Getting Started with Azure SQL Database

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Chad Green, Data & Solutions Architect
ProgressiveHealth

chadgreen@chadgreen.com
chadgreen.com
@ChadGreen
ChadwickEGreen

Database as a Service (DaaS)

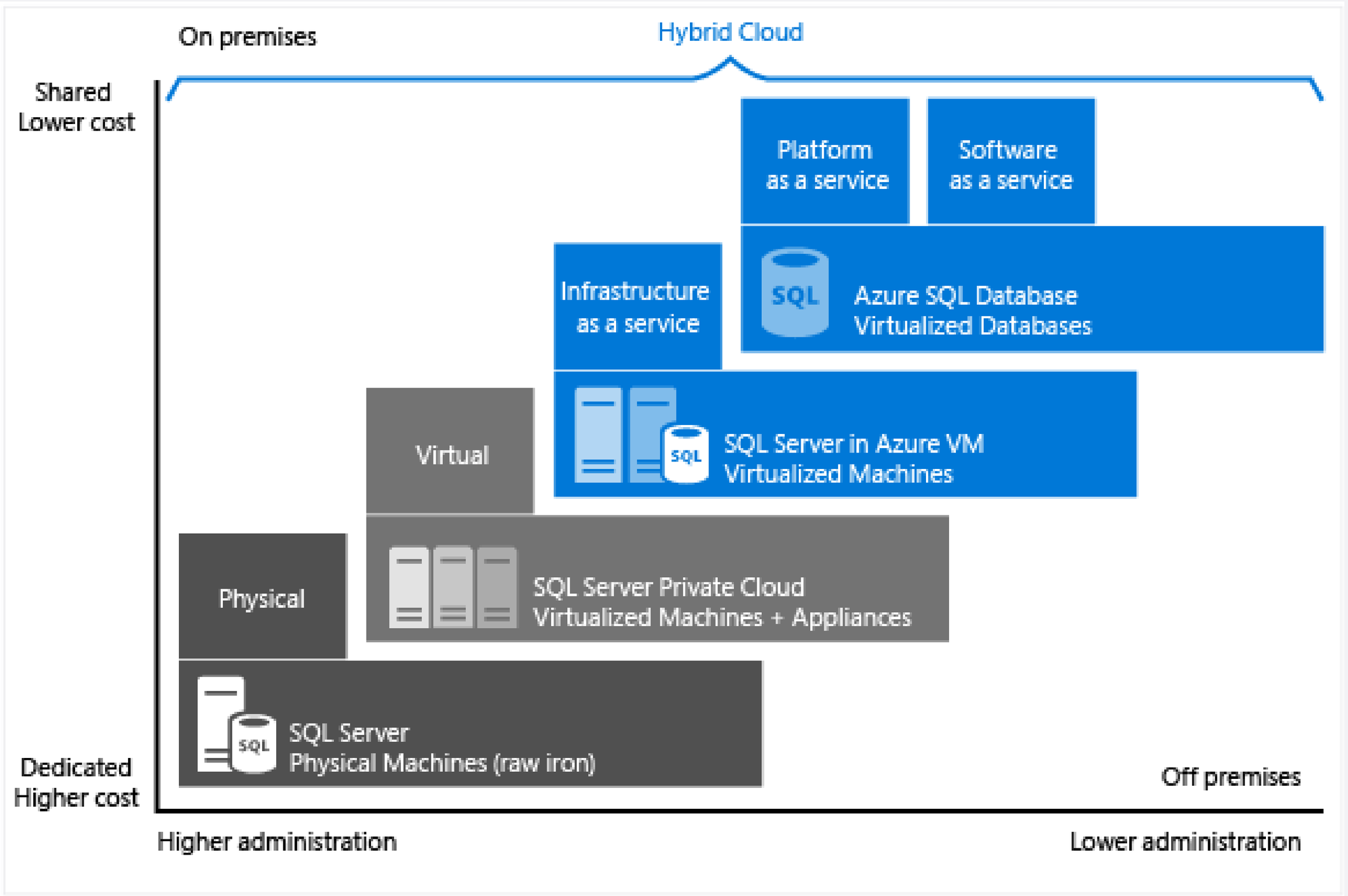
Cloud computing service model that provides users with some form of access to a database without the need for setting up physical hardware, installing software

Options to Bring Your Database to the Cloud

Microsoft's Data Platform

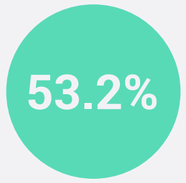
- Four basic options for hosting SQL Server
  - SQL Server on physical machines
  - SQL Server in on-premise virtualized machines
  - SQL Server in Azure Virtual Machine
  - Azure SQL Database

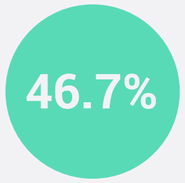
Microsoft’s Data Platform



Why Azure SQL Database

Less expensive than on-premise/hosted





Increase in IT staff efficiencies

Less database-related downtime

Total five-year average discounted business benefits per Azure SQL Database

Five-year ROI

Payback period

Azure SQL Database versus SQL Server on Azure Virtual Machines

Azure SQL Database	SQL Server on Azure VMs
New cloud-designed applications that have time constraints in development and marketing	Existing applications that require fast migration to the cloud with minimal change
Teams that need built-in high availability, disaster recovery, and upgrade for the database	Teams that can configure and mange high availability, disaster recovery, and patching for SQL Server
Teams that do not want to manage the underlying operating system and configuration settings	You need a customized environment with full administrative rights
Databases of up to 4-TB	SQL Server instances with up to 64-TB of storage

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Azure SQL Database versus SQL Server on Azure Virtual Machines

Azure SQL Database

- DaaS hosted in Azure cloud that falls into SaaS and PaaS
- Develop directory on the service using built-in features and functionality
- Pay-as-you-go
- Options to scale up or out

SQL Server on Azure VMs

- IaaS
- Built on standardized hardware that is owned, hosted, and maintained by Microsoft
- Pay-as-you-go or bring your own license
- Full administrative rights

SQL Server Features Not Supported

- Change Data Capture
- Common Language Runtime
- Cross-database queries (Elastic queries yes)
- Cross-database transactions
- Database mail
- Database mirroring
- Data Quality Services
- Database snapshots
- Most DBCC statements supported
- Most DDL statements supported
- Only Database DDL Triggers
- Distributed partition views
- Distributed transactions (Elastic transactions yes)
- Most DML triggers supported
- Most DMVs supported
- Event notifications
- Some extended events
- Extended stored procedures
- Filestream
- Most functions supported
- Master Data Services
- Minimal logging in bulk import
- Modifying system data
- OPENDATASOURCE
- OPENQUERY
- OPENROWSET
- Polybase
- Policy-based management
- Resource governor
- RESTORE statements
- Sematic search
- Service Broker
- Server configuration settings
- SQL Server Agent
- SQL Server Analysis Services (SSAS)
- SQL Server Auditing
- SQL Server Profiler
- SQL Sever Reporting Services (SSRS)
- Only some system stored procedures supported
- Only some system catalog views supported
- Trace flags

What is Azure SQL Database

What is SQL Azure Database

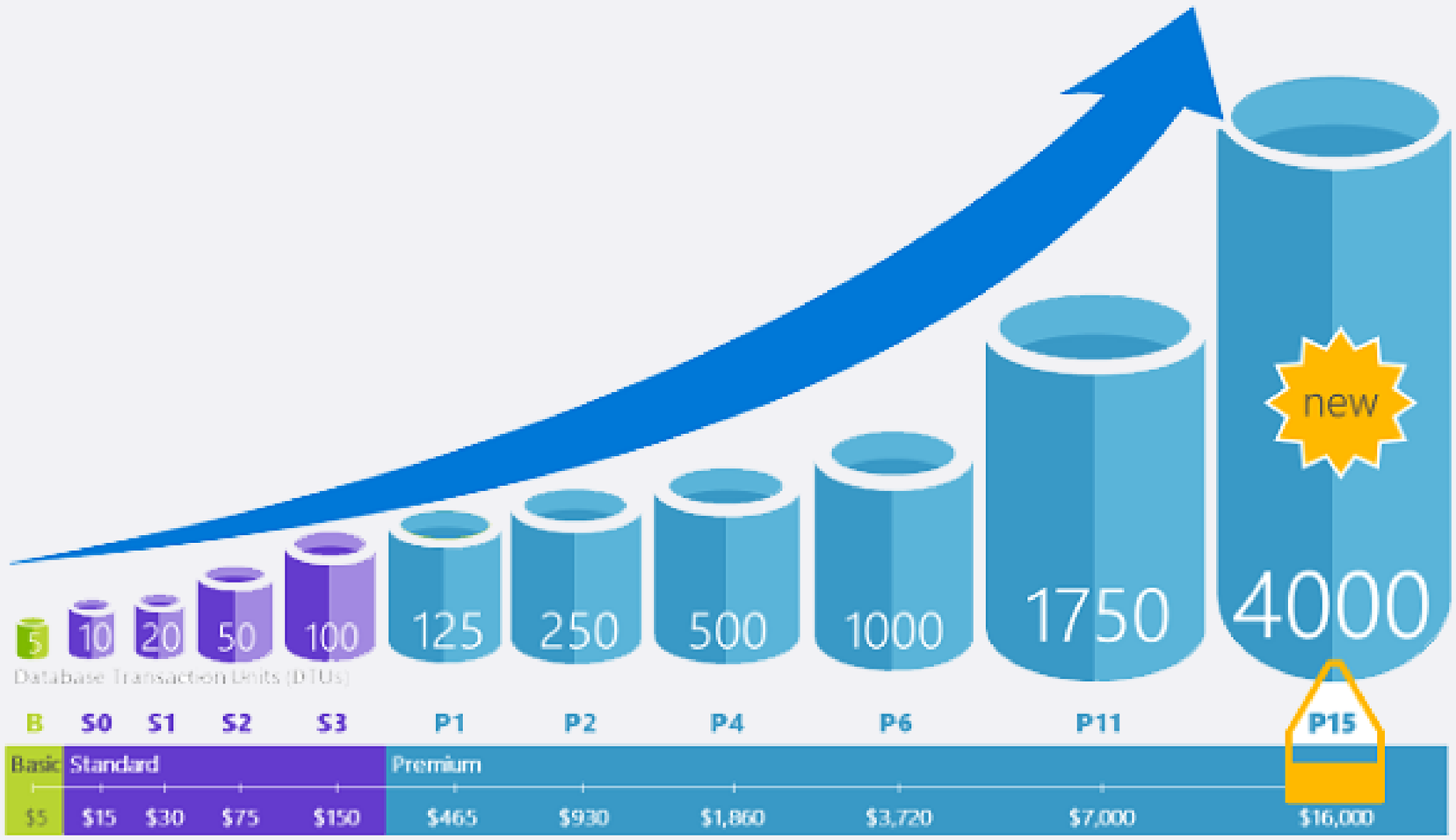
Azure SQL Database is a cloud-based relational database service, built on the Microsoft SQL Server engine designed to deliver predictable performance and scalability, with virtually no downtime and near-zero administration.

SQL Server with out the administration headaches!

Scalable Performance and Pools

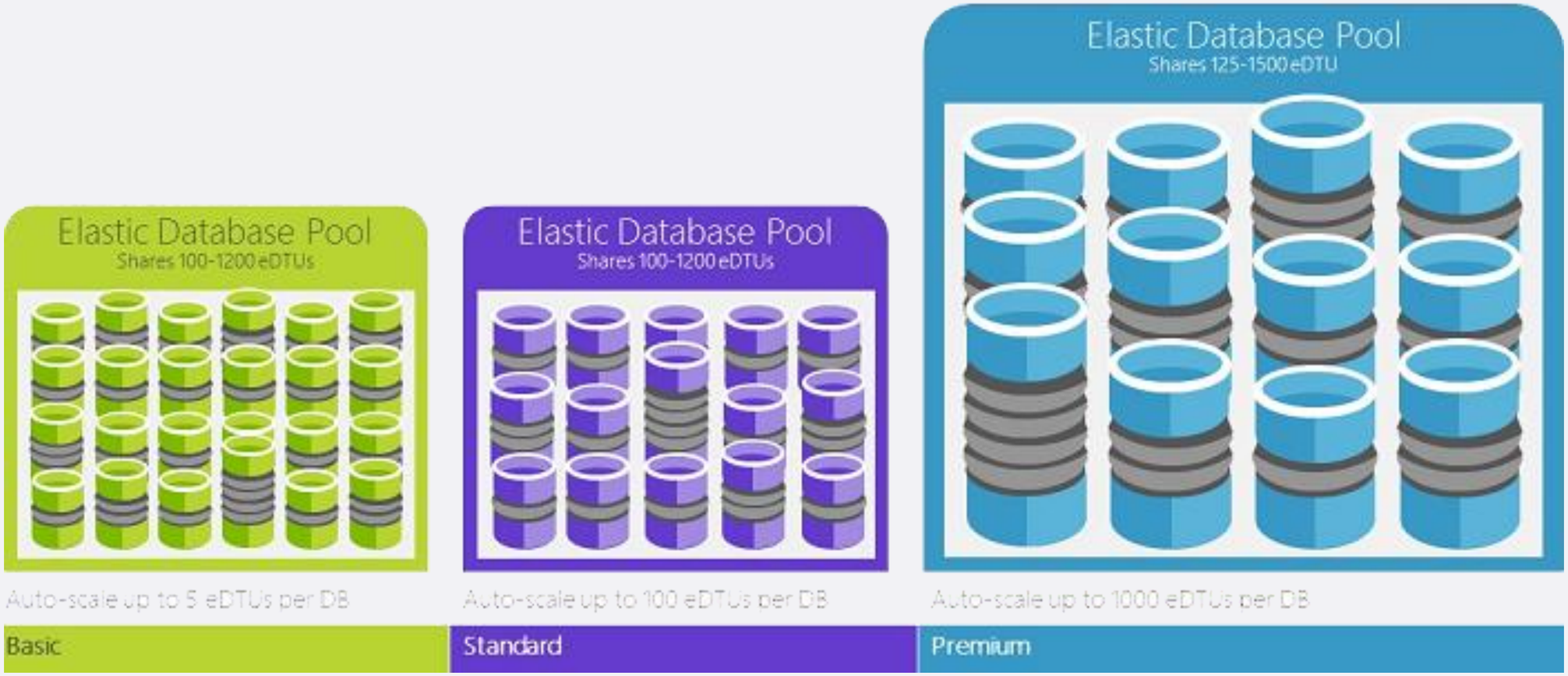
Scalable Performance and Pools

- Adjust performance and scale without downtime



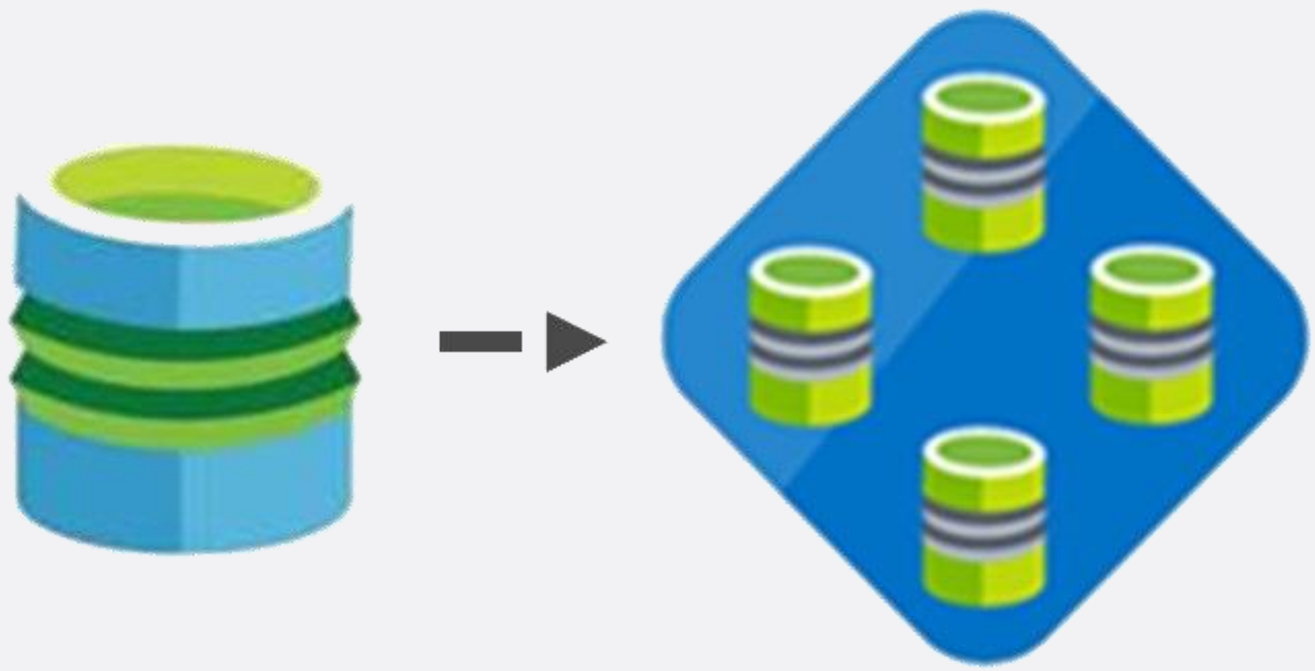
Scalable Performance and Pools

- Elastic Pools to maximize resource utilization



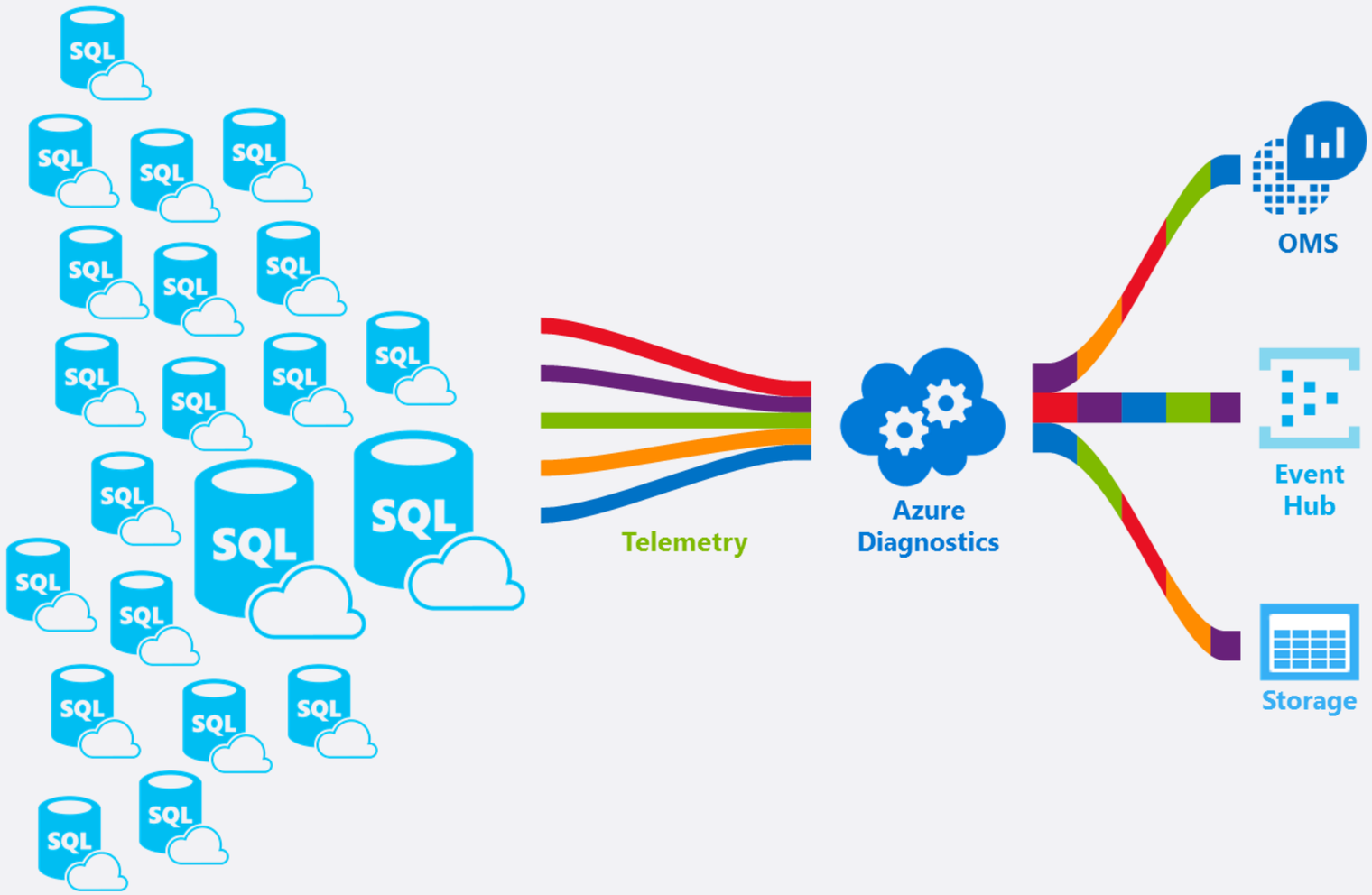
Scalable Performance and Pools

- Blend single databases with pooled databases



Scalable Performance and Pools

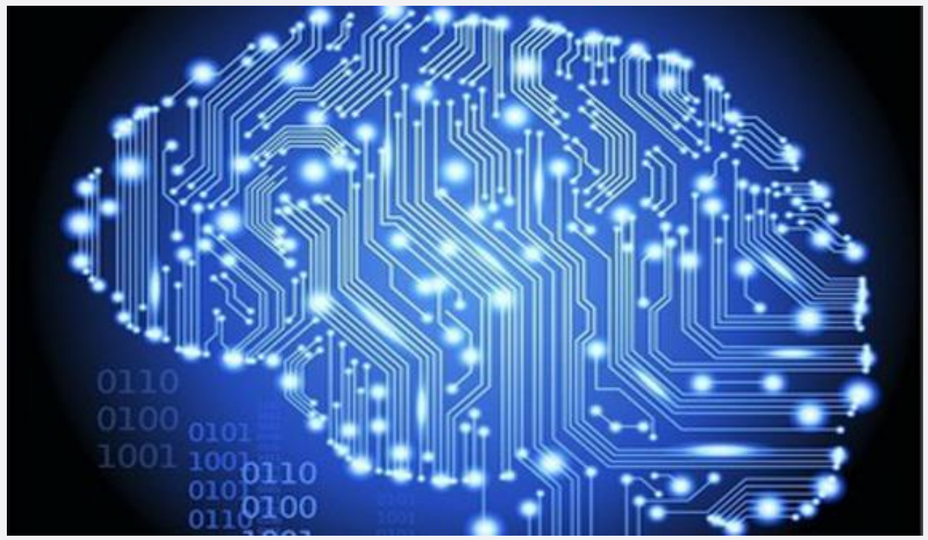
- Extensive monitoring and alerting capabilities



Built-In Intelligence

Built-In Intelligence

- Automatic performance monitoring and tuning
  - Automatic Index Management
  - Automatic Plan Correction



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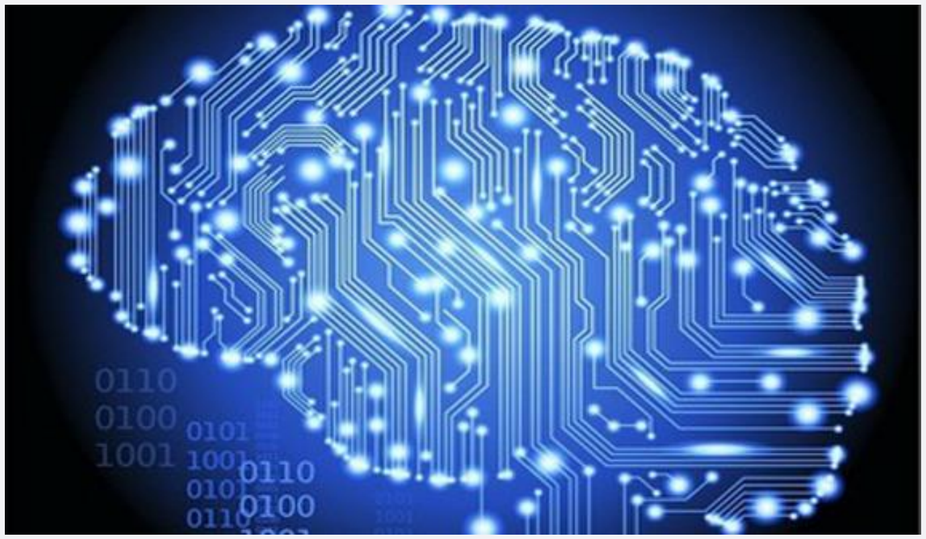
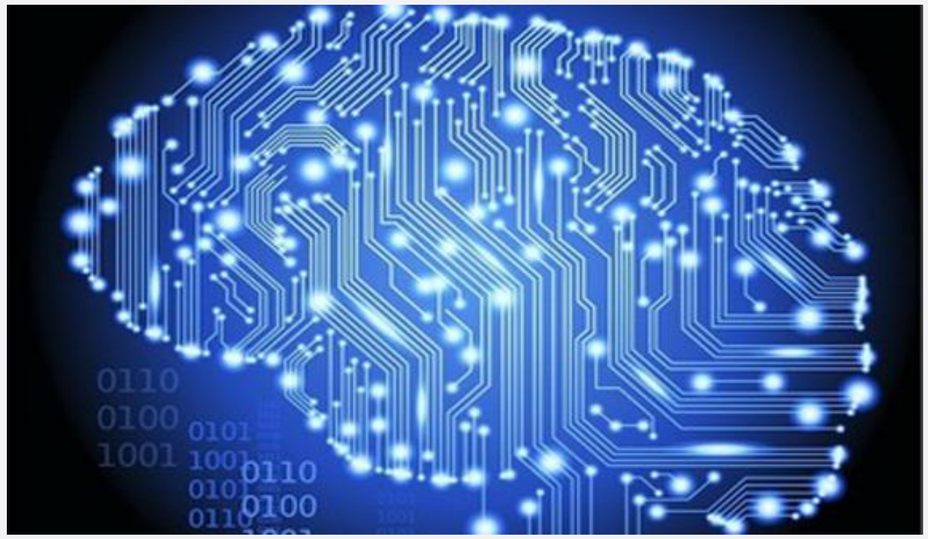
- Adaptive Query Processing



Built-In Intelligence

- Automatic performance monitoring and tuning
  - Automatic Index Management
  - Automatic Plan Correction
- Adaptive Query Processing
- Intelligent Threat Detection



Advanced Security and Compliance

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- Auditing for compliance and security

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- Data encryption at rest

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- Row-level security (RLS)
- Azure Active Directory integration and multi-factor authentication
- Compliance certification

Microsoft Azure Compliance Offerings

Pricing Models

Azure SQL Database Pricing Models

DTU (Black Box)

- Based upon bundled measure of compute, storage, and IO resources
- Performance levels expressed in terms of Database Transaction Units (DTUs) and elastic Database Transaction Units (eDTUs)
- Best for customers who want simple, pre-configured resource options

vCore (Transparent Box)

- Allows Independently scale compute and storage – up to 80 vCores, 4-Tb of data storage, and 200,000 IOPS
- Allows you to use Azure Hybrid Benefit for SQL Server to gain cost savings
- Best for customers who value flexibility, control, and transparency

What are Database Transaction Units (DTUs)

Database Transaction Unit – DTU

Bounding box

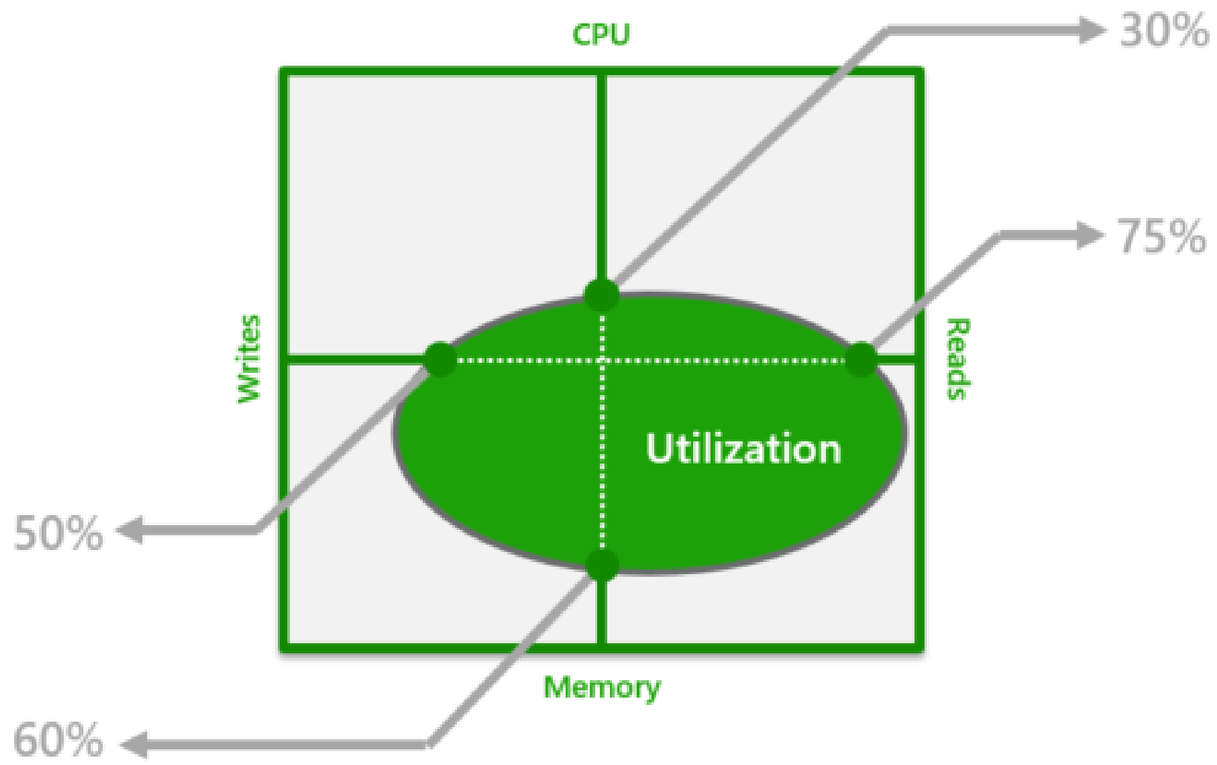
Monitoring database workload utilization within bounding box

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. %



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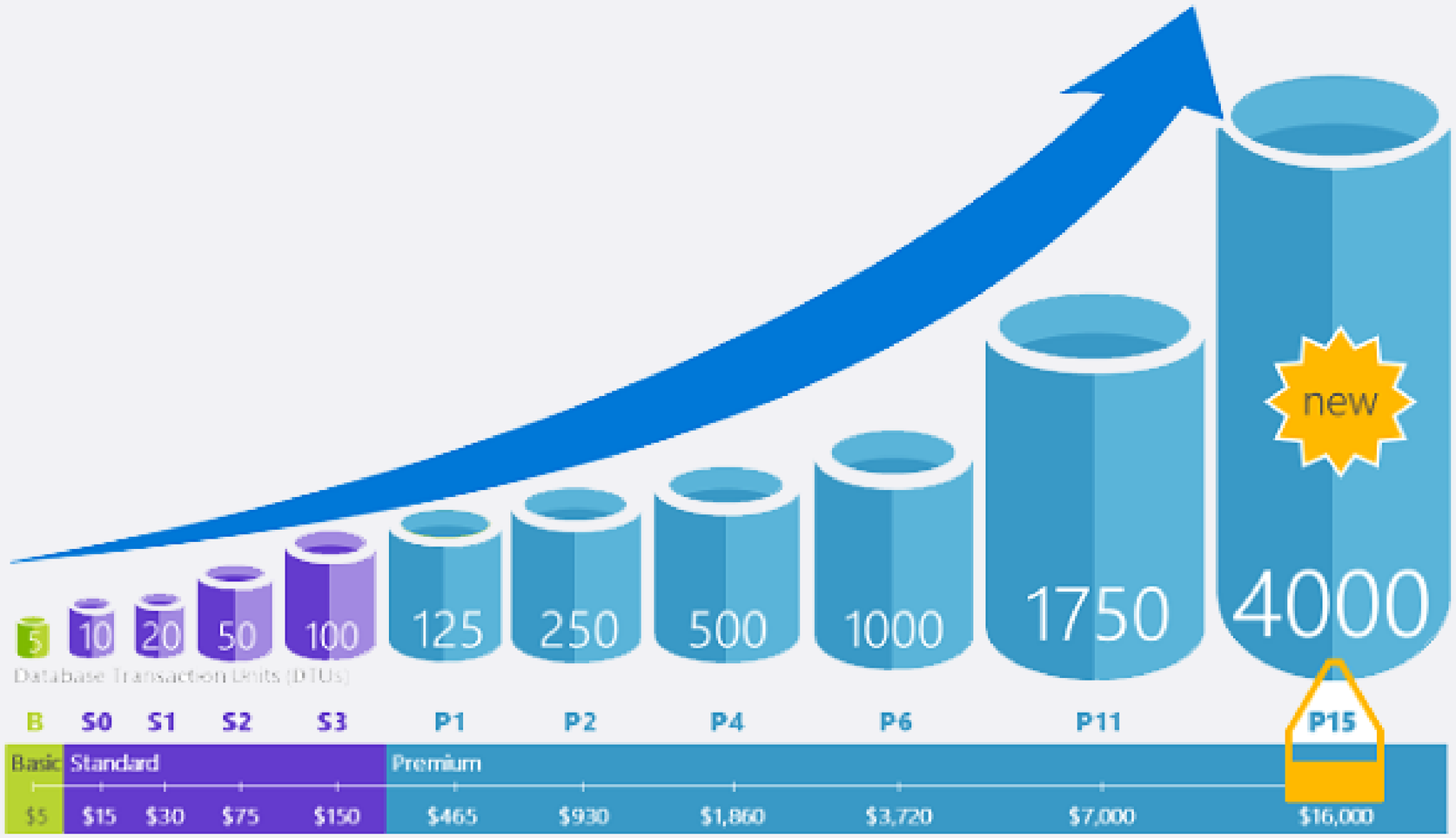
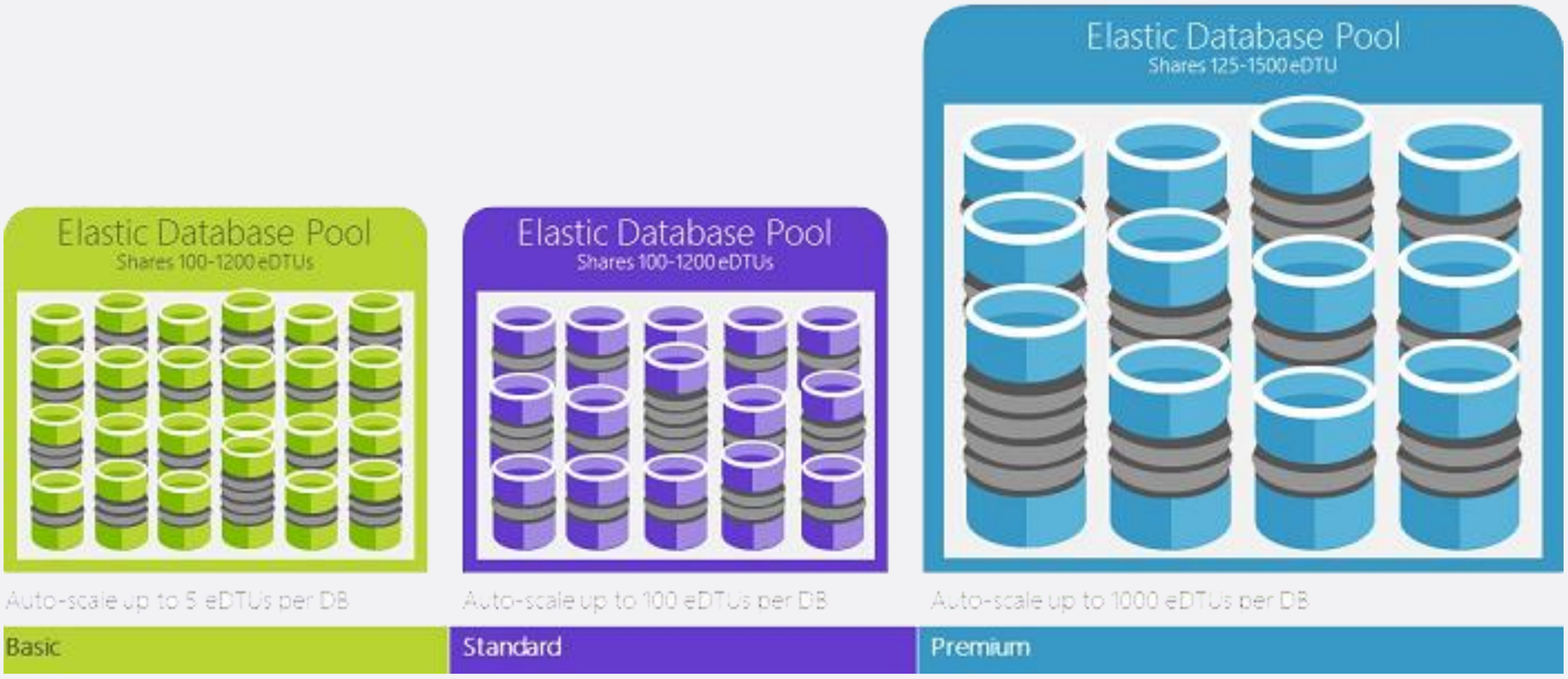
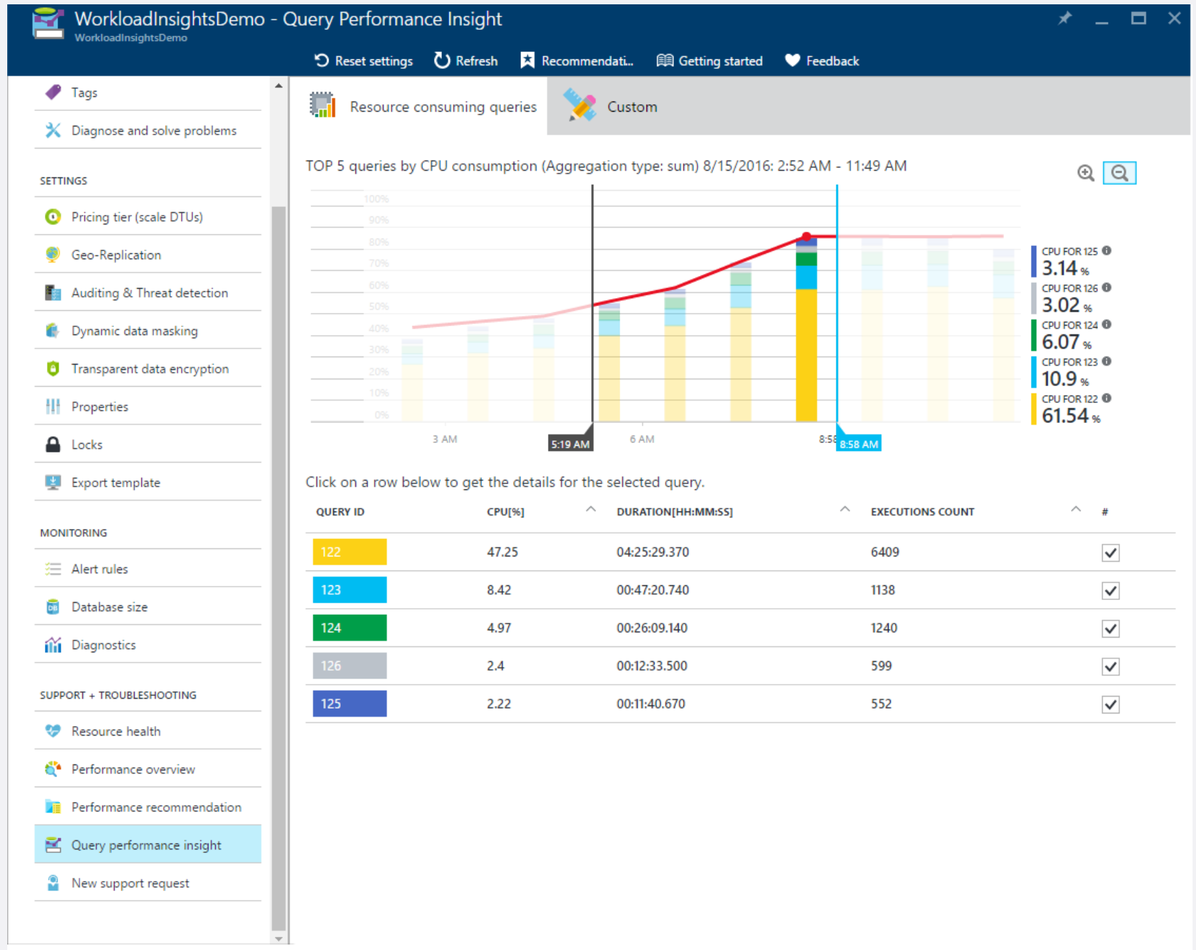


What are elastic Database Transaction Units (eDTUs)



How can I determine the number of DTUs needed by my workload

- DTU Calculator – dtucalculator.azurewebsites.net
- SQL Database Query Performance Insight
- sys.dm_db_resource_stats
- sys.resource_stats



More details about vCore-based purchasing model

- Represents the logical CPU offered with an option to choose between generations of hardware
- Flexibility, control, transparency of individual resource consumption, and straightforward way to translate on-premises workload requirements to the cloud
- Allows you to scale compute, memory, and storage
- Pay for
  - Compute (service tier + number of vCores + generation of hardware)
  - Type and amount of data and log storage
  - Number of IOs
  - Backup storage (RA-GRS)

Demos

Demos

- Create an Azure SQL Database
- Add records to the database
- Use Azure SQL Query
- Dynamic Data Masking
- Geo-Replication
- Apply Performance Recommendations
- Enable Automatic Tuning

Create an Azure SQL Database

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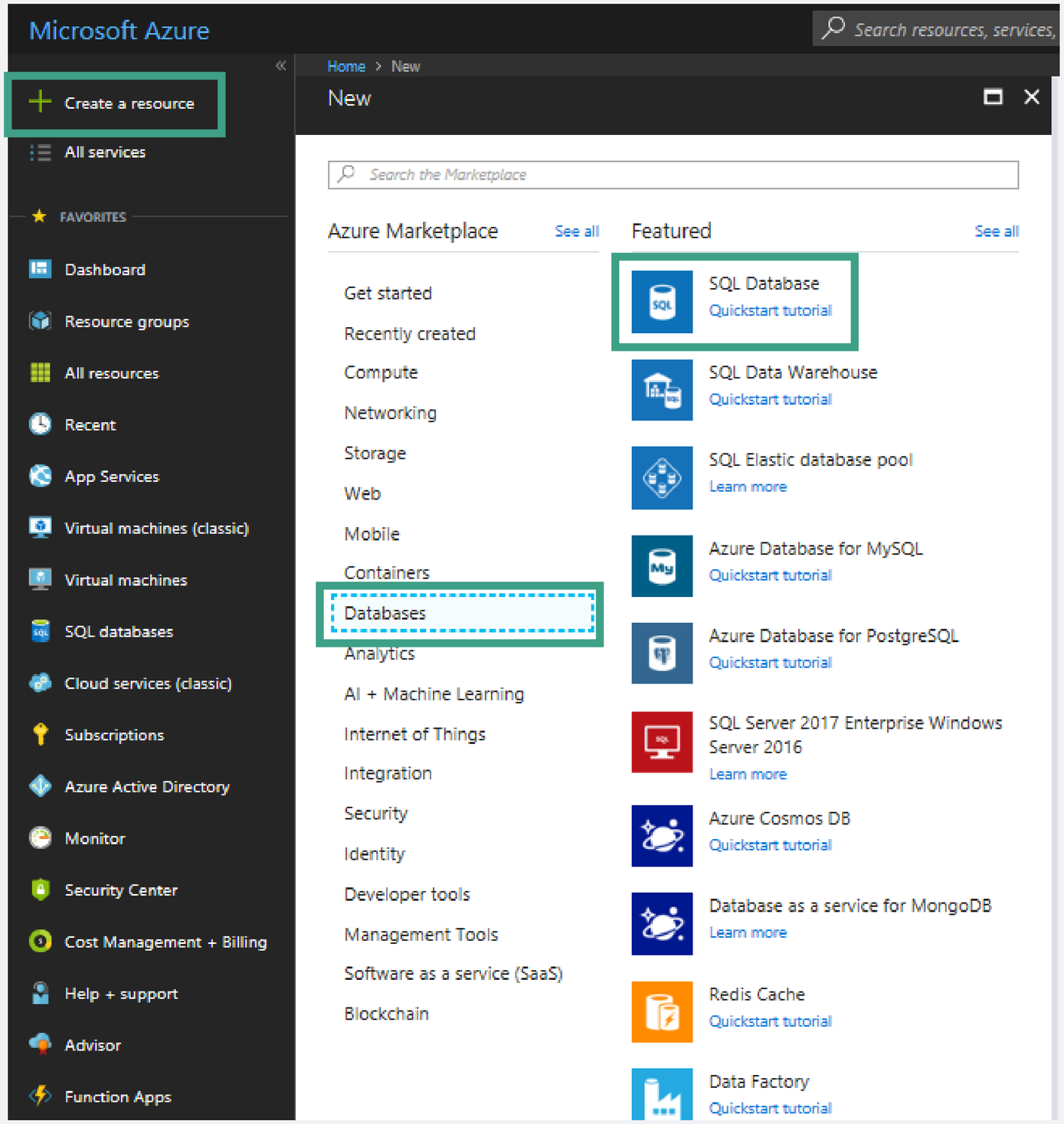

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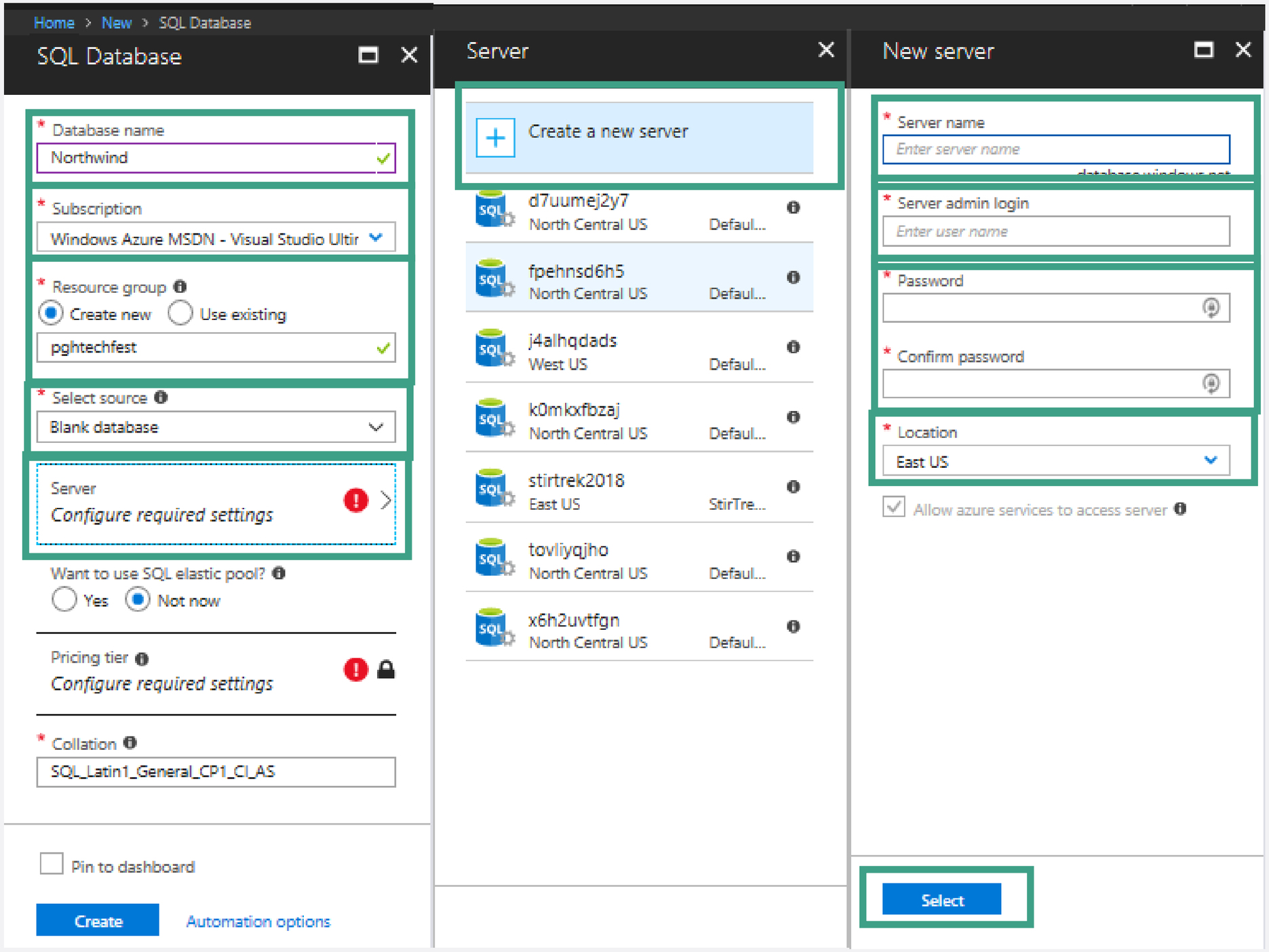

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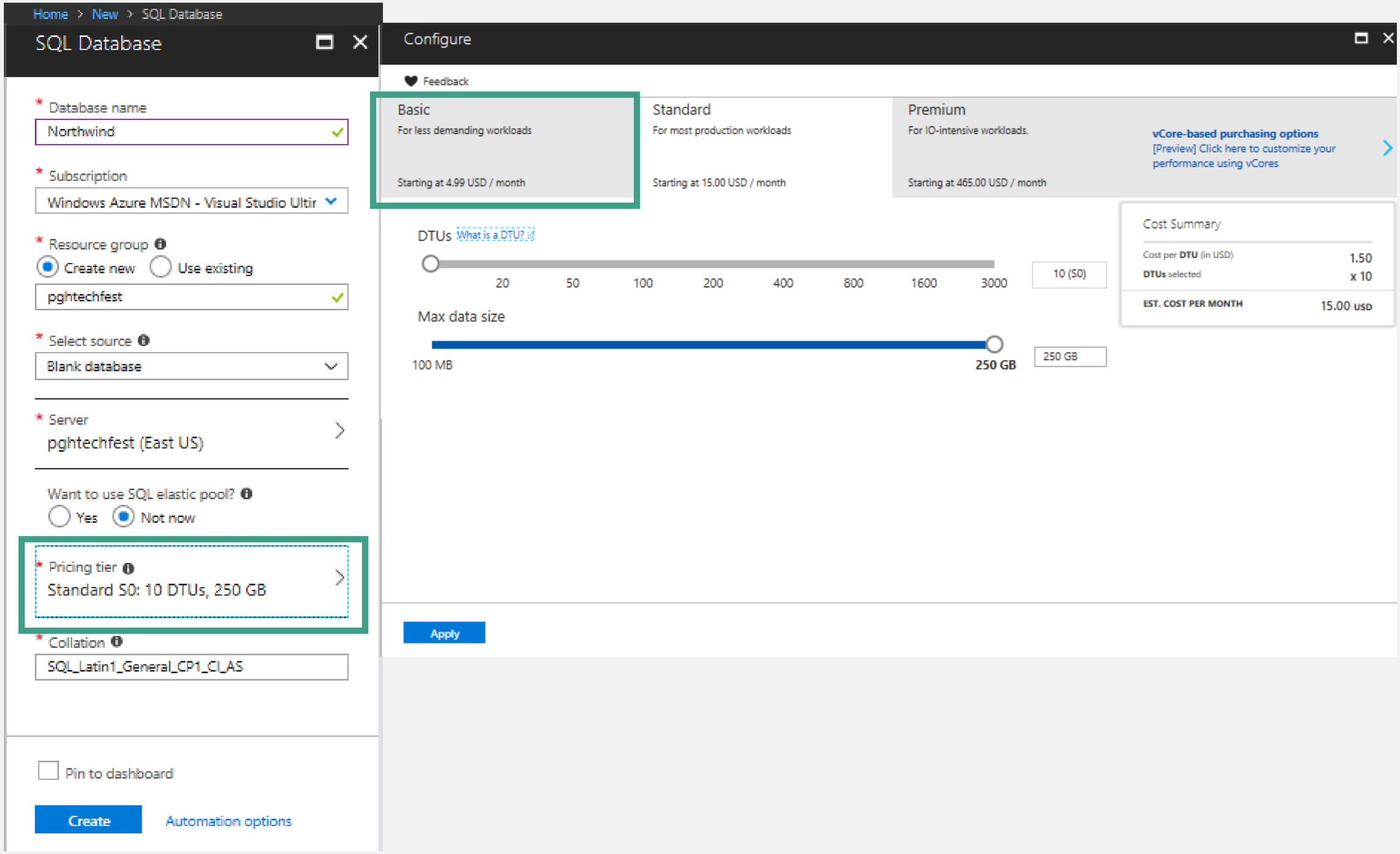

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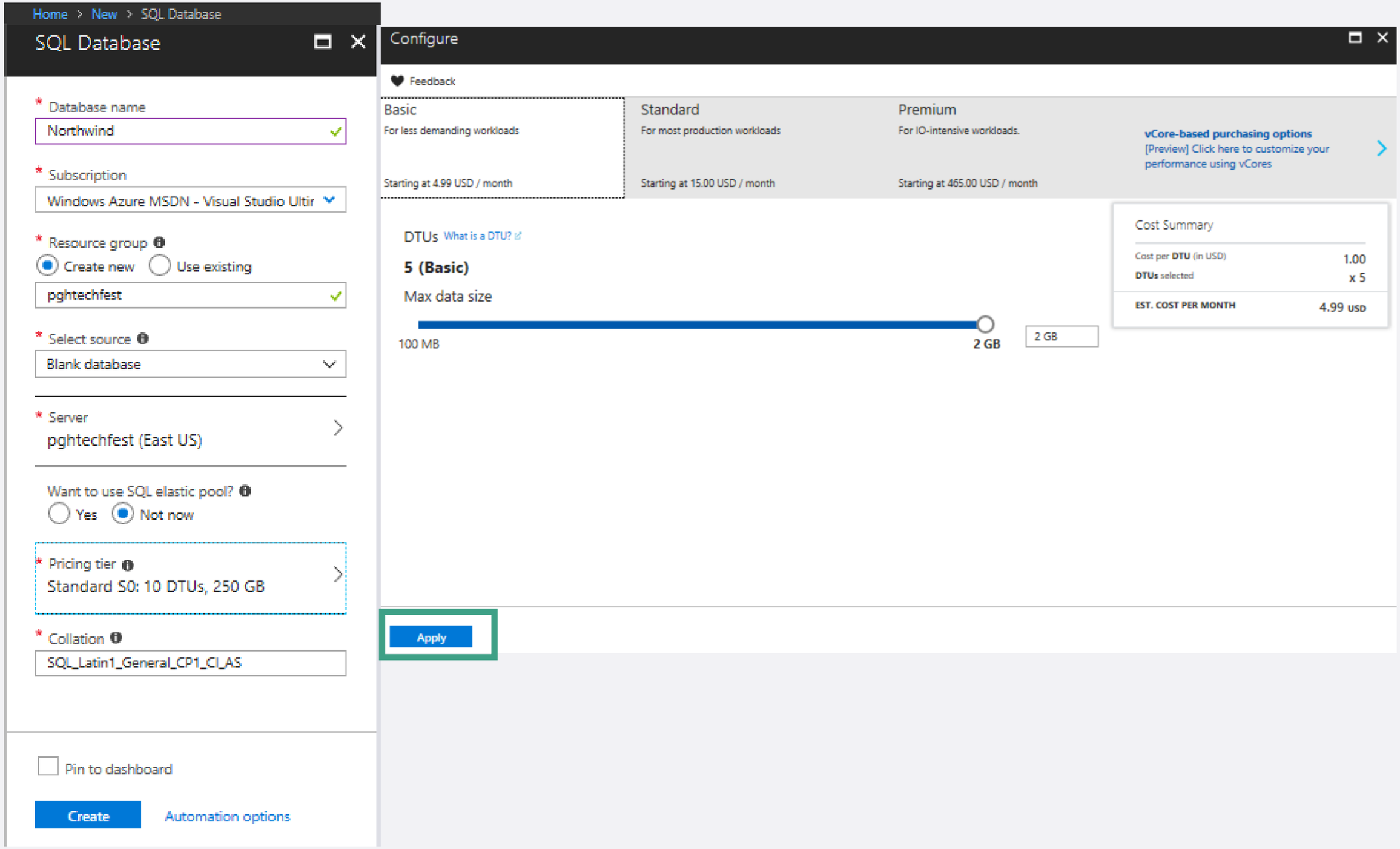

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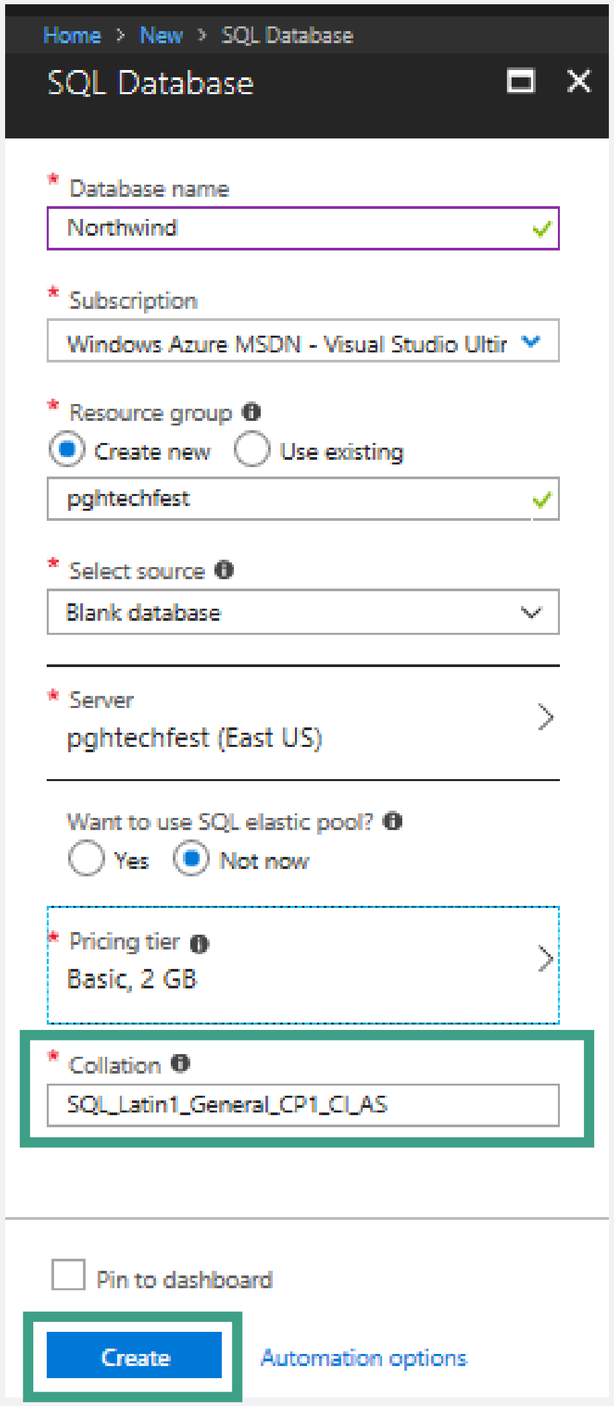

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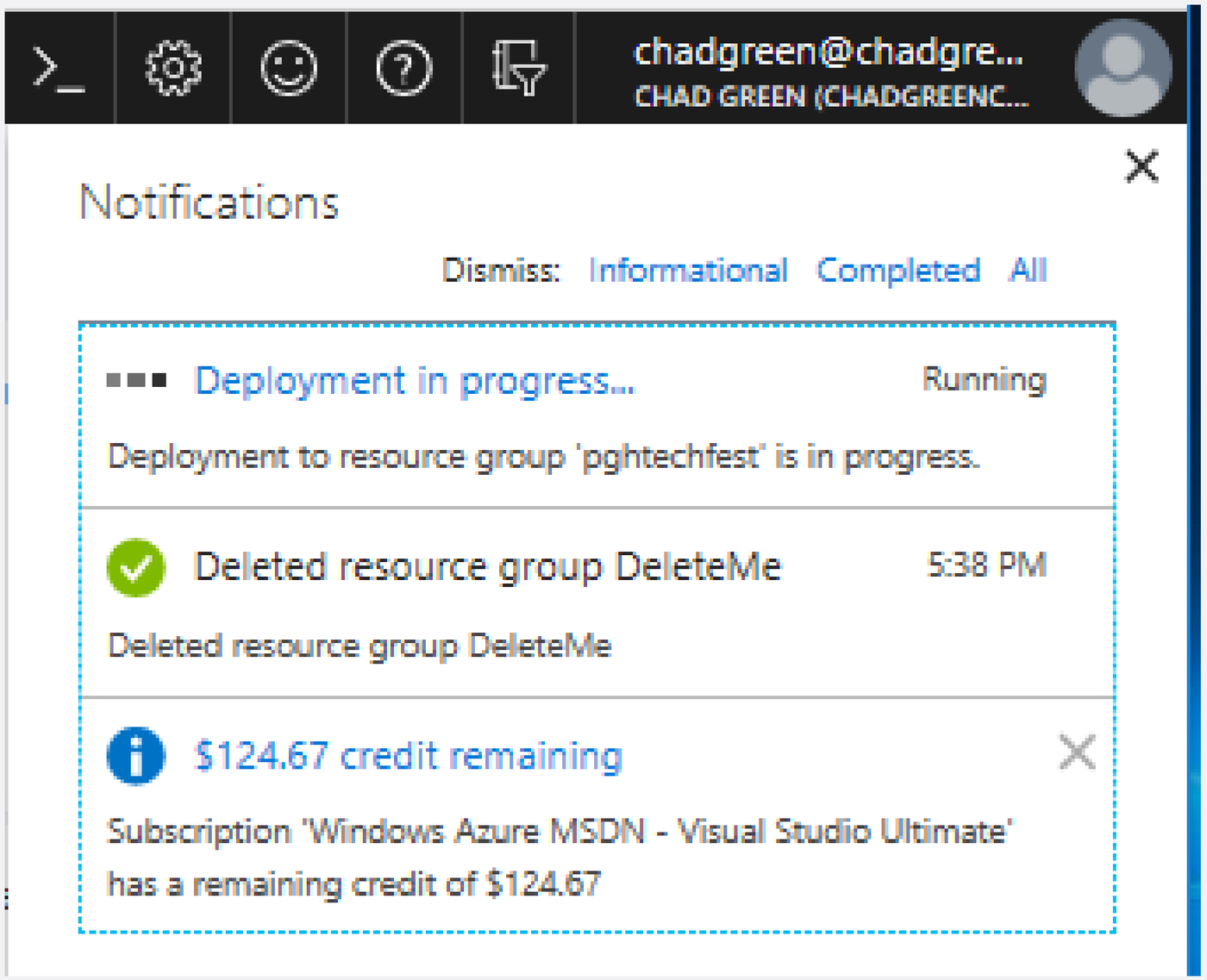

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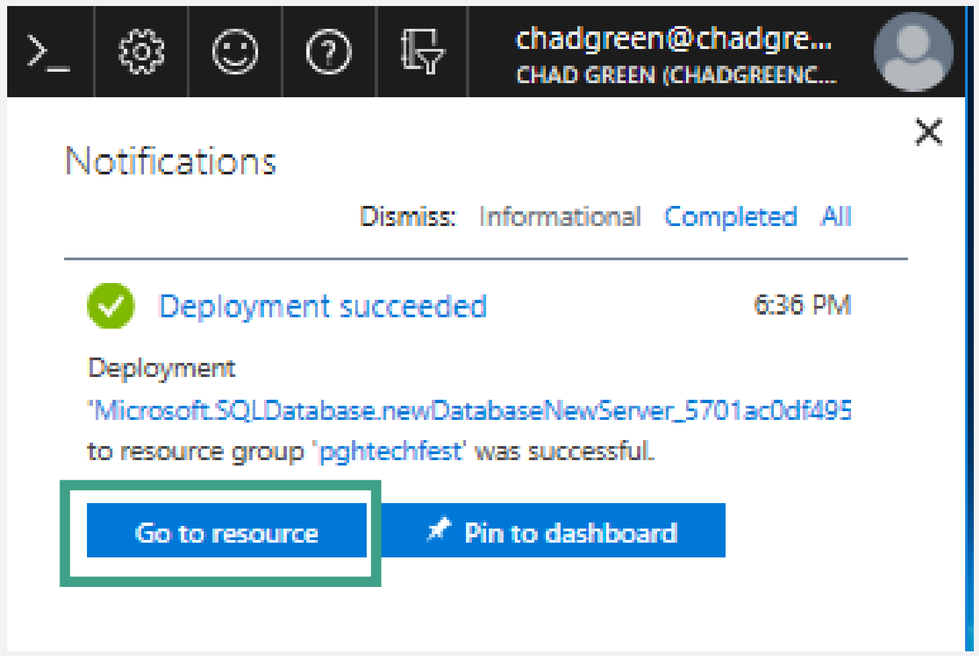

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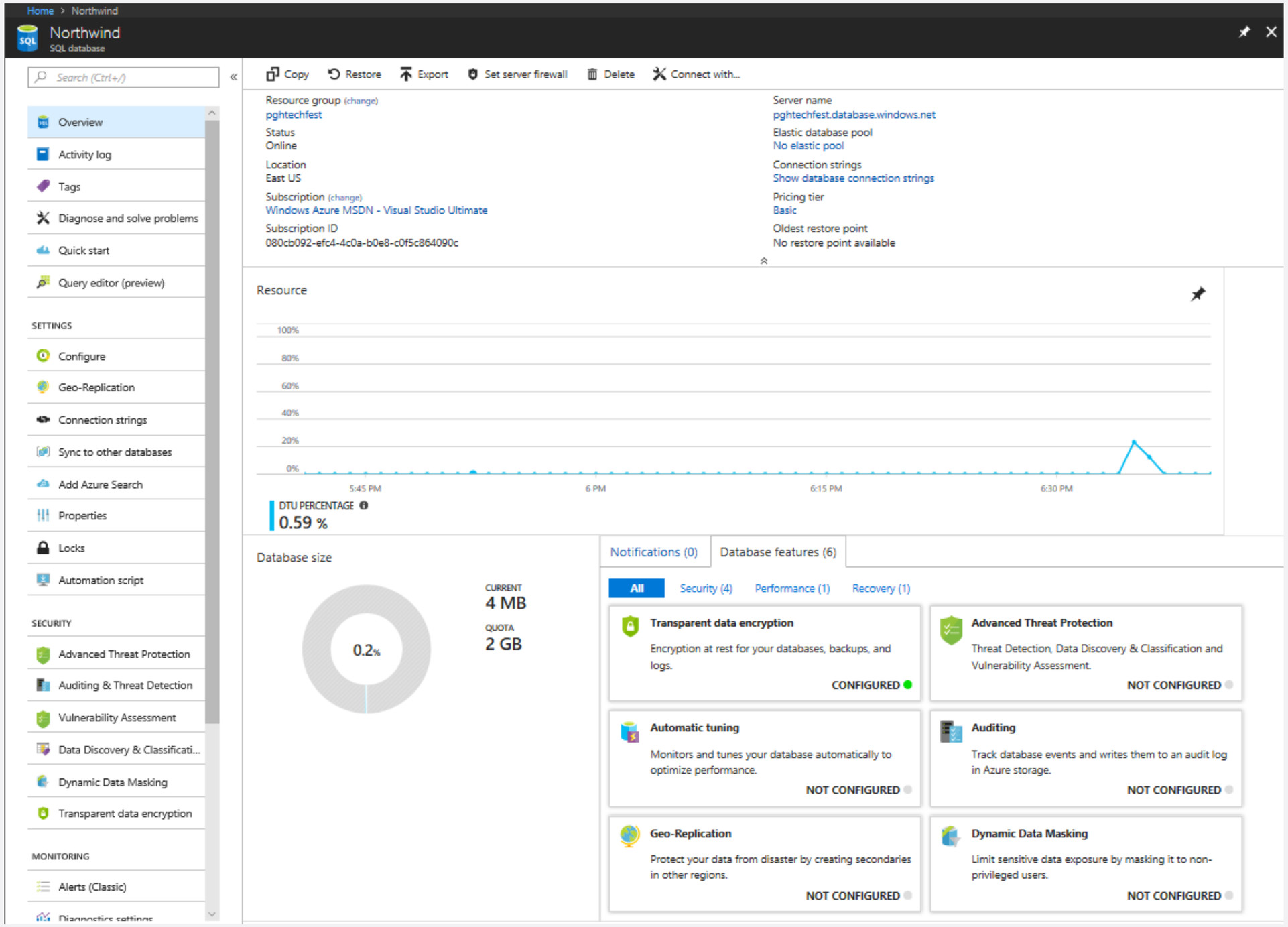

Add records to the database

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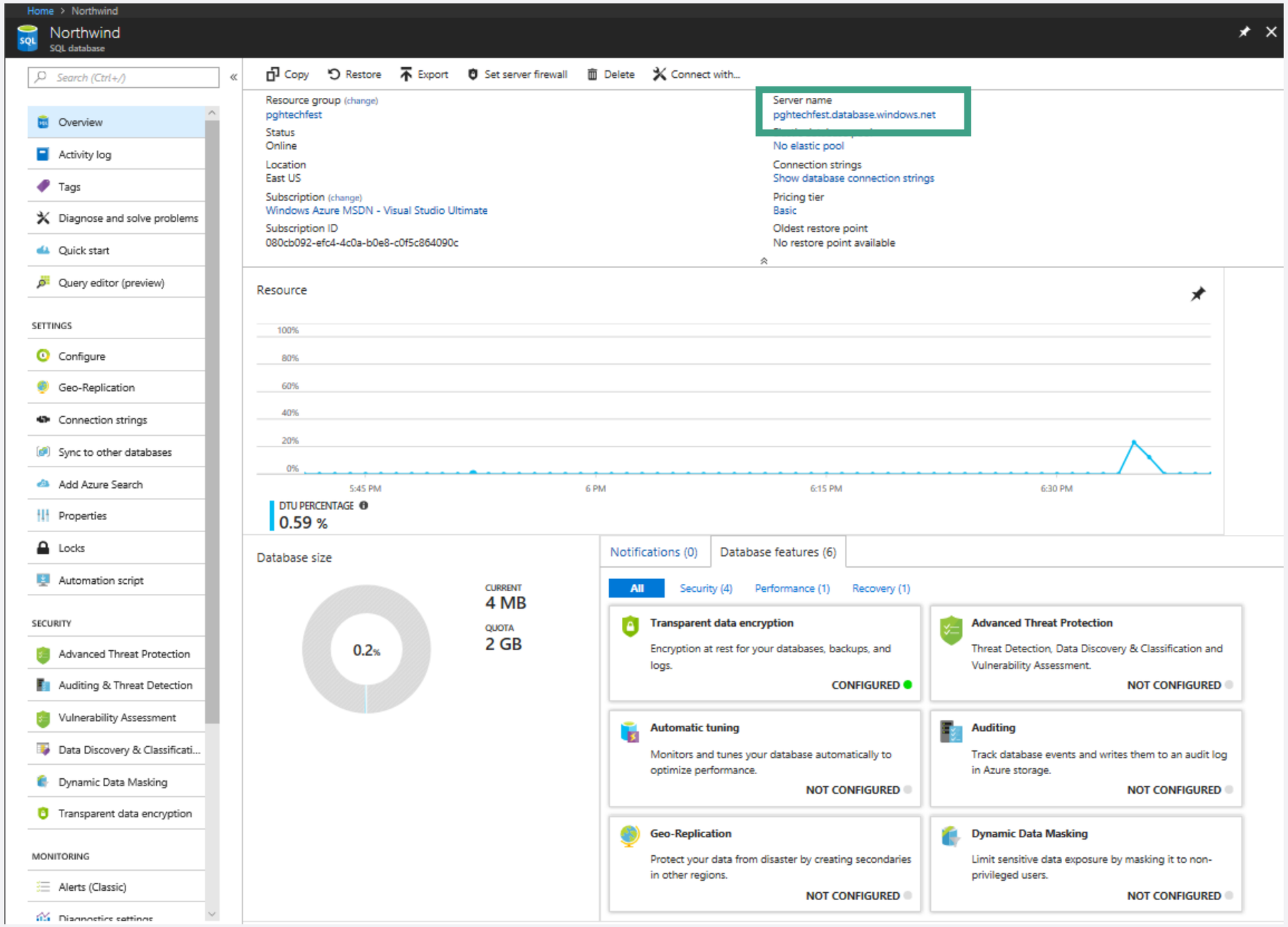

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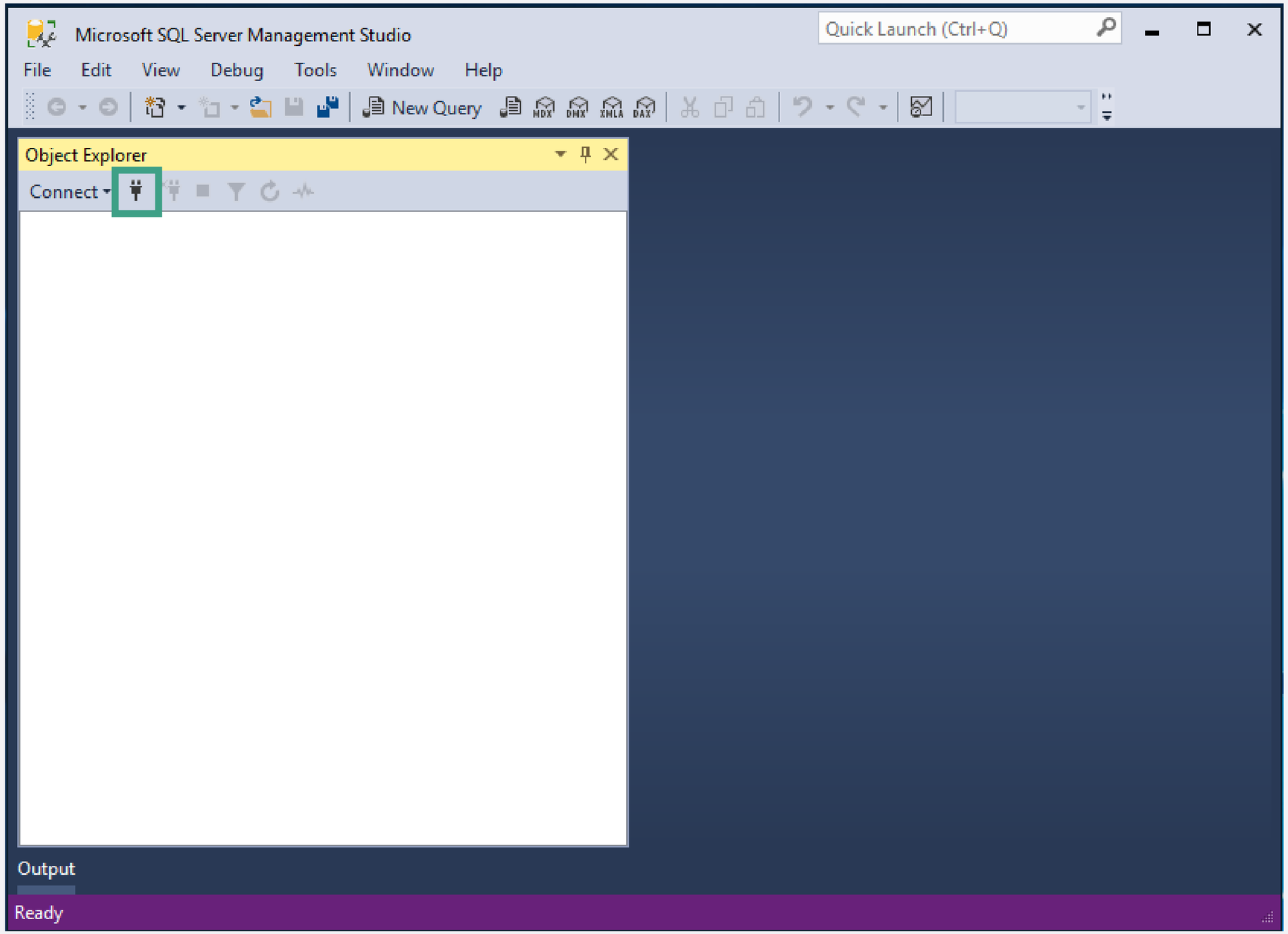

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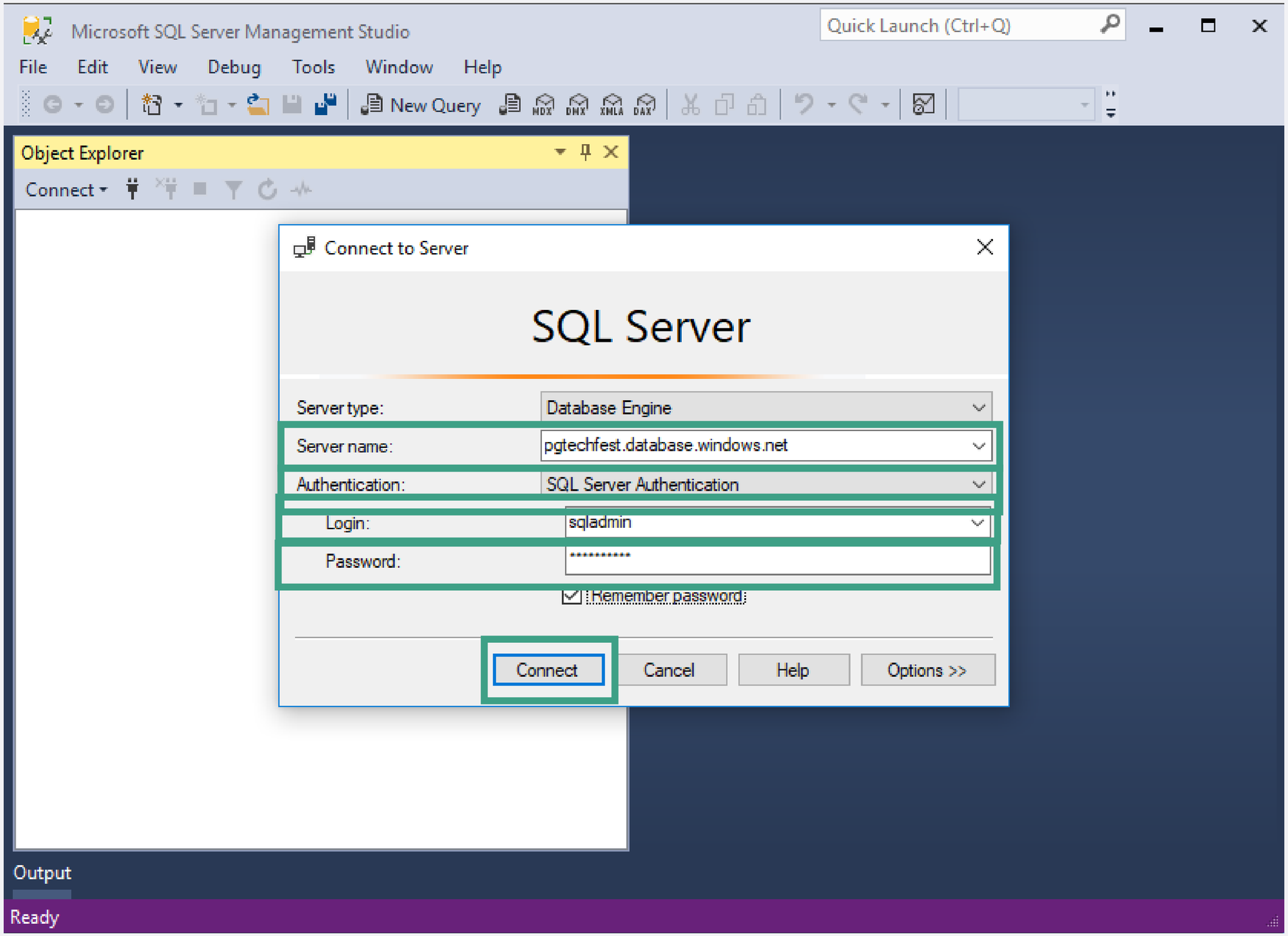

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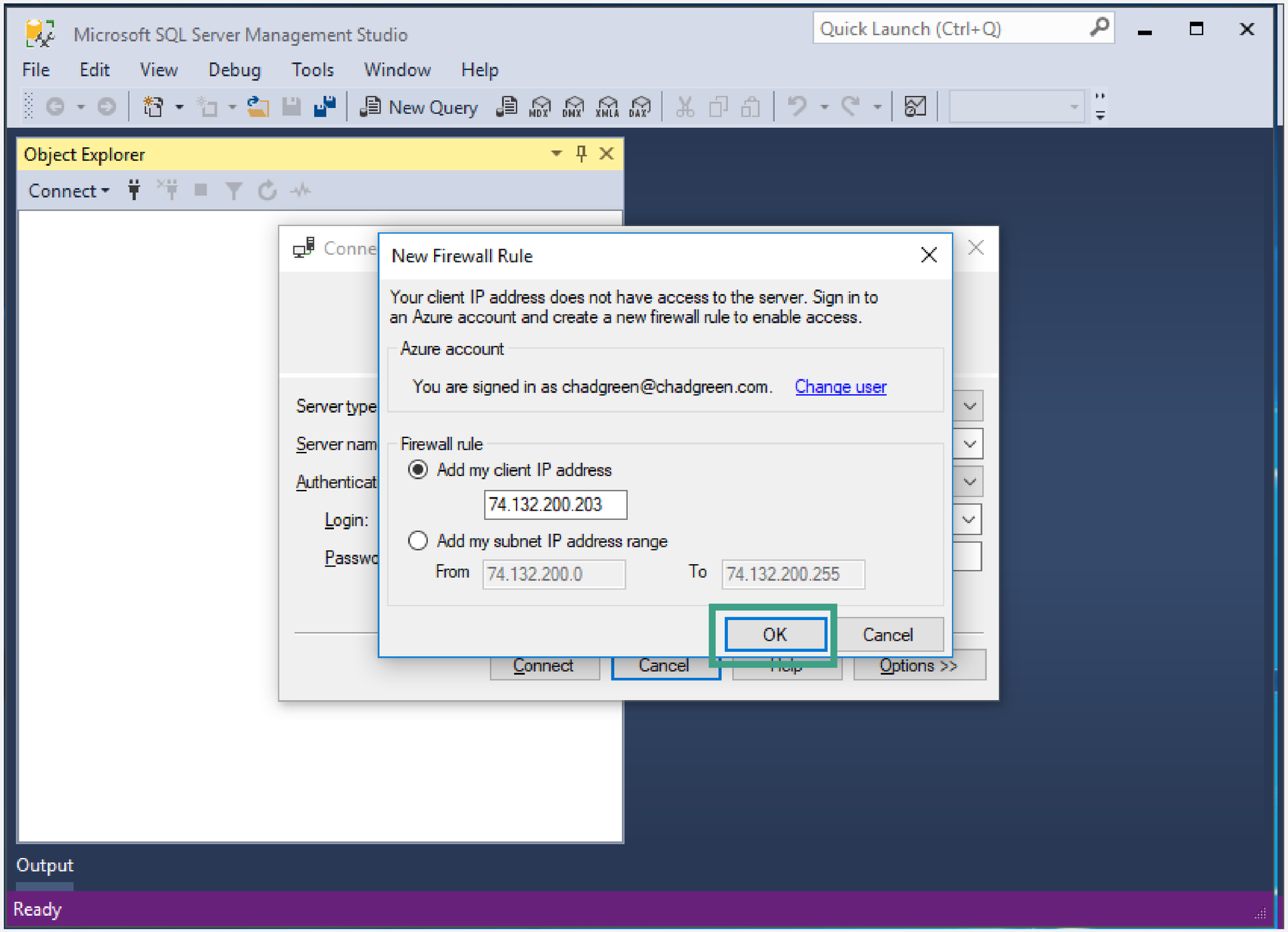

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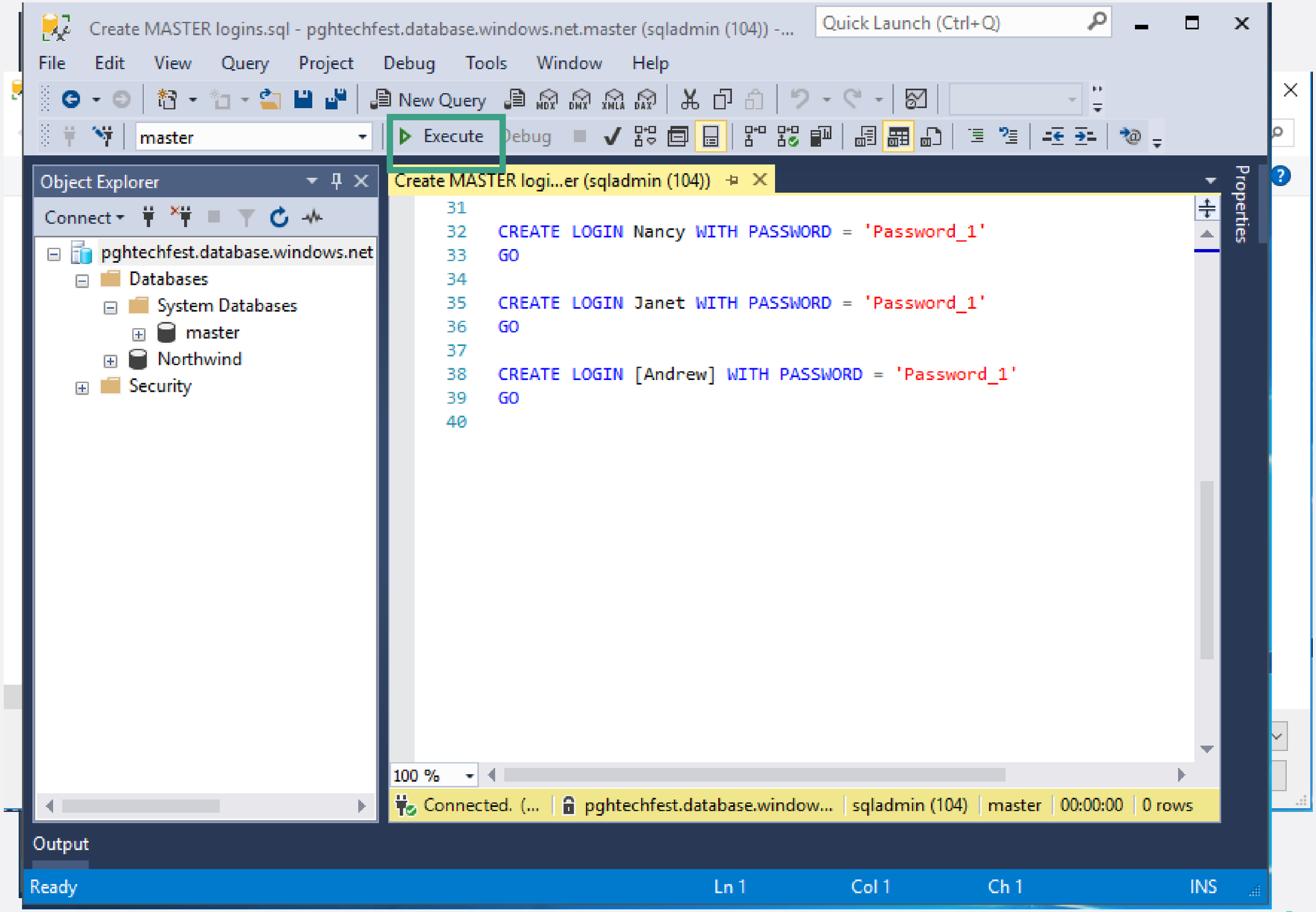

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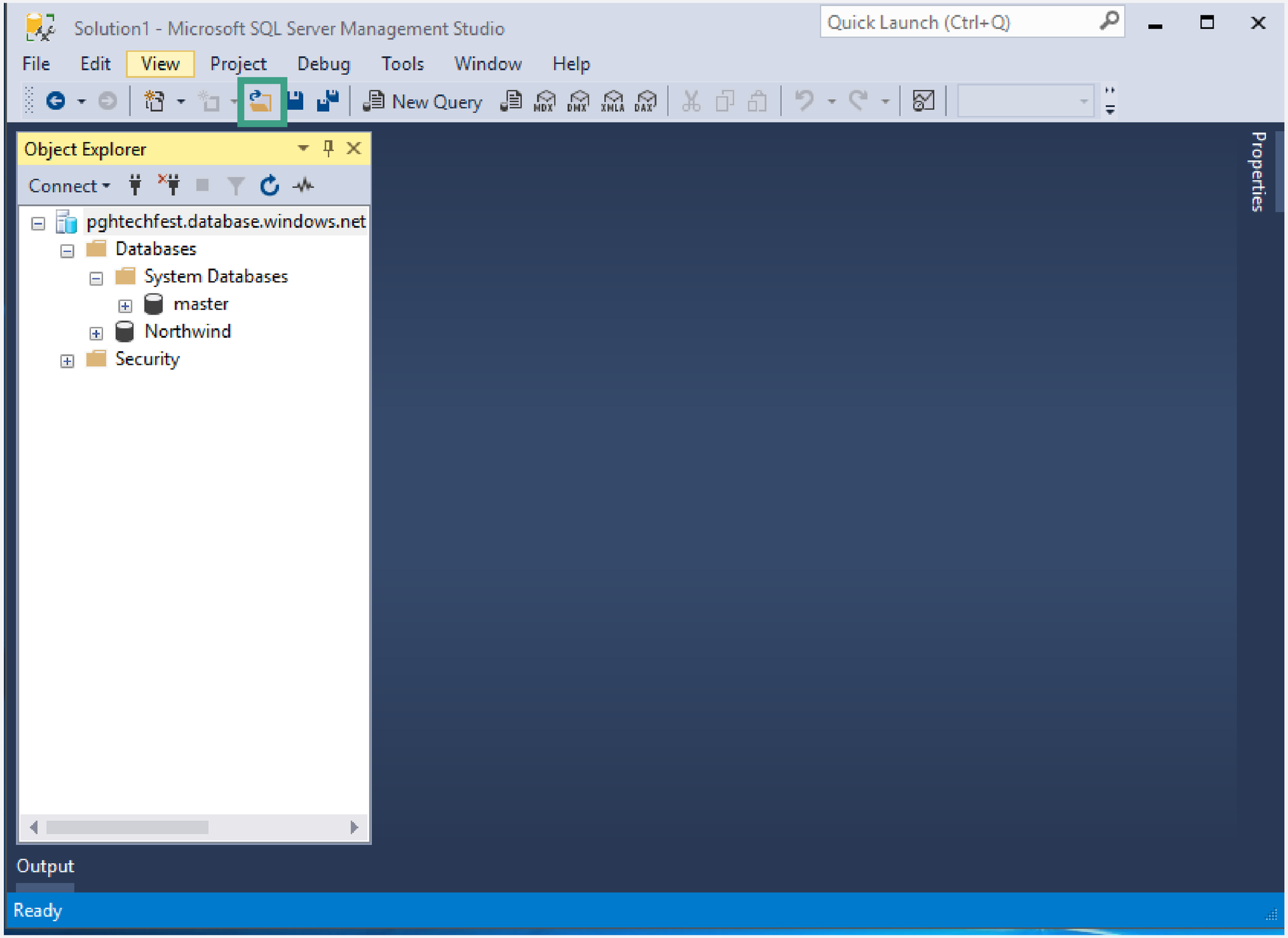

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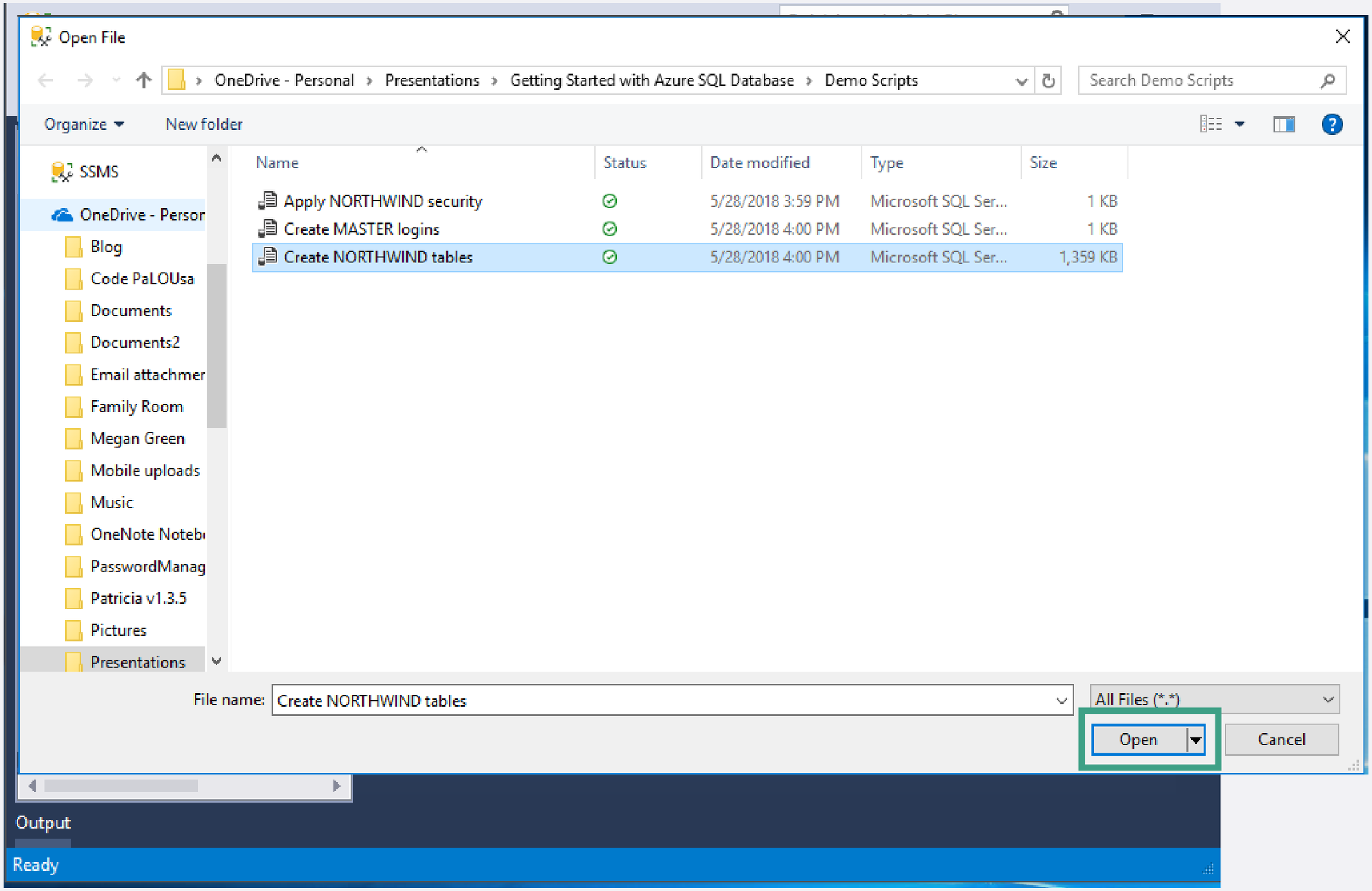


Add Records to the Database

Create NORTHWIND tables.sql - pghtechfest.database.windows.net.Northwind (sqladmin (...

Quick Launch (Ctrl+Q)

File Edit View Query Project Debug Tools Window Help

New Query

Northwind | Execute | Debug

Object Explorer

Connect

- pghtechfest.database.windows.net
  - Databases
    - System Databases
      - master
    - Northwind
  - Security

Create NORTHWIND...d (sqladmin (123))

```
1  CREATE USER Nancy FOR LOGIN Nancy
2  GO
3  EXEC sp_addrolemember N'db_datareader', N'Nancy'
4  GO
5
6
7   CREATE USER Janet FOR LOGIN Janet
8  GO
9  EXEC sp_addrolemember N'db_datareader', N'Janet'
10 GO
11
12
13  CREATE USER Andrew FOR LOGIN Andrew
14 GO
15 EXEC sp_addrolemember N'db_datareader', N'Andrew'
16 GO
17
18
19 ALTER ROLE [db_datareader] ADD MEMBER [Nancy]
20 GO
21 ALTER ROLE [db_datareader] ADD MEMBER [Janet]
22 GO
23 ALTER ROLE [db_datareader] ADD MEMBER [Andrew]
24 GO
```

100 %

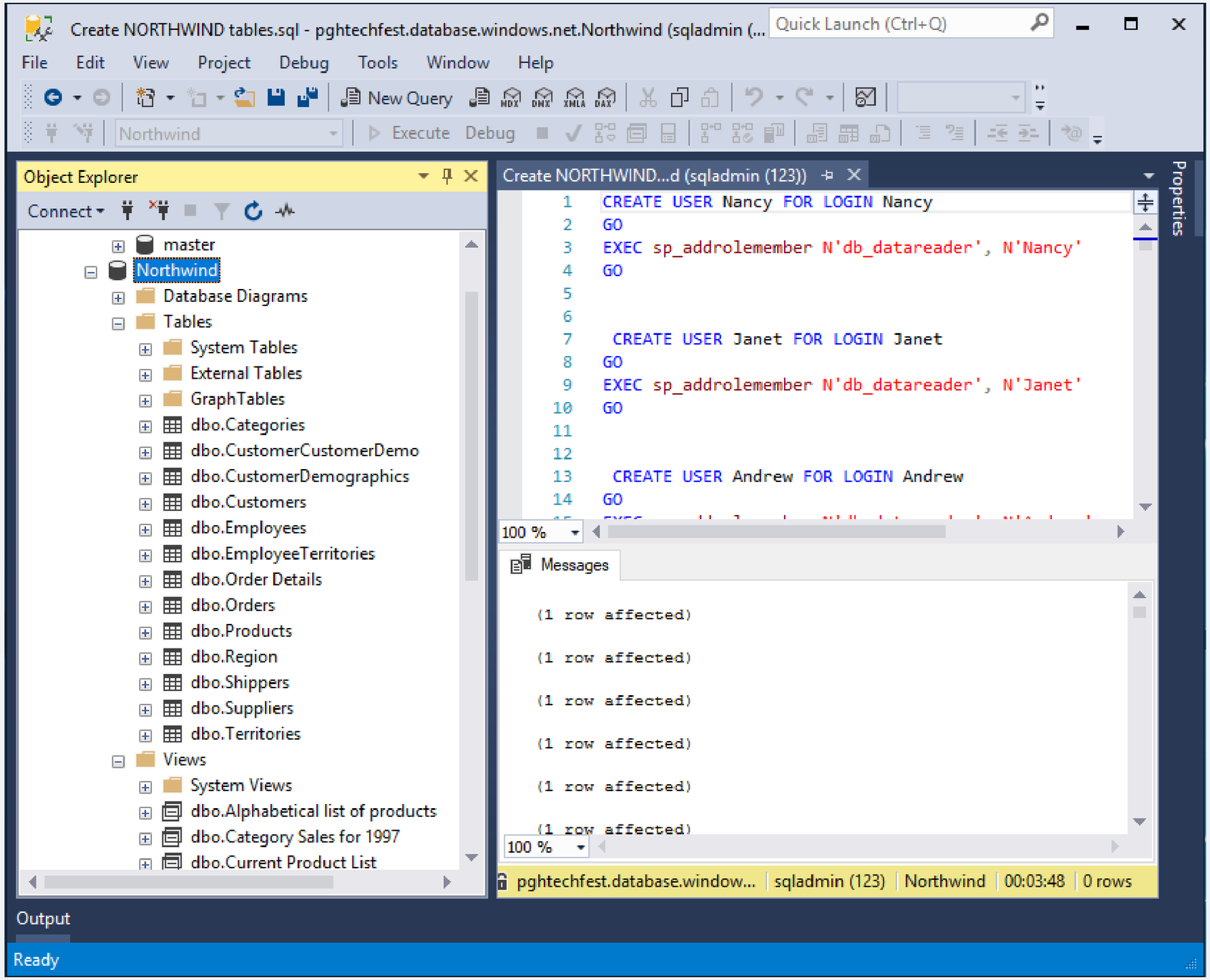
Connect... | pghtechfest.database.window... | sqladmin (123) | Northwind | 00:00:00 | 0 rows

Properties

Output

Ready Ln 1 Col 1 Ch 1 INS

Add Records to the Database



Use Azure SQL Query

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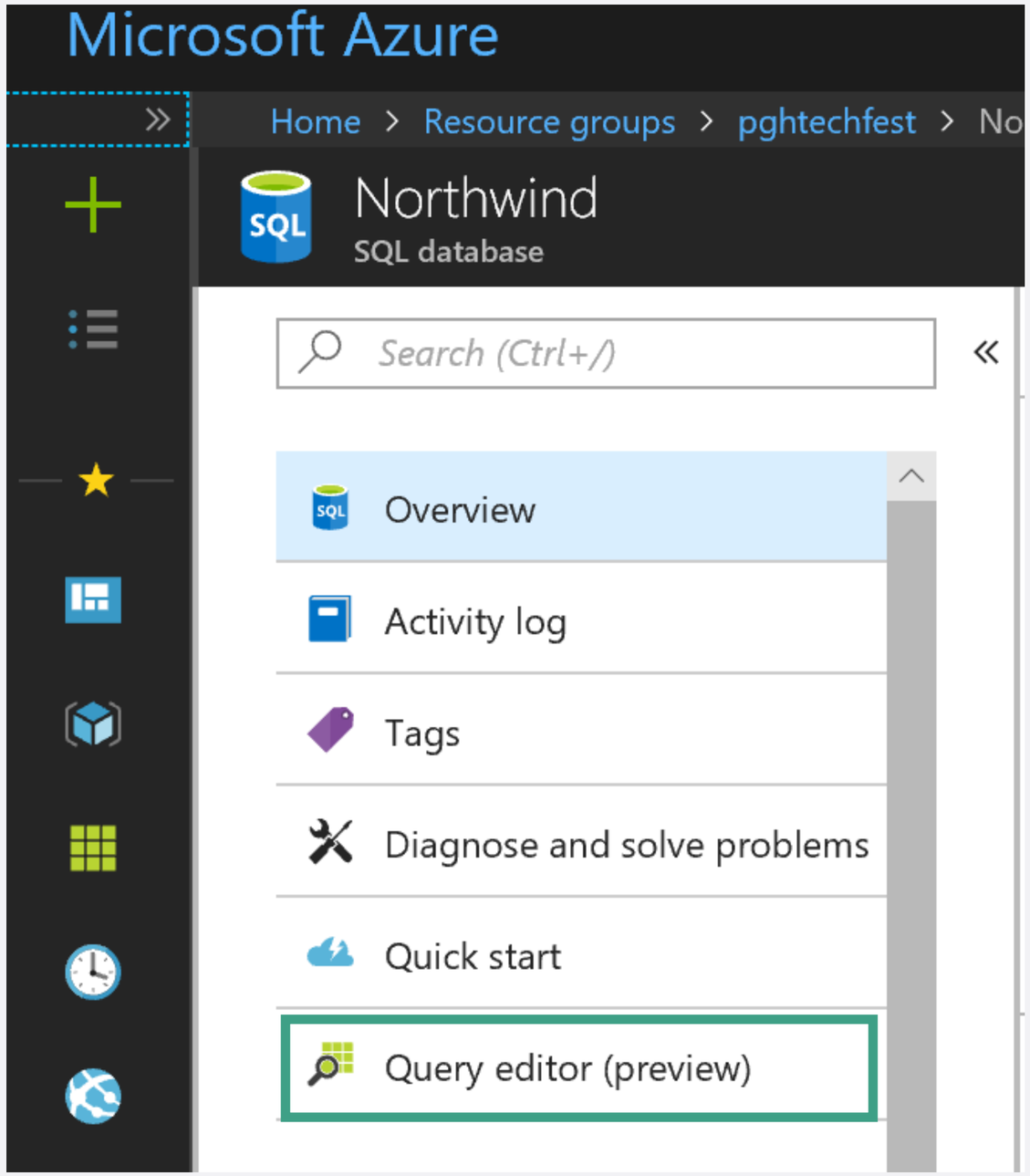

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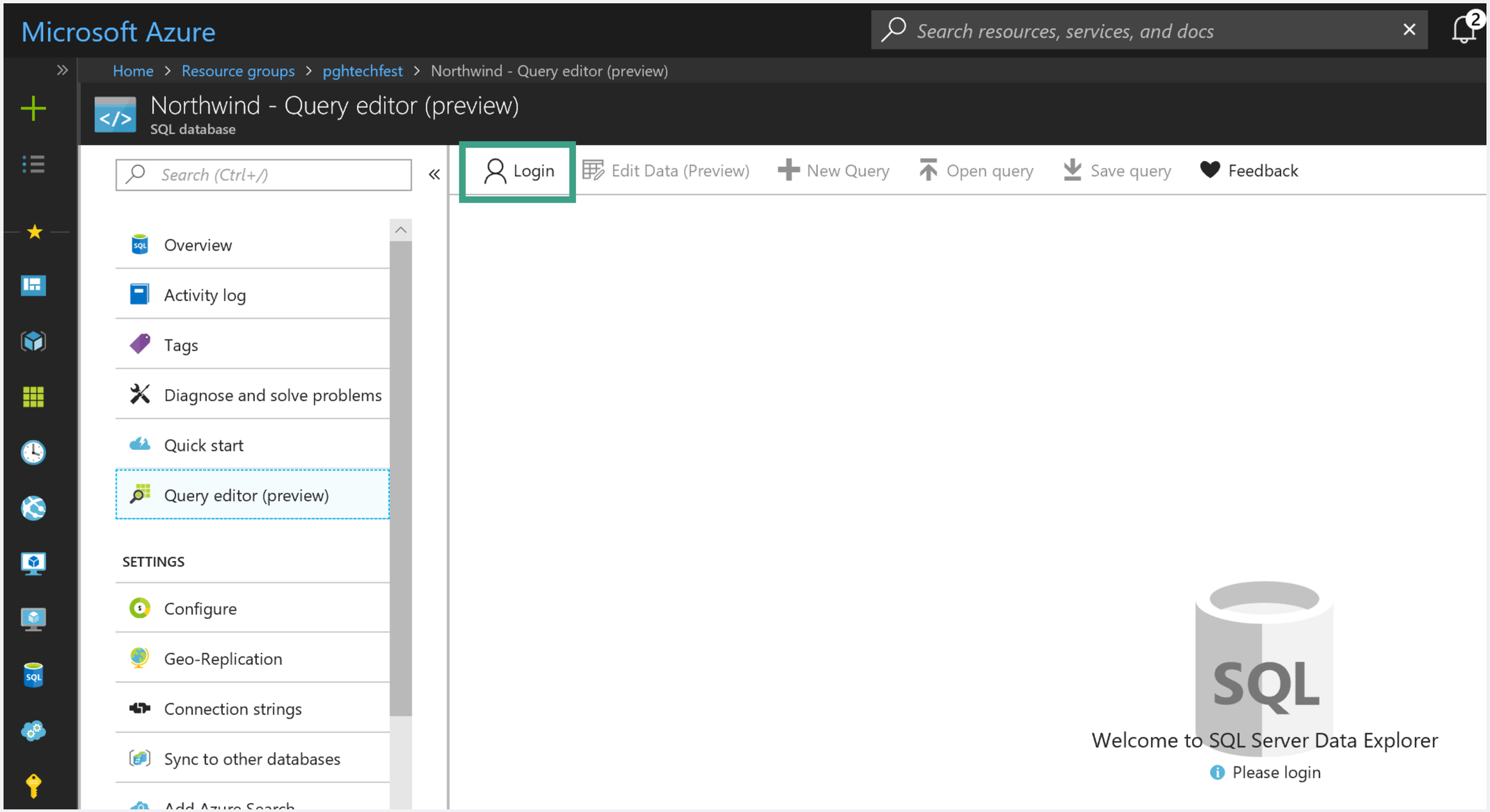

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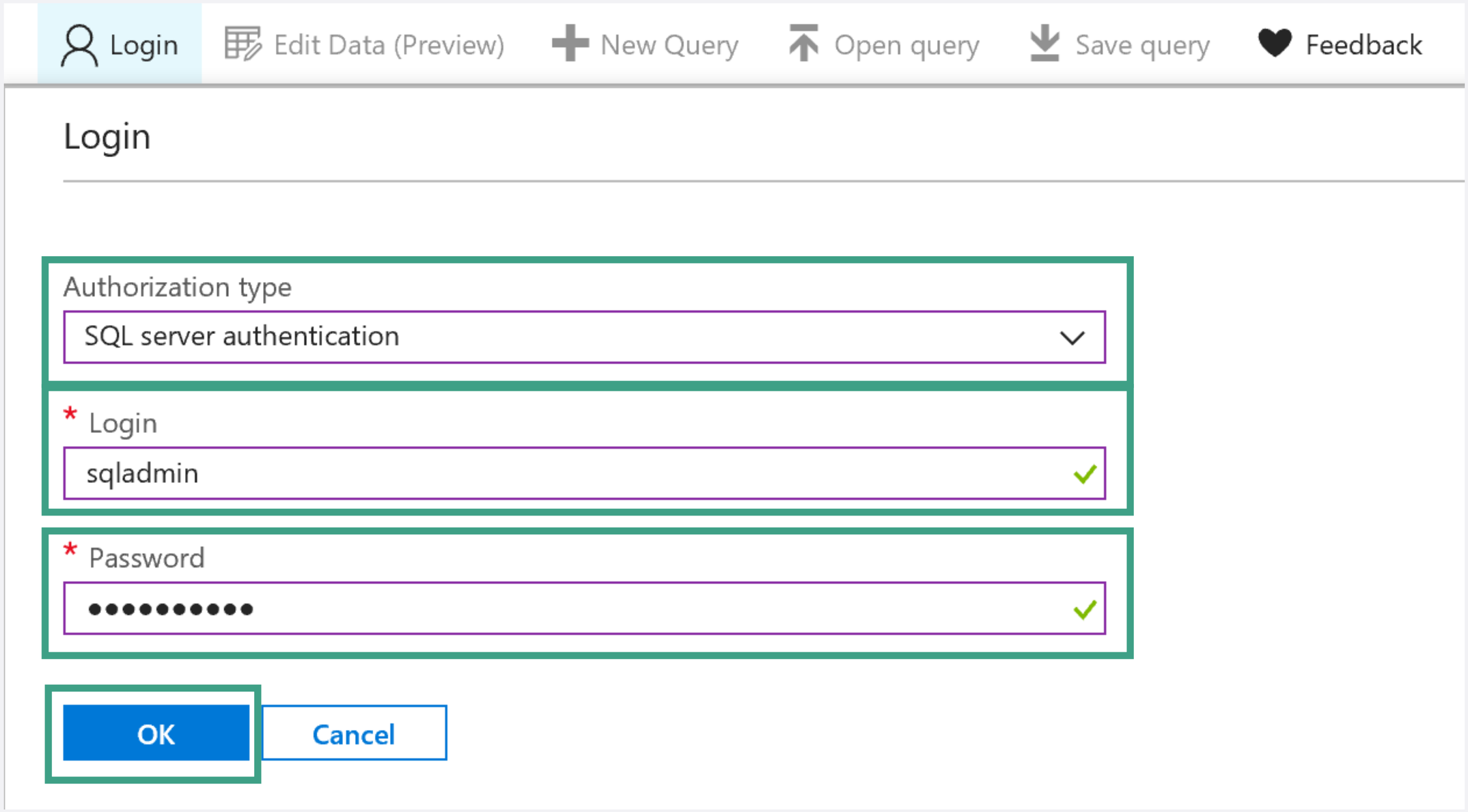

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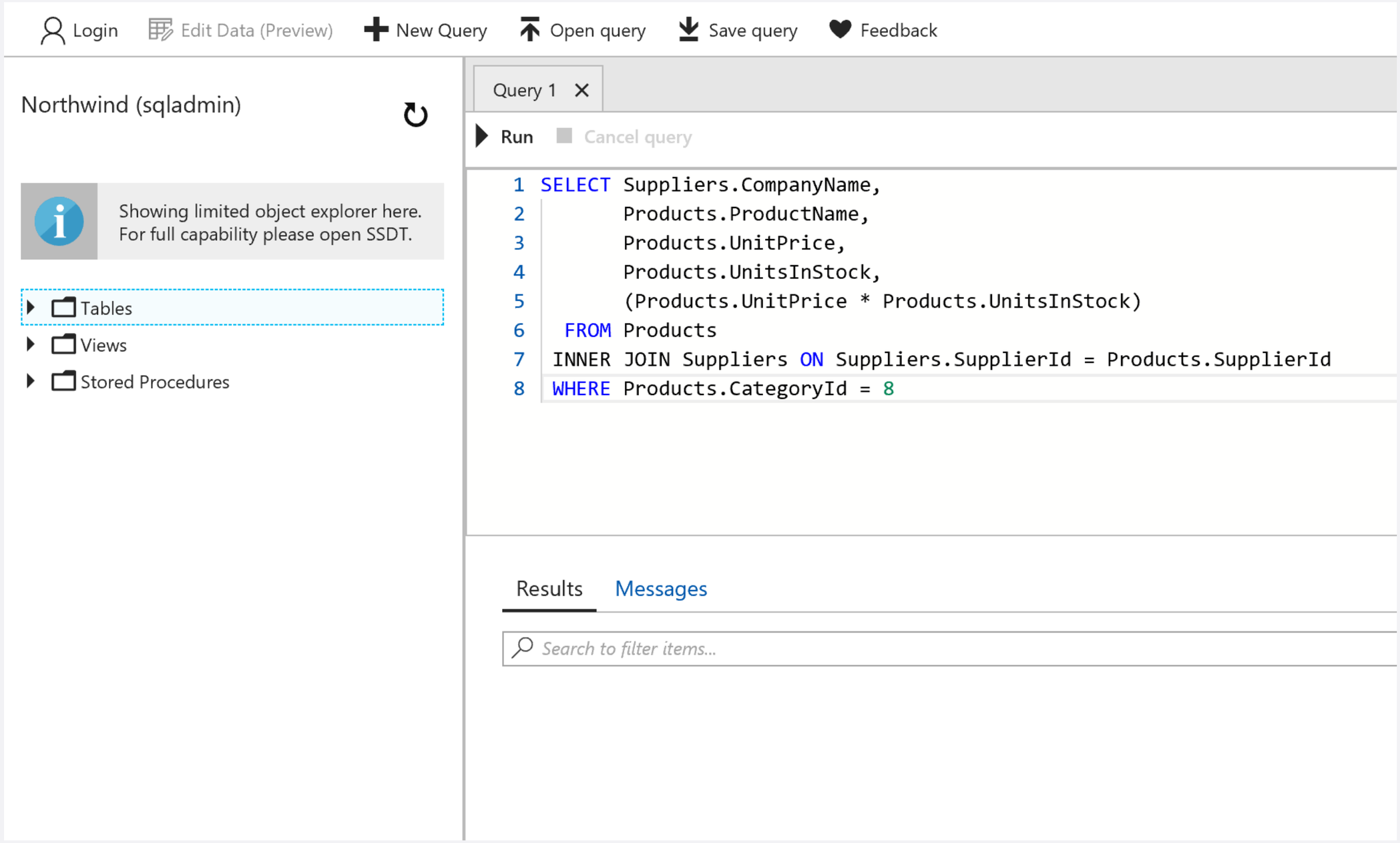


Use Azure SQL Query

Login | Edit Data (Preview) | New Query | Open query | Save query | Feedback

Northwind (sqladmin)

Showing limited object explorer here.
For full capability please open SSDT.

- Tables
- Views
- Stored Procedures

Query 1

Run | Cancel query

```
1 SELECT Suppliers.CompanyName,
2        Products.ProductName,
3        Products.UnitPrice,
4        Products.UnitsInStock,
5        (Products.UnitPrice * Products.UnitsInStock)
6  FROM Products
7 INNER JOIN Suppliers ON Suppliers.SupplierId = Products.SupplierId
8 WHERE Products.CategoryId = 8
```

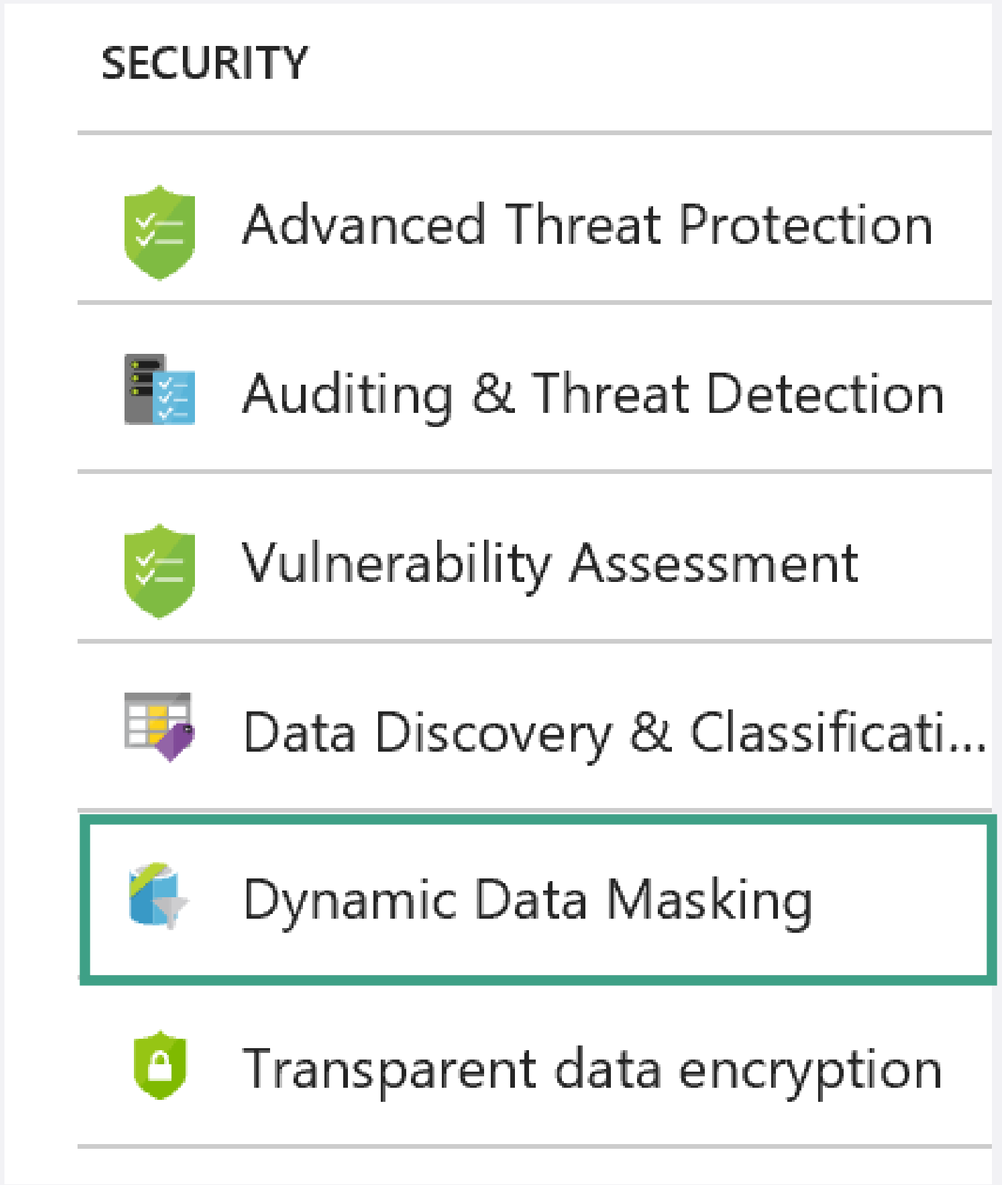
Results | Messages

Search to filter items...

COMPANYNAME	PRODUCTNAME	UNITPRICE	UNITSINSTOCK
Tokyo Traders	Ikura	31.0000	31
Mayumi's	Konbu	6.0000	24
Pavlova, Ltd.	Carnarvon Tigers	62.5000	42
Nord-Ost-Fisch Handelsgesellscha...	Nord-Ost Matjeshering	25.8900	10

Dynamic Data Masking

Dynamic Data Masking



Dynamic Data Masking

Save Discard Add mask Feedback

Masking rules

MASK NAME	MASK FUNCTION
You haven't created any masking rules.	

SQL users excluded from masking (administrators are always excluded)

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Recommended fields to mask

SCHEMA	TABLE	COLUMN	
dbo	Customers	Address	ADD MASK
dbo	Customers	Phone	ADD MASK
dbo	Employees	LastName	ADD MASK
dbo	Employees	FirstName	ADD MASK
dbo	Employees	Address	ADD MASK

Load more

Dynamic Data Masking

Save Discard Add mask Feedback

Masking rules

MASK NAME	MASK FUNCTION
dbo_Customers_Phone	Default value (0, xxxx, 01-01-1900)

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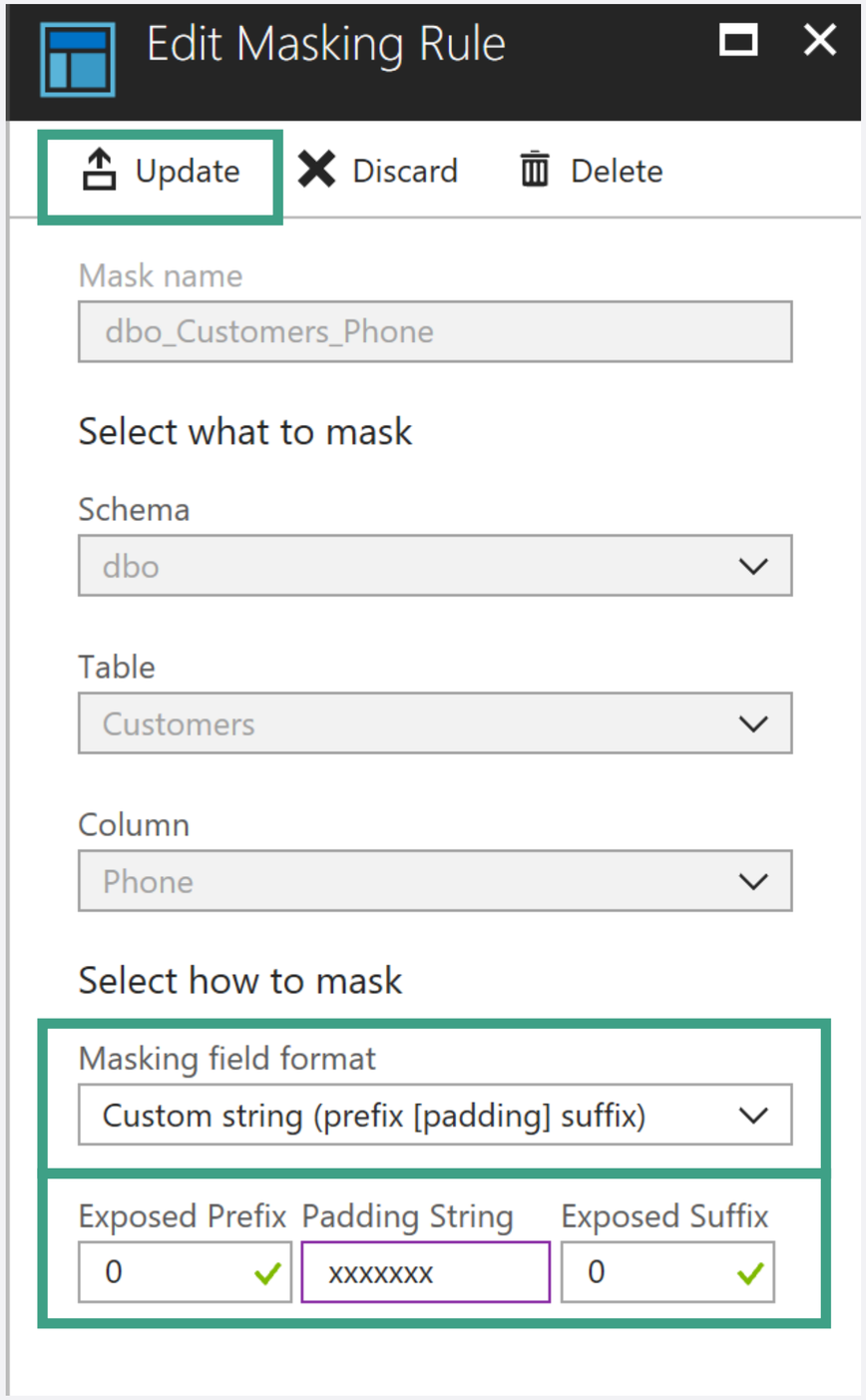
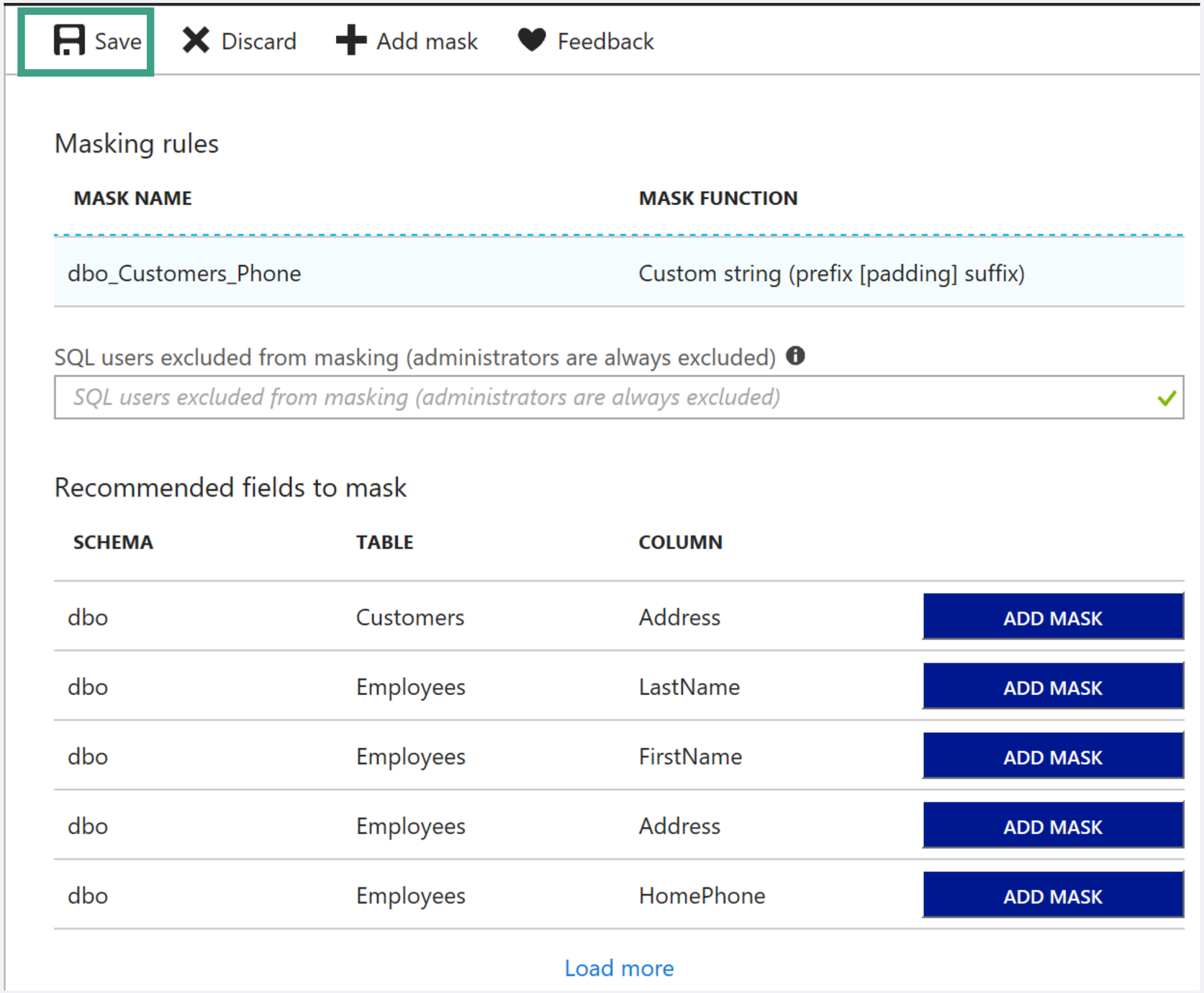
dbo	Employees	FirstName	ADD MASK
dbo	Employees	Address	ADD MASK
dbo	Employees	HomePhone	ADD MASK

Load more

Dynamic Data Masking

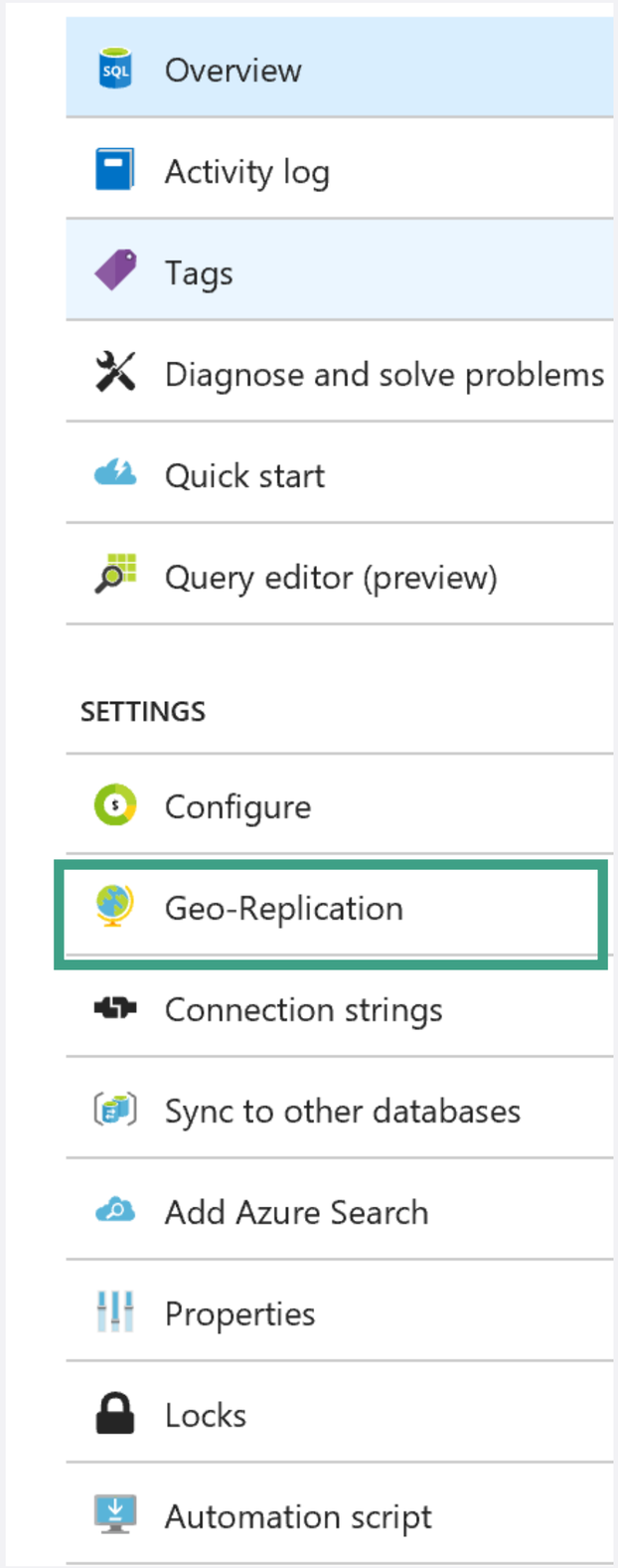


Dynamic Data Masking



Geo-Replication

Geo-Replication



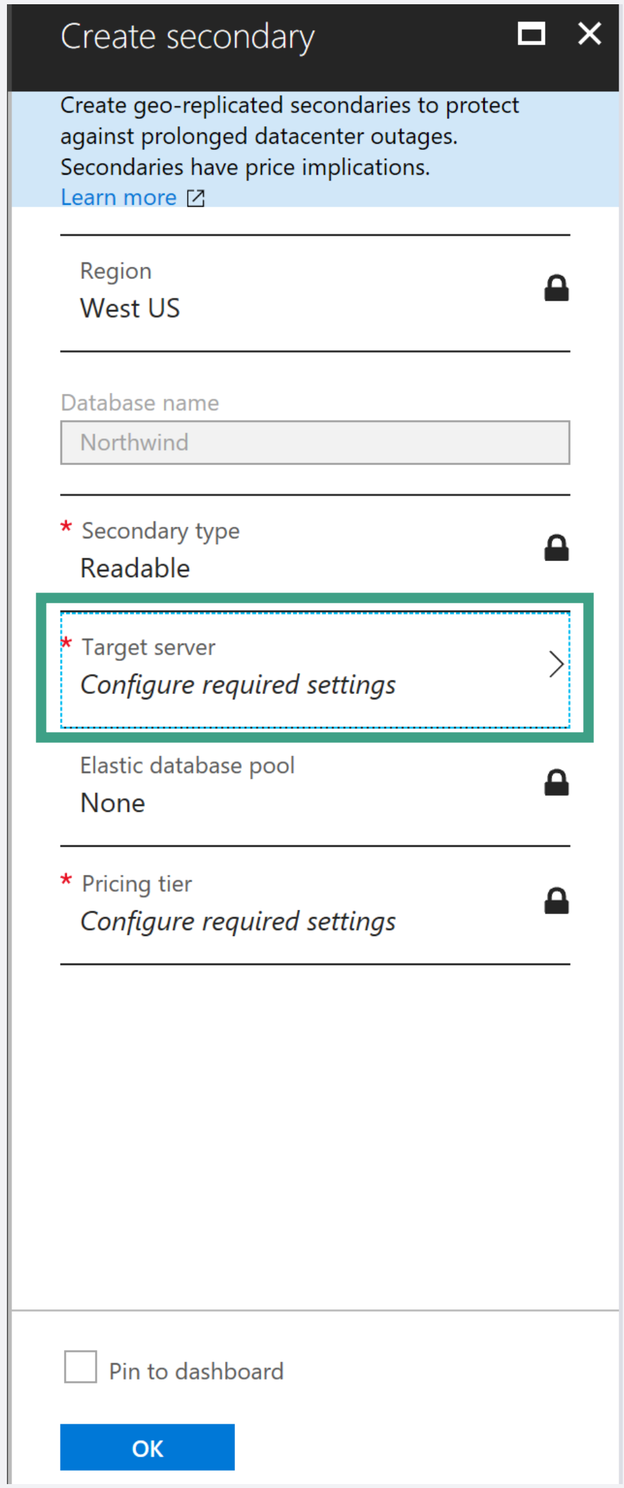
Geo-Replication

Select a region on the map or from the Target Regions list to create a secondary database.

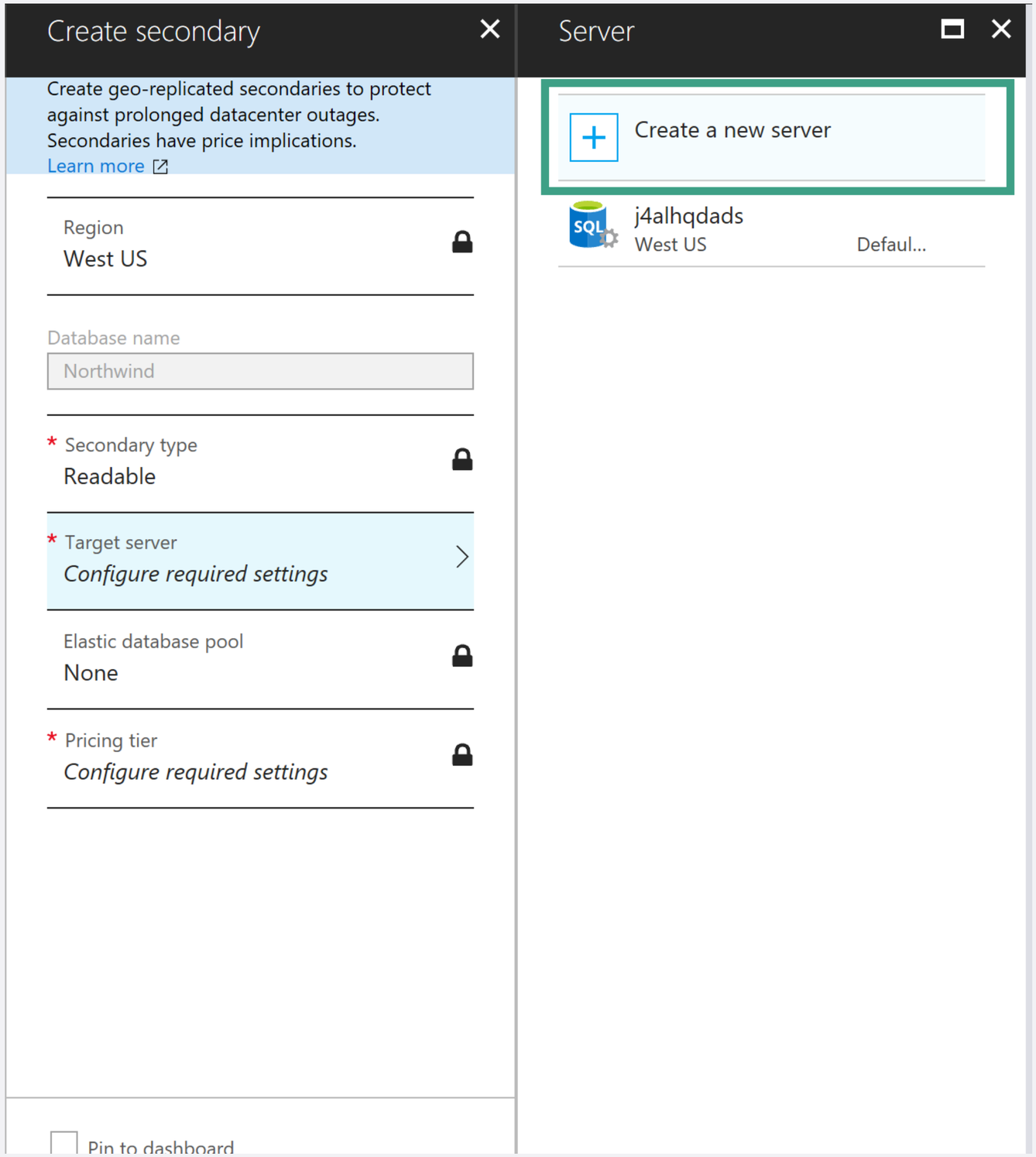
You can now automatically manage replication, connectivity and failover of this database by adding it to failover group.

	SERVER/DATABASE	FAILOVER POLICY	STATUS
PRIMARY			
East US	pghtechfest/Northwind	None	Online
SECONDARIES			
Geo-Replication is not configured			

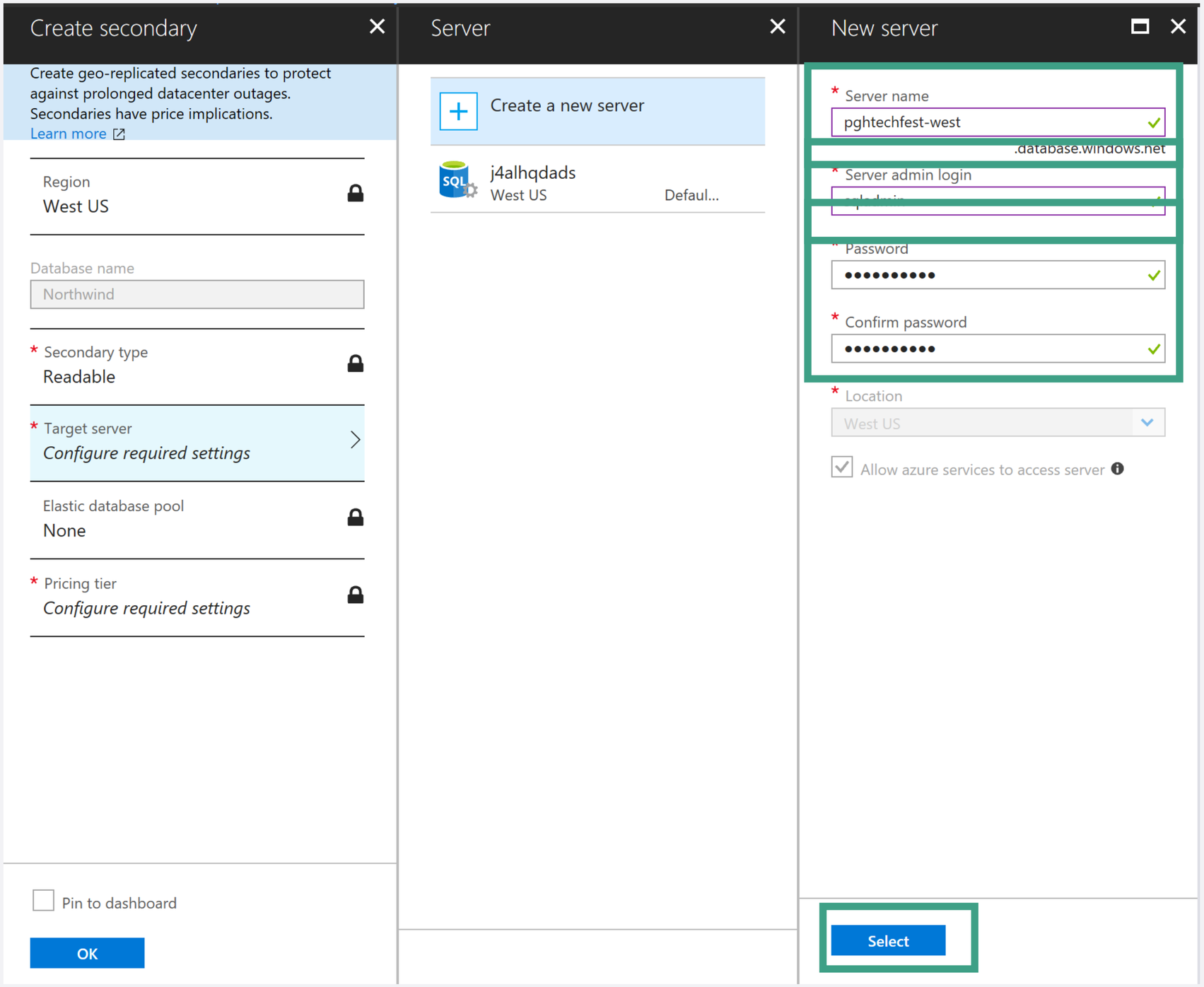
Geo-Replication



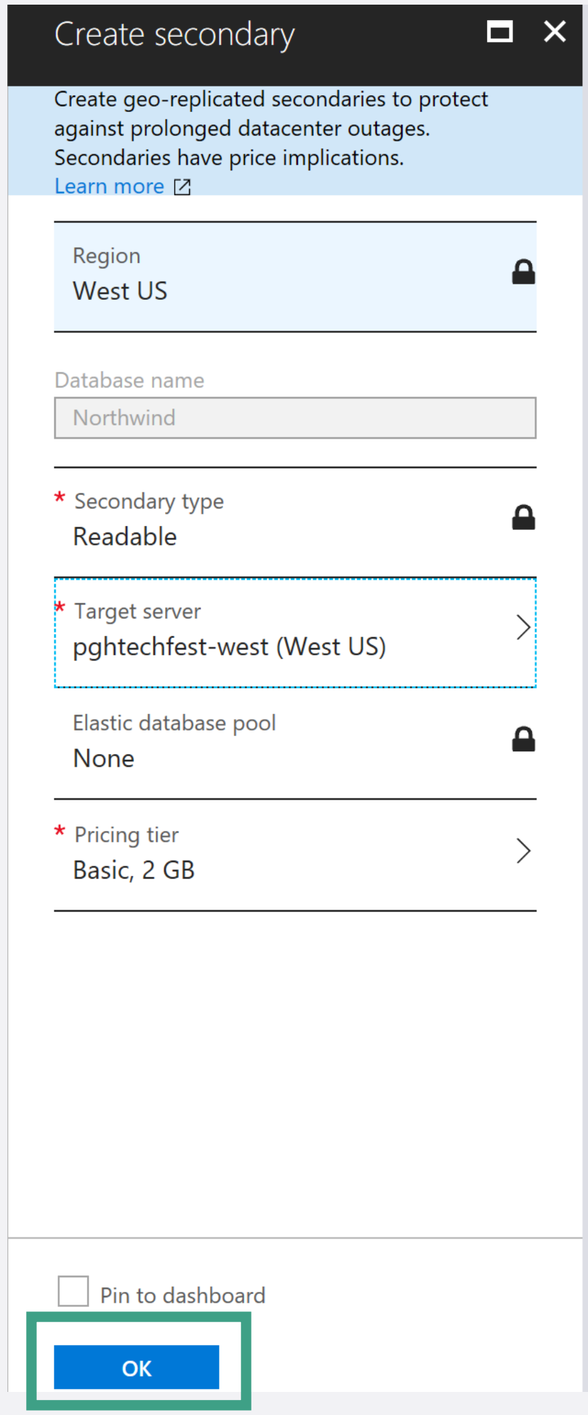
Geo-Replication



Geo-Replication



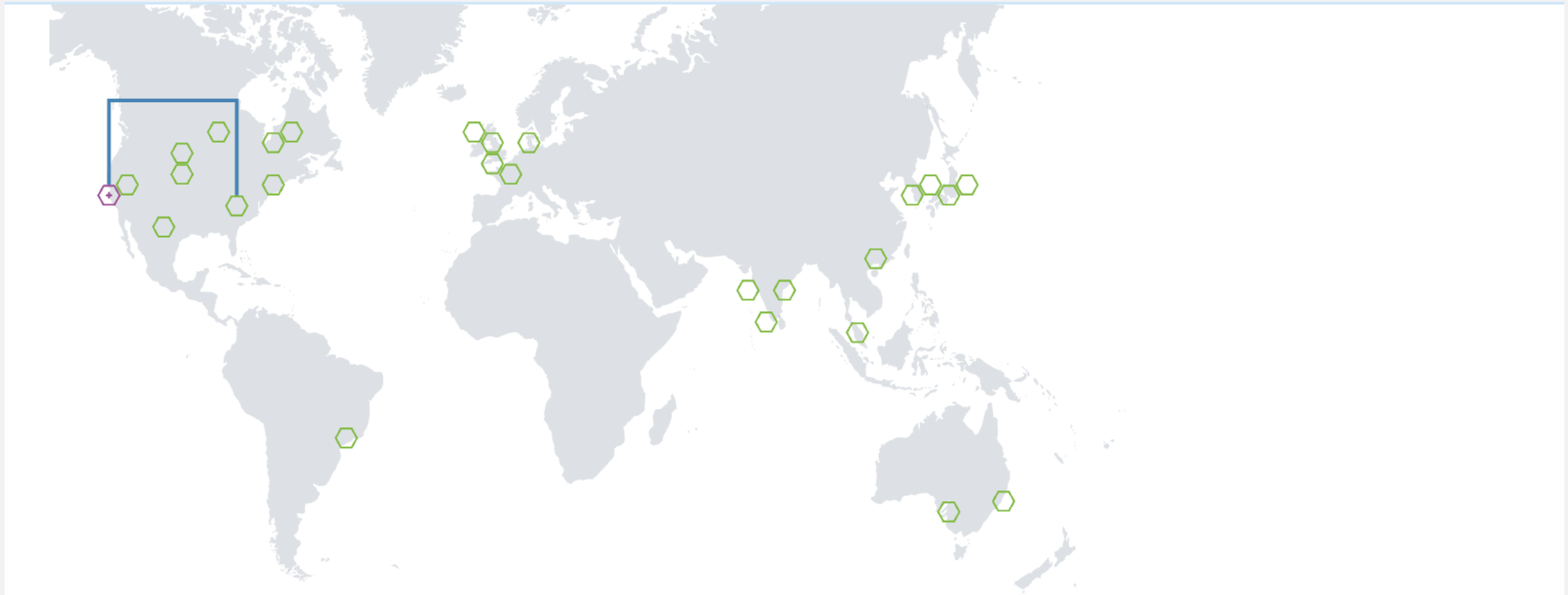
Geo-Replication



Geo-Replication

	SERVER/DATABASE	FAILOVER POLICY	STATUS
PRIMARY			
East US	pghtechfest/Northwind	None	Online
SECONDARIES			
West US	pghtechfest-west/Northwind		Initializin...

Geo-Replication



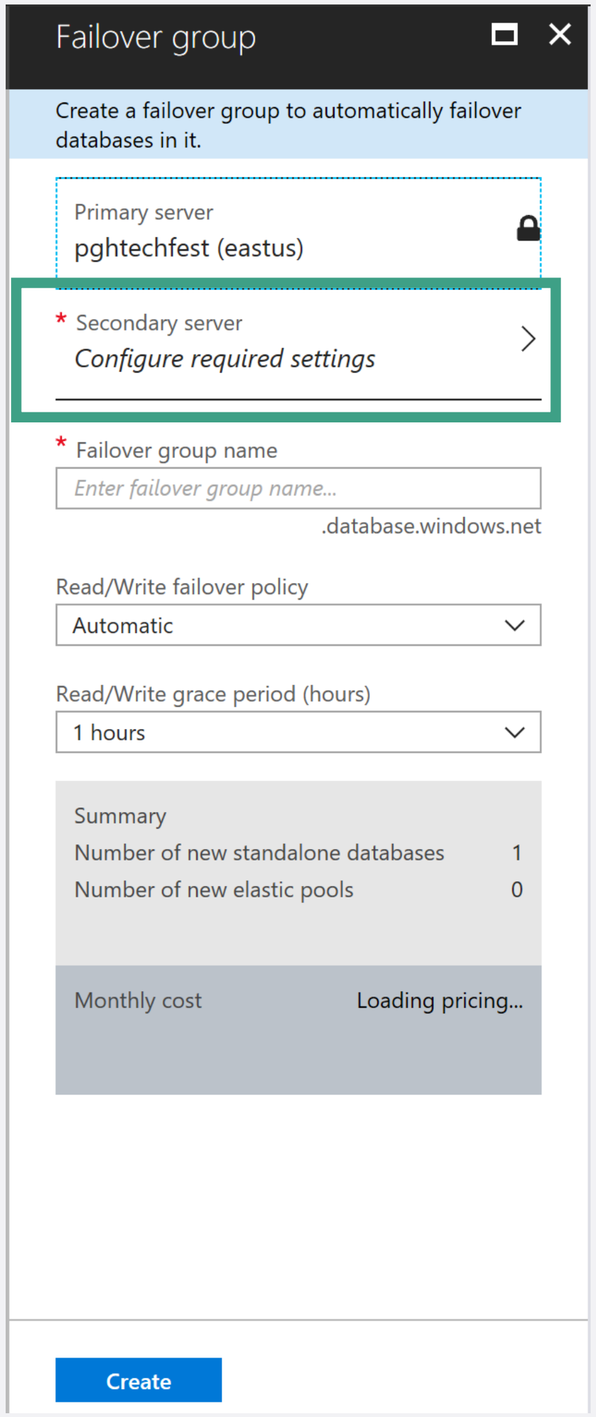
	SERVER/DATABASE	FAILOVER POLICY	STATUS
PRIMARY			
East US	pghtechfest/Northwind	None	Online
SECONDARIES			
West US	pghtechfest-west/Northwind		Readable ...

Geo-Replication

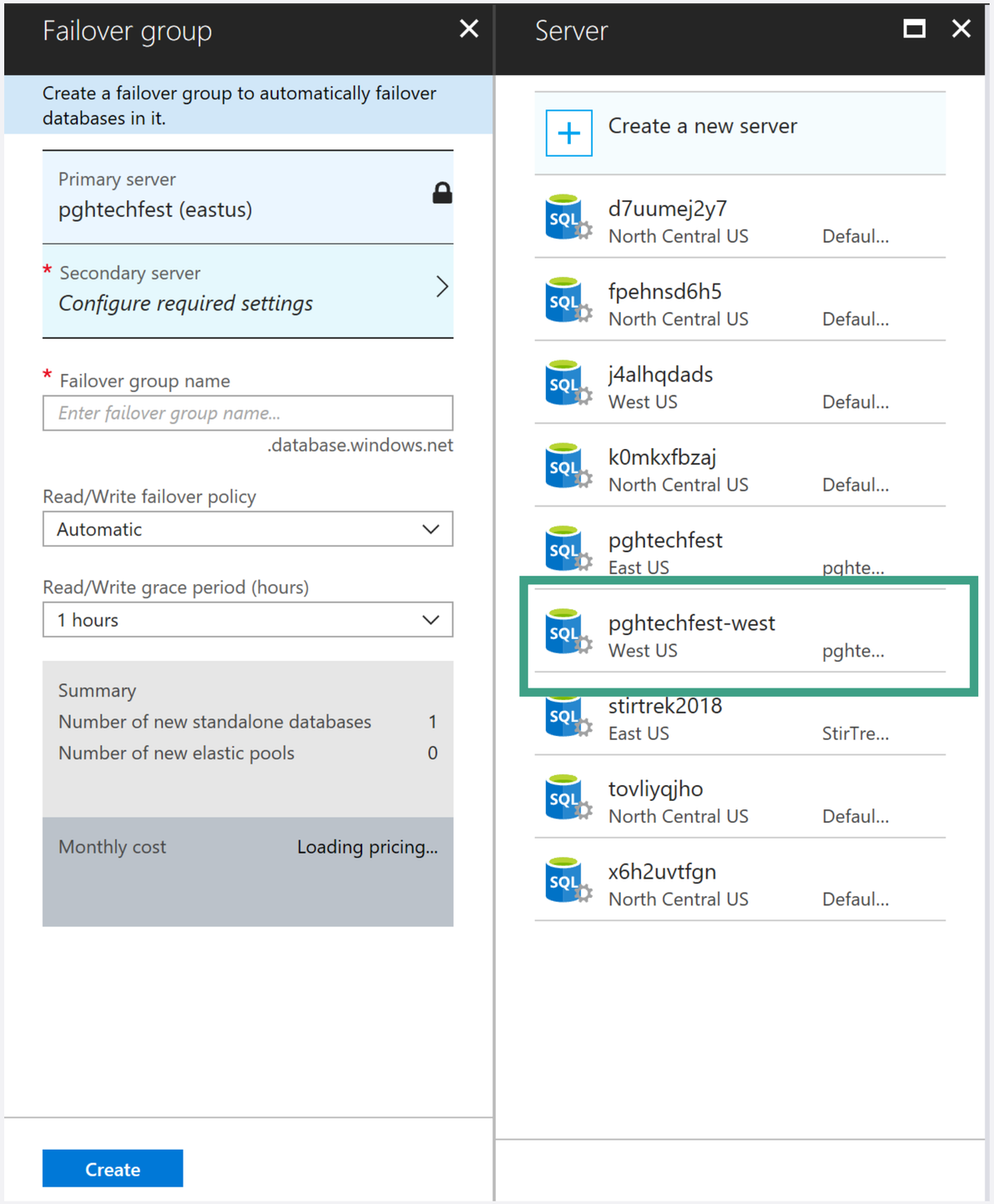
You can now automatically manage replication, connectivity and failover of this database by adding it to failover group.

	SERVER/DATABASE	FAILOVER POLICY	STATUS
PRIMARY			
East US	pghtechfest/Northwind	None	Online
SECONDARIES			
West US	pghtechfest-west/Northwind		Readable ...

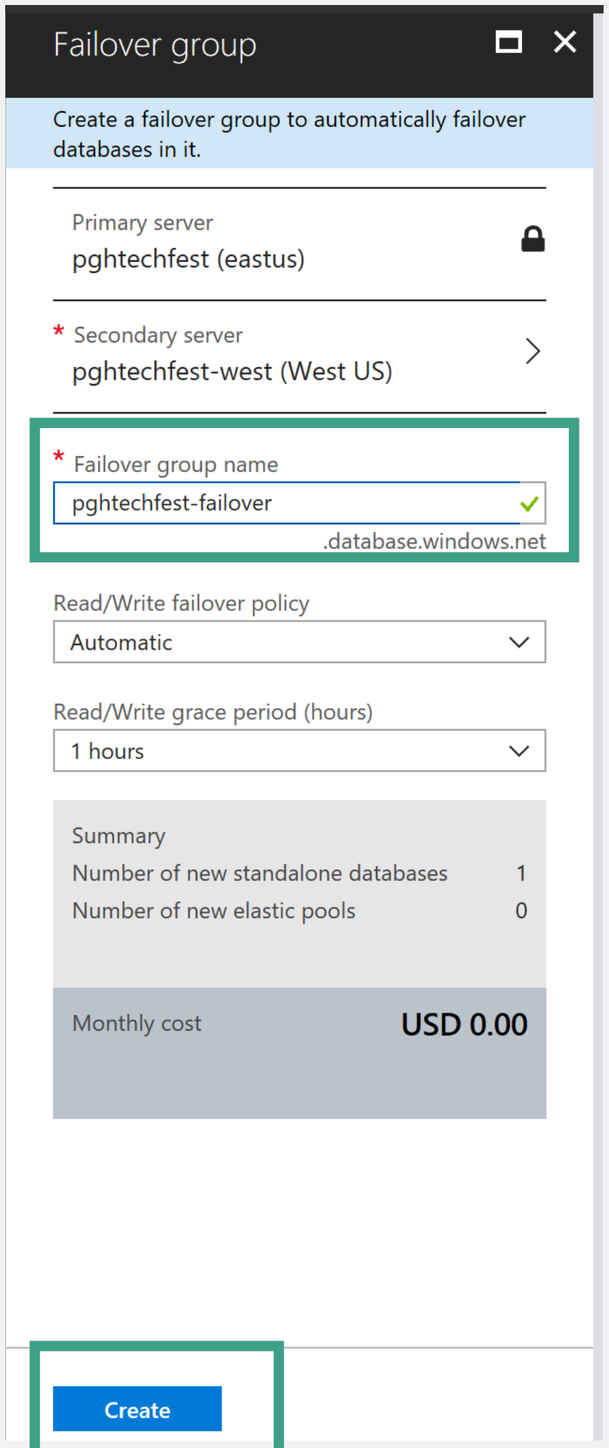
Geo-Replication



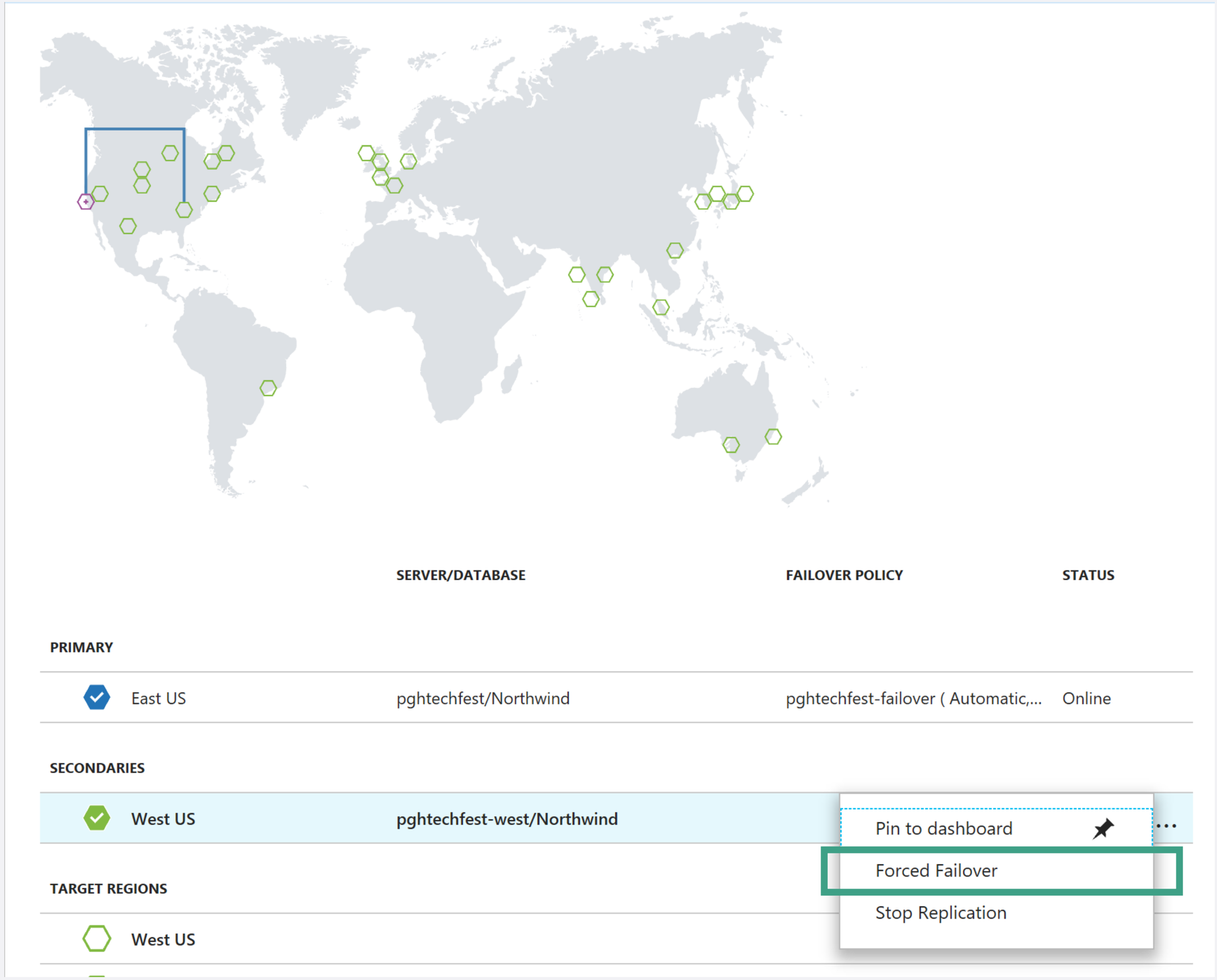
Geo-Replication



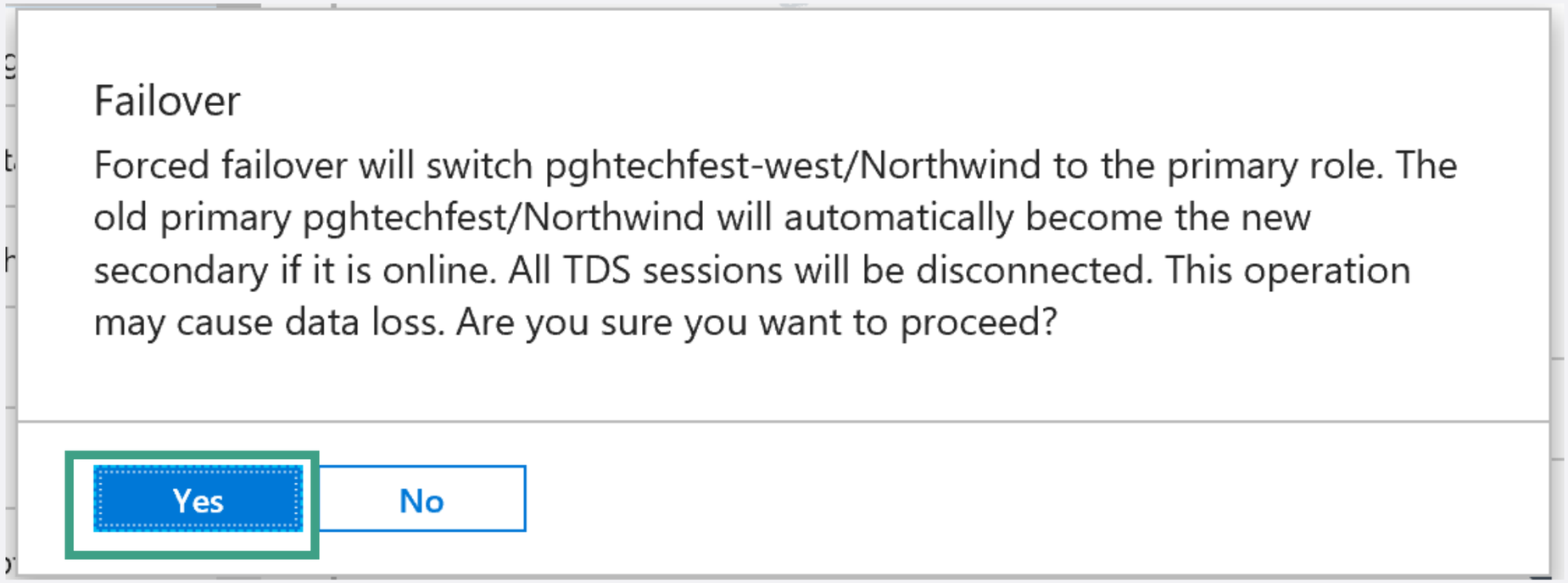
Geo-Replication



Geo-Replication



Geo-Replication



chadgreen@chadgreen.com

chadgreen.com

@ChadGreen

ChadwickEGreen

bit.ly/PTFSQLD

thank you.