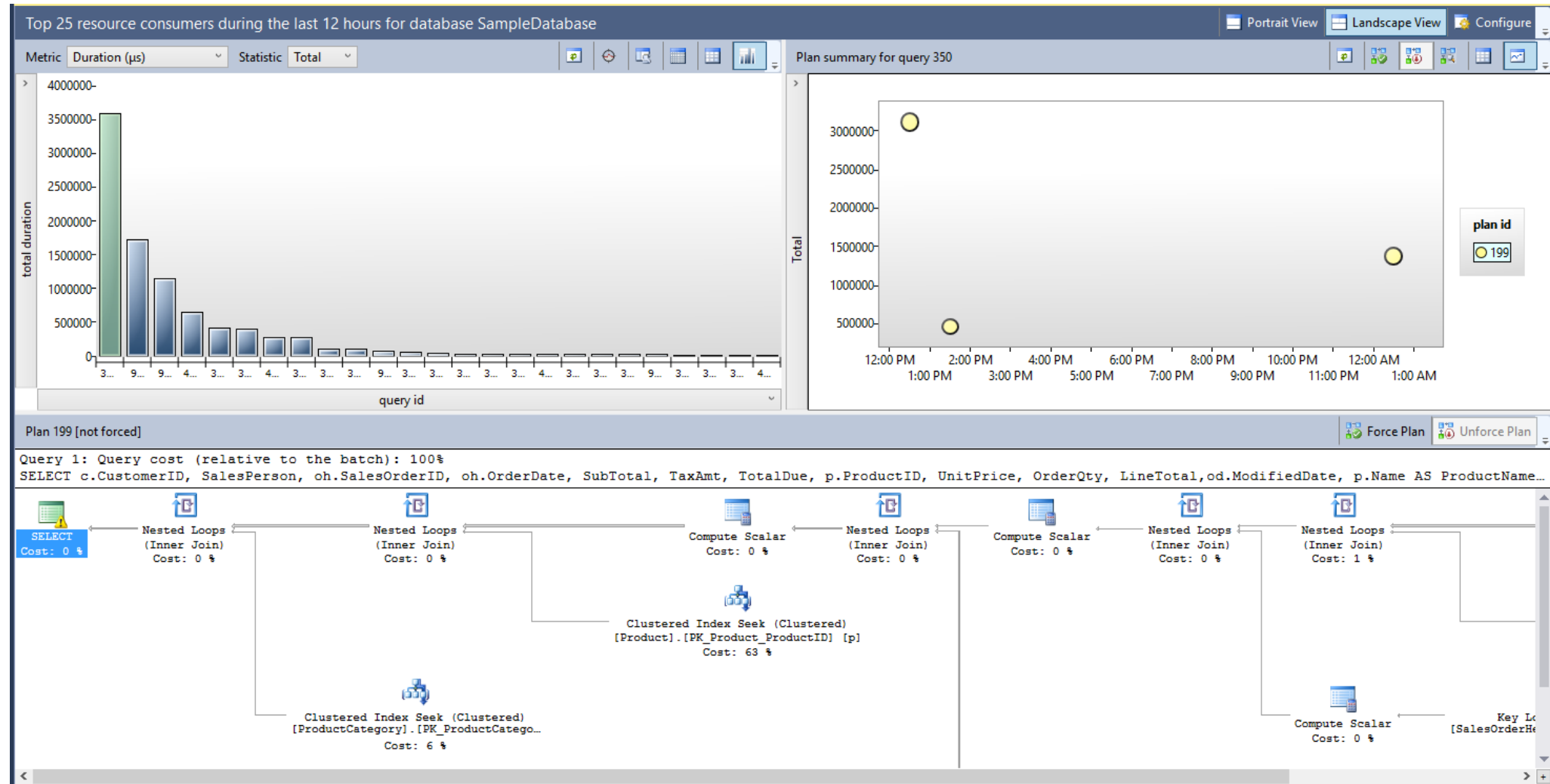
Azure Portal

Query
Performance
Insight

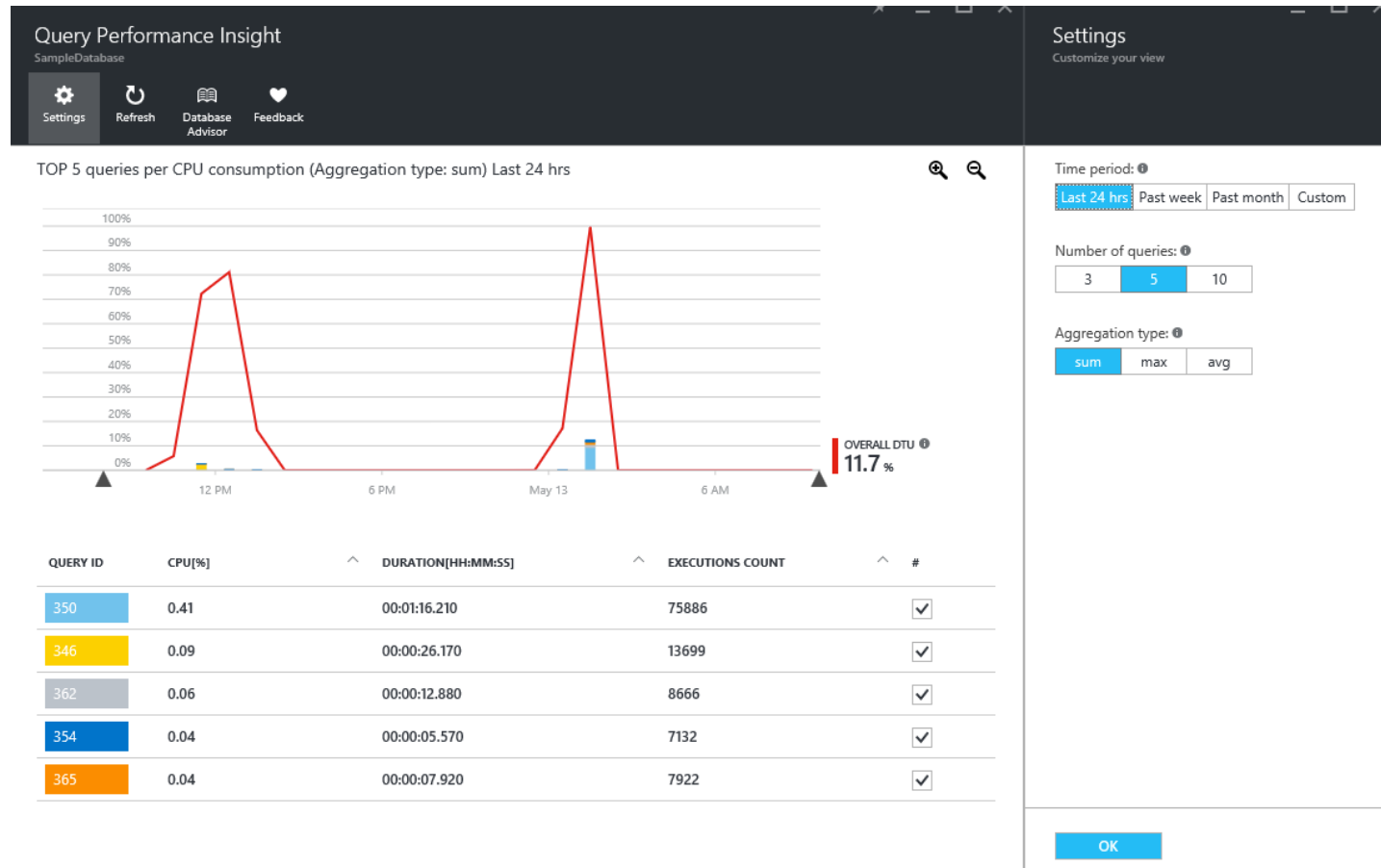
Auto-Tuning
Index



Query Store







Query Performance Insight



Automatic Tuning

Tuning history

ACTION	↕	RECOMMENDATION DESCRIPTION
		Table: [Users] Indexed columns: [Age]
		FORCE PLAN
		CREATE INDEX
		DROP INDEX



Thank you!



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