

ANKARA ÜNİVERSİTESİ
MÜHENDİSLİK FAKÜLTESİ
BİLGİSAYAR MÜHENDİSLİĞİ BÖLÜMÜ



BLM4522 Ağ Tabanlı Paralel Dağıtım Sistemleri Dersi Final Raporu

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Github : github.com/GadirD/BLM4522_VideolarveRapor

Bu rapor, BLM4522 Ağ Tabanlı Paralel Dağıtım Sistemleri dersi kapsamında, Microsoft SQL Server (MSSQL) kullanılarak verilen projelere yönelik geliştirdiğimiz çözümleri içermektedir. Dersin amacı doğrultusunda; veritabanı yönetimi, güvenliği, yedekleme, optimizasyon ve performans izleme gibi konular üzerinde uygulamalı çalışmalar gerçekleştirilmiştir.

1. Veritabanı Performans Optimizasyonu ve İzleme

```
use Proje1  
  
SELECT COUNT(*)  
FROM ShippingData  
WHERE Mode_of_Shipment = 'Flight';
```

| Results | | Messages |
|---------|------------------|----------|
| | (No column name) | |
| 1 | 1777 | |

| SQL Server Profiler | | | | | | | | | |
|---|-------------------------------------|-----------|-----|-------|--------|----------|------|--------------|--|
| File Edit View Replay Tools Window Help | | | | | | | | | |
| Untitled - 1 (localhost) | | | | | | | | | |
| EventClass | TextData | LoginName | CPU | Reads | Writes | Duration | SPID | StartTime | |
| SQL:BatchCompleted | use Proje1 SELECT COUNT(*) FROM ... | DESKTO... | 16 | 188 | 0 | 16 | 75 | 2025-05-09 1 | |
| Trace is running. | | | | | | | | | |
| Ln 1, Col 1 Rows: 1 | | | | | | | | | |
| Connections: 1 | | | | | | | | | |

Bir sorgu çalıştırılmış ve bu sorgunun performansı, SQL Server Profiler aracı kullanılarak analiz edilmiştir.

```
CREATE NONCLUSTERED INDEX IX Mode of Shipment
ON ShippingData (Mode_of_Shipment);
```

Messages

Commands completed successfully.

Completion time: 2025-05-09T13:44:57.6038352+03:00

```
SELECT COUNT(*)
FROM ShippingData
WHERE Mode_of_Shipment = 'Flight';
```

Messages

(No column name)

| | |
|---|------|
| 1 | 1777 |
|---|------|

SQL Server Profiler

File Edit View Replay Tools Window Help

Untitled - 1 (localhost)

| EventClass | TextData | LoginName | CPU | Reads | Writes | Duration | SPID | StartTime |
|--------------------|---|-----------|-----|-------|--------|----------|------|--------------|
| SQL:BatchCompleted | use Proje1 SELECT COUNT(*) FROM ... | DESKTO... | 16 | 188 | 0 | 16 | 75 | 2025-05-09 1 |
| SQL:BatchCompleted | CREATE NONCLUSTERED INDEX IX_Mode_of... | DESKTO... | 0 | 1796 | 23 | 22 | 75 | 2025-05-09 1 |
| SQL:BatchCompleted | SELECT COUNT(*) FROM ShippingData ... | DESKTO... | 0 | 1522 | 0 | 4 | 75 | 2025-05-09 1 |

```
SELECT COUNT(*)
FROM ShippingData
WHERE Mode_of_Shipment = 'Flight';
```

Trace is running.

Ln 3, Col 1 Rows: 3

Connections: 1

Sorgu performansını artırmak amacıyla bir non-clustered index oluşturulmuştur.

İndeks sonrası aynı sorgu tekrar çalıştırılmış ve SQL Profiler üzerinden performans değerleri incelenmiştir.

Karşılaştırma sonuçlarına göre, CPU değeri 16'dan 0'a, Duration değeri 16 ms'den 4 ms'ye düşmüştür.

```
DROP INDEX IX_Mode_of_Shipment ON ShippingData;
```

Commands completed successfully.

Completion time: 2025-05-09T13:45:19.8000755+03:00

Sonraki sorgu performansı izleme adımları için oluşturulan index kaldırılmıştır.

```
SELECT COUNT(*)
FROM ShippingData
WHERE Mode_of_Shipment = 'Flight';

SELECT
    qs.execution_count,
    qs.last_worker_time / 1000.0 AS last_cpu_time_ms,
    qs.last_elapsed_time / 1000.0 AS last_elapsed_time_ms,
    qs.last_logical_reads,
    qs.last_physical_reads,
    qt.text
FROM sys.dm_exec_query_stats AS qs
CROSS APPLY sys.dm_exec_sql_text(qs.sql_handle) AS qt
WHERE qt.text LIKE '%ShippingData%'
ORDER BY qs.last_execution_time DESC;
```

| Results | | | | | | |
|------------------|-----------------|------------------|----------------------|--------------------|---------------------|---|
| (No column name) | | | | | | |
| 1 | 1777 | | | | | |
| | execution_count | last_cpu_time_ms | last_elapsed_time_ms | last_logical_reads | last_physical_reads | text |
| 1 | 1 | 1.613000 | 1.614000 | 74 | 0 | (@1 varchar(8000))SELECT COUNT(*) FROM [Shipping... |

DMV kullanarak sorgu performansı izleme için ilk olarak index kullanmadan sorgu yapılmış ve değerler incelenmiştir.

```
CREATE NONCLUSTERED INDEX IX_Mode_of_Shipment  
ON ShippingData (Mode_of_Shipment);
```

```
SELECT  
    qs.execution_count,  
    qs.last_worker_time / 1000.0 AS last_cpu_time_ms,  
    qs.last_elapsed_time / 1000.0 AS last_elapsed_time_ms,  
    qs.last_logical_reads,  
    qs.last_physical_reads,  
    qt.text  
FROM sys.dm_exec_query_stats AS qs  
CROSS APPLY sys.dm_exec_sql_text(qs.sql_handle) AS qt  
WHERE qt.text LIKE '%ShippingData%'  
ORDER BY qs.last_execution_time DESC;
```

Results

Messages

(No column name)

1777

| | execution_count | last_cpu_time_ms | last_elapsed_time_ms | last_logical_reads | last_physical_reads | text |
|---|-----------------|------------------|----------------------|--------------------|---------------------|--|
| 1 | 1 | 0.355000 | 0.355000 | 8 | 0 | (@1 varchar(8000))SELECT COUNT(*) FROM [ShippingDat... |
| 2 | 1 | 3.255000 | 3.846000 | 31 | 8 | SELECT COUNT(*) FROM ShippingData WHERE Mode_o... |

Index oluşturulup aynı sorgu çalıştırılmış ve sonuçlar karşılaştırılmıştır.

Bu sonuçlar, indeks kullanımıyla birlikte CPU süresi, sorgu süresi ve mantıksal okuma sayısında ciddi azalmalar olduğunu göstermektedir. Böylece sistem kaynaklarının daha verimli kullanılması sağlanmıştır.

```
CREATE NONCLUSTERED INDEX IX_Warehouse_block  
ON ShippingData (Warehouse_block);
```

Messages

Commands completed successfully.

Completion time: 2025-05-09T13:45:57.6564889+03:00

```
UPDATE ShippingData
SET Mode_of_Shipment = 'Air'
WHERE Mode_of_Shipment = 'Flight';

SELECT
    qs.execution_count,
    qs.last_worker_time / 1000.0 AS last_cpu_time_ms,
    qs.last_elapsed_time / 1000.0 AS last_elapsed_time_ms,
    qs.last_logical_reads,
    qs.last_physical_reads,
    qt.text
FROM sys.dm_exec_query_stats AS qs
CROSS APPLY sys.dm_exec_sql_text(qs.sql_handle) AS qt
WHERE qt.text LIKE '%ShippingData%'
ORDER BY qs.last_execution_time DESC;
```

100 %
Results Messages

| | execution_count | last_cpu_time_ms | last_elapsed_time_ms | last_logical_reads | last_physical_reads | text |
|---|-----------------|------------------|----------------------|--------------------|---------------------|---|
| 1 | 1 | 46.139000 | 52.682000 | 21541 | 7 | UPDATE ShippingData SET Mode_of_Shipment = '... |

Yeni bir non-clustered index oluşturularak güncelleme performansına etkisi incelenmiştir. Oluşturulan indeks sonrasında, güncelleme istatistikleri DMV aracılığıyla analiz edilmiştir.


```

SELECT
    OBJECT_NAME(i.object_id) AS table_name,
    i.name AS index_name,
    i.index_id,
    i.type_desc,
    s.user_seeks,
    s.user_scans,
    s.user_lookups,
    s.user_updates,
    s.last_user_seek,
    s.last_user_scan
FROM sys.indexes AS i
LEFT JOIN sys.dm_db_index_usage_stats AS s
    ON i.object_id = s.object_id AND i.index_id = s.index_id
WHERE OBJECTPROPERTY(i.object_id, 'IsUserTable') = 1
    AND i.name IS NOT NULL
    AND i.is_primary_key = 0
    AND i.is_unique = 0
ORDER BY s.user_seeks + s.user_scans + s.user_lookups ASC;

```

| | table_name | index_name | index_id | type_desc | user_seeks | user_scans | user_lookups | user_updates | last_user_seek | last_user_scan |
|---|--------------|---------------------|----------|--------------|------------|------------|--------------|--------------|-------------------------|----------------|
| 1 | ShippingData | IX_Warehouse_block | 6 | NONCLUSTERED | NULL | NULL | NULL | NULL | NULL | NULL |
| 2 | ShippingData | IX_Mode_of_Shipment | 3 | NONCLUSTERED | 2 | 0 | 0 | 1 | 2025-05-09 13:46:04.113 | NULL |

Oluşturulan iki indeksin performansa etkisi karşılaştırılmış ve DMV verileri üzerinden analiz yapılmıştır. Analiz sonucunda indekslerden birinin yapılan güncelleme işleminde hiç kullanılmadığı belirlenmiştir.

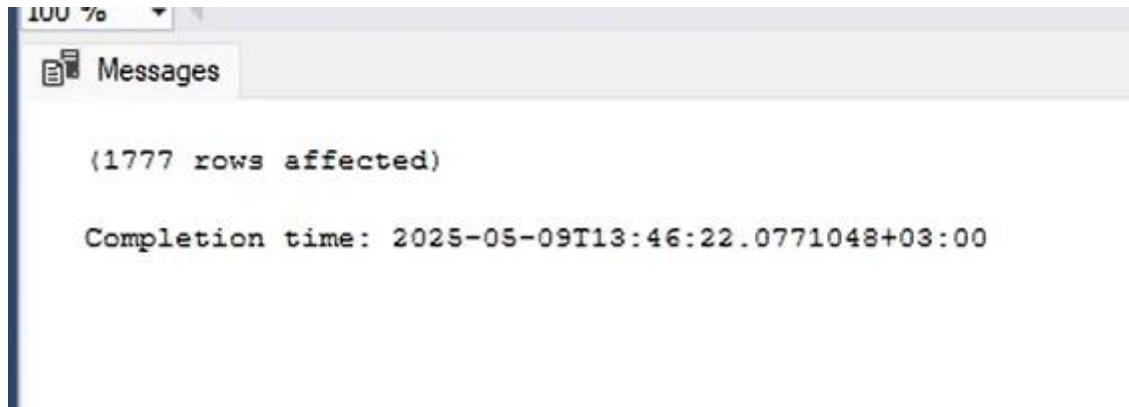
Bu tespit, sys.dm_db_index_usage_stats görünümü yardımıyla yapılmış ve indeksin güncelleme tarafından erişilmediği, dolayısıyla sistemde gereksiz yer kapladığı anlaşılmıştır.

```

DROP INDEX IX_Warehouse_block ON ShippingData

UPDATE ShippingData
SET Mode_of_Shipment = 'Flight'
WHERE Mode_of_Shipment = 'Air';

```



```
UPDATE ShippingData
SET Mode_of_Shipment = 'Air'
WHERE Mode_of_Shipment = 'Flight';

SELECT
    qs.execution_count,
    qs.last_worker_time / 1000.0 AS last_cpu_time_ms,
    qs.last_elapsed_time / 1000.0 AS last_elapsed_time_ms,
    qs.last_logical_reads,
    qs.last_physical_reads,
    qt.text
FROM sys.dm_exec_query_stats AS qs
CROSS APPLY sys.dm_exec_sql_text(qs.sql_handle) AS qt
WHERE qt.text LIKE '%ShippingData%'
ORDER BY qs.last_execution_time DESC;
```

| Results | | Messages | | | | |
|---------|-----------------|------------------|----------------------|--------------------|---------------------|---|
| | execution_count | last_cpu_time_ms | last_elapsed_time_ms | last_logical_reads | last_physical_reads | text |
| 1 | 1 | 24.132000 | 26.817000 | 20719 | 24 | UPDATE ShippingData SET Mode_of_Shipment = '... |

Sorgularda kullanılmayan gereksiz bir indeks tespit edilmiş ve sistemden kaldırılmıştır. Ardından, daha önce indeksli durumda çalıştırılan güncelleme işlemi yeniden tekrarlanmıştır.

İlgili indeks kaldırıldıktan sonra gerçekleştirilen güncelleme işleminin performans değerleri incelenmiş ve CPU süresi ve işlem süresinde iyileşme gözlemlenmiştir. Bu durum, kullanılmayan indekslerin sistemde yalnızca yer kaplamakla kalmayıp, yazma işlemlerinde performans kaybına yol açabileceğini ortaya koymuştur.


```

SELECT TOP 5
    qs.execution_count,
    qs.total_worker_time / qs.execution_count / 1000.0 AS avg_cpu_time_ms,
    qs.total_elapsed_time / qs.execution_count / 1000.0 AS avg_elapsed_time_ms,
    qs.max_elapsed_time / 1000.0 AS max_elapsed_time_ms,
    qt.text
FROM sys.dm_exec_query_stats AS qs
CROSS APPLY sys.dm_exec_sql_text(qs.sql_handle) AS qt
WHERE qt.text LIKE '%ShippingData%'
ORDER BY qs.max_elapsed_time DESC;

```

| | execution_count | avg_cpu_time_ms | avg_elapsed_time_ms | max_elapsed_time_ms | text |
|---|-----------------|-----------------|---------------------|---------------------|---|
| 1 | 1 | 24.132000 | 26.817000 | 26.817000 | UPDATE ShippingData SET Mode_of_Shipment = '... |
| 2 | 1 | 2.159000 | 2.159000 | 2.159000 | UPDATE ShippingData SET Mode_of_Shipment = '... |

Veritabanı üzerinde performansı düşük sorguları belirlemek amacıyla, en uzun süre çalışan ilk 5 sorguyu listeleyen bir DMV sorgusu çalıştırılmıştır.

Elde edilen sonuçlar, sistemde kaynak tüketimi yüksek olan sorguların belirlenmesini sağlamış ve iyileştirme yapılması gereken noktalar hakkında fikir vermiştir.

2. Veritabanı Yedekleme ve Felaketten Kurtarma Planı

İnternette hazır bir veri tabanı alınmıştır.

```
USE proje2;
SELECT TOP 50 * FROM dbo.train;
```

| PassengerId | Survived | Pclass | Name | Sex | Age | SibSp | Parch | Ticket |
|-------------|----------|--------|---|--------|------|-------|-------|------------------|
| 1 | 0 | 3 | Braund, Mr. Owen Harris | male | 22 | 1 | 0 | A/5 21171 |
| 2 | 1 | 1 | Cumings, Mrs. John Bradley (Florence Briggs Thayer) | female | 38 | 1 | 0 | PC 17599 |
| 3 | 1 | 3 | Heikkinen, Miss. Laina | female | 26 | 0 | 0 | STON/O2. 3101282 |
| 4 | 1 | 1 | Futrelle, Mrs. Jacques Heath (Lily May Peel) | female | 35 | 1 | 0 | 113803 |
| 5 | 0 | 3 | Allen, Mr. William Henry | male | 35 | 0 | 0 | 373450 |
| 6 | 0 | 3 | Moran, Mr. James | male | NULL | 0 | 0 | 330877 |
| 7 | 0 | 1 | McCarthy, Mr. Timothy J | male | 54 | 0 | 0 | 17463 |
| 8 | 0 | 3 | Palsson, Master. Gosta Leonard | male | 2 | 3 | 1 | 349909 |
| 9 | 1 | 3 | Johnson, Mrs. Oscar W (Elisabeth Vilhelmina Berg) | female | 27 | 0 | 2 | 347742 |
| 10 | 1 | 2 | Nasser, Mrs. Nicholas (Adele Achem) | female | 14 | 1 | 0 | 237736 |
| 11 | 1 | 3 | Sandstrom, Miss. Marguerite Rut | female | 4 | 1 | 1 | PP 9549 |
| 12 | 1 | 1 | Bonnell, Miss. Elizabeth | female | 58 | 0 | 0 | 113783 |
| 13 | 0 | 3 | Saunders, Mr. William Henry | male | 20 | 0 | 0 | A/5. 2151 |
| 14 | 0 | 3 | Andersson, Mr. Anders Johan | male | 39 | 1 | 5 | 347082 |
| 15 | 0 | 3 | Vestrom, Miss. Hulda Amanda Adolfina | female | 14 | 0 | 0 | 350406 |
| 16 | 1 | 2 | Hewlett, Mrs. (Mary D Kingcome) | female | 55 | 0 | 0 | 248706 |
| 17 | 0 | 3 | Rice, Master. Eugene | male | 2 | 4 | 1 | 382652 |
| 18 | 1 | 2 | Williams, Mr. Charles Eugene | male | NULL | 0 | 0 | 244373 |

Sorgu sonucu veri tabanının ilk 50 elemanı gösterilmiştir.

```
BACKUP DATABASE proje2
TO DISK = 'C:\Yedekler\TitanicTamYedek.bak'
WITH FORMAT, INIT, NAME = 'Titanic Veritabani Tam Yedekleme',
CHECKSUM;

RESTORE VERIFYONLY
FROM DISK = 'C:\Yedekler\TitanicTamYedek.bak'
WITH CHECKSUM;
```

| Messages |
|---|
| Processed 1440 pages for database 'proje2', file 'Proje5' on file 1. Processed 2 pages for database 'proje2', file 'Proje5_log' on file 1. BACKUP DATABASE successfully processed 1442 pages in 0.027 seconds (417.100 MB/sec). Completion time: 2025-04-23T18:42:42.6519053+03:00 |

| Messages |
|--|
| The backup set on file 1 is valid. Completion time: 2025-04-23T18:42:48.6359548+03:00 |

```
-----  
BACKUP DATABASE proje2  
TO DISK = 'C:\Yedekler\TitanicArtikYedek.bak'  
WITH DIFFERENTIAL, NAME = 'Titanic Artik Yedek',  
CHECKSUM;
```

```
RESTORE VERIFYONLY  
FROM DISK = 'C:\Yedekler\TitanicArtikYedek.bak'  
WITH CHECKSUM;
```

100 %

Messages

Processed 56 pages for database 'proje2', file 'Proje5' on file 1.
Processed 2 pages for database 'proje2', file 'Proje5_log' on file 1.
BACKUP DATABASE WITH DIFFERENTIAL successfully processed 58 pages in 0.010 seconds (44.921 MB/sec).

Completion time: 2025-04-23T18:42:54.7099690+03:00

100 %

Messages

The backup set on file 1 is valid.

Completion time: 2025-04-23T18:43:00.9358665+03:00

Veriler geri yüklenmiş ve yüklenirken verilerin bütünlüğü kontrol edilmiştir

```
-----  
ALTER DATABASE proje2 SET RECOVERY FULL;  
GO  
  
BACKUP LOG proje2  
TO DISK = 'C:\Yedekler\TitanicLogYedek.trn'  
WITH NAME = 'Titanic Log Yedek',  
CHECKSUM;  
  
RESTORE VERIFYONLY  
FROM DISK = 'C:\Yedekler\TitanicLogYedek.trn'  
WITH CHECKSUM;
```

100 %

Messages

Processed 18 pages for database 'proje2', file 'Proje5_log' on file 1.
BACKUP LOG successfully processed 18 pages in 0.002 seconds (70.312 MB/sec).

Completion time: 2025-04-23T18:43:07.3869748+03:00

```
100 %  
Messages  
The backup set on file 1 is valid.  
  
Completion time: 2025-04-23T18:43:14.0495997+03:00
```

Veri tabanının log kaydı alınmış, verilerin doğruluğu kontrol edilmiştir.

| Ad | Değiştirme tarihi | Tür | Boyut |
|-----------------------|-------------------|-------------|-----------|
| TitanicArtikYedek.bak | 23.04.2025 18:42 | BAK Dosyası | 2.168 KB |
| TitanicLogYedek.trn | 23.04.2025 18:43 | TRN Dosyası | 240 KB |
| TitanicTamYedek.bak | 23.04.2025 18:42 | BAK Dosyası | 13.432 KB |

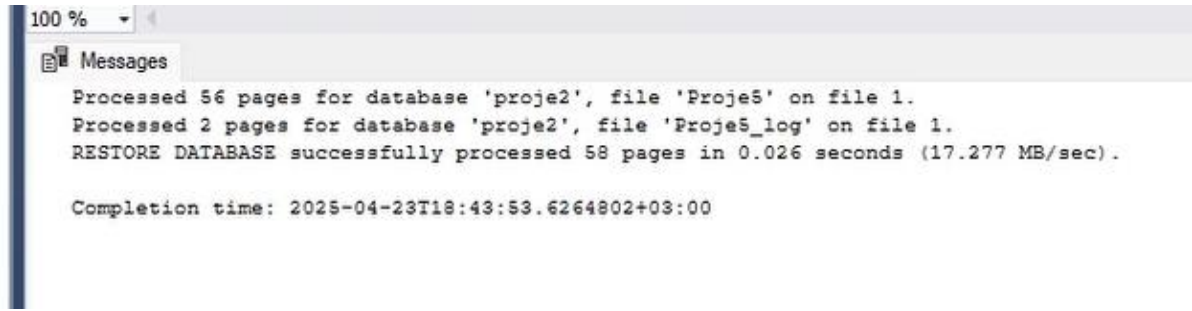
```
USE master;  
ALTER DATABASE proje2 SET SINGLE_USER WITH ROLLBACK IMMEDIATE;  
DROP DATABASE proje2;
```

```
100 %  
Messages  
Commands completed successfully.  
  
Completion time: 2025-04-23T18:43:21.0776484+03:00
```

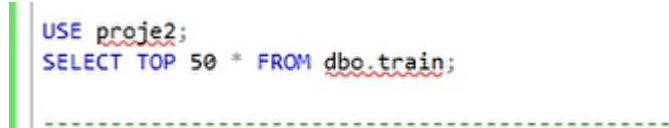
Yedeklerin doğruluğunun kontrolü için veri tabanını siliyoruz.

```
--  
RESTORE DATABASE proje2  
FROM DISK = 'C:\Yedekler\TitanicTamYedek.bak'  
WITH NORECOVERY, REPLACE, CHECKSUM;  
  
--  
  
RESTORE DATABASE proje2  
FROM DISK = 'C:\Yedekler\TitanicArtikYedek.bak'  
WITH RECOVERY, CHECKSUM;
```

```
100 %  
Messages  
Processed 1440 pages for database 'proje2', file 'Proje5' on file 1.  
Processed 2 pages for database 'proje2', file 'Proje5_log' on file 1.  
RESTORE DATABASE successfully processed 1442 pages in 0.015 seconds (750.781 MB/sec).  
  
Completion time: 2025-04-23T18:43:42.7706331+03:00
```

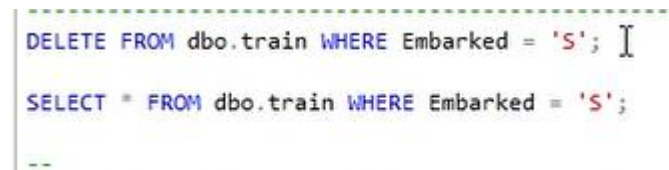


Tam yedek ve artık yedek başarıyla geri yüklendi.



| | Name | Sex | Age | SibSp | Parch | Ticket | Fare | Cabin | Embarked |
|----|---|--------|------|-------|-------|------------------|--------|-------|----------|
| 1 | Braund, Mr. Owen Haris | male | 22 | 1 | 0 | A/5 21171 | 725 | NULL | S |
| 2 | Cumings, Mrs. John Bradley (Florence Briggs Thayer) | female | 38 | 1 | 0 | PC 17599 | 712833 | C85 | C |
| 3 | Heikkinen, Miss. Laina | female | 26 | 0 | 0 | STON/O2. 3101282 | 7925 | NULL | S |
| 4 | Futrelle, Mrs. Jacques Heath (Lily May Peel) | female | 35 | 1 | 0 | 113803 | 531 | C123 | S |
| 5 | Allen, Mr. William Henry | male | 35 | 0 | 0 | 373450 | 805 | NULL | S |
| 6 | Moran, Mr. James | male | NULL | 0 | 0 | 330877 | 84583 | NULL | Q |
| 7 | McCarthy, Mr. Timothy J | male | 54 | 0 | 0 | 17463 | 518625 | E46 | S |
| 8 | Palsson, Master. Gosta Leonard | male | 2 | 3 | 1 | 349909 | 21075 | NULL | S |
| 9 | Johnson, Mrs. Oscar W (Elisabeth Vilhelmina Berg) | female | 27 | 0 | 2 | 347742 | 111333 | NULL | S |
| 10 | Nasser, Mrs. Nicholas (Adele Achem) | female | 14 | 1 | 0 | 237736 | 300708 | NULL | C |
| 11 | Sandstrom, Miss. Marguerite Rut | female | 4 | 1 | 1 | PP 9549 | 167 | G6 | S |
| 12 | Bonnell, Miss. Elizabeth | female | 58 | 0 | 0 | 113783 | 2655 | C103 | S |
| 13 | Saunderscock, Mr. William Henry | male | 20 | 0 | 0 | A/5. 2151 | 805 | NULL | S |
| 14 | Andersson, Mr. Anders Johan | male | 39 | 1 | 5 | 347082 | 31275 | NULL | S |
| 15 | Vestrom, Miss. Hulda Amanda Adolfina | female | 14 | 0 | 0 | 350406 | 78542 | NULL | S |
| 16 | Hewlett, Mrs. (Mary D Kingcome) | female | 55 | 0 | 0 | 248706 | 16 | NULL | S |
| 17 | Rice, Master. Eugene | male | 2 | 4 | 1 | 382652 | 29125 | NULL | Q |
| 18 | Williams, Mr. Charles Eugene | male | NULL | 0 | 0 | 244373 | 13 | NULL | S |

Veri tabanının geri yüklendiğini göstermek için ilk 50 eleman incelenmiştir.



(644 rows affected)

Completion time: 2025-04-23T18:44:15.5495573+03:00

100 %

Results Messages

| PassengerId | Survived | Pclass | Name | Sex | Age | SibSp | Parch | Ticket | Fare | Cabin | Embarked |
|-------------|----------|--------|------|-----|-----|-------|-------|--------|------|-------|----------|
|-------------|----------|--------|------|-----|-----|-------|-------|--------|------|-------|----------|

İkinci bir senaryo olarak veri tabanındaki embarked sütununda S değeri olan satırlar silinmiştir.

```
--
USE master;
ALTER DATABASE proje2 SET SINGLE_USER WITH ROLLBACK IMMEDIATE;
RESTORE DATABASE proje2
FROM DISK = 'C:\Yedekler\TitanicTamYedek.bak'
WITH REPLACE, CHECKSUM;

USE proje2;
SELECT * FROM dbo.train WHERE Embarked = 'S';
```

Messages

Processed 1440 pages for database 'proje2', file 'Proje5' on file 1.
Processed 2 pages for database 'proje2', file 'Proje5_log' on file 1.
RESTORE DATABASE successfully processed 1442 pages in 0.037 seconds (304.370 MB/sec).
Completion time: 2025-04-23T18:44:25.6835640+03:00

Results Messages

| | Name | Sex | Age | SibSp | Parch | Ticket | Fare | Cabin | Embarked |
|----|---|--------|------|-------|-------|------------------|--------|-------|----------|
| 1 | Braund, Mr. Owen Harris | male | 22 | 1 | 0 | A/5 21171 | 725 | NULL | S |
| 2 | Heikkinen, Miss. Laina | female | 26 | 0 | 0 | STON/O2. 3101282 | 7925 | NULL | S |
| 3 | Futrelle, Mrs. Jacques Heath (Lily May Peel) | female | 35 | 1 | 0 | 113803 | 531 | C123 | S |
| 4 | Allen, Mr. William Henry | male | 35 | 0 | 0 | 373450 | 805 | NULL | S |
| 5 | McCarthy, Mr. Timothy J | male | 54 | 0 | 0 | 17463 | 518625 | E46 | S |
| 6 | Palsson, Master. Gosta Leonard | male | 2 | 3 | 1 | 349909 | 21075 | NULL | S |
| 7 | Johnson, Mrs. Oscar W (Elisabeth Vilhelmina Berg) | female | 27 | 0 | 2 | 347742 | 111333 | NULL | S |
| 8 | Sandstrom, Miss. Marguerite Rut | female | 4 | 1 | 1 | PP 9549 | 167 | G6 | S |
| 9 | Bonnell, Miss. Elizabeth | female | 58 | 0 | 0 | 113783 | 2655 | C103 | S |
| 10 | Saunderscock, Mr. William Henry | male | 20 | 0 | 0 | A/5. 2151 | 805 | NULL | S |
| 11 | Andersson, Mr. Anders Johan | male | 39 | 1 | 5 | 347082 | 31275 | NULL | S |
| 12 | Vestrom, Miss. Hulda Amanda Adolfina | female | 14 | 0 | 0 | 350406 | 78542 | NULL | S |
| 13 | Hewlett, Mrs. (Mary D Kingcome) | female | 55 | 0 | 0 | 248706 | 16 | NULL | S |
| 14 | Williams, Mr. Charles Eugene | male | NULL | 0 | 0 | 244373 | 13 | NULL | S |
| 15 | Vander Planke, Mrs. Julius (Emelia Maria Vandemo... | female | 31 | 1 | 0 | 345763 | 18 | NULL | S |
| 16 | Fynney, Mr. Joseph J | male | 35 | 0 | 0 | 239865 | 26 | NULL | S |
| 17 | Beesley, Mr. Lawrence | male | 34 | 0 | 0 | 248698 | 13 | D56 | S |
| 18 | Sloper, Mr. William Thompson | male | 28 | 0 | 0 | 113788 | 355 | A6 | S |

Tam yedek geri yüklenerek veri tabanında yapılan hatalı işlem geri alınmış oldu.

3. Veritabanı Güvenliği ve Erişim Kontrolü

```
--DATABASE Creation

CREATE DATABASE secDB;
GO

USE secDB;
GO

CREATE TABLE Users (
    userID INT PRIMARY KEY IDENTITY(1,1),
    userName NVARCHAR(50),
    pass NVARCHAR(100),
    email NVARCHAR(100)
);

INSERT INTO Users (userName, pass, email)
VALUES ('admin', 'admin123', 'admin@example.com'),
('kullanici1', '12345', 'kullanici1@example.com');
```

Messages

(2 rows affected)

Completion time: 2025-04-23T18:12:19.4868453+03:00

100 %

Results Messages

| | userID | userName | pass | email |
|---|--------|------------|----------|------------------------|
| 1 | 1 | admin | admin123 | admin@example.com |
| 2 | 2 | kullanici1 | 12345 | kullanici1@example.com |

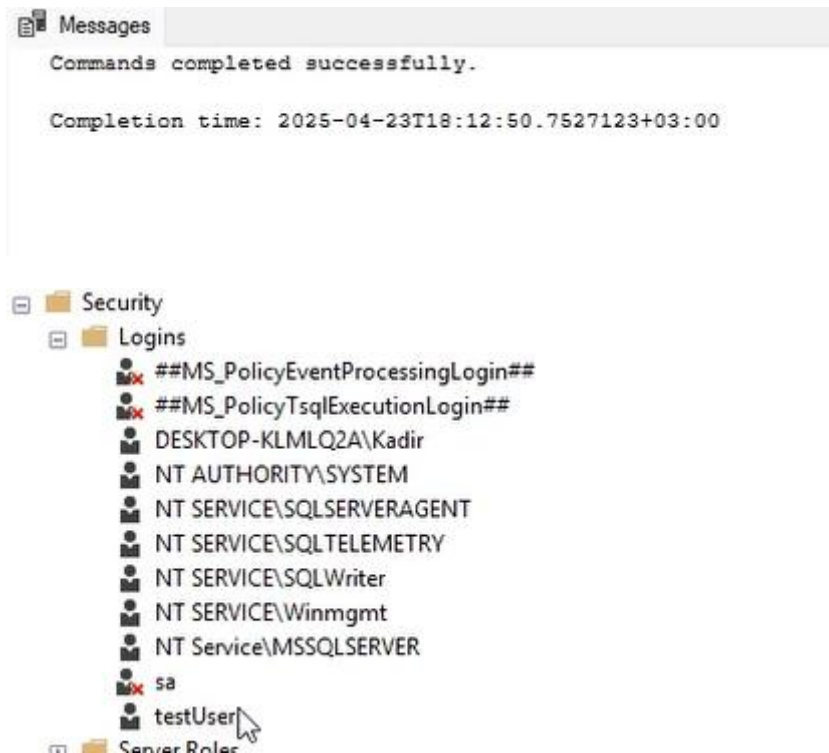
2 satırdan oluşan bir veri tabanı oluşturuyoruz.

```
--Access Management

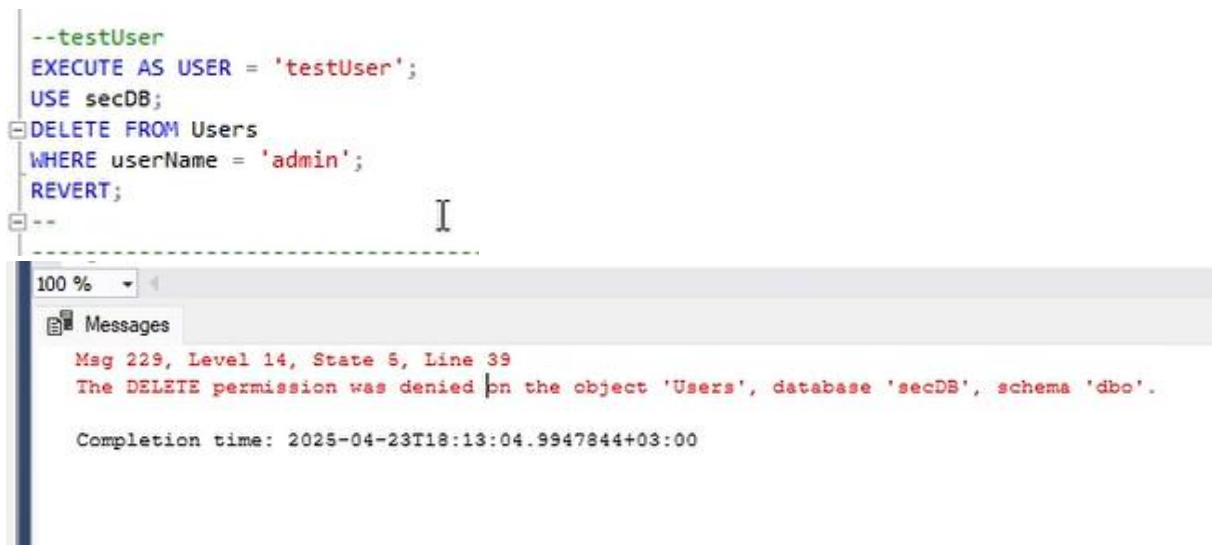
CREATE LOGIN testUser WITH PASSWORD = 'test123';
CREATE USER testUser FOR LOGIN testUser;

USE secDB;
GO

GRANT SELECT ON Users TO testUser;
DENY DELETE ON Users TO testUser;
```



Okuma yetkisine sahip ama silme yetkisi bulunmayan bir kullanıcı oluşturuyoruz.



Yeni oluşturduğumuz testUser ile veri tabanında silme işlemi yapmaya çalışıyoruz sonuç olarak da yetkisinin olmadığını görüyoruz.

```
--Data Encyrption

USE master;
GO

CREATE MASTER KEY ENCRYPTION BY PASSWORD = 'master123';
CREATE CERTIFICATE secCert
WITH SUBJECT = 'secDB Certification';

USE secDB;
GO

CREATE DATABASE ENCRYPTION KEY
WITH ALGORITHM = AES_256
ENCRYPTION BY SERVER CERTIFICATE secCert;

ALTER DATABASE secDB
SET ENCRYPTION ON;
```

Warning: The certificate used for encrypting the database encryption key has not been backed up. You should immediately back up the certificate and the private key associated with the certificate. If the certificate ev
Completion time: 2025-04-23T18:13:16.2957825+03:00

Veri şifreleme işlemi yapıldı.

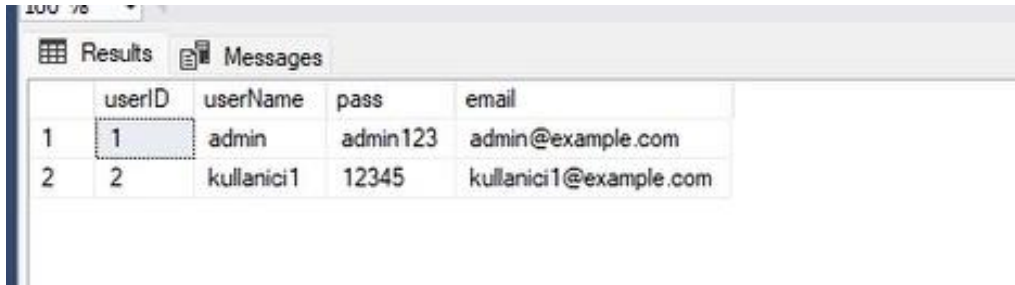
```
--Show
SELECT
    db.name AS DatabaseName,
    db.is_encrypted AS IsEncrypted,
    dek.encrypted_state AS EncryptionState,
    dek.percent_complete AS PercentComplete,
    dek.key_algorithm AS Algorithm,
    dek.key_length AS KeyLength
FROM sys.databases db
LEFT JOIN sys.dm_database_encryption_keys dek
ON db.database_id = dek.database_id
WHERE db.name = 'secDB';
```

| DatabaseName | IsEncrypted | EncryptionState | PercentComplete | Algorithm | KeyLength |
|--------------|-------------|-----------------|-----------------|-----------|-----------|
| 1 secDB | 1 | 3 | 0 | AES | 256 |

Verilerin şifrelendiğinin kontrolünü yapıyoruz.

```
--SQL Injection
EXECUTE AS USER = 'testUser';

DECLARE @sql NVARCHAR(MAX);
SET @sql = 'SELECT * FROM Users WHERE userName = '' + 'admin'' OR 1=1--' + ''';
EXEC(@sql);
REVERT;
```

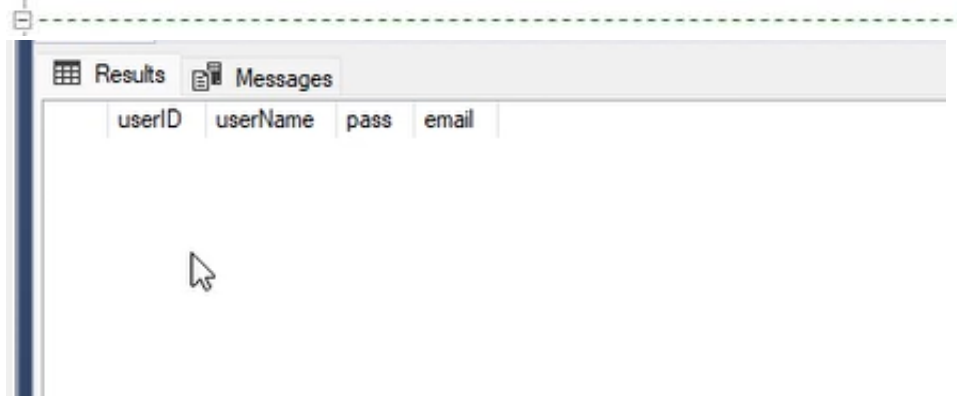


| | userID | userName | pass | email |
|---|--------|------------|----------|------------------------|
| 1 | 1 | admin | admin123 | admin@example.com |
| 2 | 2 | kullanici1 | 12345 | kullanici1@example.com |

Bu örnekte, kullanıcı girdisi doğrudan SQL sorgusuna eklenerek çalıştırıldığından sistem SQL injection saldırılarına açıktır.

```
EXECUTE AS USER = 'testUser';
DECLARE @sql NVARCHAR(MAX);
DECLARE @KullaniciAdi NVARCHAR(50) = 'admin' OR 1=1--';

SET @sql = N'SELECT * FROM Users WHERE userName = @Adi';
EXEC sp_executesql @sql, N'@Adi NVARCHAR(50)', @Adi = @KullaniciAdi;
REVERT;
```



| userID | userName | pass | email |
|--------|----------|------|-------|
|--------|----------|------|-------|

Bu örnekte ise parametrik sorgu kullanılarak kullanıcı girdisi izole edilmiştir ve SQL injection saldırılarına karşı güvenlik sağlanmıştır.


```
--Creating an AUDIT
use master;
CREATE SERVER AUDIT loginLogs
TO FILE (FILEPATH = 'C:\AuditLogs\')
WITH (ON_FAILURE = CONTINUE);
ALTER SERVER AUDIT loginLogs WITH (STATE = ON);

USE secDB;
GO

CREATE DATABASE AUDIT SPECIFICATION loginLogsSpec
FOR SERVER AUDIT loginLogs
ADD (SELECT ON OBJECT::Users BY testUser)
WITH (STATE = ON);
```

Messages

Commands completed successfully.

Completion time: 2025-04-23T18:14:10.3358336+03:00

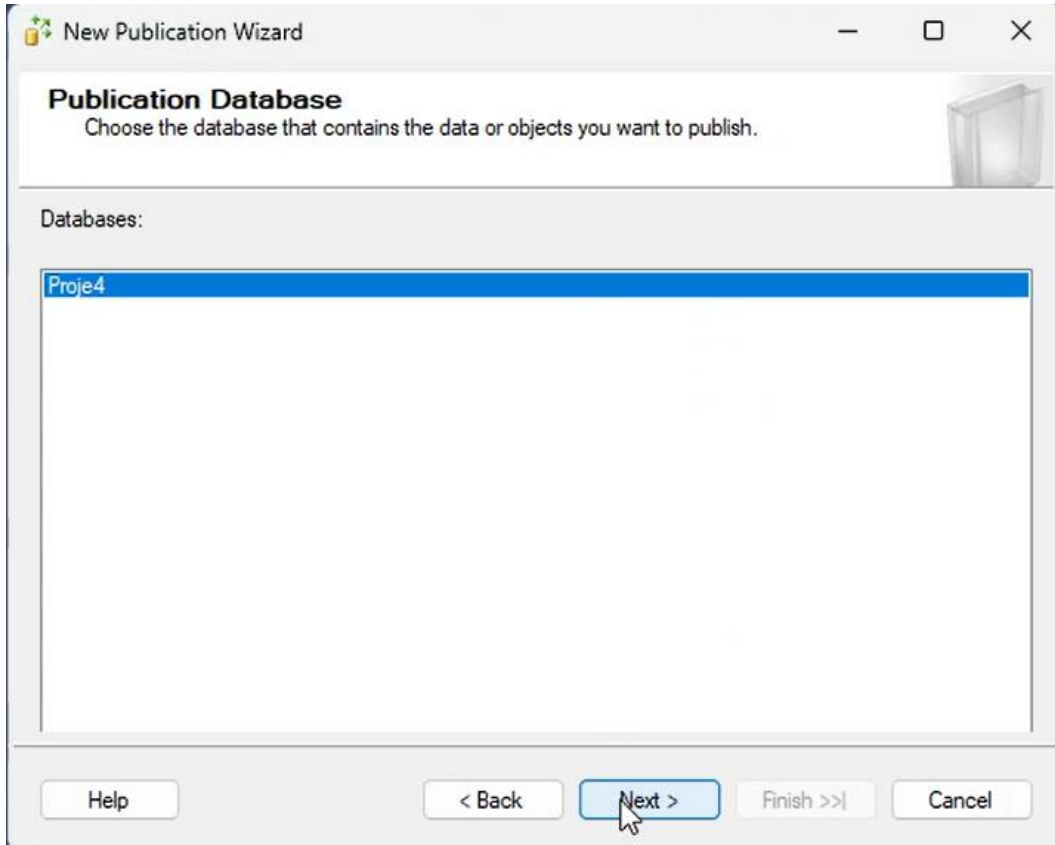
| Ad | Değiştirme tarihi | Tür | Boyut |
|--|-------------------|------------------|-------|
| loginLogs_231B0AC3-45C7-40A6-926B-5B404C2D6BD6_0_13389894... | 23.04.2025 18:14 | SQLAUDIT Dosyası | 0 KB |

Kullanıcı aktiviteleri, SQL Server Audit özelliği kullanılarak izlenip kaydedildi.

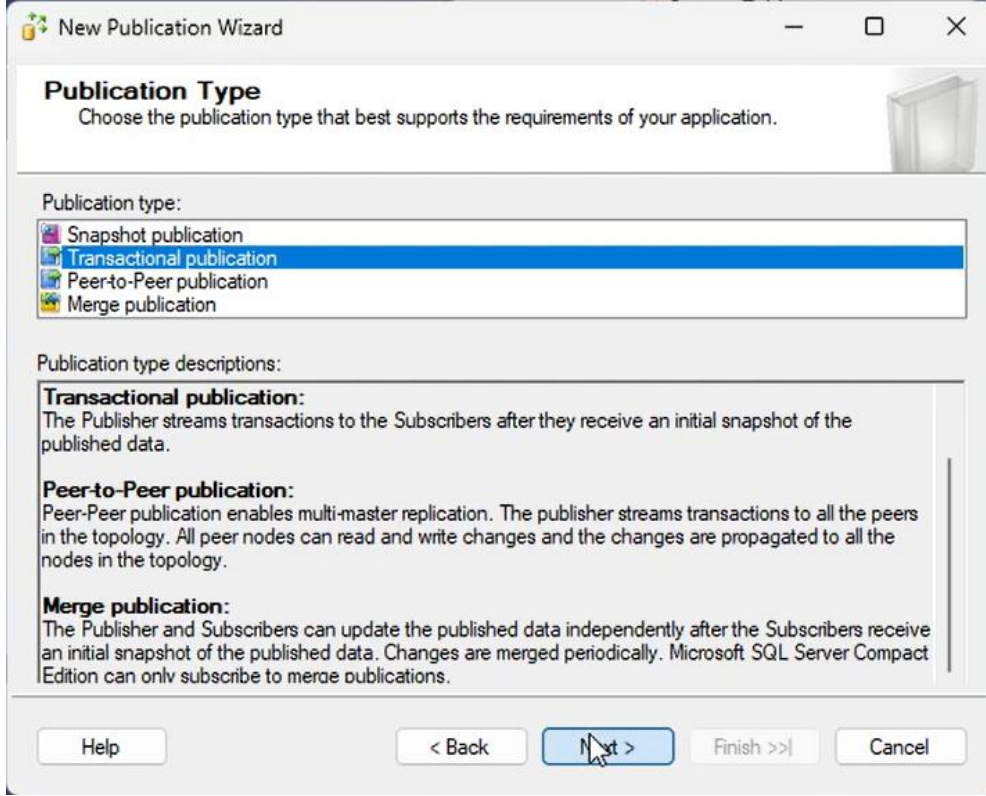
4. Veritabanı Yük Dengeleme ve Dağıtık Veritabanı Yapıları



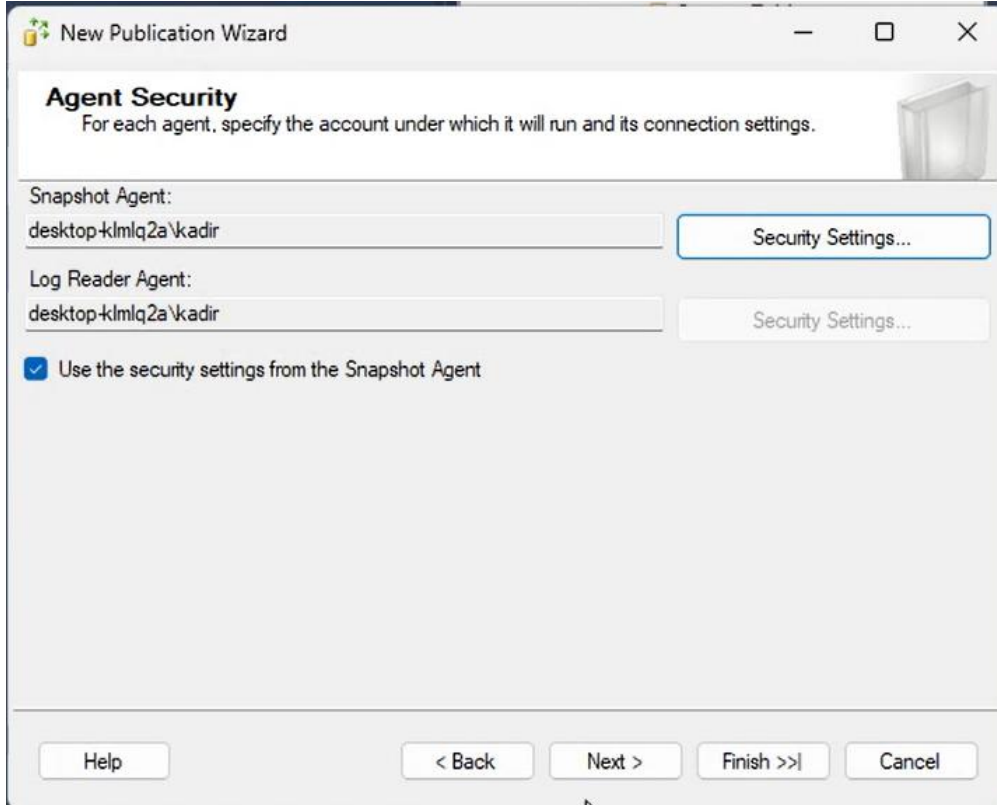
Yeni bir publication oluşturmak için sihirbaz çalıştırılır.



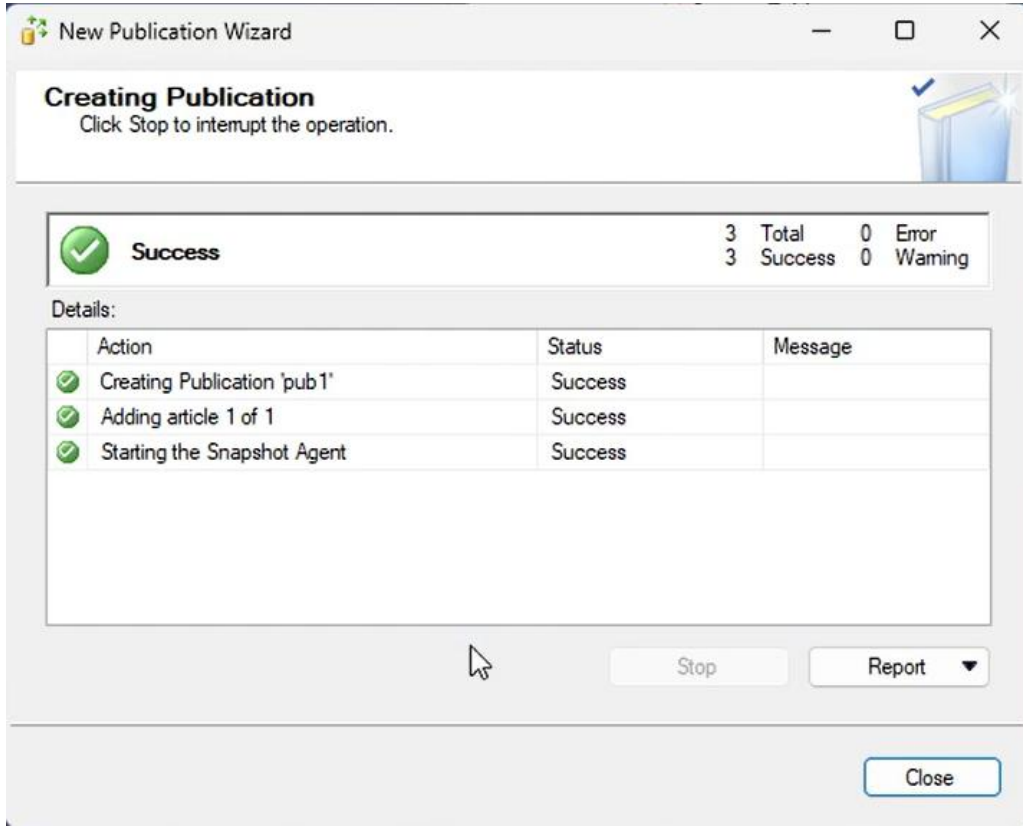
Replikasyon işlemi için kullanılacak, çoğaltılacak verilerin bulunduğu veritabanı bu adımda seçilir.



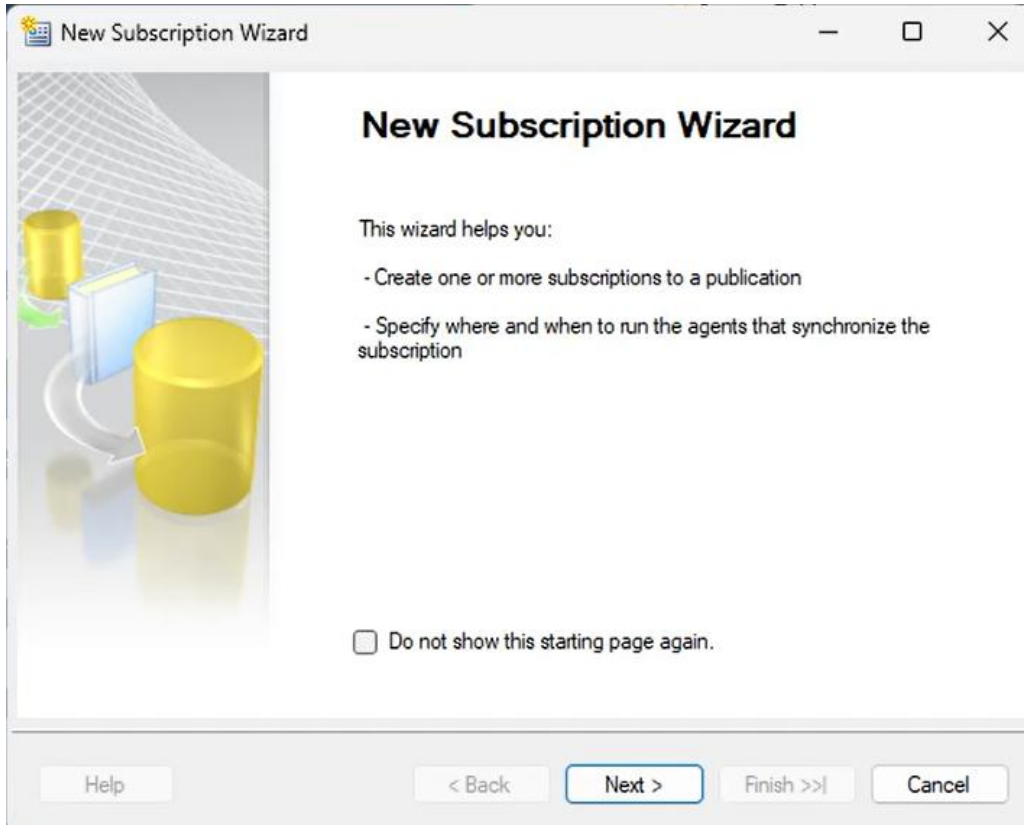
Transactional Publication tipi seçilerek, verilerin gerçek zamanlı olarak subscriber'a iletilmesi sağlandı.



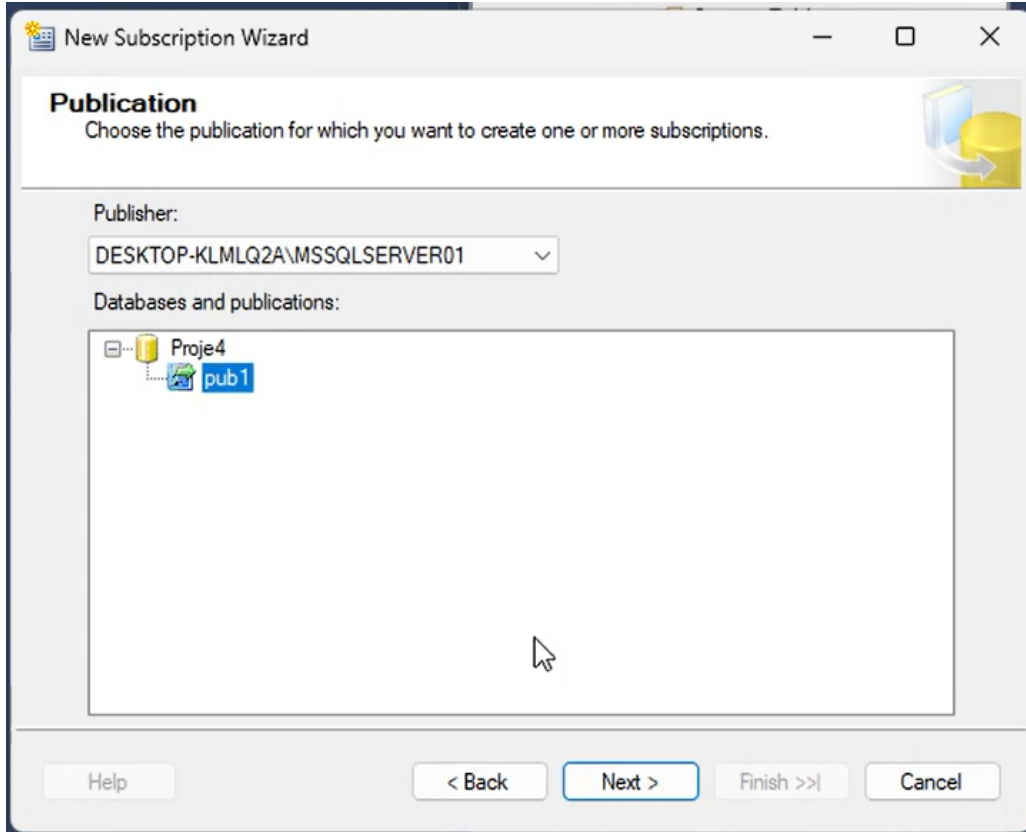
Distribution Agent'ın hangi kullanıcı hesabıyla çalışacağı ve verilerin aktarılacağı subscriber sunucusuna hangi kimlik bilgileriyle bağlanacağı belirlendi.



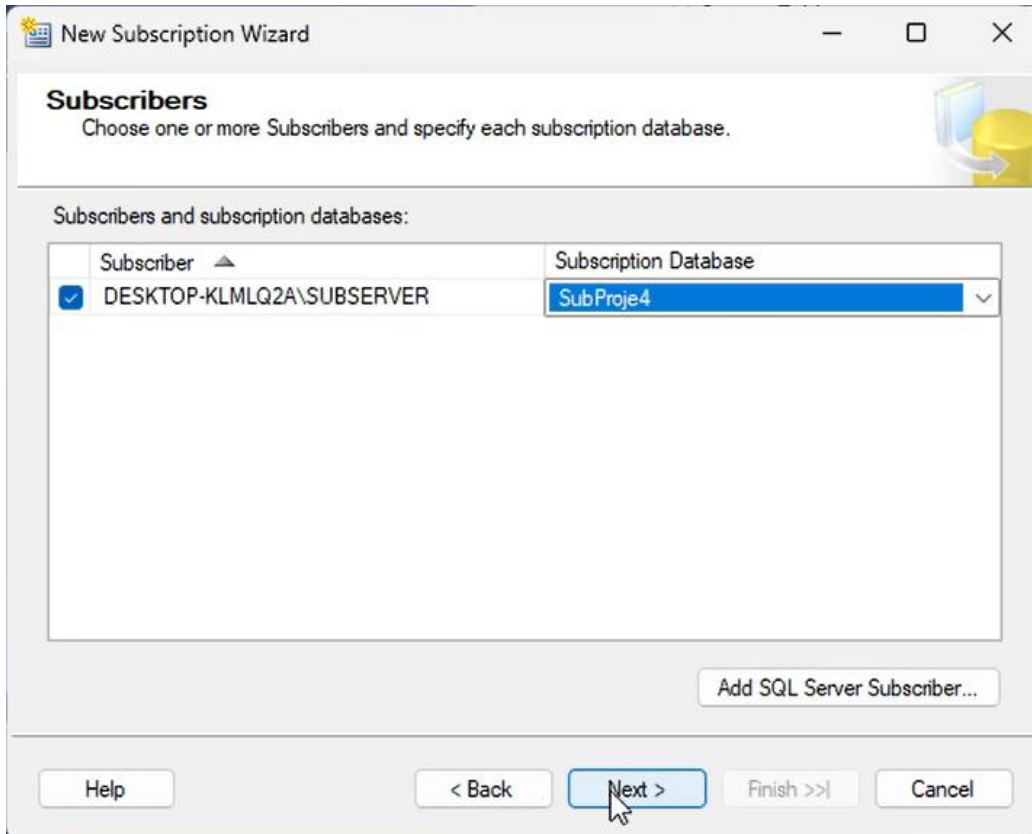
Publication başarıyla oluşturulmuştur.



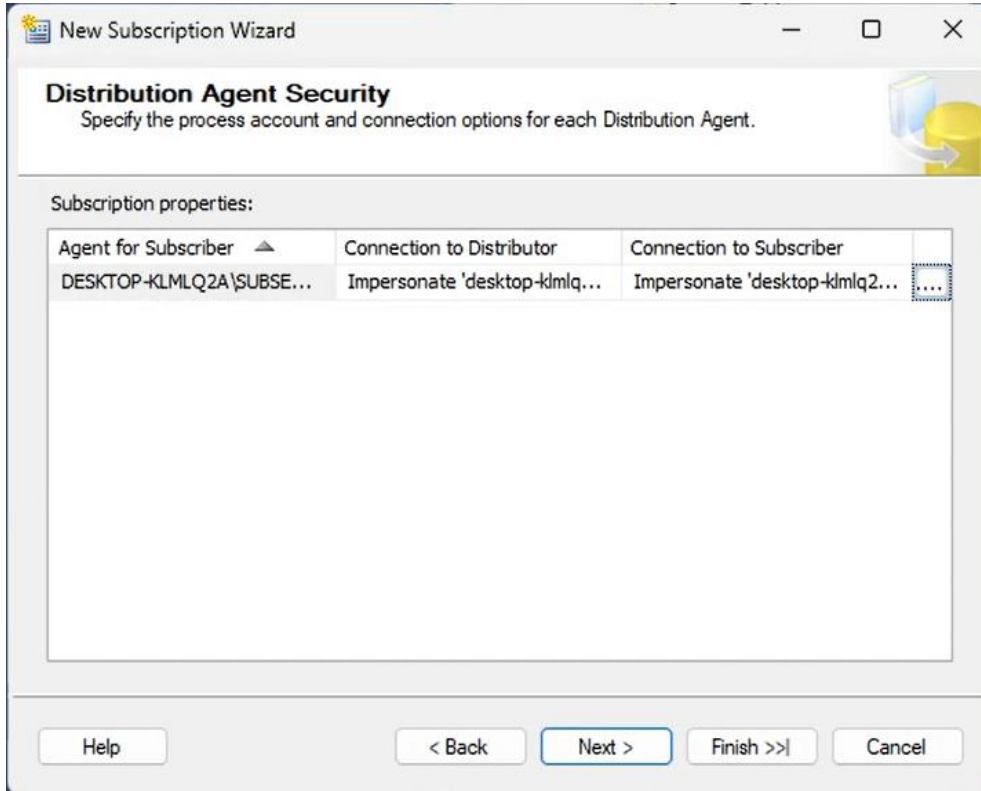
Yeni bir subscription oluşturmak için sihirbaz çalıştırılır.



Oluşturulacak subscription'ın hangi publication ile ilişkilendirileceği seçilir.



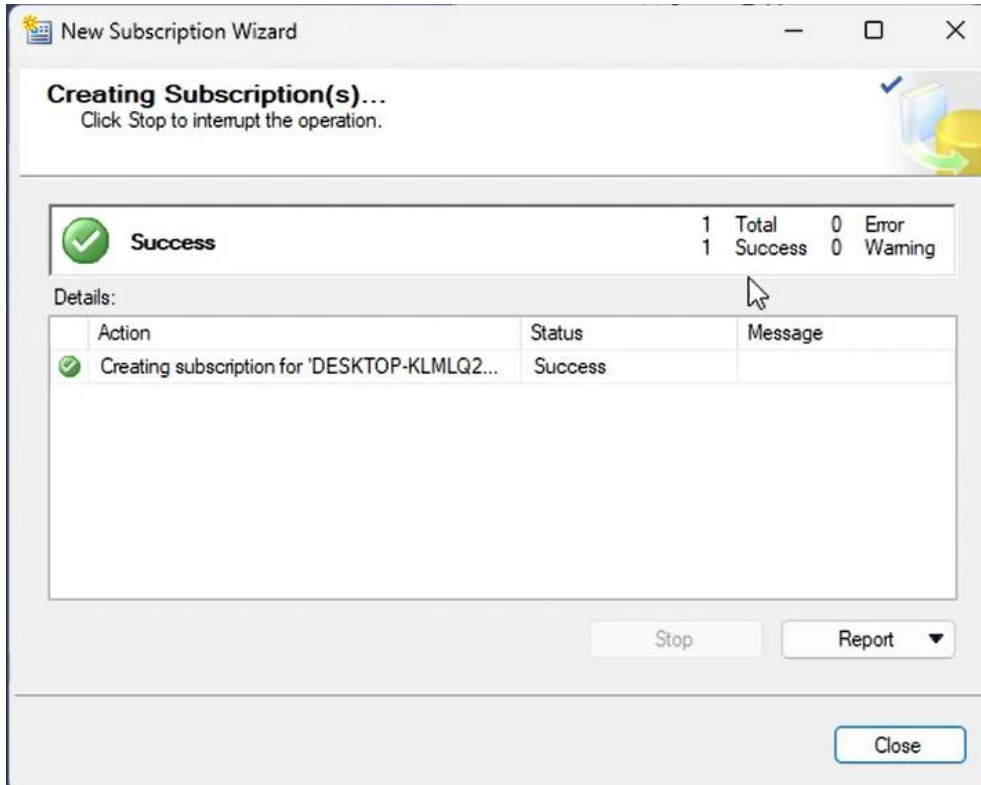
Verilerin aktarılacağı subscriber sunucusu ve hedef veritabanı bu adımda belirlenir.



The screenshot shows the 'New Subscription Wizard' window, specifically the 'Distribution Agent Security' step. The title bar reads 'New Subscription Wizard'. The main heading is 'Distribution Agent Security' with the instruction 'Specify the process account and connection options for each Distribution Agent.' Below this, the 'Subscription properties:' section contains a table with three columns: 'Agent for Subscriber', 'Connection to Distributor', and 'Connection to Subscriber'. The first row shows 'DESKTOP-KLMLQ2A\SUBSE...', 'Impersonate \'desktop-klmlq...', and 'Impersonate \'desktop-klmlq2...'. At the bottom, there are buttons for 'Help', '< Back', 'Next >', 'Finish >>|', and 'Cancel'.

| Agent for Subscriber | Connection to Distributor | Connection to Subscriber |
|--------------------------|--------------------------------|---------------------------------|
| DESKTOP-KLMLQ2A\SUBSE... | Impersonate \'desktop-klmlq... | Impersonate \'desktop-klmlq2... |

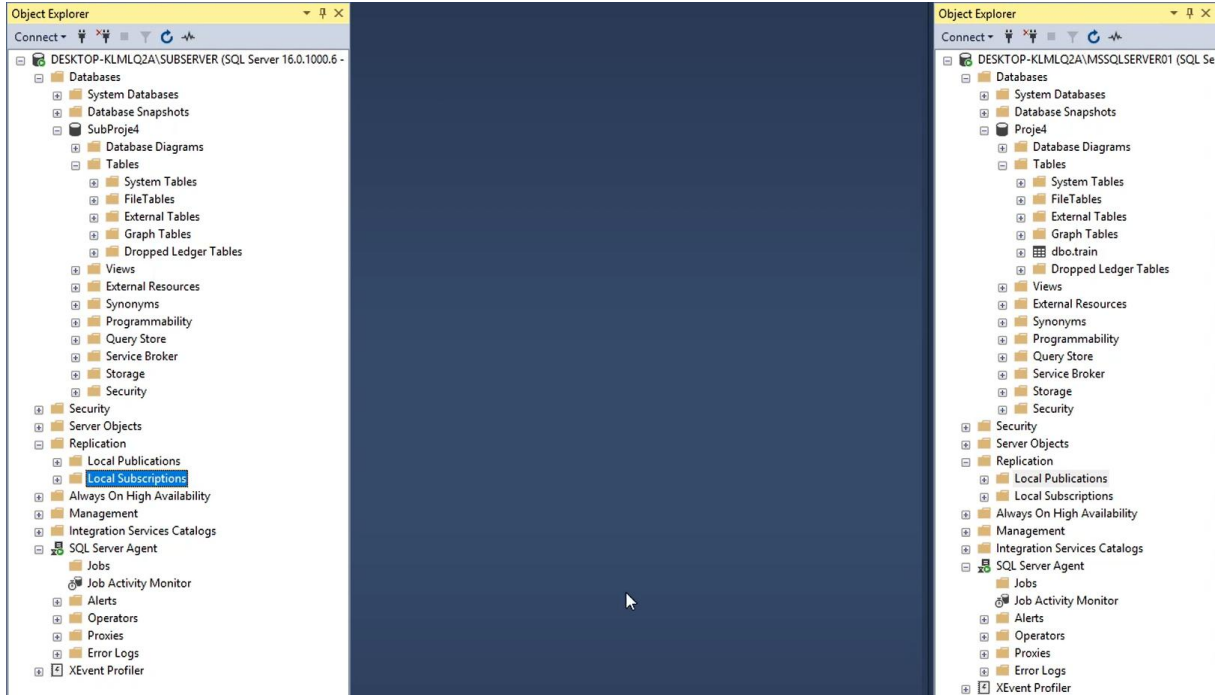
Subscription oluşturulurken, dağıtımı gerçekleştirecek Distribution Agent'ın çalışacağı hesap ve bu agent'ın hem distribution veritabanına hem de subscriber sunucusuna hangi kimlik bilgileriyle bağlanacağı yapılandırıldı.



The screenshot shows the 'New Subscription Wizard' window, specifically the 'Creating Subscription(s)...' step. The title bar reads 'New Subscription Wizard'. The main heading is 'Creating Subscription(s)...' with the instruction 'Click Stop to interrupt the operation.' Below this, there is a summary table showing '1 Total' and '0 Error'. A 'Details:' section contains a table with three columns: 'Action', 'Status', and 'Message'. The first row shows 'Creating subscription for \'DESKTOP-KLMLQ2...' with a 'Success' status. At the bottom, there are buttons for 'Stop', 'Report', and 'Close'.

| Action | Status | Message |
|---|---------|---------|
| Creating subscription for \'DESKTOP-KLMLQ2... | Success | |

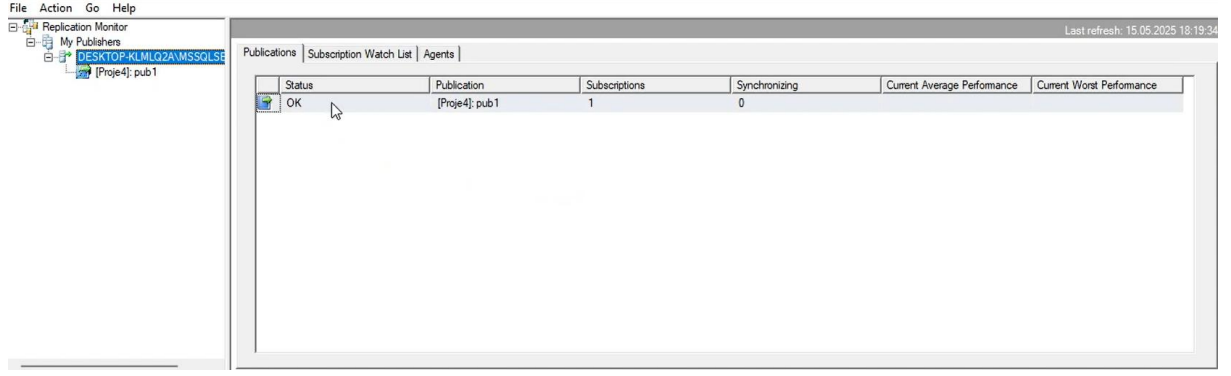
Subscription başarıyla oluşturulmuştur.



Replikasyon işlemleri başlamadan önceki durum gösterilmektedir. Sağdaki veritabanı (kopyalanan) dolu ve tüm veriler mevcutken, soldaki veritabanı (kopyalayan) henüz boş ve veri içermemektedir.



Replikasyon işlemi tamamlandıktan sonraki durum gösterilmektedir. Hem kopyalanan veritabanı hem de kopyalayan veritabanı tamamen dolu ve senkronize durumdadır.



Bu görüntü, Replication Monitor arayüzünden alınmıştır ve replikasyonun başarılı bir şekilde çalıştığını göstermektedir.

5. Veri Temizleme ve ETL Süreçleri Tasarımı

```
use etl
SELECT * FROM dirty_cafe_sales
```

| | Transaction_ID | Item | Quantity | Price_Per_Unit | Total_Spent | Payment_Method | Location | Transaction_Date |
|----|----------------|----------|----------|----------------|-------------|----------------|----------|------------------|
| 1 | TXN_1000555 | Tea | 1 | 15 | 15 | Credit Card | In-store | 2023-10-19 |
| 2 | TXN_1001832 | Salad | 2 | 50 | 100 | Cash | Takeaway | NULL |
| 3 | TXN_1002457 | Cookie | 5 | 10 | 50 | Digital Wallet | Takeaway | 2023-09-29 |
| 4 | TXN_1003246 | Juice | 2 | 30 | 60 | NULL | NULL | 2023-02-15 |
| 5 | TXN_1004184 | Smoothie | 1 | 40 | 40 | Credit Card | In-store | 2023-05-18 |
| 6 | TXN_1004563 | Tea | 5 | 15 | 75 | Credit Card | In-store | 2023-10-28 |
| 7 | TXN_1005331 | Coffee | 1 | 20 | 20 | Digital Wallet | Takeaway | 2023-11-04 |
| 8 | TXN_1005377 | Cake | 5 | NULL | 150 | Digital Wallet | Takeaway | 2023-06-03 |
| 9 | TXN_1005472 | Coffee | 4 | 20 | 80 | Credit Card | NULL | 2023-04-21 |
| 10 | TXN_1006942 | Salad | 1 | 50 | 50 | Credit Card | In-store | 2023-11-30 |
| 11 | TXN_1007347 | Salad | 4 | 50 | 200 | Digital Wallet | In-store | 2023-08-28 |
| 12 | TXN_1009421 | Cookie | 4 | 10 | 40 | Cash | Takeaway | 2023-02-21 |
| 13 | TXN_1010950 | Cookie | NULL | 10 | 10 | Digital Wallet | Takeaway | 2023-01-07 |
| 14 | TXN_1011236 | Cake | 1 | 30 | 30 | Cash | In-store | 2023-02-08 |
| 15 | TXN_1012349 | UNKNOWN | 4 | 30 | 120 | Cash | In-store | 2023-07-08 |
| 16 | TXN_1015883 | Cookie | 4 | 10 | 40 | Cash | In-store | 2023-10-16 |
| 17 | TXN_1016246 | Coffee | 1 | 20 | 20 | ERROR | NULL | 2023-01-19 |
| 18 | TXN_1018470 | Juice | 3 | 30 | 90 | NULL | ERROR | 2023-01-14 |
| 19 | TXN_1018880 | Smoothie | 5 | 40 | 200 | Digital Wallet | NULL | 2023-07-15 |

İnternette hazır bir veritabanı alınmıştır.

```
DELETE FROM dirty_cafe_sales
WHERE Transaction_Id IS NULL OR
  LOWER(Transaction_Id) = 'unknown' OR
  LOWER(Transaction_Id) = 'error';
```

```
DELETE FROM dirty_cafe_sales
WHERE Item IS NULL OR
  LOWER(Item) = 'unknown' OR
  LOWER(Item) = 'error';
```

```
Messages

(0 rows affected)

Completion time: 2025-05-07T16:13:08.9291070+03:00
```

(969 rows affected)

Completion time: 2025-05-07T16:13:12.8879413+03:00

```
SELECT * FROM dirty_cafe_sales WHERE Transaction_Id IS NULL OR  
LOWER(Transaction_Id) = 'unknown' OR  
LOWER(Transaction_Id) = 'error';
```

```
SELECT * FROM dirty_cafe_sales WHERE Item IS NULL OR  
LOWER(Item) = 'unknown' OR  
LOWER(Item) = 'error';
```

| Results | | Messages | | | | | |
|----------------|------|----------|----------------|-------------|----------------|----------|------------------|
| Transaction_ID | Item | Quantity | Price_Per_Unit | Total_Spent | Payment_Method | Location | Transaction_Date |

Results Messages

| Transaction_ID | Item | Quantity | Price_Per_Unit | Total_Spent | Payment_Method | Location | Transaction_Date |
|----------------|------|----------|----------------|-------------|----------------|----------|------------------|
|----------------|------|----------|----------------|-------------|----------------|----------|------------------|

Transaction_Id ve Item değeri NULL, unknown, error değeri bulunan satırlar silinmiş ve kontrolleri yapılmıştır.

```
UPDATE dirty_cafe_sales  
SET Payment_Method = 'UNKNOWN'  
WHERE Payment_Method IS NULL OR  
LOWER(Payment_Method) = 'unknown' OR  
LOWER(Payment_Method) = 'error';
```

(2877 rows affected)

Completion time: 2025-05-07T16:13:23.7924123+03:00

```
UPDATE dirty_cafe_sales  
SET Payment_Method = UPPER(Payment_Method)
```




Messages

(9031 rows affected)

Completion time: 2025-05-07T16:13:28.3048985+03:00

```
UPDATE dirty_cafe_sales
SET Location = 'UNKNOWN'
WHERE Location IS NULL OR
  LOWER(Location) = 'unknown' OR
  LOWER(Location) = 'error';
```



Messages

(3583 rows affected)

Completion time: 2025-05-07T16:13:31.9524971+03:00

Payment_Method ve Location sütunu için boş ve hatalı sonuçlar UNKNOWN olarak değiştirilmiş ve belirli bir standartta olması için sütun içindeki bütün değerler büyük harfle yazılmıştır.

| | Transaction_ID | Item | Quantity | Price_Per_Unit | Total_Spent | Payment_Method | Location | Transaction_Date |
|----|----------------|----------|----------|----------------|-------------|----------------|----------|------------------|
| 1 | TXN_1000555 | Tea | 1 | 15 | 15 | CREDIT CARD | UNKNOWN | 2023-10-19 |
| 2 | TXN_1001832 | Salad | 2 | 50 | 100 | CASH | UNKNOWN | NULL |
| 3 | TXN_1002457 | Cookie | 5 | 10 | 50 | DIGITAL WALLET | UNKNOWN | 2023-09-29 |
| 4 | TXN_1003246 | Juice | 2 | 30 | 60 | UNKNOWN | UNKNOWN | 2023-02-15 |
| 5 | TXN_1004184 | Smoothie | 1 | 40 | 40 | CREDIT CARD | UNKNOWN | 2023-05-18 |
| 6 | TXN_1004563 | Tea | 5 | 15 | 75 | CREDIT CARD | UNKNOWN | 2023-10-28 |
| 7 | TXN_1005331 | Coffee | 1 | 20 | 20 | DIGITAL WALLET | UNKNOWN | 2023-11-04 |
| 8 | TXN_1005377 | Cake | 5 | NULL | 150 | DIGITAL WALLET | UNKNOWN | 2023-06-03 |
| 9 | TXN_1005472 | Coffee | 4 | 20 | 80 | CREDIT CARD | UNKNOWN | 2023-04-21 |
| 10 | TXN_1006942 | Salad | 1 | 50 | 50 | CREDIT CARD | UNKNOWN | 2023-11-30 |
| 11 | TXN_1007347 | Salad | 4 | 50 | 200 | DIGITAL WALLET | UNKNOWN | 2023-08-28 |
| 12 | TXN_1009421 | Cookie | 4 | 10 | 40 | CASH | UNKNOWN | 2023-02-21 |
| 13 | TXN_1010950 | Cookie | NULL | 10 | 10 | DIGITAL WALLET | UNKNOWN | 2023-01-07 |
| 14 | TXN_1011236 | Cake | 1 | 30 | 30 | CASH | UNKNOWN | 2023-02-08 |
| 15 | TXN_1015883 | Cookie | 4 | 10 | 40 | CASH | UNKNOWN | 2023-10-16 |
| 16 | TXN_1016246 | Coffee | 1 | 20 | 20 | UNKNOWN | UNKNOWN | 2023-01-19 |
| 17 | TXN_1018470 | Juice | 3 | 30 | 90 | UNKNOWN | UNKNOWN | 2023-01-14 |
| 18 | TXN_1018880 | Smoothie | 5 | 40 | 200 | DIGITAL WALLET | UNKNOWN | 2023-07-15 |
| 19 | TXN_1020478 | Coffee | 1 | 20 | 20 | DIGITAL WALLET | UNKNOWN | 2023-03-09 |

Tablonun son durumu yukarıdaki gibidir.

```

UPDATE dirty_cafe_sales
SET Total_Spent = Price_Per_Unit * Quantity
WHERE
    (Total_Spent IS NULL OR
    LOWER(Total_Spent) = 'unknown' OR
    LOWER(Total_Spent) = 'error')
AND Price_Per_Unit IS NOT NULL
AND Quantity IS NOT NULL;

```

(415 rows affected)

Completion time: 2025-05-07T16:13:53.6106169+03:00

```

SELECT * FROM dirty_cafe_sales WHERE Total_Spent IS NULL OR
    LOWER(Total_Spent) = 'unknown' OR
    LOWER(Total_Spent) = 'error';

```

| | Transaction_ID | Item | Quantity | Price_Per_Unit | Total_Spent | Payment_Method | Location | Transaction_Date |
|----|----------------|----------|----------|----------------|-------------|----------------|----------|------------------|
| 1 | TXN_1259340 | Tea | 3 | NULL | NULL | DİGİTAL WALLET | UNKNOWN | 2023-02-24 |
| 2 | TXN_1525583 | Sandwich | 3 | NULL | NULL | CASH | UNKNOWN | 2023-05-20 |
| 3 | TXN_1547245 | Sandwich | NULL | 40 | NULL | UNKNOWN | UNKNOWN | 2023-09-11 |
| 4 | TXN_1975184 | Coffee | NULL | 20 | NULL | DİGİTAL WALLET | UNKNOWN | 2023-01-15 |
| 5 | TXN_2023651 | Sandwich | NULL | 40 | NULL | CASH | UNKNOWN | 2023-05-25 |
| 6 | TXN_2253622 | Sandwich | 5 | NULL | NULL | DİGİTAL WALLET | UNKNOWN | 2023-09-30 |
| 7 | TXN_2428781 | Salad | NULL | 50 | NULL | UNKNOWN | UNKNOWN | 2023-05-09 |
| 8 | TXN_2546684 | Juice | NULL | 30 | NULL | DİGİTAL WALLET | UNKNOWN | 2023-04-08 |
| 9 | TXN_2857444 | Smoothie | 1 | NULL | NULL | CASH | UNKNOWN | 2023-05-10 |
| 10 | TXN_2962976 | Juice | NULL | 30 | NULL | UNKNOWN | UNKNOWN | 2023-03-17 |
| 11 | TXN_3229409 | Juice | NULL | 30 | NULL | CASH | UNKNOWN | 2023-04-15 |
| 12 | TXN_3251829 | Tea | NULL | 15 | NULL | DİGİTAL WALLET | UNKNOWN | 2023-07-25 |
| 13 | TXN_3577949 | Cake | 3 | NULL | NULL | UNKNOWN | UNKNOWN | 2023-04-25 |
| 14 | TXN_3705445 | Cookie | 5 | NULL | NULL | CASH | UNKNOWN | 2023-09-13 |
| 15 | TXN_3809533 | Juice | 2 | NULL | NULL | DİGİTAL WALLET | UNKNOWN | 2023-02-02 |
| 16 | TXN_4550558 | Cookie | NULL | 10 | NULL | CREDIT CARD | UNKNOWN | 2023-08-04 |
| 17 | TXN_4565754 | Smoothie | NULL | 40 | NULL | DİGİTAL WALLET | UNKNOWN | 2023-10-06 |
| 18 | TXN_4628338 | Coffee | NULL | 20 | NULL | CASH | UNKNOWN | 2023-12-25 |
| 19 | TXN_4987129 | Sandwich | 3 | NULL | NULL | UNKNOWN | UNKNOWN | 2023-10-20 |

Total_Spent sütunundaki bilinmeyen ve hatalı değerler, Price_Per_Unit ve Quantity sütunlarındaki değerler yardımıyla dolduruldu.

İki değerden en az birisi bilinmiyor ise Total_Spend sütunu doldurulamadı.

```

UPDATE dirty_cafe_sales
SET Quantity = Total_Spent / Price_Per_Unit
WHERE
    (Quantity IS NULL OR
    LOWER(Quantity) = 'unknown' OR
    LOWER(Quantity) = 'error')
AND Total_Spent IS NOT NULL
AND Price_Per_Unit IS NOT NULL;

SELECT * FROM dirty_cafe_sales WHERE Quantity IS NULL OR
    LOWER(Quantity) = 'unknown' OR
    LOWER(Quantity) = 'error';

```

| Messages | | | | | | | | |
|----------|----------------|----------|----------|----------------|-------------|----------------|----------|------------------|
| | Transaction_ID | Item | Quantity | Price_Per_Unit | Total_Spent | Payment_Method | Location | Transaction_Date |
| 1 | TXN_1547245 | Sandwich | NULL | 40 | NULL | UNKNOWN | UNKNOWN | 2023-09-11 |
| 2 | TXN_1575608 | Sandwich | NULL | NULL | 200 | UNKNOWN | UNKNOWN | 2023-01-05 |
| 3 | TXN_1975184 | Coffee | NULL | 20 | NULL | DIGITAL WALLET | UNKNOWN | 2023-01-15 |
| 4 | TXN_2023651 | Sandwich | NULL | 40 | NULL | CASH | UNKNOWN | 2023-05-25 |
| 5 | TXN_2428781 | Salad | NULL | 50 | NULL | UNKNOWN | UNKNOWN | 2023-05-09 |
| 6 | TXN_2546684 | Juice | NULL | 30 | NULL | DIGITAL WALLET | UNKNOWN | 2023-04-08 |
| 7 | TXN_2962976 | Juice | NULL | 30 | NULL | UNKNOWN | UNKNOWN | 2023-03-17 |
| 8 | TXN_3071092 | Coffee | NULL | NULL | 40 | UNKNOWN | UNKNOWN | 2023-09-08 |
| 9 | TXN_3229409 | Juice | NULL | 30 | NULL | CASH | UNKNOWN | 2023-04-15 |
| 10 | TXN_3251829 | Tea | NULL | 15 | NULL | DIGITAL WALLET | UNKNOWN | 2023-07-25 |
| 11 | TXN_3593060 | Smoothie | NULL | NULL | 160 | CASH | UNKNOWN | 2023-03-05 |
| 12 | TXN_3849488 | Salad | NULL | NULL | 50 | UNKNOWN | UNKNOWN | 2023-03-01 |
| 13 | TXN_4550558 | Cookie | NULL | 10 | NULL | CREDIT CARD | UNKNOWN | 2023-08-04 |
| 14 | TXN_4565754 | Smoothie | NULL | 40 | NULL | DIGITAL WALLET | UNKNOWN | 2023-10-06 |
| 15 | TXN_4628338 | Coffee | NULL | 20 | NULL | CASH | UNKNOWN | 2023-12-25 |
| 16 | TXN_5308047 | Cookie | NULL | NULL | 10 | CREDIT CARD | UNKNOWN | 2023-10-28 |
| 17 | TXN_5744797 | Cake | NULL | NULL | 30 | CASH | UNKNOWN | 2023-12-20 |
| 18 | TXN_5884081 | Cookie | NULL | 10 | NULL | DIGITAL WALLET | UNKNOWN | 2023-07-05 |
| 19 | TXN_6177081 | Cookie | NULL | NULL | 10 | CASH | UNKNOWN | 2023-07-26 |


```

UPDATE dirty_cafe_sales
SET Price_Per_Unit = Total_Spent / Quantity
WHERE
  (Price_Per_Unit IS NULL OR
  LOWER(Price_Per_Unit) = 'unknown' OR
  LOWER(Price_Per_Unit) = 'error')
AND Total_Spent IS NOT NULL
AND Quantity IS NOT NULL;

SELECT * FROM dirty_cafe_sales WHERE Price_Per_Unit IS NULL OR
  LOWER(Price_Per_Unit) = 'unknown' OR
  LOWER(Price_Per_Unit) = 'error';

```

| Messages | | | | | | | | |
|----------|----------------|----------|----------|----------------|-------------|----------------|----------|------------------|
| | Transaction_ID | Item | Quantity | Price_Per_Unit | Total_Spent | Payment_Method | Location | Transaction_Date |
| 1 | TXN_1259340 | Tea | 3 | NULL | NULL | DIGITAL WALLET | UNKNOWN | 2023-02-24 |
| 2 | TXN_1525583 | Sandwich | 3 | NULL | NULL | CASH | UNKNOWN | 2023-05-20 |
| 3 | TXN_1575608 | Sandwich | NULL | NULL | 200 | UNKNOWN | UNKNOWN | 2023-01-05 |
| 4 | TXN_2253622 | Sandwich | 5 | NULL | NULL | DIGITAL WALLET | UNKNOWN | 2023-09-30 |
| 5 | TXN_2857444 | Smoothie | 1 | NULL | NULL | CASH | UNKNOWN | 2023-05-10 |
| 6 | TXN_3071092 | Coffee | NULL | NULL | 40 | UNKNOWN | UNKNOWN | 2023-09-08 |
| 7 | TXN_3577949 | Cake | 3 | NULL | NULL | UNKNOWN | UNKNOWN | 2023-04-25 |
| 8 | TXN_3593060 | Smoothie | NULL | NULL | 160 | CASH | UNKNOWN | 2023-03-05 |
| 9 | TXN_3705445 | Cookie | 5 | NULL | NULL | CASH | UNKNOWN | 2023-09-13 |
| 10 | TXN_3809533 | Juice | 2 | NULL | NULL | DIGITAL WALLET | UNKNOWN | 2023-02-02 |
| 11 | TXN_3849488 | Salad | NULL | NULL | 50 | UNKNOWN | UNKNOWN | 2023-03-01 |
| 12 | TXN_4987129 | Sandwich | 3 | NULL | NULL | UNKNOWN | UNKNOWN | 2023-10-20 |
| 13 | TXN_5118799 | Cookie | 2 | NULL | NULL | CASH | UNKNOWN | 2023-04-23 |
| 14 | TXN_5308047 | Cookie | NULL | NULL | 10 | CREDIT CARD | UNKNOWN | 2023-10-28 |
| 15 | TXN_5744797 | Cake | NULL | NULL | 30 | CASH | UNKNOWN | 2023-12-20 |
| 16 | TXN_6105807 | Smoothie | 3 | NULL | NULL | CREDIT CARD | UNKNOWN | 2023-01-18 |
| 17 | TXN_6177081 | Cookie | NULL | NULL | 10 | CASH | UNKNOWN | 2023-07-26 |
| 18 | TXN_6206792 | Tea | NULL | NULL | 60 | CREDIT CARD | UNKNOWN | 2023-10-13 |
| 19 | TXN_6424202 | Cookie | 2 | NULL | NULL | CREDIT CARD | UNKNOWN | 2023-11-20 |

Aynı şekilde Quantity ve Price_Per_Unit sütunundaki boş ve hatalı değerler de dolduruldu.

```

DELETE FROM dirty_cafe_sales
WHERE
    Quantity < 0 OR
    Price Per Unit < 0 OR
    Total Spent < 0;

SELECT * FROM dirty_cafe_sales WHERE Quantity < 0 OR
    Price Per Unit < 0 OR
    Total Spent < 0;

```

| Transaction_ID | Item | Quantity | Price_Per_Unit | Total_Spent | Payment_Method | Location | Transaction_Date |
|----------------|------|----------|----------------|-------------|----------------|----------|------------------|
|----------------|------|----------|----------------|-------------|----------------|----------|------------------|

Quantity, Price_Per_Unit, Total_Spent değerlerinde hatalı olacak negatif sayı kontrolü yapılmıştır.

```

SELECT *
INTO CleanCafeSales
FROM dirty_cafe_sales;

```

```

SELECT * FROM CleanCafeSales

```

| Results | Messages | Transaction_ID | Item | Quantity | Price_Per_Unit | Total_Spent | Payment_Method | Location | Transaction_Date |
|---------|----------|----------------|----------|----------|----------------|-------------|----------------|----------|------------------|
| 1 | | TXN_1000555 | Tea | 1 | 15 | 15 | CREDIT CARD | UNKNOWN | 2023-10-19 |
| 2 | | TXN_1001832 | Salad | 2 | 50 | 100 | CASH | UNKNOWN | NULL |
| 3 | | TXN_1002457 | Cookie | 5 | 10 | 50 | DIGITAL WALLET | UNKNOWN | 2023-09-29 |
| 4 | | TXN_1003246 | Juice | 2 | 30 | 60 | UNKNOWN | UNKNOWN | 2023-02-15 |
| 5 | | TXN_1004184 | Smoothie | 1 | 40 | 40 | CREDIT CARD | UNKNOWN | 2023-05-18 |
| 6 | | TXN_1004563 | Tea | 5 | 15 | 75 | CREDIT CARD | UNKNOWN | 2023-10-28 |
| 7 | | TXN_1005331 | Coffee | 1 | 20 | 20 | DIGITAL WALLET | UNKNOWN | 2023-11-04 |
| 8 | | TXN_1005377 | Cake | 5 | 30 | 150 | DIGITAL WALLET | UNKNOWN | 2023-06-03 |
| 9 | | TXN_1005472 | Coffee | 4 | 20 | 80 | CREDIT CARD | UNKNOWN | 2023-04-21 |
| 10 | | TXN_1006942 | Salad | 1 | 50 | 50 | CREDIT CARD | UNKNOWN | 2023-11-30 |
| 11 | | TXN_1007347 | Salad | 4 | 50 | 200 | DIGITAL WALLET | UNKNOWN | 2023-08-28 |
| 12 | | TXN_1009421 | Cookie | 4 | 10 | 40 | CASH | UNKNOWN | 2023-02-21 |
| 13 | | TXN_1010950 | Cookie | 1 | 10 | 10 | DIGITAL WALLET | UNKNOWN | 2023-01-07 |
| 14 | | TXN_1011236 | Cake | 1 | 30 | 30 | CASH | UNKNOWN | 2023-02-08 |
| 15 | | TXN_1015883 | Cookie | 4 | 10 | 40 | CASH | UNKNOWN | 2023-10-16 |
| 16 | | TXN_1016246 | Coffee | 1 | 20 | 20 | UNKNOWN | UNKNOWN | 2023-01-19 |
| 17 | | TXN_1018470 | Juice | 3 | 30 | 90 | UNKNOWN | UNKNOWN | 2023-01-14 |
| 18 | | TXN_1018880 | Smoothie | 5 | 40 | 200 | DIGITAL WALLET | UNKNOWN | 2023-07-15 |
| 19 | | TXN_1020478 | Coffee | 1 | 20 | 20 | DIGITAL WALLET | UNKNOWN | 2023-03-09 |

Temizlenmiş standartlaştırılmış ve dönüştürülmüş veriler temiz bir veri tabanına kopyalanmıştır.

```

SELECT
    COUNT(*) AS ToplamKayit,
    SUM(CASE WHEN Item IS NULL OR LOWER(Item) IN ('unknown', 'error') THEN 1 ELSE 0 END) AS HatalıItem,
    SUM(CASE WHEN Quantity IS NULL OR Quantity < 0 THEN 1 ELSE 0 END) AS HatalıQuantity,
    SUM(CASE WHEN Price Per Unit IS NULL OR Price Per Unit < 0 THEN 1 ELSE 0 END) AS HatalıPrice,
    SUM(CASE WHEN Total Spent IS NULL OR Total Spent < 0 THEN 1 ELSE 0 END) AS HatalıTotalSpent
FROM CleanCafeSales;

```

100 % ▾

Results

Messages

| | ToplamKayit | HatalıItem | HatalıQuantity | HatalıPrice | HatalıTotalSpent |
|---|-------------|------------|----------------|-------------|------------------|
| 1 | 9031 | 0 | 35 | 32 | 37 |

Yapılan temizleme, standartlaştırma ve dönüştürme işlemlerine dair bir rapor oluşturulmuştur.

6. Veritabanı Yükseltme ve Sürüm Yönetimi

```
USE Proje6  
BACKUP DATABASE Proje6 TO DISK = 'C:\Yedekler\Proje6_PreUpgrade.bak';
```

```
Messages  
Processed 1080 pages for database 'Proje6', file 'Proje6' on file 1.  
Processed 2 pages for database 'Proje6', file 'Proje6_log' on file 1.  
BACKUP DATABASE successfully processed 1082 pages in 0.023 seconds (367.357 MB/sec).  
  
Completion time: 2025-05-14T14:23:04.0085104+03:00
```

Veritabanı yükseltme işlemi öncesi olası sorunlardan dolayı veritabanı yedeği alınır.

```
CREATE TABLE SchemaChangesLog (  
    ChangeID INT IDENTITY(1,1),  
    ChangedBy NVARCHAR(100),  
    EventType NVARCHAR(50),  
    ObjectName NVARCHAR(200),  
    ChangeDate DATETIME DEFAULT GETDATE()  
);  
  
CREATE TRIGGER trg_SchemaChanges  
ON DATABASE  
FOR CREATE_TABLE, ALTER_TABLE, DROP_TABLE  
AS  
BEGIN  
    DECLARE @eventData XML = EVENTDATA();  
    INSERT INTO SchemaChangesLog (ChangedBy, EventType, ObjectName)  
    VALUES (  
        SYSTEM_USER,  
        @eventData.value('(/EVENT_INSTANCE/EventType)[1]', 'NVARCHAR(50)'),  
        @eventData.value('(/EVENT_INSTANCE/ObjectName)[1]', 'NVARCHAR(200)')  
    );  
END;
```

Veritabanı üzerinde yapılacak geliştirmede ve değişiklikleri takip edebilmek için DDL Trigger tanımlıyoruz.

```
ALTER TABLE train ADD Email NVARCHAR(100);  
  
SELECT * FROM SchemaChangesLog;
```



```
DELETE FROM train
WHERE Row_ID = (SELECT MAX(Row_ID) FROM train);
```

| Messages | | | | | | | |
|----------|--------|----------------|------------|------------|----------------|-------------|---------|
| | Row_ID | Order_ID | Order_Date | Ship_Date | Ship_Mode | Customer_ID | Custom |
| 1 | 9800 | CA-2016-128608 | 2016-01-12 | 2016-01-17 | Standard Class | CS-12490 | Cindy ! |
| 2 | 9799 | CA-2016-128608 | 2016-01-12 | 2016-01-17 | Standard Class | CS-12490 | Cindy ! |
| 3 | 9798 | CA-2016-128608 | 2016-01-12 | 2016-01-17 | Standard Class | CS-12490 | Cindy ! |
| 4 | 9797 | CA-2016-128608 | 2016-01-12 | 2016-01-17 | Standard Class | CS-12490 | Cindy ! |
| 5 | 9796 | CA-2017-125920 | 2017-05-21 | 2017-05-28 | Standard Class | SH-19975 | Sally H |

Veritabanı yükseltme işlemlerinden sonra CRUD(Create, Read, Update, Delete) işlemleri test ediliyor.

```
USE master;
ALTER DATABASE Proje6 SET SINGLE_USER WITH ROLLBACK IMMEDIATE;

RESTORE DATABASE Proje6
FROM DISK = 'C:\Yedekler\Proje6_PreUpgrade.bak'
WITH REPLACE;

ALTER DATABASE Proje6 SET MULTI_USER;
```

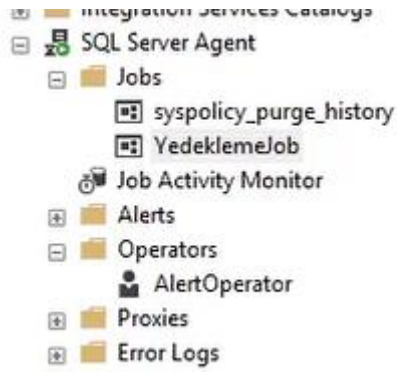
100 %

Messages

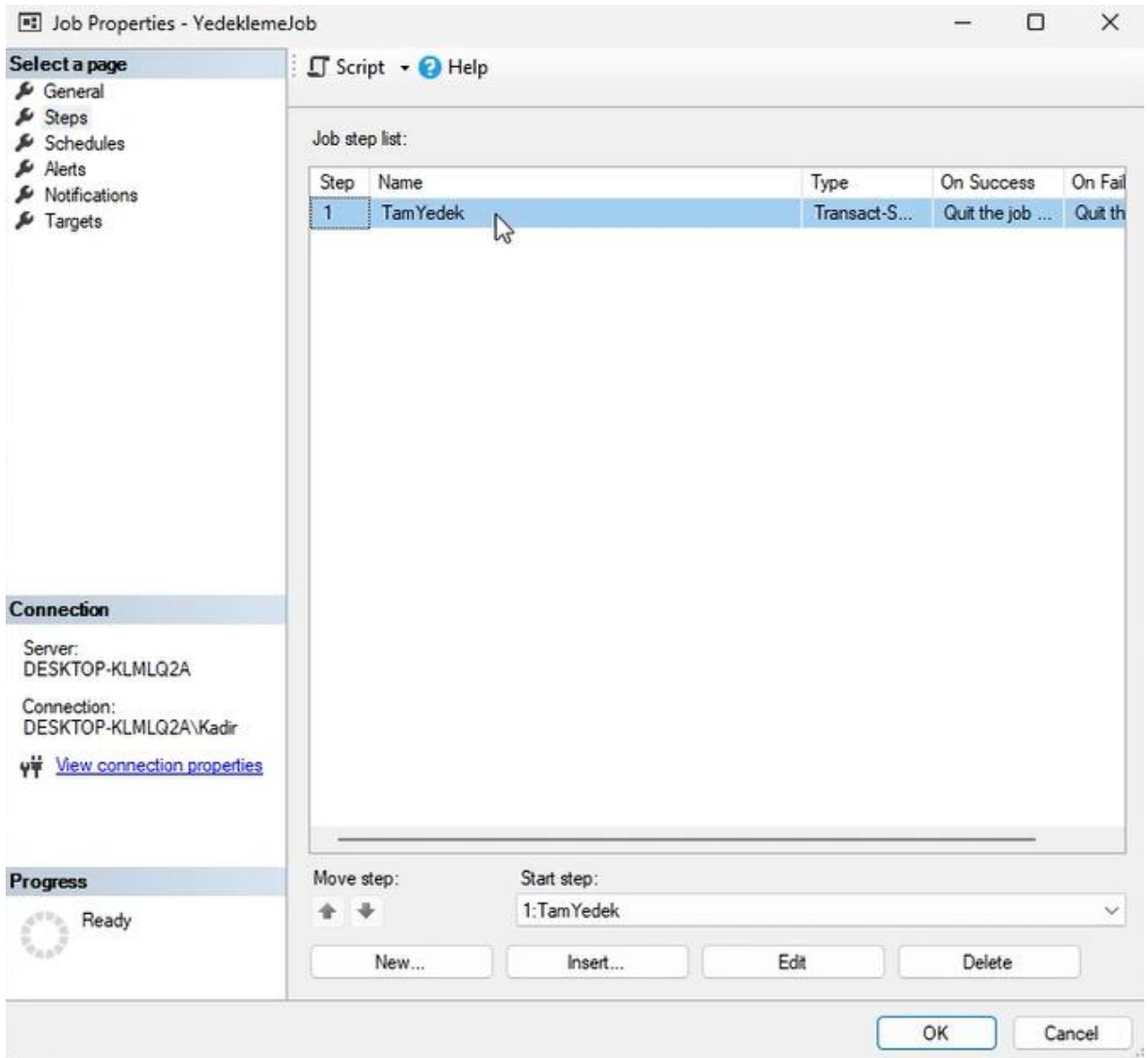
Processed 1080 pages for database 'Proje6', file 'Proje6' on file 1.
 Processed 2 pages for database 'Proje6', file 'Proje6_log' on file 1.
 RESTORE DATABASE successfully processed 1082 pages in 0.055 seconds (153.622 MB/sec).
 Completion time: 2025-05-14T14:24:10.4079866+03:00

Alınabilecek bir sorun için geri dönüş (rollback) işlemi simüle ediliyor.

7. Veritabanı Yedekleme ve Otomasyon Çalışması



SQL Server Agent altında "YedeklemeJob" adlı bir iş oluşturularak yedekleme süreci tanımlandı.



"YedeklemeJob" işi içerisinde "TamYedek" adında bir adım oluşturularak işlem detaylandırıldı.

Job Step Properties - TamYedek

Select a page

- General
- Advanced

Script Help

Step name: TamYedek

Type: Transact-SQL script (T-SQL)

Run as:

Database: Proje7

Command:

```
BACKUP DATABASE Proje7  
TO DISK = 'C:\Yedekler\Proje7_TamYedek.bak'  
WITH FORMAT, INIT, NAME = 'Tam Veritabanı Yedegi'
```

Open... Select All Copy Paste Parse

Connection

Server: DESKTOP-KLMLQ2A

Connection: DESKTOP-KLMLQ2A\Kadir

[View connection properties](#)

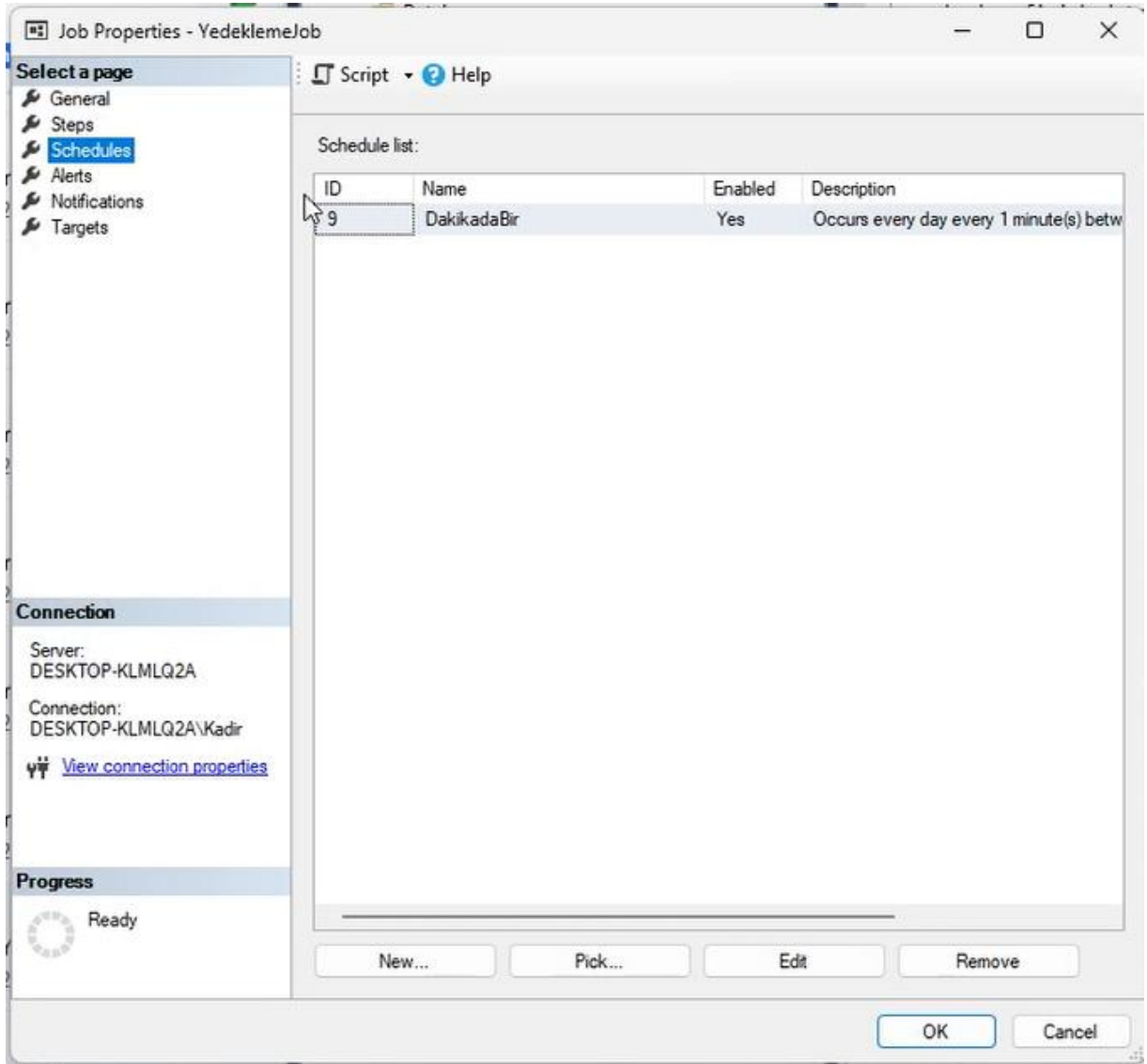
Progress

Ready

Previous Next

OK Cancel

"TamYedek" adımımda Proje7 veritabanının belirli bir dizine yedeklenmesi için T-SQL komutu tanımlandı.



"DakikadaBir" adlı zamanlama tanımlanarak yedekleme işinin her dakika çalışması sağlandı.

Job Schedule Properties - DakikadaBir

Name:

Schedule type: ☒ Enabled

One-time occurrence

Date: Time:

Frequency

Occurs:

Recurs every: day(s)

Daily frequency

☐ Occurs once at:

☒ Occurs every: minute(s) Starting at:

Ending at:

Duration

Start date: ☒ End date:

☐ No end date:

Summary

Description:

Zamanlama detayları girilerek işin her gün 1 dakikada bir kez çalışması ayarlandı.

Proje7.sql - localh...KLMLQ2A\Kadir (65))

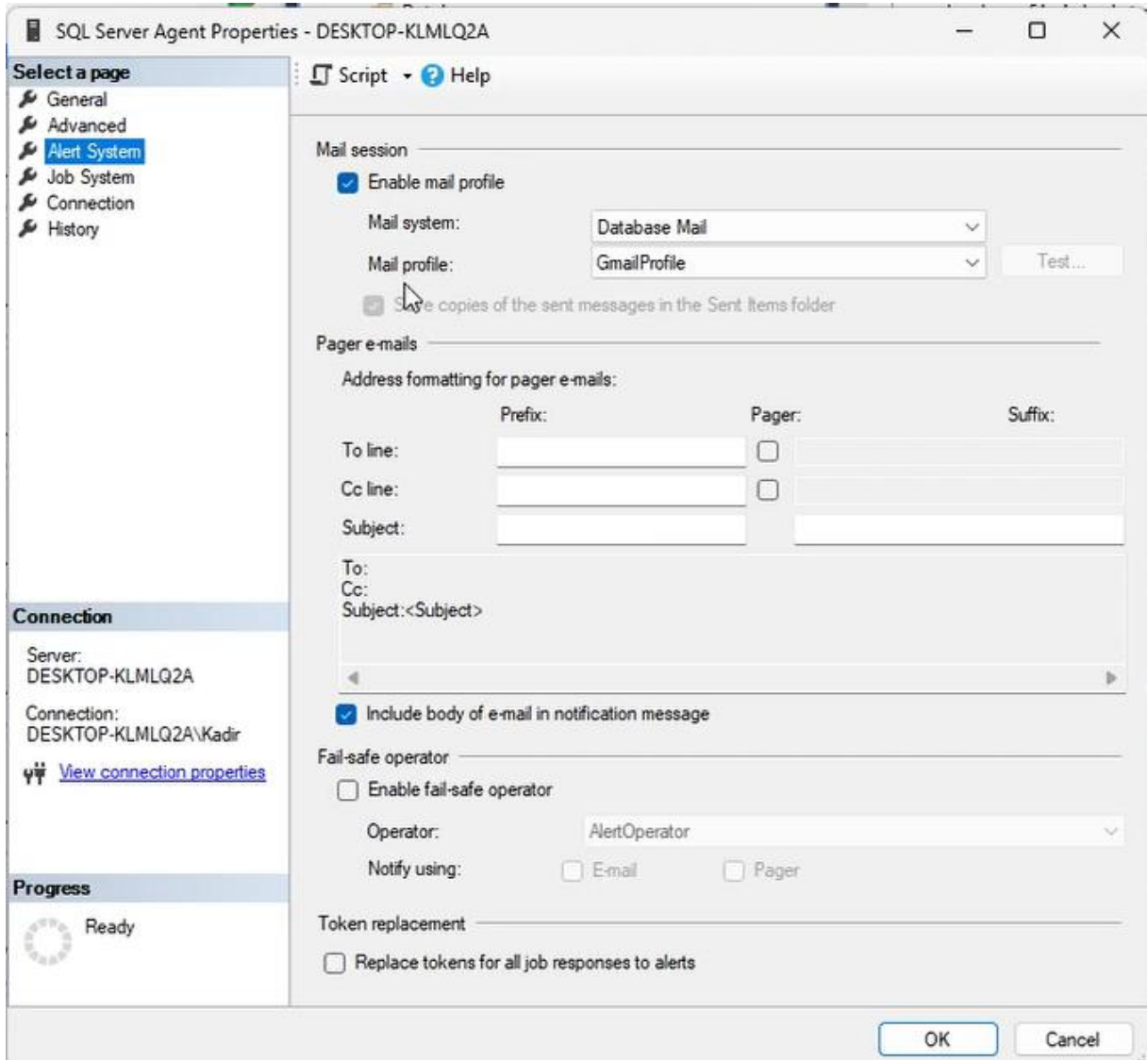
```
SELECT
    database_name,
    backup_start_date,
    backup_finish_date,
    backup_size/1024/1024 AS backup_size_MB,
    physical_device_name
FROM msdb.dbo.backupset bs
JOIN msdb.dbo.backupmediafamily bmf ON bs.media_set_id = bmf.media_set_id
WHERE backup_start_date > DATEADD(day, -7, GETDATE())
ORDER BY backup_start_date DESC;
```

100 %

Results Messages

| | database_name | backup_start_date | backup_finish_date | backup_size_MB | physical_device_name |
|----|---------------|-------------------------|-------------------------|----------------|---------------------------------|
| 1 | Proje7 | 2025-04-23 19:21:00.000 | 2025-04-23 19:21:00.000 | 3.33593750000 | C:\Yedekler\Proje7_TamYedek.bak |
| 2 | Proje7 | 2025-04-23 19:20:01.000 | 2025-04-23 19:20:01.000 | 3.33593750000 | C:\Yedekler\Proje7_TamYedek.bak |
| 3 | Proje7 | 2025-04-23 19:19:00.000 | 2025-04-23 19:19:00.000 | 3.33593750000 | C:\Yedekler\Proje7_TamYedek.bak |
| 4 | Proje7 | 2025-04-23 19:18:01.000 | 2025-04-23 19:18:01.000 | 3.33593750000 | C:\Yedekler\Proje7_TamYedek.bak |
| 5 | Proje7 | 2025-04-23 19:17:00.000 | 2025-04-23 19:17:00.000 | 3.33593750000 | C:\Yedekler\Proje7_TamYedek.bak |
| 6 | Proje7 | 2025-04-23 19:16:00.000 | 2025-04-23 19:16:00.000 | 3.33593750000 | C:\Yedekler\Proje7_TamYedek.bak |
| 7 | Proje7 | 2025-04-23 19:15:47.000 | 2025-04-23 19:15:47.000 | 3.33593750000 | C:\Yedekler\Proje7_TamYedek.bak |
| 8 | Proje7 | 2025-04-23 19:15:23.000 | 2025-04-23 19:15:23.000 | 3.33593750000 | C:\Yedekler\Proje7_TamYedek.bak |
| 9 | Proje7 | 2025-04-23 19:15:01.000 | 2025-04-23 19:15:01.000 | 3.33593750000 | C:\Yedekler\Proje7_TamYedek.bak |
| 10 | Proje7 | 2025-04-23 19:14:00.000 | 2025-04-23 19:14:00.000 | 3.33593750000 | C:\Yedekler\Proje7_TamYedek.bak |
| 11 | Proje7 | 2025-04-23 19:13:28.000 | 2025-04-23 19:13:28.000 | 3.33593750000 | C:\Yedekler\Proje7_TamYedek.bak |
| 12 | Proje7 | 2025-04-23 19:13:00.000 | 2025-04-23 19:13:00.000 | 3.33593750000 | C:\Yedekler\Proje7_TamYedek.bak |
| 13 | Proje7 | 2025-04-23 19:12:01.000 | 2025-04-23 19:12:01.000 | 3.33593750000 | C:\Yedekler\Proje7_TamYedek.bak |
| 14 | Proje7 | 2025-04-23 19:11:01.000 | 2025-04-23 19:11:01.000 | 3.33593750000 | C:\Yedekler\Proje7_TamYedek.bak |
| 15 | Proje7 | 2025-04-23 19:10:00.000 | 2025-04-23 19:10:01.000 | 3.33593750000 | C:\Yedekler\Proje7_TamYedek.bak |
| 16 | Proje7 | 2025-04-23 19:09:00.000 | 2025-04-23 19:09:00.000 | 3.33593750000 | C:\Yedekler\Proje7_TamYedek.bak |
| 17 | Proje7 | 2025-04-23 19:08:00.000 | 2025-04-23 19:08:00.000 | 3.33593750000 | C:\Yedekler\Proje7_TamYedek.bak |
| 18 | Proje7 | 2025-04-23 19:07:00.000 | 2025-04-23 19:07:00.000 | 3.33593750000 | C:\Yedekler\Proje7_TamYedek.bak |

Son 7 güne ait veri tabanı yedeklemeleri sorgulanarak başarılı şekilde alınan yedekler raporlandı.



SQL Server Agent için e-posta bildirimi amacıyla Database Mail sistemi "GmailProfile" profiliyle etkinleştirilmiştir.

AlertOperator Properties

Select a page

- General
- Notifications
- History

Script Help

Name: AlertOperator ☒ Enabled

Notification options

E-mail name: kdr.tasdemir2002@gmail.com

Pager e-mail name:

Pager on duty schedule

| | | |
|------------------------------------|--------------------|------------------|
| <input type="checkbox"/> Monday | | |
| <input type="checkbox"/> Tuesday | | |
| <input type="checkbox"/> Wednesday | | |
| <input type="checkbox"/> Thursday | Workday start time | Workday end time |
| <input type="checkbox"/> Friday | 09:00:00 | 18:00:00 |
| <input type="checkbox"/> Saturday | 09:00:00 | 18:00:00 |
| <input type="checkbox"/> Sunday | 09:00:00 | 18:00:00 |


Connection

Server: DESKTOP-KLMLQ2A

Connection: DESKTOP-KLMLQ2A\Kadir

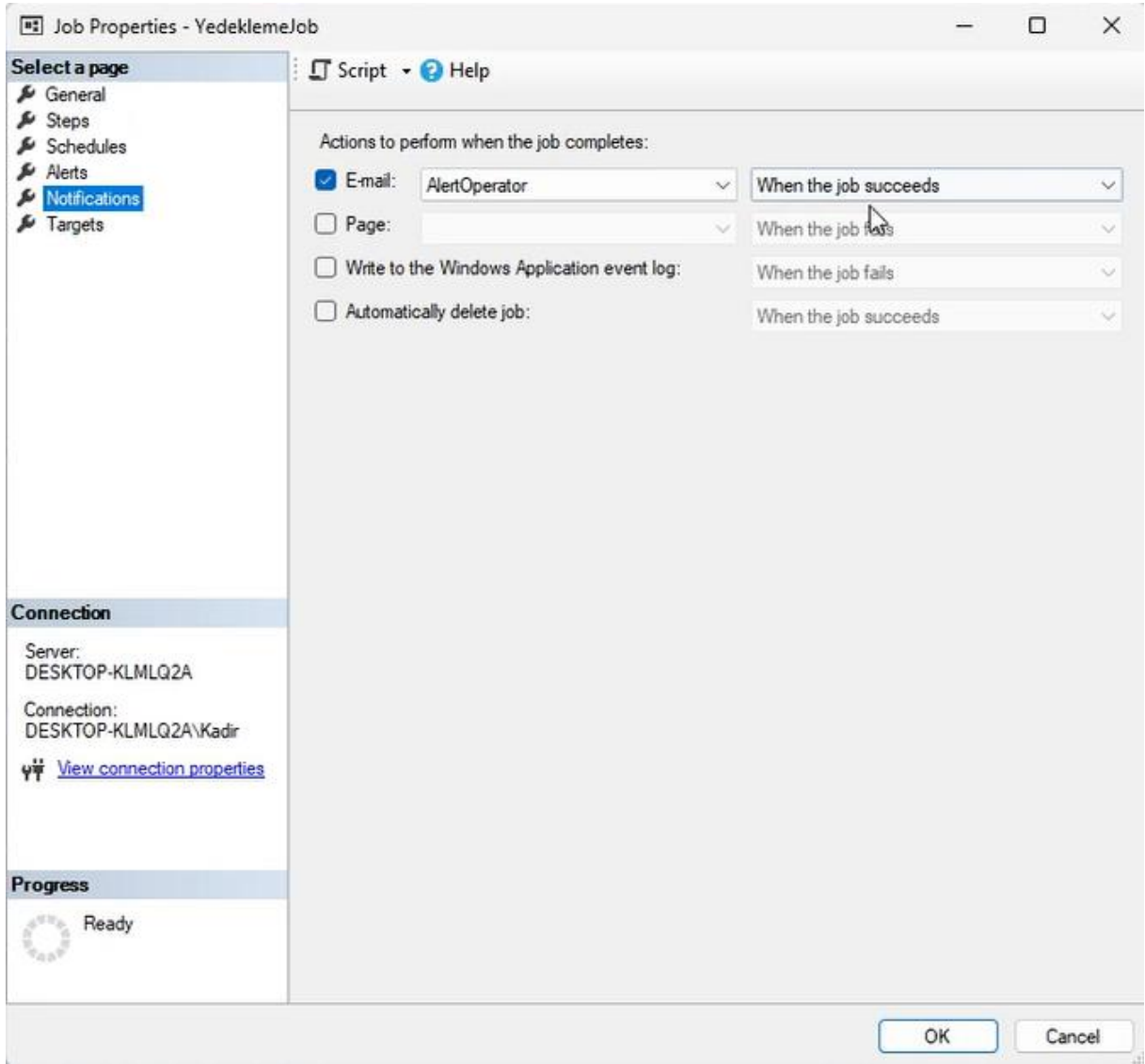
[View connection properties](#)

Progress














 Ready

OK Cancel

"AlertOperator" adlı operatör tanımlanarak bildirimlerin gönderileceği e-posta adresi belirlenmiştir.



"YedeklemeJob" adlı iş başarıyla tamamlandığında "AlertOperator"a e-posta gönderilecek şekilde yapılandırılmıştır.

| | | |
|---|---|--|
| <input type="checkbox"/> |  ben | 19:22 |
| [The job succeeded.] SQL Server Job System: 'Yede... JOB RUN: 'YedeklemeJob' was run on 23.04.2025 at 19:... ☆ | | |
| <input type="checkbox"/> |  ben | 19:21 |
| [The job succeeded.] SQL Server Job System: 'Yede... JOB RUN: 'YedeklemeJob' was run on 23.04.2025 at 19:... ☆ | | |
| <input type="checkbox"/> |  ben | 19:20 |
| [The job succeeded.] SQL Server Job System: 'Yede... JOB RUN: 'YedeklemeJob' was run on 23.04.2025 at 19:... ☆ | | |
| <input type="checkbox"/> |  ben | 19:19 |
| [The job succeeded.] SQL Server Job System: 'Yede... JOB RUN: 'YedeklemeJob' was run on 23.04.2025 at 19:... ☆ | | |
| <input type="checkbox"/> |  ben | 19:18 |
| [The job succeeded.] SQL Server Job System: 'Yede... JOB RUN: 'YedeklemeJob' was run on 23.04.2025 at 19:... ☆ | | |
| <input type="checkbox"/> |  ben | 19:17 |
| [The job succeeded.] SQL Server Job System: 'Yede... JOB RUN: 'YedeklemeJob' was run on 23.04.2025 at 19:... ☆ | | |
|  |  ben |     |
| [The job succeeded.] SQL Server Job System: 'Yede... JOB RUN: 'YedeklemeJob' was run on 23.04.2025 at 19:... ☆ | | |
| <input type="checkbox"/> |  ben | 19:15 |
| [The job succeeded.] SQL Server Job System: 'Yedekle... JOB RUN: 'YedeklemeJob' was run on 23.04.2025 at 19:... ☆ | | |

Yedekleme işinin her çalıştırılmasında gönderilen başarı bildirimi e-postaları gelen kutusunda görülmektedir.

[The job succeeded.] SQL Server
Job System: 'YedeklemeJob'
completed on \\DESKTOP-
KLMLQ2A. 📄 Gelen Kutusu x

SQL Server Agent <k... 19:22 (0 dakika önce) ☆ 😊 ↶ ⋮

Alici: ben ▼

JOB RUN: 'YedeklemeJob' was run on 23.04.2025 at 19:22:00

DURATION: 0 hours, 0 minutes, 0 seconds

STATUS: Succeeded

MESSAGES: The job succeeded. The Job was invoked by Schedule
9 (DakikadaBir). The last step to run was step 1 (TamYedek).

Yedekleme işi başarıyla tamamlandığında gönderilen e-posta detayında işin çalışma zamanı, süresi, durumu ve kullanılan adımlar yer almaktadır.