

Table Distribution in Dedicated SQL Pool: That is not "a simple table"

Riccardo Perico


The logo for DATA SATURDAYS. The word "DATA" is in a large, white, sans-serif font. To the left of the "D" is a blue icon consisting of three horizontal bars of increasing length, resembling a stylized "D" or a data bar chart. Below "DATA", the word "SATURDAYS" is written in a smaller, white, sans-serif font, with each letter spaced out.



Sponsors



About me

- BI & Power BI Engineer @ 
- More than 10 years in Microsoft “Data Realm”
- Giving my little contribution to the community
- Mail: rperico@lucient.com
- Twitter: [@R1k91](https://twitter.com/R1k91)
- LinkedIn: [riccardo-perico](https://www.linkedin.com/in/riccardo-perico)
- Blog: medium.com/riccardo-perico
- Repository: github.com/R1k91



DATA SATURDAYS



Power Platform
World Tour



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- Azure Synapse SQL Pools Architecture
- Distribution types
- Distribution strategy can affect query performance
- Distribution strategy can affect ingestion performance

“Synapse SQL is the ability to do T-SQL based analytics in Synapse workspace.
Synapse SQL has two consumption models: dedicated and serverless.”

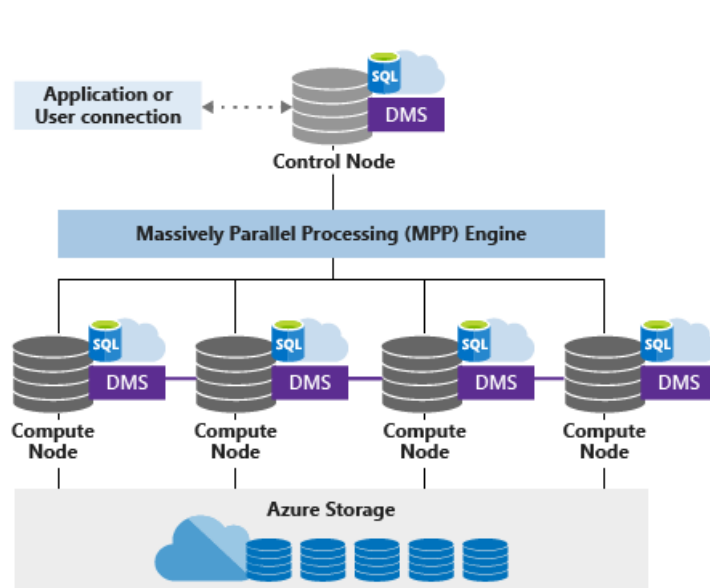
[Terminology - Azure Synapse Analytics | Microsoft Learn](#)

It's a distributed architecture

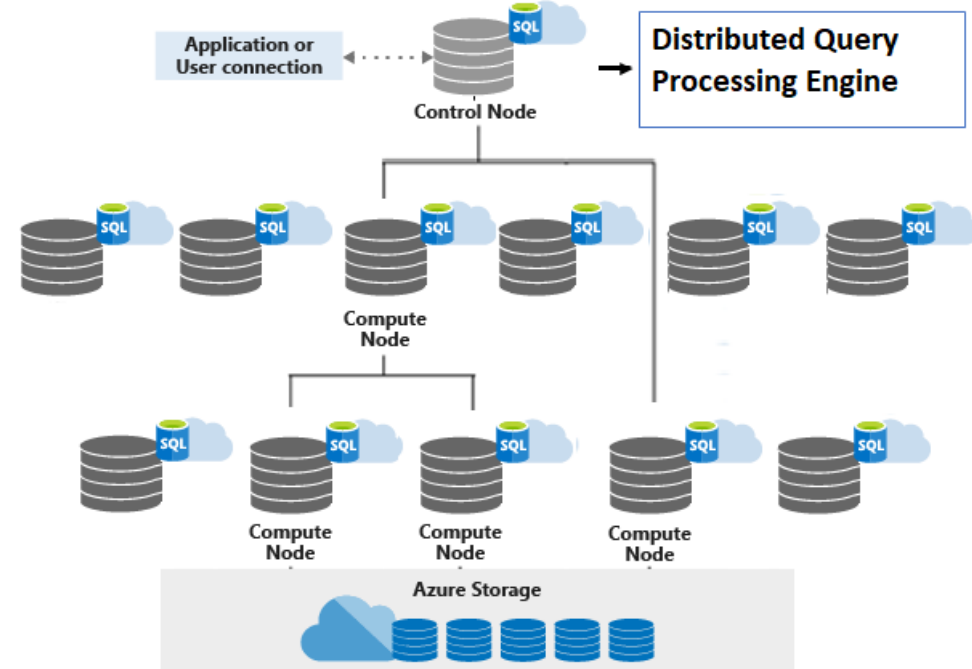
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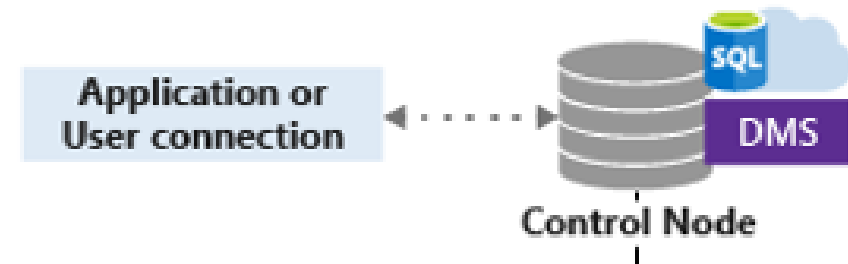
Dedicated SQL pool



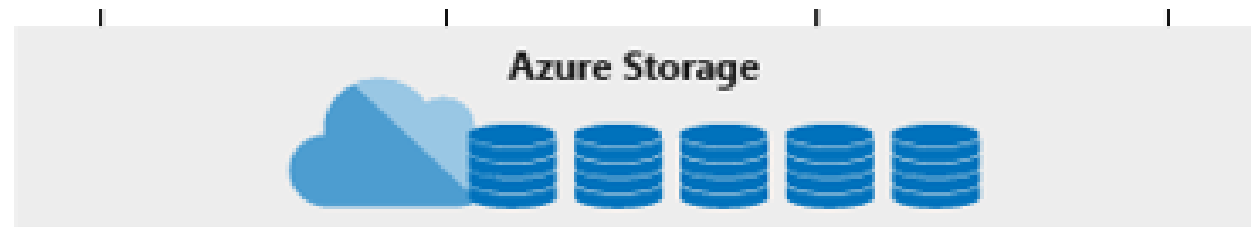
Serverless SQL pool



- Architecture brain
- Architecture front-end
- Runs the distributed query engine (DQE)
- Transforms T-SQL query in parallel queries running against each distro

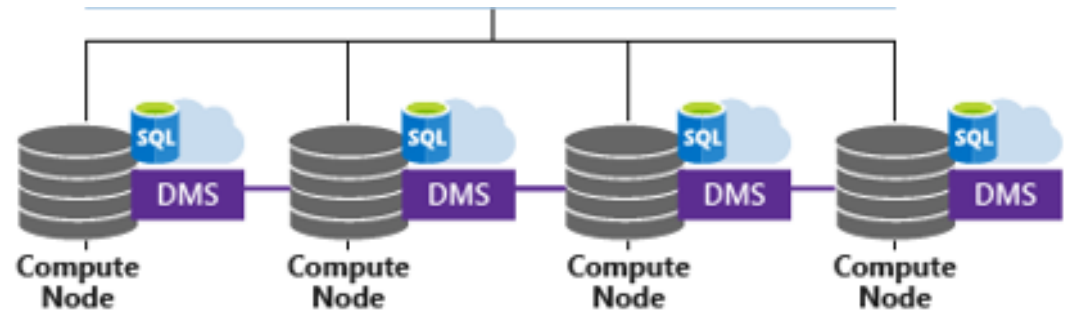


- Data stored on Azure storage
- Data divided into shards (aka distributions)
- There're always 60 distributions
- Types of sharding
 - Replicate
 - Round Robin
 - Hash



Compute node(s)

- From 1 to 60 nodes according to DWU
- Distributions map to Compute nodes

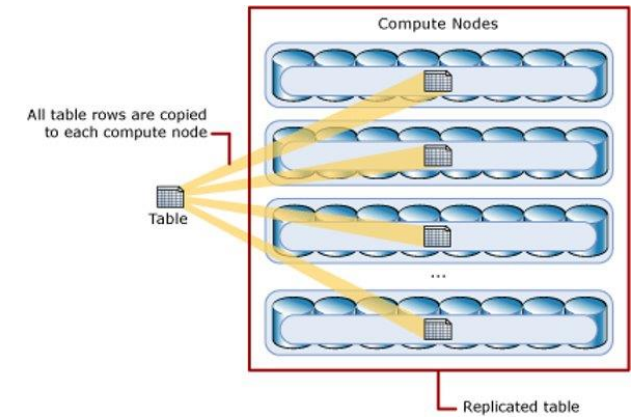
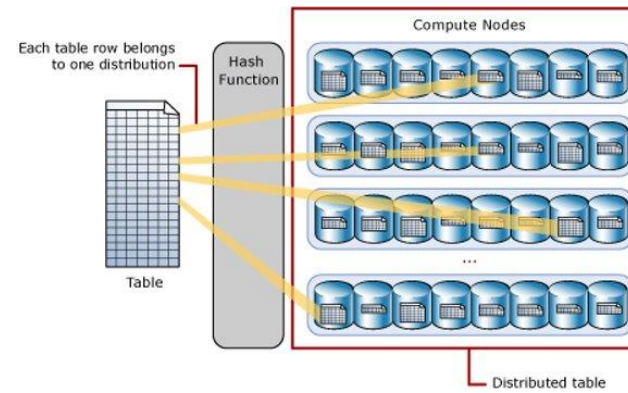
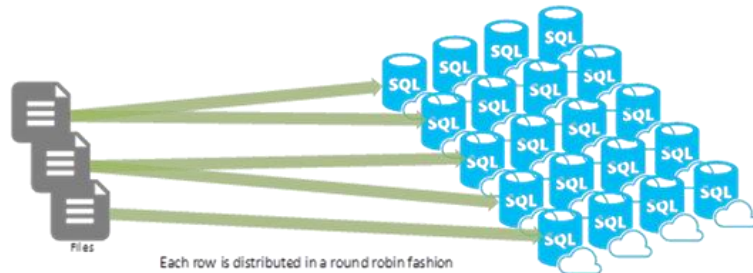


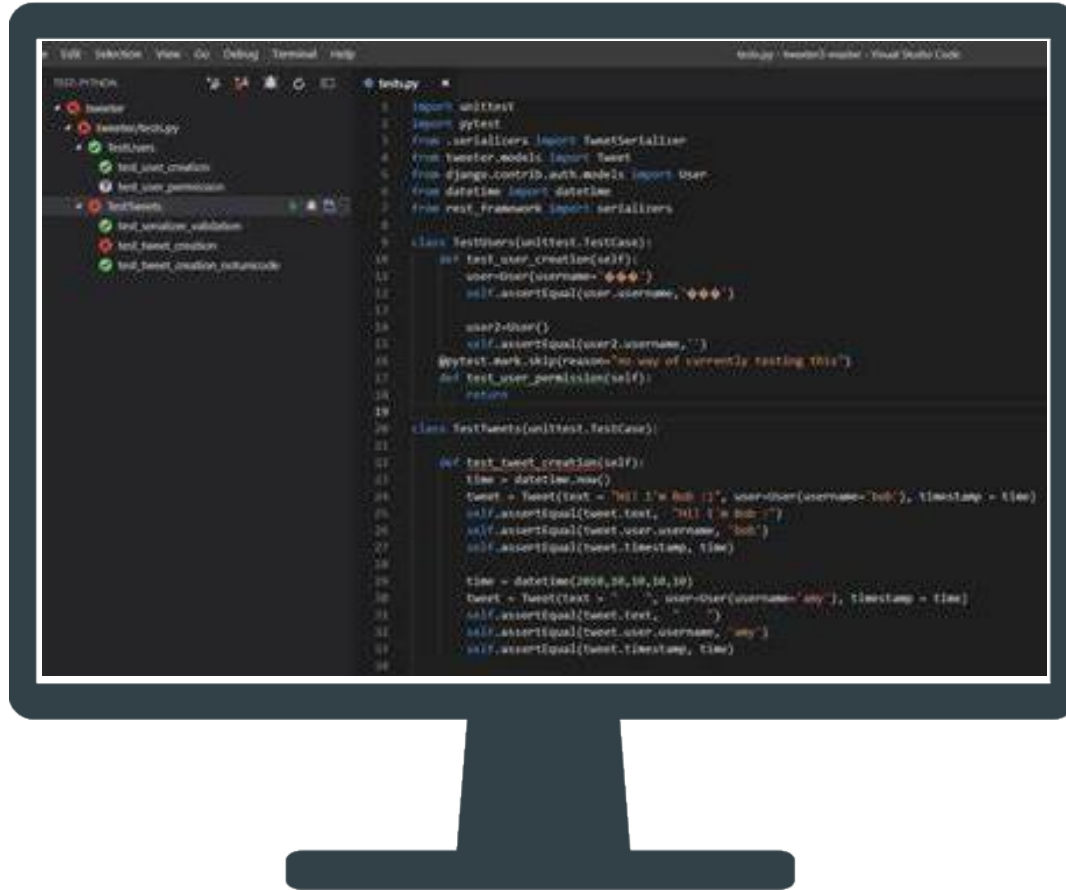
60 smaller queries

- Query is always divided into 60 smaller queries against 60 distributions
- Distributions per compute node depends on DWU

Performance level	Compute nodes	Distributions per Compute node	Memory per data warehouse (GB)
DW100c	1	60	60
DW200c	1	60	120
DW300c	1	60	180
DW400c	1	60	240
DW500c	1	60	300
DW1000c	2	30	600
DW1500c	3	20	900
DW2000c	4	15	1200
DW2500c	5	12	1500
DW3000c	6	10	1800

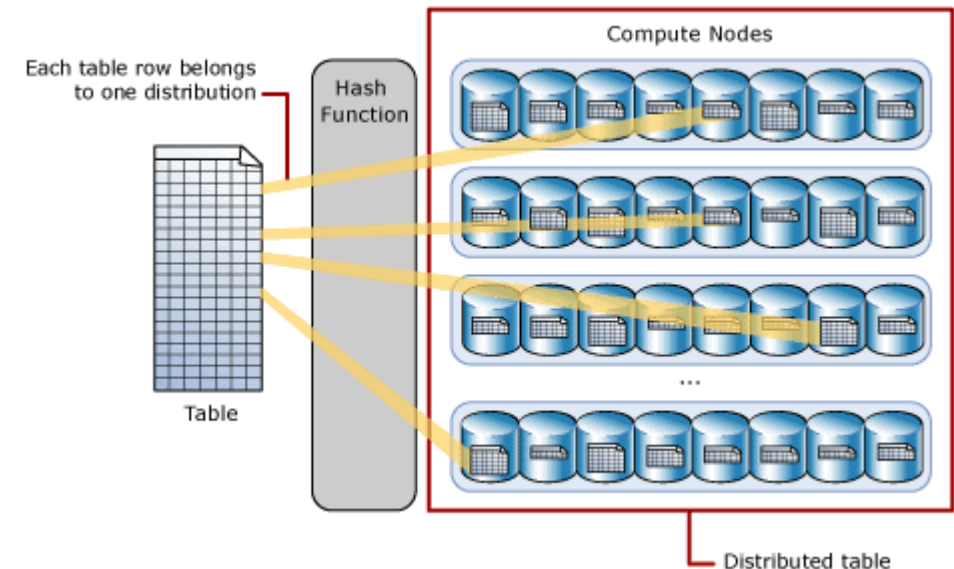
Sharding Types





Data Skewness

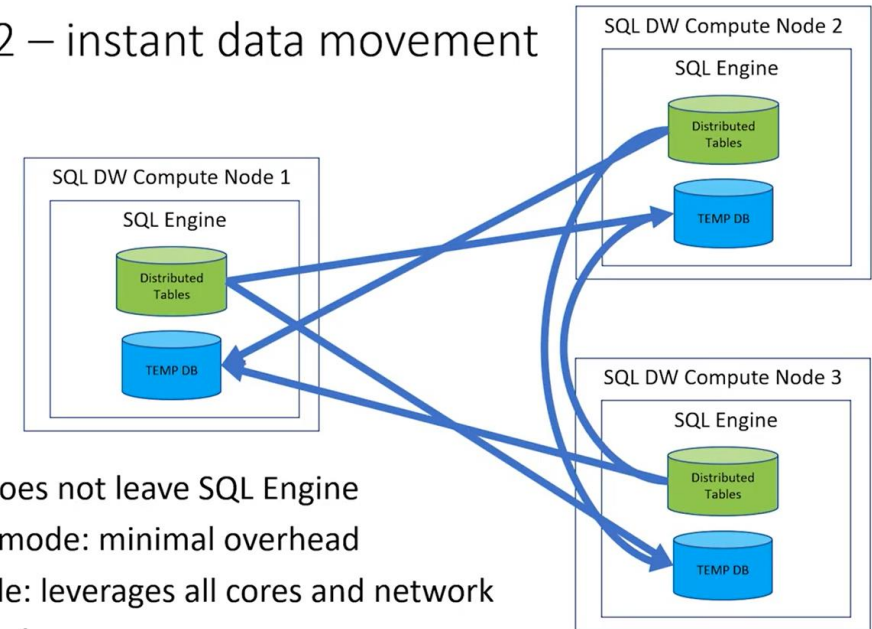
- Data aren't distributed evenly across distributions
- Unbalanced load on compute nodes



```
select *
from sys.dm_pdw_request_steps
where request_id = (select top 1 request_id
from sys.dm_pdw_exec_requests
where [label] = 'tpch_q14'
order by submit_time desc)
```

request_id	step_index	operation_type	distribution_type	location_type	status	error_id	start_time	end_time	total_elapsed_time	row_count
QID1314265	0	RandomIDOperation	Unspecified	Control	Complete	NULL	2018-08-14 20:34:45.777	2018-08-14 20:34:45.777	0	-1
QID1314265	1	OnOperation	AllDistributions	Compute	Complete	NULL	2018-08-14 20:34:45.777	2018-08-14 20:34:45.917	140	-1
QID1314265	2	ShuffleMoveOperation	AllDistributions	Compute	Complete	NULL	2018-08-14 20:34:45.917	2018-08-14 20:34:50.480	4562	204844163
QID1314265	3	OnOperation	Unspecified	Control	Complete	NULL	2018-08-14 20:34:50.480	2018-08-14 20:34:50.510	31	-1
QID1314265	4	PartitionMoveOperation	Unspecified	DMS	Complete	NULL	2018-08-14 20:34:50.510	2018-08-14 20:34:55.150	4640	60

Gen2 – instant data movement



Data does not leave SQL Engine

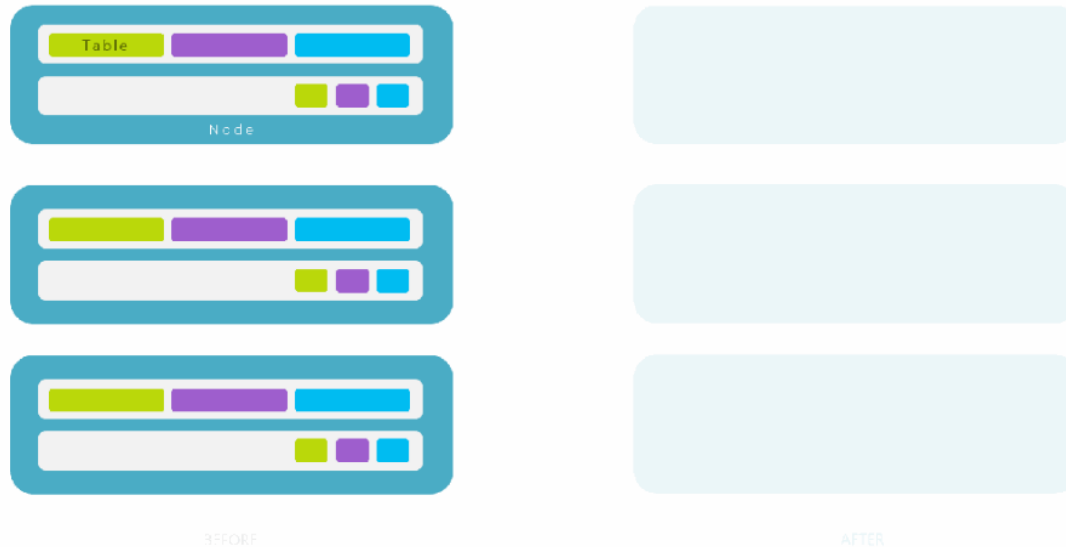
Batch-mode: minimal overhead

Scalable: leverages all cores and network

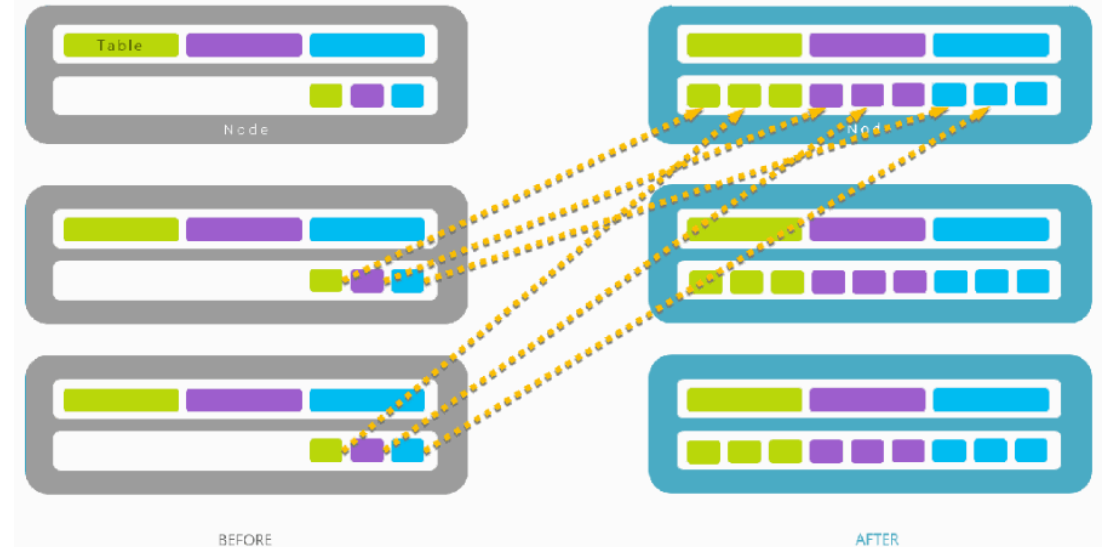
It's Free!

Shuffle vs Broadcast

SHUFFLE HASH JOIN



BROADCAST HASH JOIN



[Dedicated SQL pool \(formerly SQL DW\) architecture - Azure Synapse Analytics | Microsoft Learn](#)

[Memory and concurrency limits - Azure Synapse Analytics | Microsoft Learn](#)

[Shuffle vs. Broadcast Join, Visually and Concisely – Book of Architectures \(jixjia.com\)](#)

Q&A

The logo for Data Saturdays features the word "DATA" in a large, white, sans-serif font. To the left of the "D" is a blue icon consisting of three horizontal bars of increasing length, resembling a stylized "D" or a data bar chart. Below "DATA" is the word "SATURDAYS" in a smaller, white, sans-serif font.

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The logo for Chn0va community features the word "chn0va" in a blue, lowercase, sans-serif font. To the left of the text is a yellow circular icon with a blue "C" shape inside. Below the text "chn0va" is the word "community" in a smaller, blue, lowercase, sans-serif font.

chn0va
community

Thank you!

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SQL Pool:
That is not "a simple table"**

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