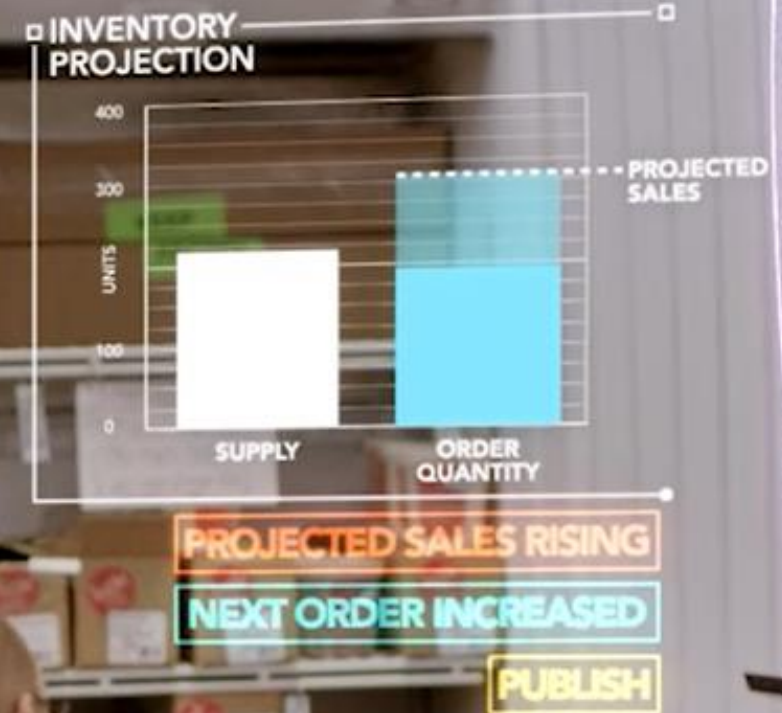


# SQL Data Warehouse

## Key Concepts

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# Agenda

SQL DW in the context of Cortana Intelligence

Introducing SQLDW

Target workloads

Scaling up vs. Scaling out

Scaling Compute

Pause Resume

# SQLDW in the CIS context



Data sources



Apps



Sensors and devices

### Information management



Data Factory



Data Catalog



Event Hub

### Big data stores



Data Lake Store



SQL Data Warehouse

### Machine learning and analytics



Machine Learning



Data Lake Analytics



HDInsight (Hadoop, Spark)



Stream Analytics

### Intelligence



Cognitive Services



Bot Framework



Cortana



Dashboards and visualizations

Power BI



People



Apps



Automated systems



Web



Mobile



Bots

Data

Intelligence

Action



# The Cortana Intelligence Platform



Cortana, Cognitive Services, Bot Framework



Power BI



Stream Analytics



HDInsight



Azure Machine Learning (MRS)



SQL Data Warehouse (SQL DB, Document DB)



Data Lake



Event Hubs



Data Factory



Data Catalog

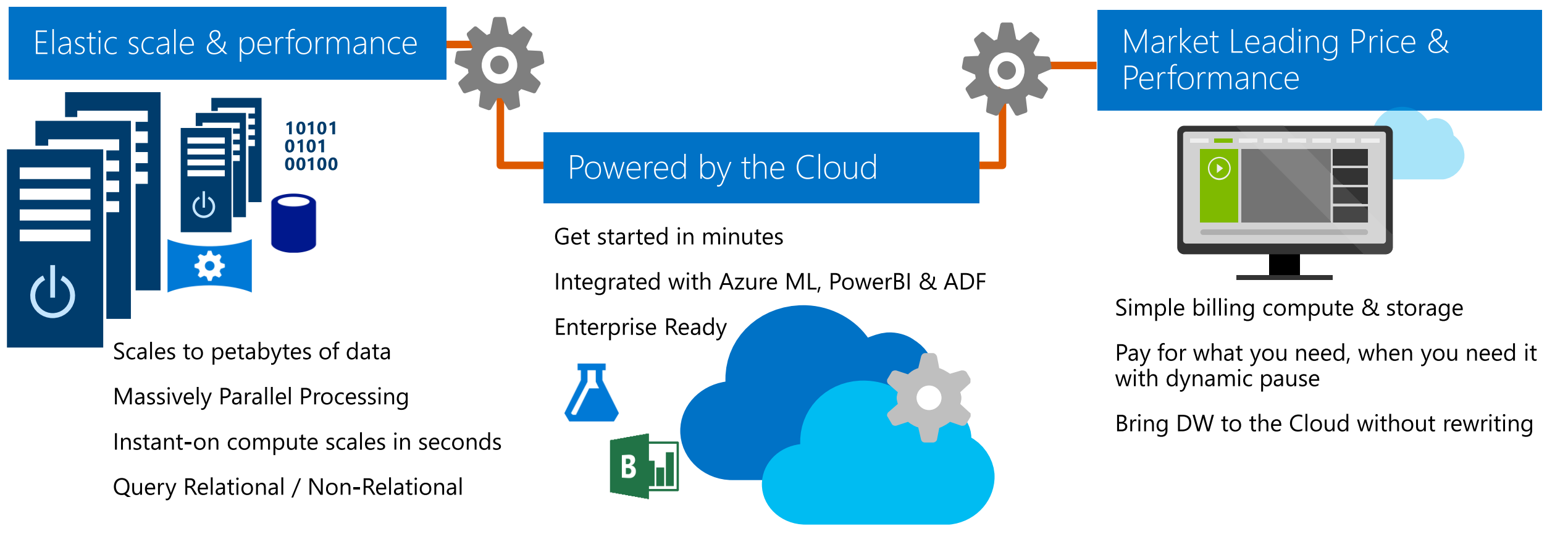


Microsoft Azure

# Introducing SQLDW

# What is Azure SQL Data Warehouse

- A relational data warehouse-as-a-service (PaaS), fully managed by Microsoft.
- First elastic cloud data warehouse with enterprise-grade capabilities.
- Support smallest to largest data storage needs while handling queries up to 100x faster.



# What is MPP?

MPP stands for “MASSIVE PARALLEL PROCESSING”

- A divide and conquer strategy
- Take one big problem & break it up & execute it individually
- Team approach “Many hands make light work”

## Requires

- A method for scheduling tasks
- A communication plan to maximise efficiency
- A distribution method for exchange of goods



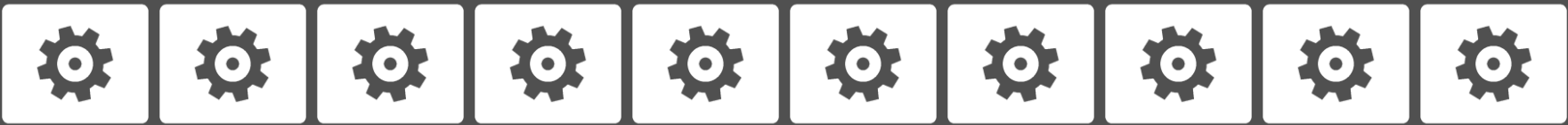
# Logical Overview



Compute



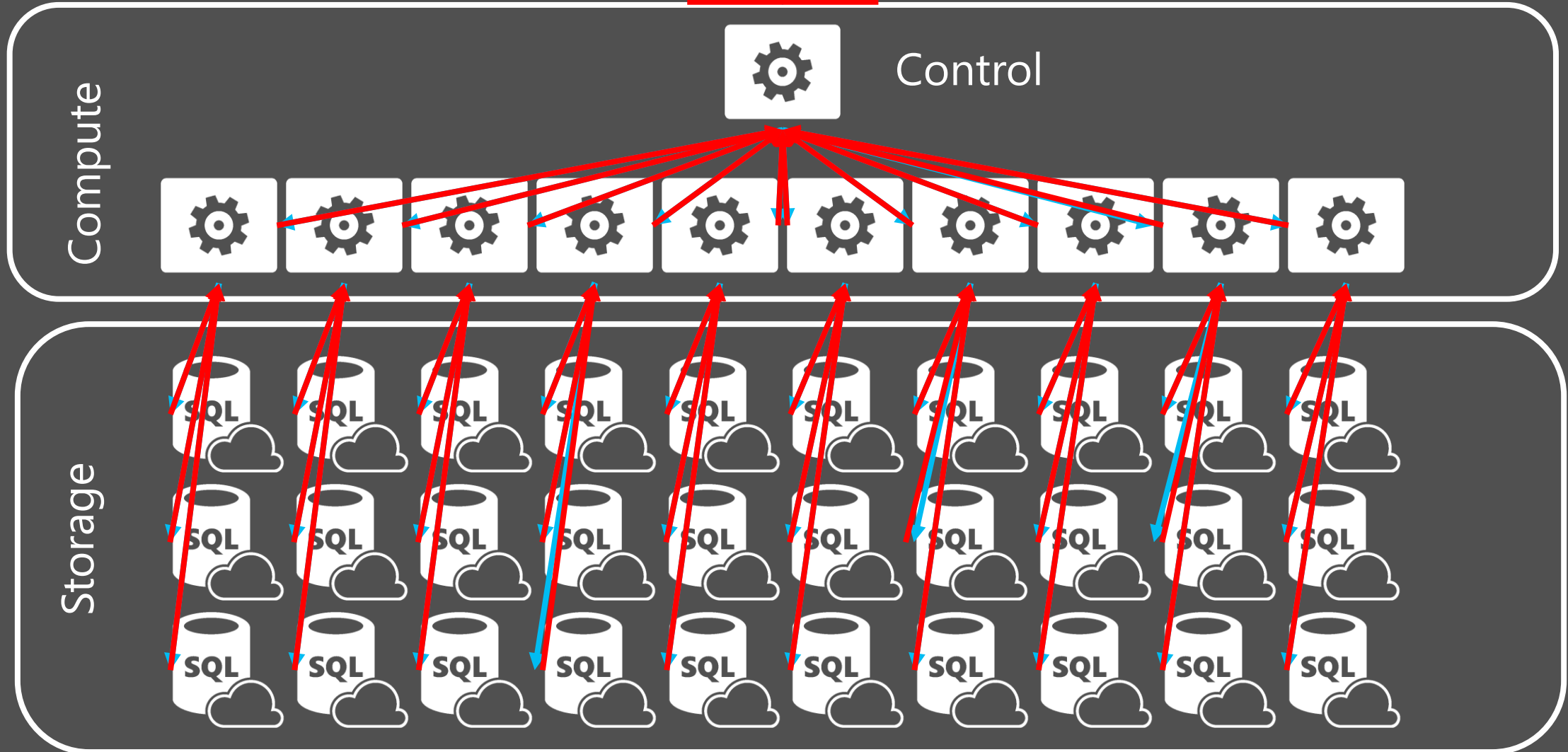
Control



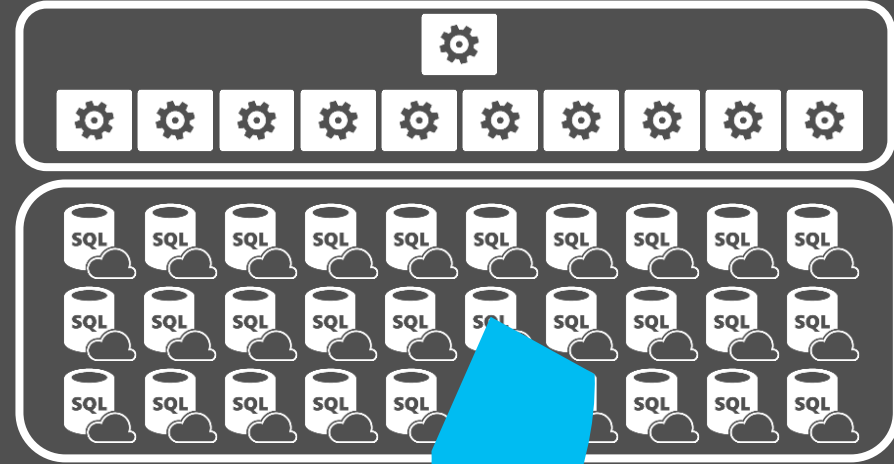
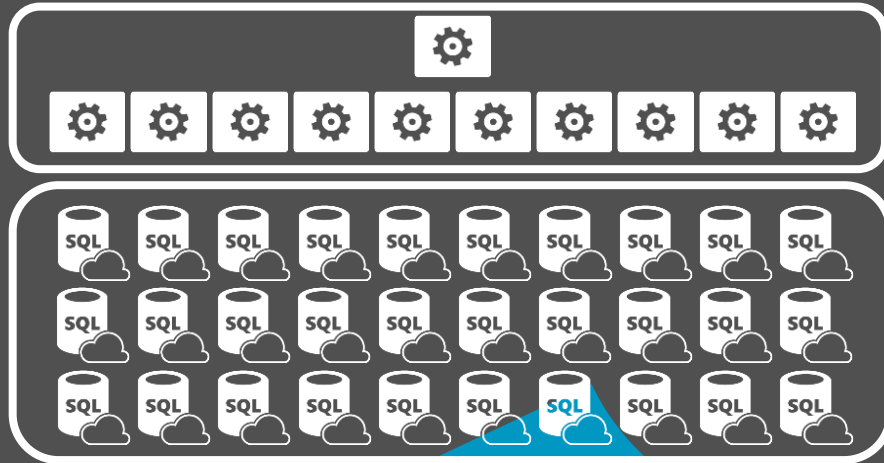
Storage



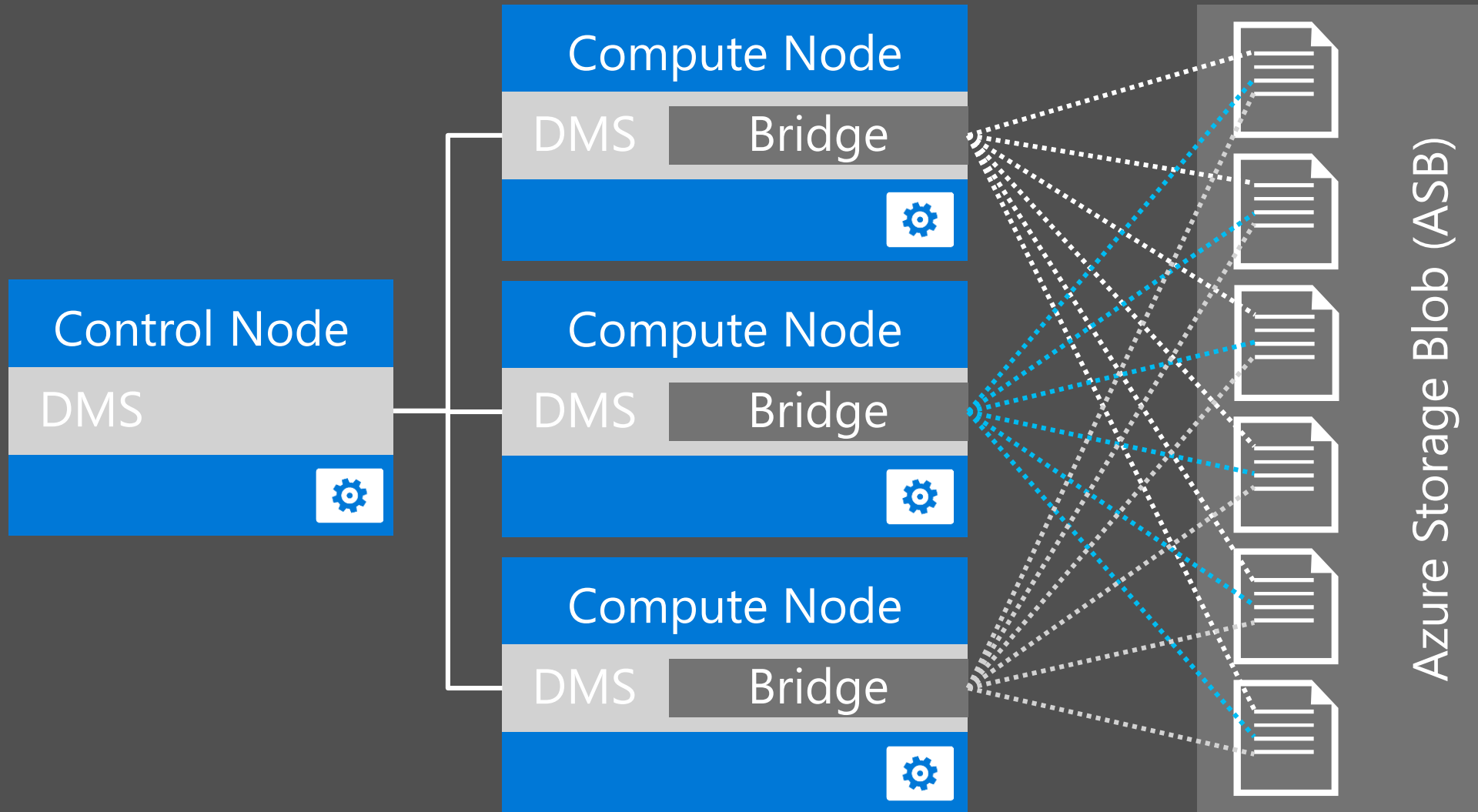
# Distributed queries




# Geo-redundant










# Parallel Load



# Fully managed PaaS

**ContosoRetailDW**  
SQL Data Warehouse

 Settings  Pause  Scale  Open in Visual ...  Open in PowerBI  Restore  Delete

Essentials ^

Resource group  
[jrjwestusrg](#)

Location  
West US

Subscription name  
[ElasticScaleDev\\_657854](#)

Server name  
[jrjwestus.database.windows.net](#)

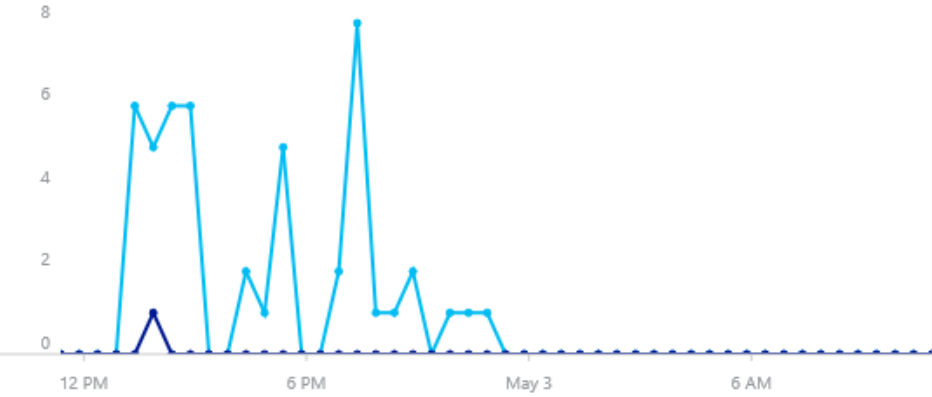
Status  
Online

Connection strings  
[Show database connection strings](#)

[All settings](#) →

Monitoring Add tiles +

Query Activity



SUCCESS

48

FAIL

1

Settings  
ContosoRetailDW

SUPPORT + TROUBLESHOOTING

Troubleshoot

Audit logs

Resource health

New support request

RESOURCE MANAGEMENT

Locks

Export template

GENERAL




Properties

Scale

**Auditing & Threat detection**

Transparent data encryption

Auditing & Threat detection  
ContosoRetailDW


Save  Discard  Explore  Feedback

☒ Inherit settings from server

[View server auditing settings](#) ↗

Auditing

ON OFF

 Downlevel clients require the u...  
of Security Enabled Connection  
Strings.

\* Storage Details

djd03282016so

⛔

Audited Events

All

⛔

Threat detection (preview) ⓘ

ON OFF

Threat detection types

All

⛔

Send alerts to ⓘ

☒ Email service and co-administrators

# Connectivity

Windows or Linux

ODBC

OLEDB

JDBC

ADO.NET

PHP



# Target workloads

# Analytical workloads

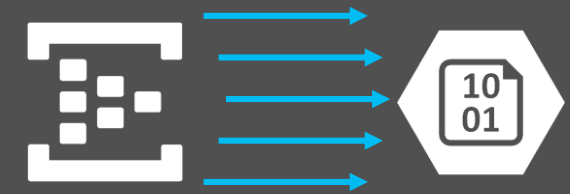
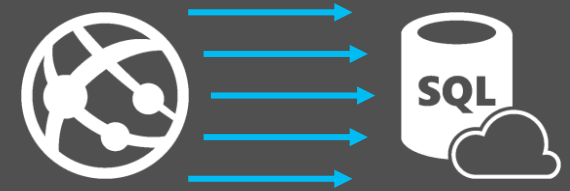
- Store large volumes of data
- Consolidate disparate data into a single location
- Shape, model, transform and aggregate data
- Perform query analysis across large datasets
- Ad-hoc reporting across large data volumes
- All using simple SQL constructs

**"SQL on SQL"**

# Unsuitable workloads

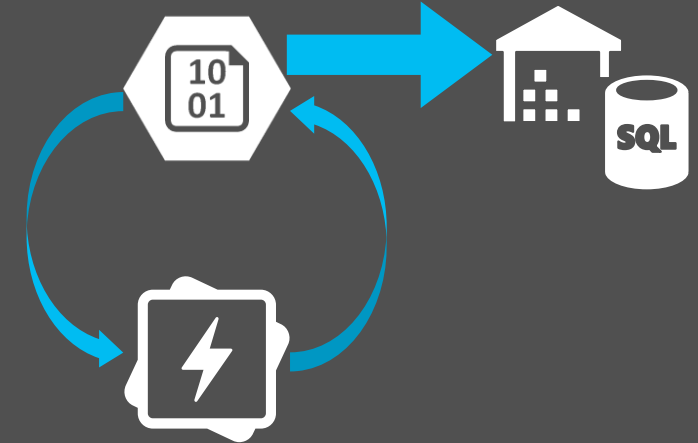
## Operational workloads (OLTP)

- High frequency reads & writes
- Large numbers of singleton selects
- High volumes of single row inserts



## Data Preparation

- Row by row processing needs
- Incompatible formats (JSON, XML)



Optimized for DW workloads

Distributed query optimizer

Complex statistics

Advanced algorithms for data movement

Clustered columnstore indexes by default

Pre-defined resource classes

# Demo:

## Creating a SQL DW Instance

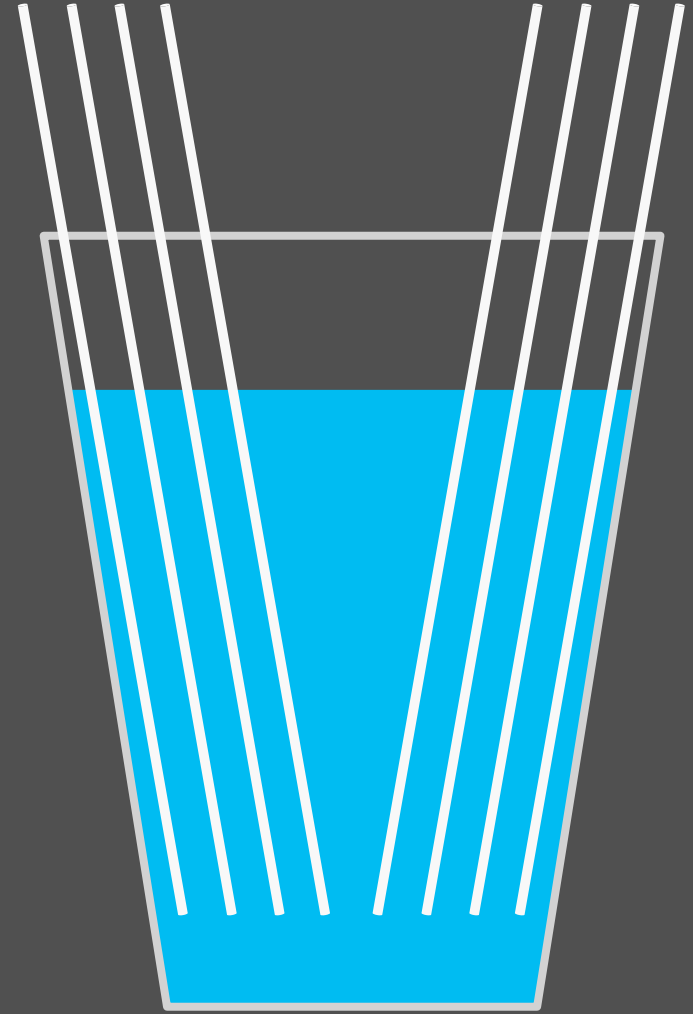
Scaling up vs. scaling out



# Scaling up

- One bucket (motherboard)
- Contains all the water (resources)
- Drinking through straws (logical procs)
- Sometimes you only get one straw...

SMP = Scaling UP



# Scaling out: The ultimate team game...



MPP  
=  
Scaling  
OUT

# Scaling out: The ultimate team drinking game...



# Scaling Compute (elastically)

Key words

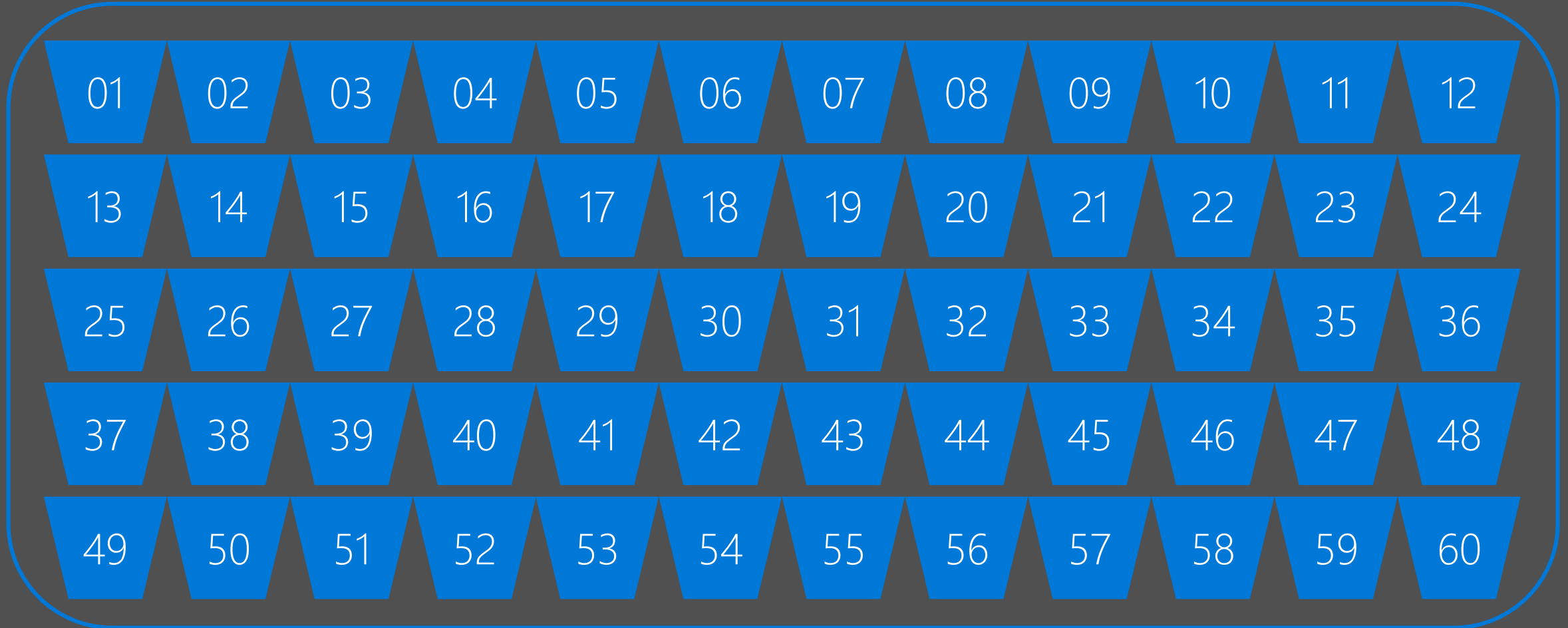
Nodes

Distributions

Service Objective

# Mapping Compute in SQLDW

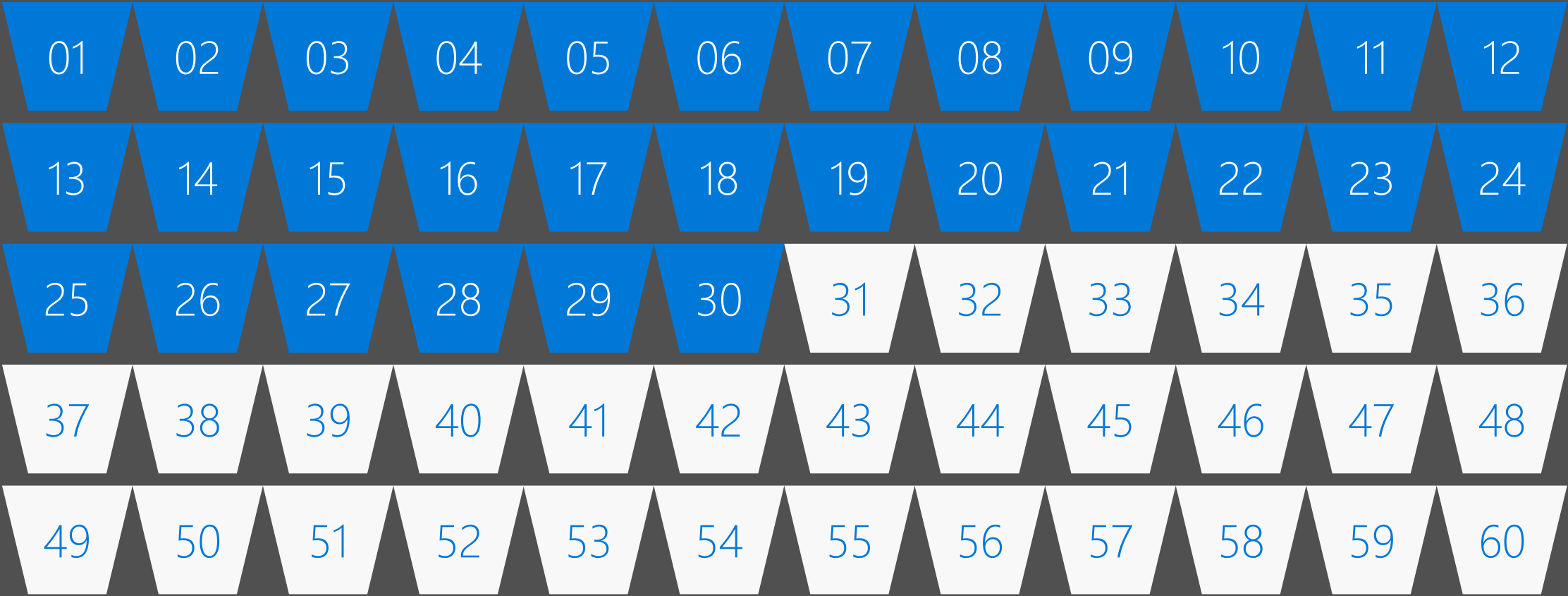
1 Compute Node





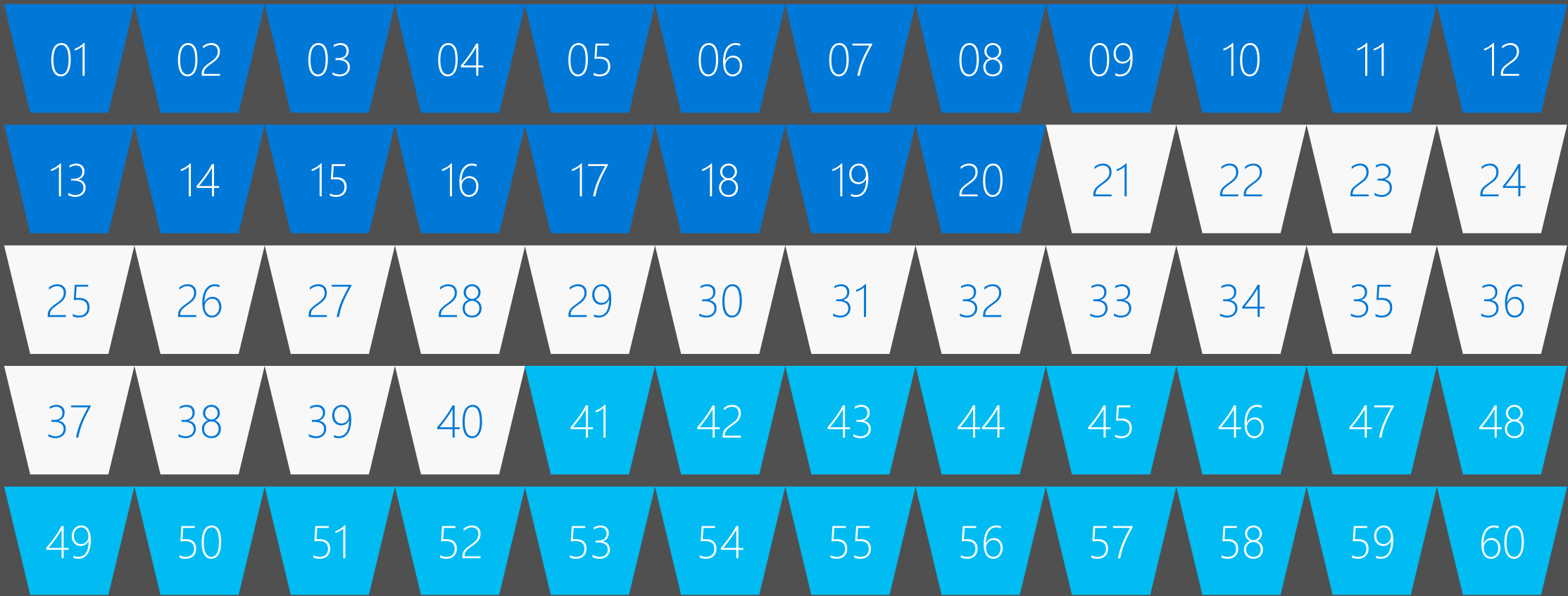
# Mapping Compute in SQLDW

2 Compute Nodes



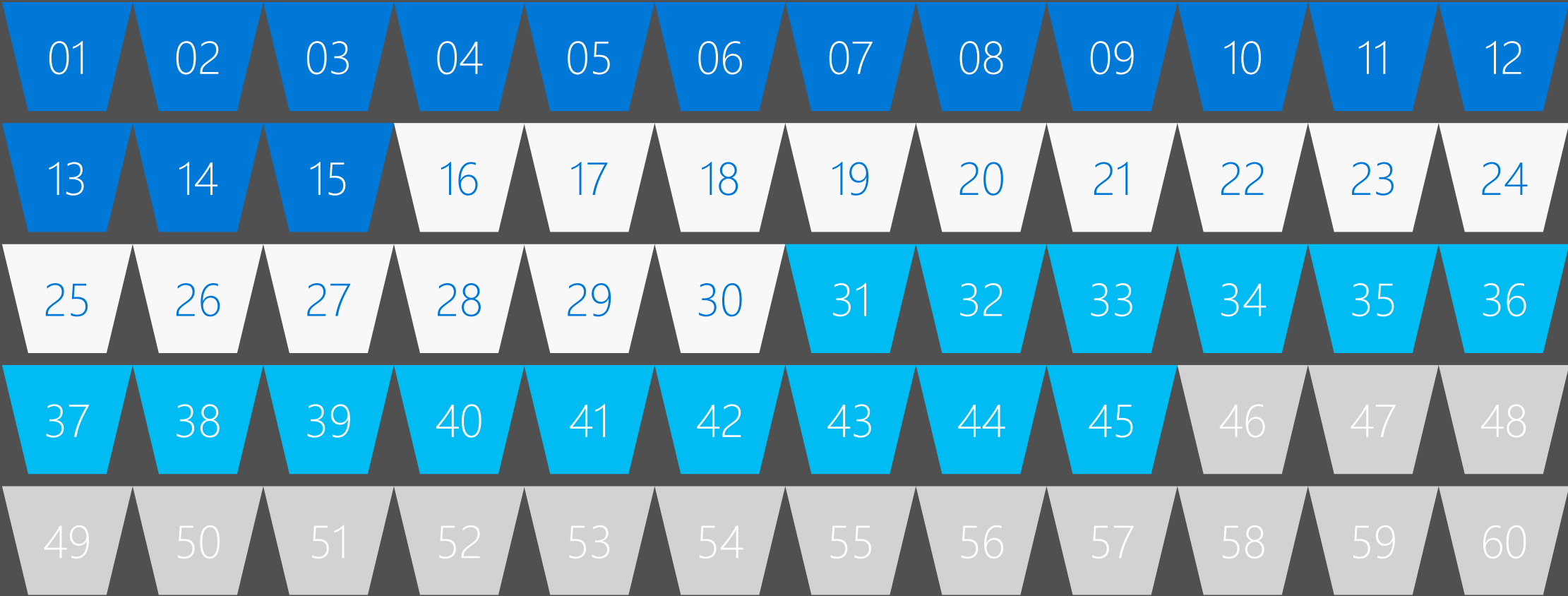
# Mapping Compute in SQLDW

3 Compute Nodes



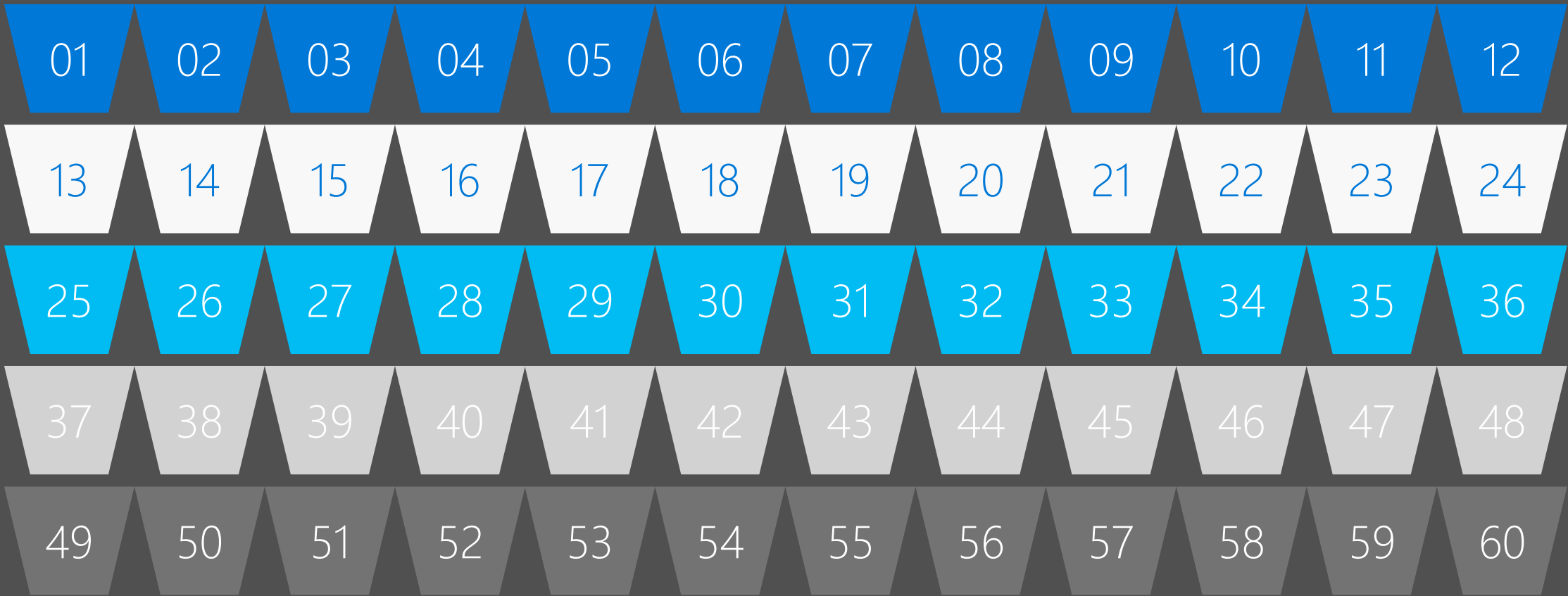
# Mapping Compute in SQLDW

4 Compute Nodes



# Mapping Compute in SQLDW

5 Compute Nodes



# Scaling options

Azure Portal

TSQL

Powershell

# Scaling with Azure Portal

The screenshot displays the Azure Portal interface for a SQL Data Warehouse named 'JRJDW'. The top navigation bar includes icons for Settings, Pause, Scale (highlighted with a red box), Open in Visual Studio, Open In PowerBI, Restore, and Delete. The right side of the top bar shows the 'Scale' page title and 'JRJDW'.

Below the navigation bar, the 'Essentials' section is visible, showing details for the resource group, location (North Europe), and subscription name. The 'Server name' is also displayed, along with the status 'Online' and a link to 'Show database connection strings'. An 'All settings' button is located at the bottom right of the Essentials section.

On the right side, the 'Performance' section shows a slider set to 100 DWU, with the text '100 DWU @ 0.78 USD/hour' displayed below it.

Resource group: [Redacted]  
Location: North Europe  
Subscription name: [Redacted]

Server name: [Redacted]  
Status: Online  
Connection strings: [Show database connection strings](#)

[All settings →](#)

Performance ⓘ  
100 DWU @ 0.78 USD/hour



# Scaling with T-SQL

```
ALTER DATABASE ContosoRetailDW  
MODIFY  
(service_objective = 'DW100')  
;
```

# Scaling with PowerShell

```
Set-AzureRmSqlDatabase
```

```
  -ResourceGroupName "RG_name"
```

```
  -ServerName "SRV_name"
```

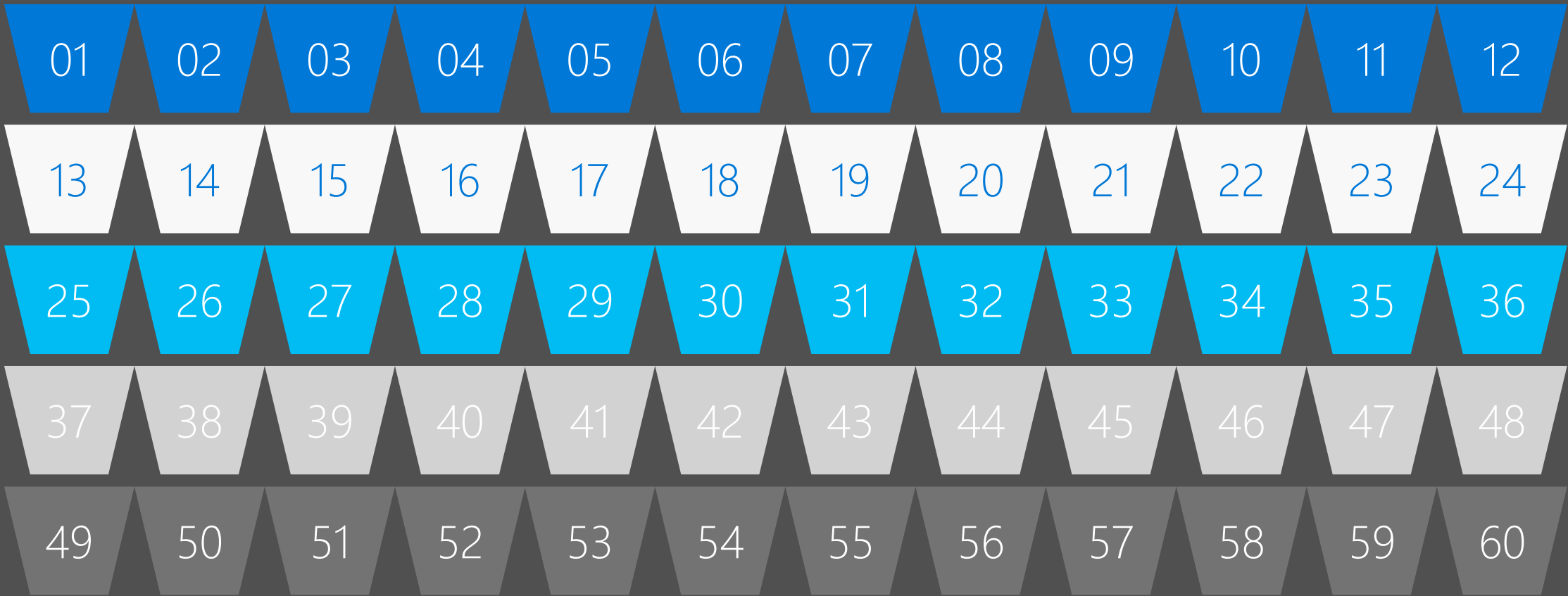
```
  -DatabaseName "DB_name"
```

```
  -RequestedServiceObjectiveName "DW100"
```

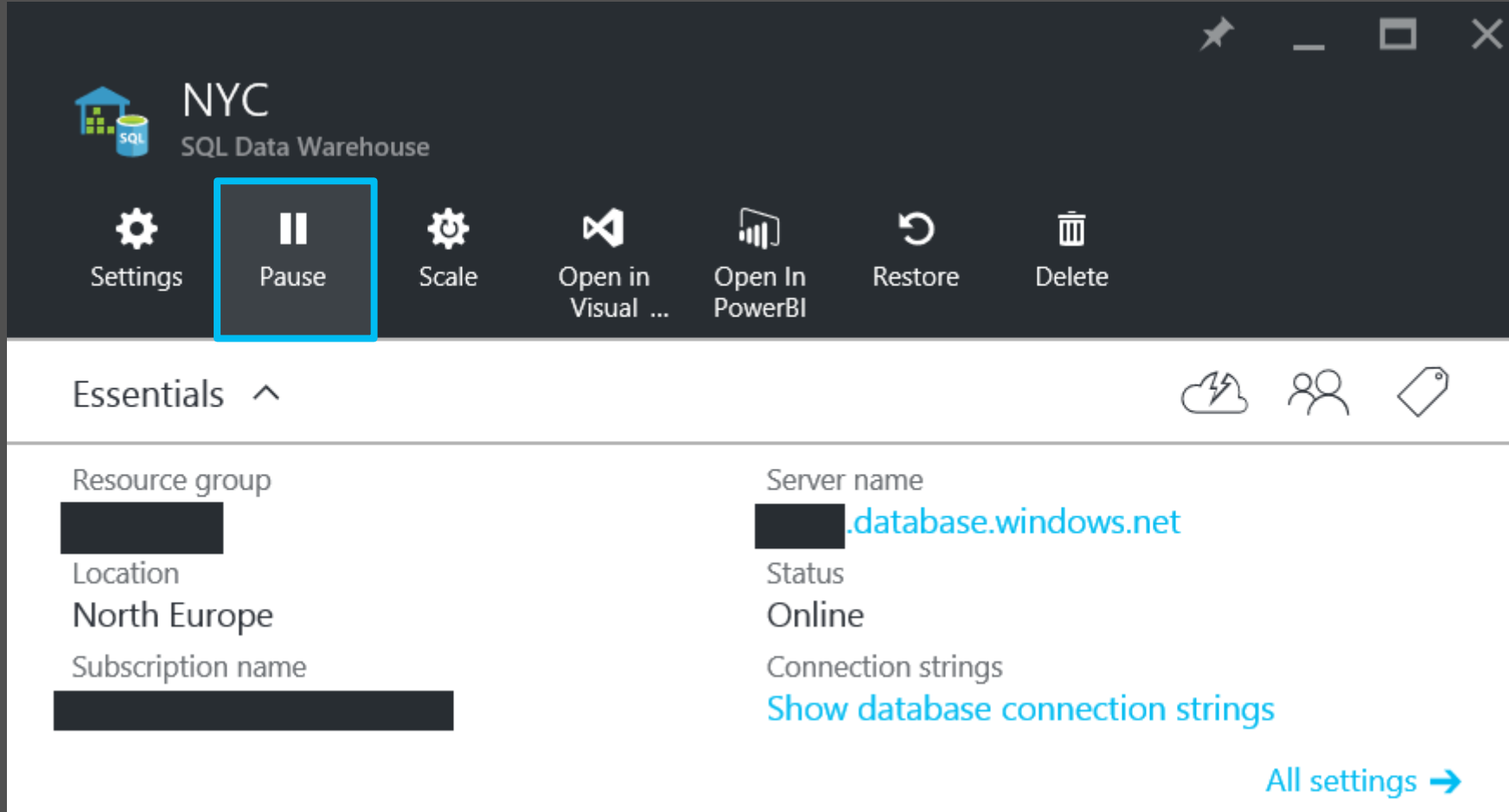
# Pause and Resume

# Pausing compute in SQLDW

5 Compute Nodes



# Pause with the portal



The screenshot shows the Azure portal interface for a SQL Data Warehouse resource. The top navigation bar includes a home icon, the resource name 'NYC', and the type 'SQL Data Warehouse'. Below this is a toolbar with several action buttons: 'Settings' (gear icon), 'Pause' (two vertical bars icon, highlighted with a red box), 'Scale' (gear icon), 'Open in Visual ...' (chart icon), 'Open In PowerBI' (PowerBI icon), 'Restore' (refresh icon), and 'Delete' (trash icon). Below the toolbar is a section titled 'Essentials' with a chevron icon. This section displays key information about the resource, organized into two columns. The left column shows 'Resource group' (redacted), 'Location' (North Europe), and 'Subscription name' (redacted). The right column shows 'Server name' (redacted), 'Status' (Online), and 'Connection strings' (with a link to 'Show database connection strings'). At the bottom right of the Essentials section is a link to 'All settings' with a right-pointing arrow.

NYC  
SQL Data Warehouse

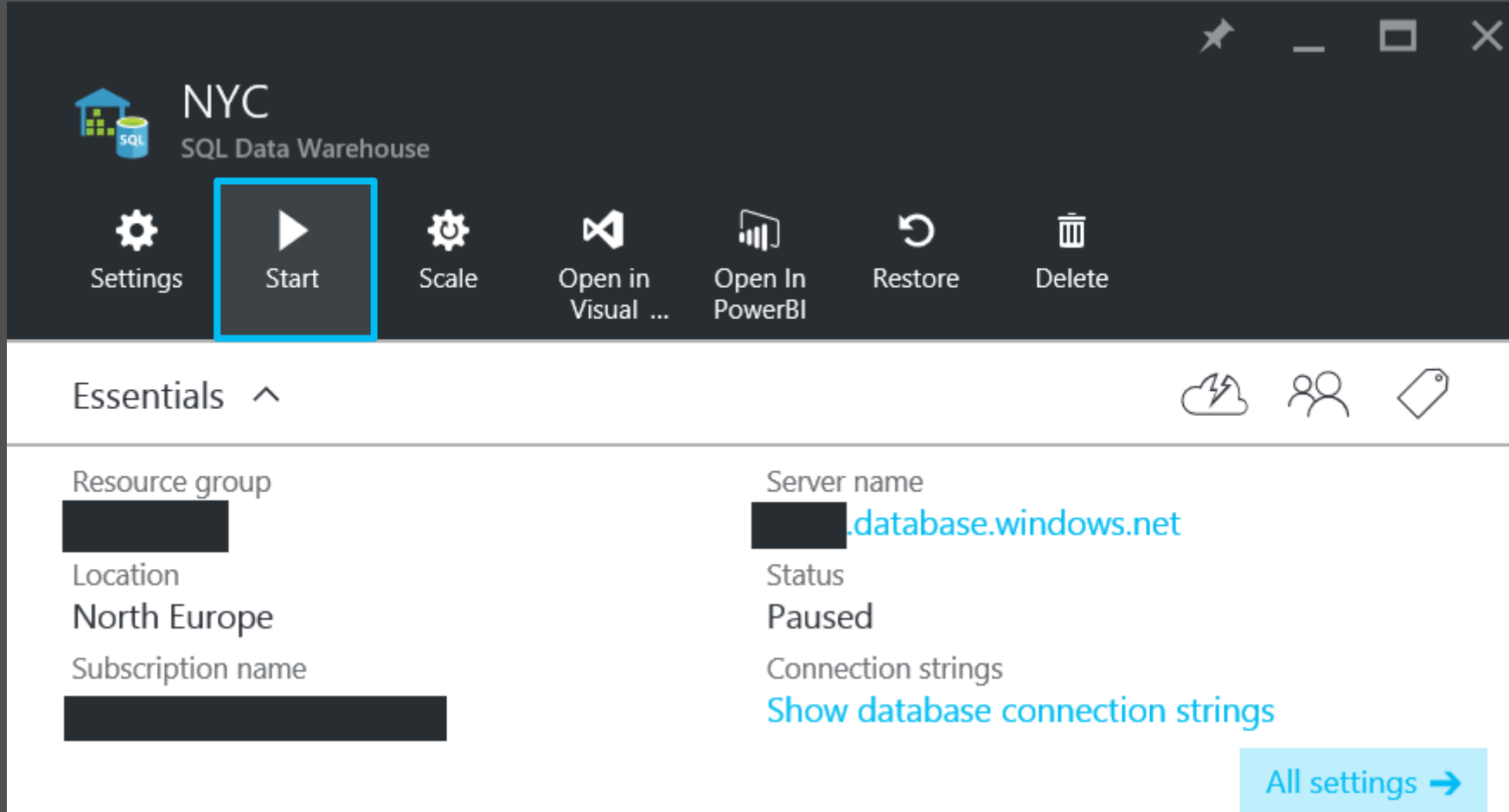
Settings Pause Scale Open in Visual ... Open In PowerBI Restore Delete

Essentials ^

Resource group	Server name
[Redacted]	[Redacted].database.windows.net
Location	Status
North Europe	Online
Subscription name	Connection strings
[Redacted]	<a href="#">Show database connection strings</a>

[All settings →](#)

# Resuming in the portal



The screenshot displays the Azure portal interface for a SQL Data Warehouse named 'NYC'. The top navigation bar includes icons for Settings, Start (highlighted with a red box), Scale, Open in Visual Studio, Open In PowerBI, Restore, and Delete. Below the navigation bar, the 'Essentials' section shows the following details:

Resource group	Server name
[Redacted]	[Redacted].database.windows.net
Location	Status
North Europe	Paused
Subscription name	Connection strings
[Redacted]	<a href="#">Show database connection strings</a>

An 'All settings' button with a right arrow is located at the bottom right of the Essentials section.

# Pause with PowerShell

**Suspend-AzureRmSqlDatabase**

- ResourceGroupName** "RG\_name"
- ServerName** "SRV\_name"
- DatabaseName** "DB\_name"

# Resume with PowerShell

## Resume-AzureRmSqlDatabase

- ResourceGroupName "RG\_name"
- ServerName "SRV\_name"
- DatabaseName "DB\_name"



# Demo: Using a SQL Data Warehouse

# Summary

# Summary

Scale-out distributed query engine

De-coupled storage from compute

Fully managed

Completely elastic

Platform as a Service (PaaS)

Petabyte scale

Leveraging cloud ecosystem

Broad range of connectivity options

# Q&A



Microsoft Azure



# Thank you

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