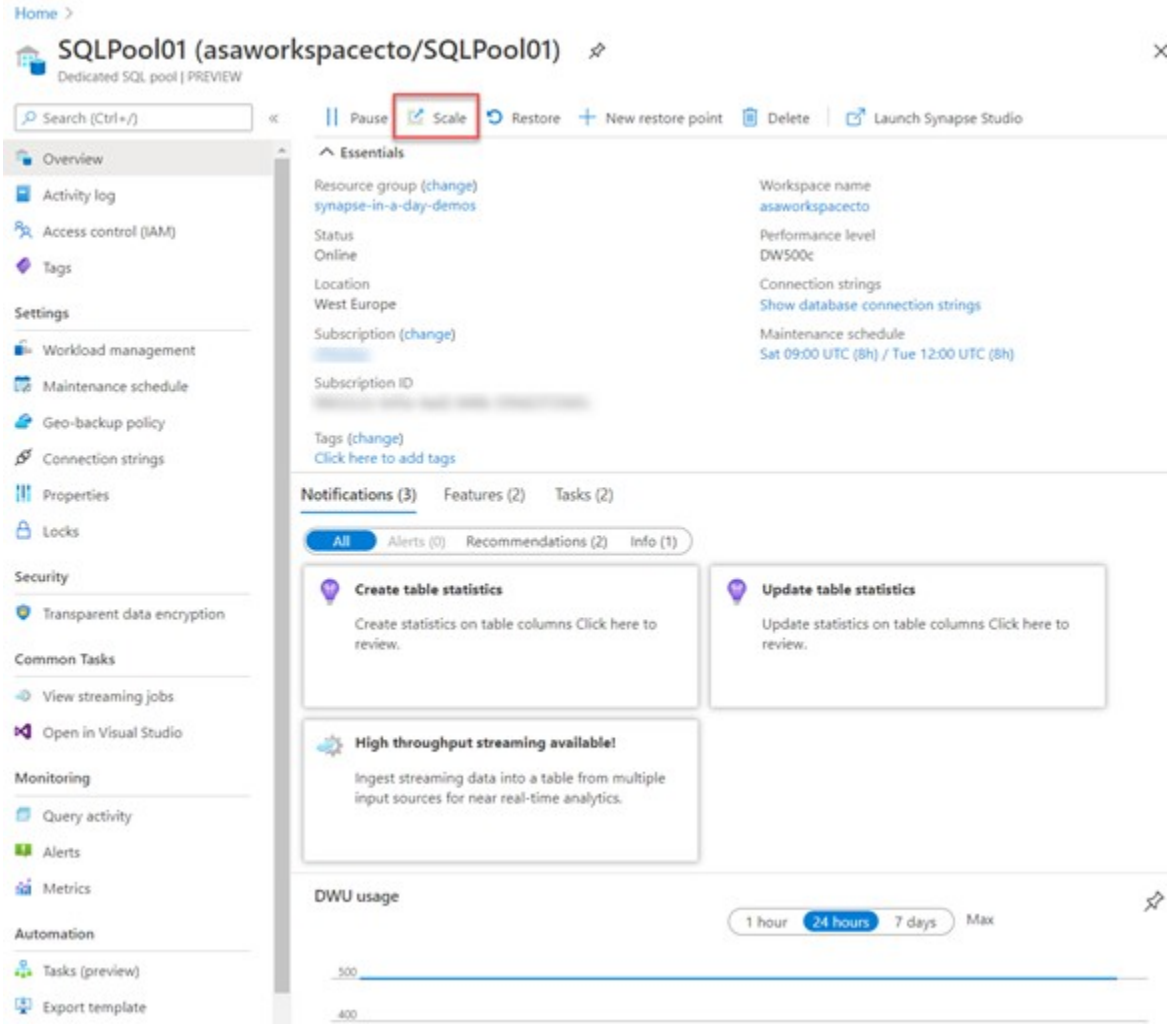
Scale compute resources in Azure Synapse Analytics

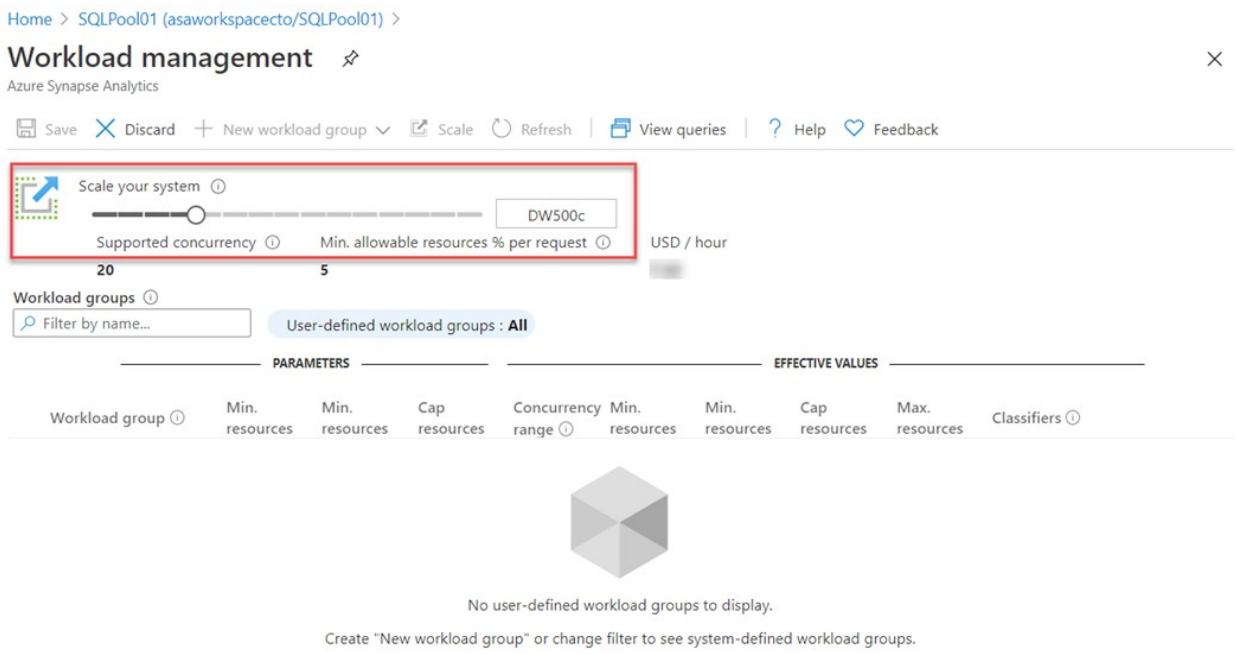
Note:

You are not required to complete the processes, tasks, activities, or steps presented in this example. The various samples provided are for illustrative purposes only and it's likely that if you try this out you will encounter issues in your system.

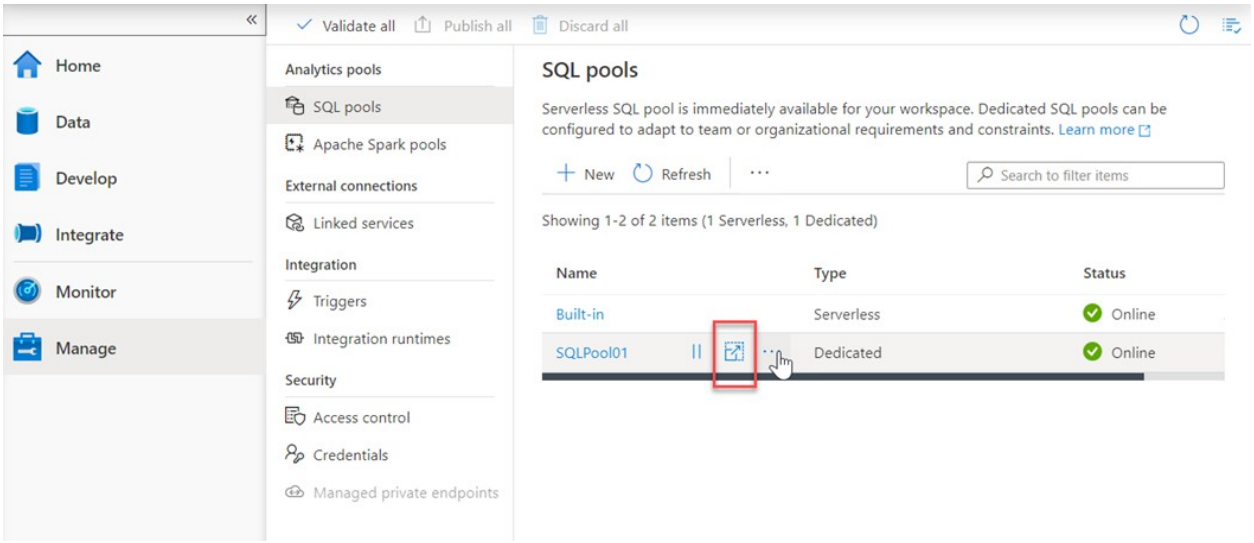
One of the key management features that you have at your disposal within Azure Synapse Analytics, is the ability to scale the compute resources for SQL or Spark pools to meet the demands of processing your data. In SQL pools, the unit of scale is an abstraction of compute power that is known as a data warehouse unit. Compute is separate from storage, which enables you to scale compute independently of the data in your system. This means you can scale up and scale down the compute power to meet your needs. You can scale a Synapse SQL pool either through the Azure portal, Azure Synapse Studio or programmatically using TSQL or PowerShell. In the Azure portal, you can click on scale icon



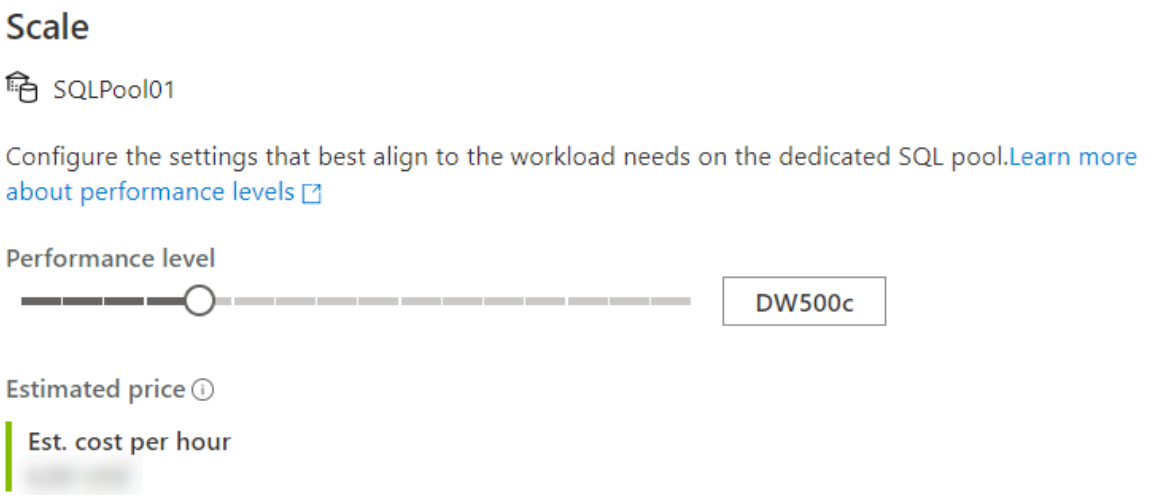
And then you can adjust the slider to scale the SQL Pool



Another option to scale is within Azure Synapse Studio, click on the scale icon:



And then move the slider as follows:



You can also make the modification using Transact-SQL

```
Set-AzSqlDatabase -ResourceGroupName "resourcegroupname" -DatabaseName "mySample DataWarehouse" -ServerName "sqlpoolservername" -RequestedServiceObjectiveName "DW 300c"
```

Scaling Apache Spark pools in Azure Synapse Analytics

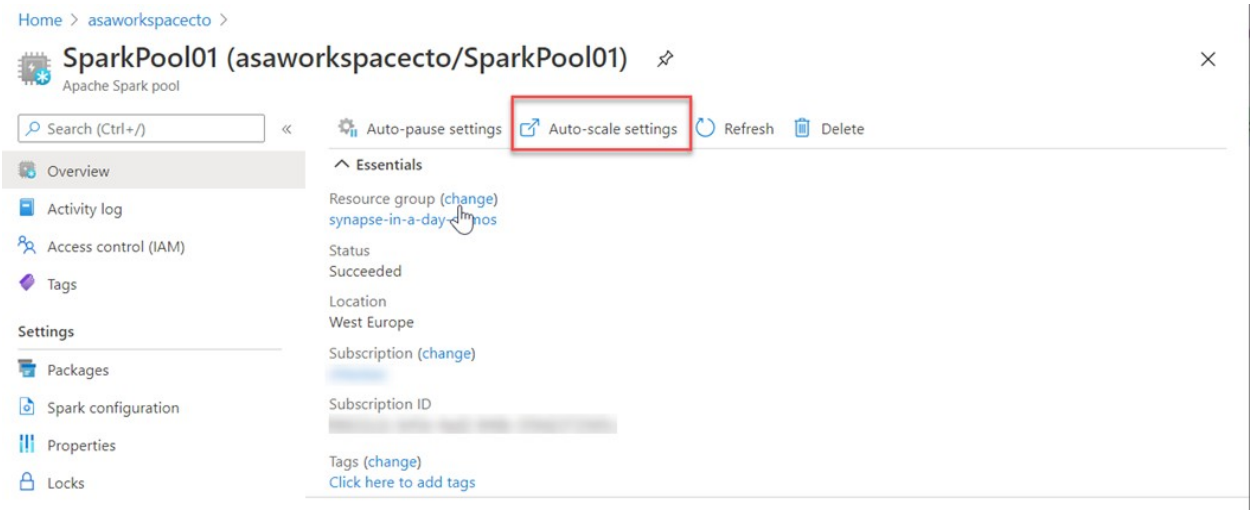
Apache Spark pools for Azure Synapse Analytics uses an Autoscale feature that automatically scales the number of nodes in a cluster instance up and down. During the creation of a new Spark pool, a minimum and maximum number of nodes can be set when Autoscale is selected. Autoscale then monitors the resource requirements of the load and scales the number of nodes up or down. To enable the Autoscale feature, complete the following steps as part of the normal pool creation process:

1. On the Basics tab, select the Enable autoscale checkbox.

2. Enter the desired values for the following properties:

- Min number of nodes.
- Max number of nodes

The initial number of nodes will be the minimum. This value defines the initial size of the instance when it's created. The minimum number of nodes can't be fewer than three. You can also modify this in the Azure portal, you can click on auto-scale settings icon



Choose the node size and the number of nodes

Auto-scale Settings

SparkPool01

Configure the settings that best align with the workload on the Apache Spark pool.

Autoscale * ⓘ

Enabled | Disabled

Node size family

MemoryOptimized

Node size *

Small (4 vCPU / 32 GB)

Number of nodes *

3 — 4

Estimated price ⓘ

Est. cost per hour

[redacted]

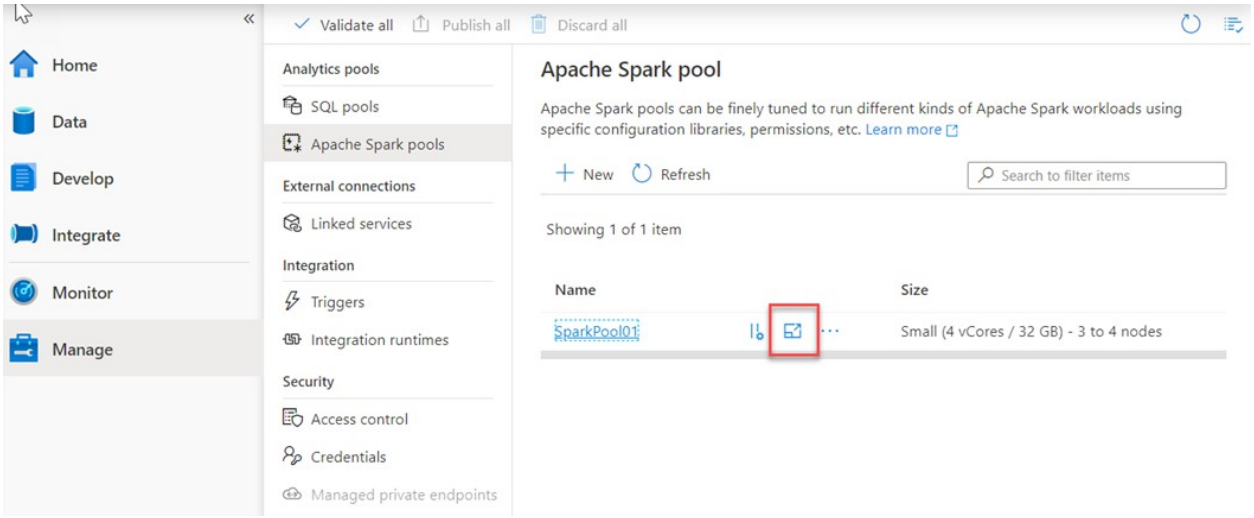
View pricing details

Force new settings ⓘ

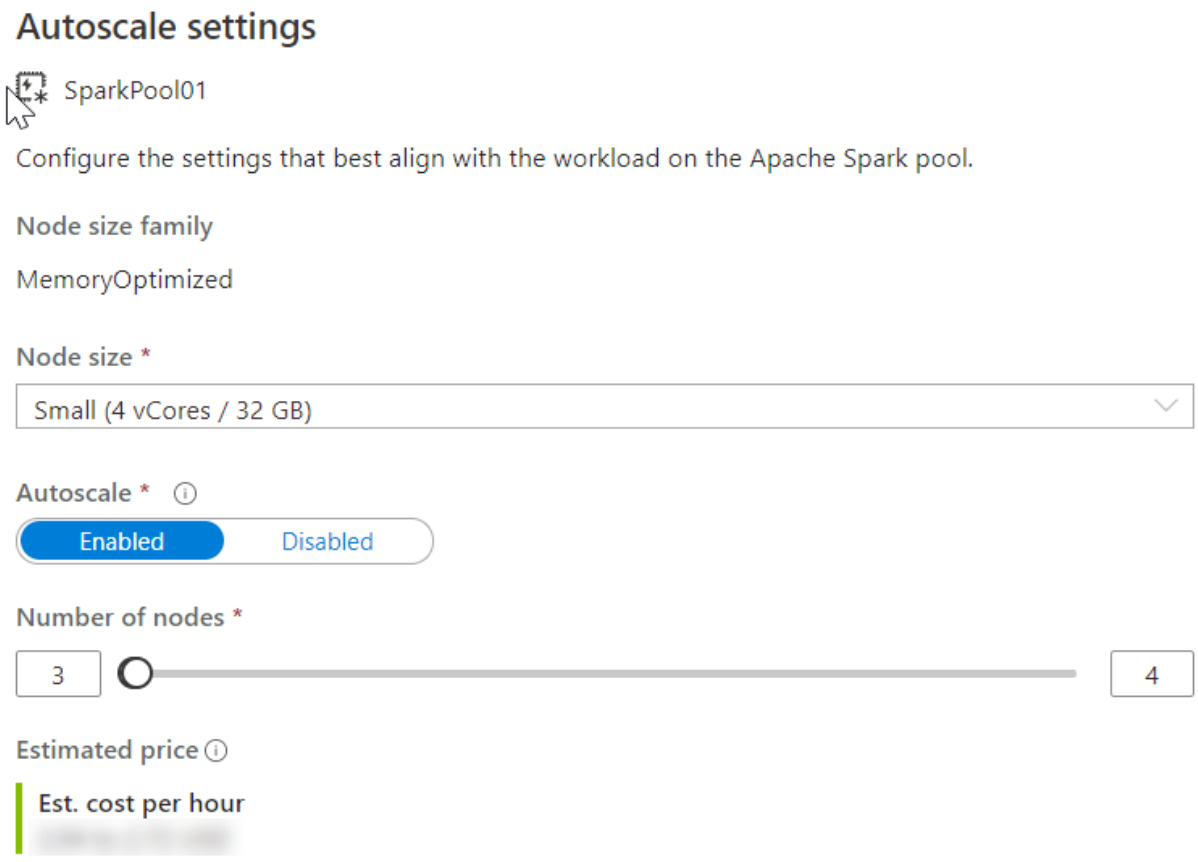
☐ Immediately apply settings change and cancel all active applications.

Apply | Cancel

and for Azure Synapse Studio as follows



And Choose the node size and the number of nodes



Autoscale continuously monitors the Spark instance and collects the following metrics:

Metric	Description
Total Pending CPU	The total number of cores required to start execution of all pending nodes.
Total Pending Memory	The total memory (in MB) required to start execution of all pending nodes.
Total Free CPU	The sum of all unused cores on the active nodes.
Total Free Memory	The sum of unused memory (in MB) on the active nodes.
Used Memory per Node	The load on a node. A node on which 10 GB of memory is used, is considered under more load than a worker with 2 GB of used memory.

The following conditions will then autoscale the memory or CPU

Scale-up	Scale-down
Total pending CPU is greater than total free CPU for more than 1 minute.	Total pending CPU is less than total free CPU for more than 2 minutes.
Total pending memory is greater than total free memory for more than 1 minute.	Total pending memory is less than total free memory for more than 2 minutes.

The scaling operation can take between 1 -5 minutes. During an instance where there is a scale down process, Autoscale will put the nodes in decommissioning state so that no new executors can launch on that node. The running jobs will continue to run and finish. The pending jobs will wait to be scheduled as normal with fewer available nodes.