



ANKARA ÜNİVERSİTESİ
MÜHENDİSLİK FAKÜLTESİ
BİLGİSAYAR MÜHENDİSLİĞİ

BLM4522 AĞ TABANLI PARALEL DAĞITIM SİSTEMLERİ

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Github repo: https://github.com/beyzanurozcelik/ag_tabanlı_prog

Drive:

https://drive.google.com/drive/folders/14XrrUx3F_cBOQJT05wU9o0xAGQB5We66?usp=sharings

Database olarak Microsoft'un yayınladığı AdventureWorks db'si kullanılmıştır.

Video kayıtları, ekran görüntüleri ve sql dosyaları githuba yüklenmiştir.

1. Veritabanı Performans Optimizasyonu ve İzleme

- **Veritabanı İzleme:** SQL Profiler ile sorgu performansı izlendi.

Karmaşık bir sorgu süresince sorgu performansı:

EventClass	TextData	ApplicationName	NTUserName	LoginName	CPU	Reads	Writes	Duration	Client
RPC:Completed	declare @p1 int set @p1=3 exec sp...	Microsoft SQ...	bnuro	BEYZAN...	0	0	0	0	
RPC:Completed	declare @p1 int set @p1=4 exec sp...	Microsoft SQ...	bnuro	BEYZAN...	15	108	0	17	
RPC:Completed	declare @p1 int set @p1=5 exec sp...	Microsoft SQ...	bnuro	BEYZAN...	0	0	0	0	
SQL:BatchStarting	select ms_ticks from sys.dm_os_sys_info	Microsoft SQ...	bnuro	BEYZAN...					
SQL:BatchCompleted	select ms_ticks from sys.dm_os_sys_info	Microsoft SQ...	bnuro	BEYZAN...	0	413	0	2	
RPC:Completed	declare @p1 int set @p1=6 exec sp...	Microsoft SQ...	bnuro	BEYZAN...	0	440	0	5	
SQL:BatchCompleted	SELECT p.Name AS ProductName, ...	Microsoft SQ...	bnuro	BEYZAN...	2220	8437	4	2326	
RPC:Completed	declare @p1 int set @p1=7 exec sp...	Microsoft SQ...	bnuro	BEYZAN...	0	0	0	0	
Audit Logout		Microsoft SQ...	bnuro	BEYZAN...	30	1714	0	3247	
SQL:BatchStarting	SET STATISTICS XML OFF SET STATISTIC...	Microsoft SQ...	bnuro	BEYZAN...					
SQL:BatchCompleted	SET STATISTICS XML OFF SET STATISTIC...	Microsoft SQ...	bnuro	BEYZAN...	0	0	0	0	
Audit Logout		Microsoft SQ...	bnuro	BEYZAN...	62	80	0	459510	

Trace is running. Ln 1629, Col 1 Rows: 1634

- **Sorgu İyileştirme:** Sorgu üzerinde yapılan iyileştirmelerle sorgu performansı artırıldı.

Eski sorgu:

SELECT

```
p.Name AS ProductName,  
c.FirstName + ' ' + c.LastName AS CustomerName,  
soh.OrderDate,  
sod.OrderQty AS QuantityOrdered,  
sod.LineTotal AS SalesAmount,  
AVG(sod.UnitPrice) AS AveragePrice,  
(SELECT SUM(sod2.LineTotal)  
FROM Sales.SalesOrderDetail sod2  
WHERE sod2.ProductID = p.ProductID) AS TotalSalesForProduct,  
(SELECT COUNT(DISTINCT soh2.SalesOrderID)  
FROM Sales.SalesOrderHeader soh2  
WHERE soh2.CustomerID = soh.CustomerID) AS NumberOfOrders,  
DATEDIFF(DAY, soh.OrderDate, GETDATE()) AS DaysSinceOrder
```

FROM

```
Sales.SalesOrderHeader soh,  
Sales.SalesOrderDetail sod,  
Production.Product p,  
Sales.Customer cust,  
Person.Person c
```

WHERE

```
    soh.SalesOrderID = sod.SalesOrderID
    AND sod.ProductID = p.ProductID
    AND soh.CustomerID = cust.CustomerID
    AND cust.PersonID = c.BusinessEntityID
    AND soh.OrderDate BETWEEN '2010-01-01' AND '2013-01-01'
    AND p.Color = 'Black'
    AND sod.UnitPrice > 50
```

GROUP BY

```
    p.Name,
    c.FirstName,
    c.LastName,
    soh.OrderDate,
    sod.OrderQty,
    sod.LineTotal,
    p.ProductID,
    soh.CustomerID
```

ORDER BY

```
    TotalSalesForProduct DESC,
    DaysSinceOrder ASC;
```

Optimize edilmiş sorgu:

SELECT

```
    p.Name AS ProductName,
    SUM(sod.LineTotal) AS TotalSales,
    AVG(sod.UnitPrice) AS AvgPrice,
    c.FirstName + ' ' + c.LastName AS CustomerName,
    soh.OrderDate
```

FROM Sales.SalesOrderHeader AS soh

JOIN Sales.SalesOrderDetail AS sod ON soh.SalesOrderID = sod.SalesOrderID

JOIN Production.Product AS p ON sod.ProductID = p.ProductID

JOIN Sales.Customer AS cust ON soh.CustomerID = cust.CustomerID

JOIN Person.Person AS c ON cust.PersonID = c.BusinessEntityID

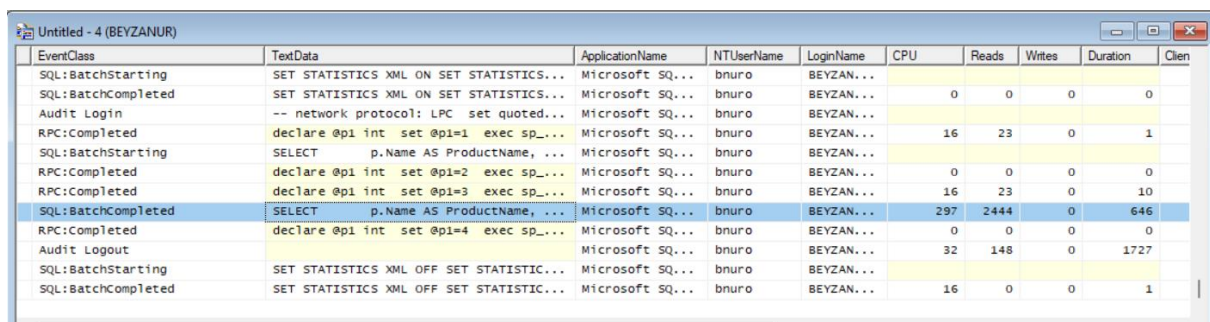
WHERE soh.OrderDate BETWEEN '2011-01-01' AND '2012-01-01'

AND p.Color = 'Black'

GROUP BY p.Name, c.FirstName, c.LastName, soh.OrderDate

ORDER BY TotalSales DESC;

Yeni performans:



EventClass	TextData	ApplicationName	NTUserName	LoginName	CPU	Reads	Writes	Duration	Client
SQL:BatchStarting	SET STATISTICS XML ON SET STATISTICS...	Microsoft SQ...	bnuro	BEYZAN...					
SQL:BatchCompleted	SET STATISTICS XML ON SET STATISTICS...	Microsoft SQ...	bnuro	BEYZAN...	0	0	0	0	
Audit Login	-- network protocol: LPC set quoted...	Microsoft SQ...	bnuro	BEYZAN...					
RPC:Completed	declare @pi int set @pi=1 exec sp_...	Microsoft SQ...	bnuro	BEYZAN...	16	23	0	1	
SQL:BatchStarting	SELECT p.Name AS ProductName, ...	Microsoft SQ...	bnuro	BEYZAN...					
RPC:Completed	declare @pi int set @pi=2 exec sp_...	Microsoft SQ...	bnuro	BEYZAN...	0	0	0	0	
RPC:Completed	declare @pi int set @pi=3 exec sp_...	Microsoft SQ...	bnuro	BEYZAN...	16	23	0	10	
SQL:BatchCompleted	SELECT p.Name AS ProductName, ...	Microsoft SQ...	bnuro	BEYZAN...	297	2444	0	646	
RPC:Completed	declare @pi int set @pi=4 exec sp_...	Microsoft SQ...	bnuro	BEYZAN...	0	0	0	0	
Audit Logout		Microsoft SQ...	bnuro	BEYZAN...	32	148	0	1727	
SQL:BatchStarting	SET STATISTICS XML OFF SET STATISTIC...	Microsoft SQ...	bnuro	BEYZAN...					
SQL:BatchCompleted	SET STATISTICS XML OFF SET STATISTIC...	Microsoft SQ...	bnuro	BEYZAN...	16	0	0	1	

● Indexleme: Indexleme yapılarak sorgu performansı daha da iyileştirildi.

- [USE](#) AdventureWorks2022;
- [GO](#)
-
- [CREATE NONCLUSTERED INDEX](#) IX_SalesOrderHeader_OrderDate
- [ON](#) Sales.SalesOrderHeader (OrderDate, CustomerID);
-
- [CREATE NONCLUSTERED INDEX](#) IX_Product_Color
- [ON](#) Production.Product (Color);
-
- [CREATE NONCLUSTERED INDEX](#) IX_Customer_PersonID
- [ON](#) Sales.Customer (PersonID);

-
- **CREATE NONCLUSTERED INDEX** IX_Sales_SalesOrderDetails
- **ON** Sales.SalesOrderDetail (ProductID)
INCLUDE (LineTotal, UnitPrice);

Son performans:

EventClass	TextData	ApplicationName	NTUserName	LoginName	CPU	Reads	Writes	Duration	Client
Audit Login	-- network protocol: LPC set quoted...	Microsoft SQ...	bnuro	BEYZAN...					
SQL:BatchStarting	use [Adventureworks2022]	Microsoft SQ...	bnuro	BEYZAN...					
SQL:BatchCompleted	use [Adventureworks2022]	Microsoft SQ...	bnuro	BEYZAN...	0	0	0	0	0
RPC:Completed	exec sp_executesql N'SELECT c1mns.na...	Microsoft SQ...	bnuro	BEYZAN...	0	92	0	1	
Audit Logout		Microsoft SQ...	bnuro	BEYZAN...	0	10...	91	13	
RPC:Completed	exec sp_reset_connection	Microsoft SQ...	bnuro	BEYZAN...	0	0	0	0	
Audit Login	-- network protocol: LPC set quoted...	Microsoft SQ...	bnuro	BEYZAN...					
SQL:BatchStarting	use [Adventureworks2022]	Microsoft SQ...	bnuro	BEYZAN...					
SQL:BatchCompleted	use [Adventureworks2022]	Microsoft SQ...	bnuro	BEYZAN...	0	0	0	0	
RPC:Completed	exec sp_executesql N'SELECT c1mns.na...	Microsoft SQ...	bnuro	BEYZAN...	0	92	0	0	
SQL:BatchStarting	SELECT p.Name AS ProductName, ...	Microsoft SQ...	bnuro	BEYZAN...					
SQL:BatchCompleted	SELECT p.Name AS ProductName, ...	Microsoft SQ...	bnuro	BEYZAN...	47	2479	0	171	

• Veri Yöneticisi Roller:

4	VeriYöneticiRolu	SELECT	GRANT	DATABASE
5	beyzanur	CONNECT	GRANT	DATABASE

Burada beyzanur kullanıcısı dışındaki kullanıcılara sadece görüntüleme izni, beyzanur kullanıcısına select ve backup izinleri verildi.

2. Veritabanı Yedekleme ve Felaketten Kurtarma Planı

• Tam, Artık, Fark Yedeklemeleri:

Job Properties - weekly_full_backup				
Select a page: General, Steps, Schedules, Alerts, Notifications, Targets				
Script Help				
Job step list:				
S...	Name	Type	On Succ...	On Failure
1	weekly_backup	Transac...	Go to th...	Go to th...
2	logs	Transac...	Quit the...	Quit the...

Job Properties - daily_diff_backup				
Select a page: General, Steps, Schedules, Alerts, Notifications, Targets				
Script Help				
Job step list:				
S...	Name	Type	On Succ...	On Failure
1	daily_backup	Transac...	Go to th...	Go to th...
2	log	Transac...	Quit the...	Quit the...

Job Properties - hourly_log_backup				
Select a page: General, Steps, Schedules, Alerts, Notifications, Targets				
Script Help				
Job step list:				
S...	Name	Type	On Succ...	On Failure
1	hourly_backup	Transac...	Go to th...	Go to th...
2	log	Transac...	Go to th...	Quit the...

Job Step Properties - daily_backup

Select a page: General Advanced

Script Help

Step name: daily_backup

Type: Transact-SQL script (T-SQL)

Run as:

Database: msdb

Command:

```
DECLARE @FileName NVARCHAR(200);
SET @FileName = 'C:\Backups\AdventureWorks_Diff_Backup_' +
FORMAT(GETDATE(), 'yyyyMMdd_HH:mm:ss') + '.bak';

BACKUP DATABASE AdventureWorks2022
TO DISK = @FileName
WITH INIT;
```

Open... Select All Copy Paste Parse

Connection

Server: beyzanur

Connection: BEYZANUR\bnuro

• Zamanlayıcılarla Yedekleme:

SQL Server Agent kullanılarak oluşturulan yedekleme joblarında schedule özelliği kullanılarak otomatik yedekleme gerçekleştirilmiştir.

ID	Name	Enabl...	Description	J...
10	weekly	Yes	Occurs every week on Sunday at 00:00:00. Sched...	V
ID	Name	Enabl...	Description	J...
11	daily	Yes	Occurs every day at 21:00:00. Schedule will be use...	V..
ID	Name	Enabl...	Description	J...
12	hourly	Yes	Occurs every day every 1 hour(s) between 00:00:0...	V..
+	✓	24.04.2025 22:00:...	BEYZANUR	hourly log backup
+	✓	24.04.2025 21:00:...	BEYZANUR	hourly log backup

• Felaketten Kurtarma Senaryoları:

Alınan tam, artık ve fark yedeklemeleri yanlışlıkla silinen veri tabanını kurtarmak için yeniden yükleniyor. Felaket kurtarma senaryosu gereğince haftada 1 tam yedek, her gün 21.00'da artık yedek ve her saat başı fark yedek alınmıştır. Felaket durumunu(DBnin silinmesi) simüle ederken kurtarma aşamasında bu yedekler kullanılmıştır.

```
DROP DATABASE AdventureWorks2022;  
GO
```

```
RESTORE DATABASE AdventureWorks2022  
FROM DISK = 'C:\Backups\AdventureWorks_Full_Backup_20250423.bak'  
WITH NORECOVERY, REPLACE;  
  
RESTORE DATABASE AdventureWorks2022  
FROM DISK = 'C:\Backups\AdventureWorks_Diff_Backup_20250424_210001.bak'  
WITH NORECOVERY;  
  
RESTORE DATABASE AdventureWorks2022  
FROM DISK = 'C:\Backups\AdventureWorks_Log_Backup_20250424_210001.bak'  
WITH NORECOVERY;  
  
RESTORE DATABASE AdventureWorks2022  
FROM DISK = 'C:\Backups\AdventureWorks_Log_Backup_20250424_220001.bak'  
WITH RECOVERY;
```

Messages

```
Processed 25376 pages for database 'AdventureWorks2022', file 'AdventureWorks2022' on file 1.  
Processed 2 pages for database 'AdventureWorks2022', file 'AdventureWorks2022_log' on file 1.  
RESTORE DATABASE successfully processed 25378 pages in 0.140 seconds (1416.155 MB/sec).  
Processed 26312 pages for database 'AdventureWorks2022', file 'AdventureWorks2022' on file 1.  
Processed 2 pages for database 'AdventureWorks2022', file 'AdventureWorks2022_log' on file 1.  
RESTORE DATABASE successfully processed 26314 pages in 0.100 seconds (2055.742 MB/sec).  
Processed 26312 pages for database 'AdventureWorks2022', file 'AdventureWorks2022' on file 1.  
Processed 2 pages for database 'AdventureWorks2022', file 'AdventureWorks2022_log' on file 1.  
RESTORE DATABASE successfully processed 26314 pages in 0.102 seconds (2015.433 MB/sec).  
Processed 26360 pages for database 'AdventureWorks2022', file 'AdventureWorks2022' on file 1.  
Processed 2 pages for database 'AdventureWorks2022', file 'AdventureWorks2022_log' on file 1.  
RESTORE DATABASE successfully processed 26362 pages in 0.127 seconds (1621.647 MB/sec).
```

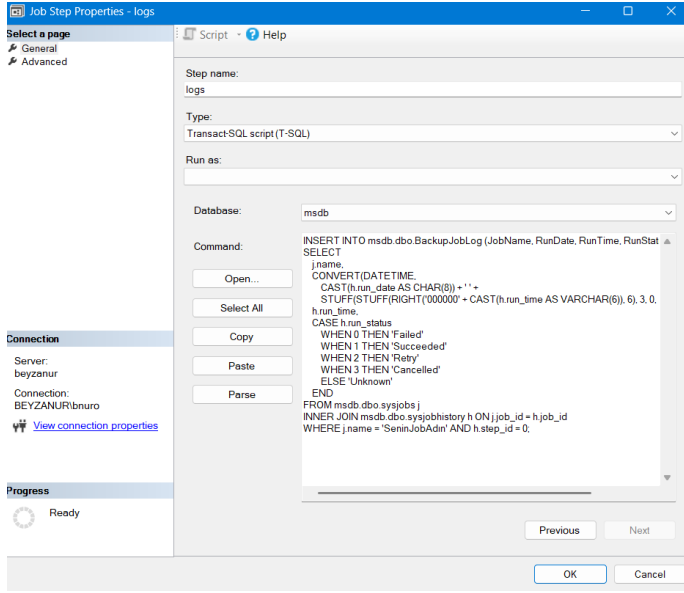
Completion time: 2025-04-24T22:57:35.8906258+03:00

3. Veritabanı Yedekleme ve Otomasyon Çalışması

- **SQL Server Agent:** Veri tabanı yedekleri SQL Server Agent jobları kullanılarak oluşturulmuştur.

```
SQL Server Agent  
├── Jobs  
│   ├── syspolicy_purge_history  
│   ├── weekly_full_backup  
│   ├── daily_diff_backup  
│   └── hourly_log_backup  
└── Job Activity Monitor
```

- **T-SQL Scripting:**
T-SQL ile yedekleme raporları oluşturulmuştur.



	JobName	RunDate	RunTime	RunStatus
1	daily_diff_backup	2025-04-24 19:00:00.000	190000	Succeeded
2	daily_diff_backup	2025-04-24 20:00:00.000	200000	Succeeded
3	daily_diff_backup	2025-04-24 20:20:00.000	202000	Succeeded
4	daily_diff_backup	2025-04-24 20:23:00.000	202300	Succeeded
5	daily_diff_backup	2025-04-24 20:25:00.000	202500	Succeeded
6	daily_diff_backup	2025-04-24 20:27:00.000	202700	Succeeded
7	hourly_log_backup	2025-04-24 19:00:00.000	190000	Succeeded
8	hourly_log_backup	2025-04-24 20:00:00.000	200000	Succeeded
9	hourly_log_backup	2025-04-24 19:00:00.000	190000	Succeeded
10	hourly_log_backup	2025-04-24 20:00:00.000	200000	Succeeded
11	hourly_log_backup	2025-04-24 21:00:00.000	210000	Succeeded
12	hourly_log_backup	2025-04-24 19:00:00.000	190000	Succeeded
13	hourly_log_backup	2025-04-24 20:00:00.000	200000	Succeeded
14	hourly_log_backup	2025-04-24 21:00:00.000	210000	Succeeded
15	hourly_log_backup	2025-04-24 22:00:00.000	220000	Succeeded

• Otomatik Yedekleme:

SQL Server Agent kullanılarak oluşturulan yedekleme joblarında schedule özelliği kullanılarak otomatik yedekleme gerçekleştirilmiştir.

ID	Name	Enabl...	Description	J...
10	weekly	Yes	Occurs every week on Sunday at 00:00:00. Sched...	V
ID	Name	Enabl...	Description	J...
11	daily	Yes	Occurs every day at 21:00:00. Schedule will be use...	V..
ID	Name	Enabl...	Description	J...
12	hourly	Yes	Occurs every day every 1 hour(s) between 00:00:0...	V..

4. Veritabanı Yük Dengeleme ve Dağıtık Veritabanı Yapıları

- **Yük Dengeleme:** SQL Server'ı Database Mirroring kullanarak yapılandırma.

4.1. İki SQL Server Instance Kur

Bilgisayarıma iki ayrı SQL Server örneği (instance) kurdu. Birisi MSSQLSERVER diğeri BEYZANUR2. Kurulum sırasında farklı instance adı verdi ki bunlar ayrı hizmet olarak çalışsın.

4.2. Aynı Veritabanını Her İki Instance'a Yükle

İlk olarak, birinci instance'ta (MSSQLSERVER) bir veritabanı (TestDB) oluşturup yedeğini aldım. İkinci instance'a (BEYZANUR), bu yedeği WITH NORECOVERY seçeneğiyle yükledim. Bu, veritabanını mirroring için "hazır ama çalışmıyor" durumda bırakır.

4.3. Her Instance'ta Mirroring Endpoint Tanımla

Her iki instance için birer mirroring endpoint tanımladım. Bu endpoint'ler, instance'ların birbirine bağlanabilmesi için TCP portu üzerinden iletişim kurmasını sağlıyor. Her endpoint farklı bir portta dinleniyor. (5022 ve 5023).

5. Veritabanı Partner Ayarlarını Yap

İlk olarak, principal instance'tan mirror instance'ın adresi tanımladım. (TCP://BEYZANUR2:5023). Ardından mirror instance'tan da principal'ın adresini (TCP://MSSQLSERVER:5022) tanımladım. Bu komutlar, iki instance'ın birbirini tanımasını sağlar.

```
SQLQuery1.sql - B...YZANUR\bnuro (62))* X
-- Principal Server'da:
CREATE ENDPOINT Mirroring
STATE = STARTED
AS TCP (LISTENER_PORT = 5022)
FOR DATABASE_MIRRORING (
    ROLE = PARTNER
);

-- Mirror Server'da:
CREATE ENDPOINT Mirroring
STATE = STARTED
AS TCP (LISTENER_PORT = 5023)
FOR DATABASE_MIRRORING (
    ROLE = PARTNER
);
```

Messages: Commands completed successfully. Completion time: 2025-05-29T21:57:29.0756303+03:00

Messages: Commands completed successfully. Completion time: 2025-05-29T22:03:46.7600895+03:00

```
);
BACKUP DATABASE AdventureWorks2022
TO DISK = 'C:\Backups\TestDB.bak';
BACKUP LOG AdventureWorks2022
TO DISK = 'C:\Backups\TestDB.trn';
ALTER DATABASE AdventureWorks2022 SET RECOVERY FULL;

);
RESTORE DATABASE TestDB
FROM DISK = 'C:\Backups\TestDB.bak'
WITH MOVE 'AdventureWorks2022' TO 'C:\SQLData\TestDB.mdf',
MOVE 'AdventureWorks2022_log' TO 'C:\SQLData\TestDB_log.ldf',
NORECOVERY, REPLACE;
```

Messages: Processed 3 pages for database 'AdventureWorks2022', file 'AdventureWorks2022_log' on file 1. BACKUP LOG successfully processed 3 pages in 0.004 seconds (5.859 MB/sec). Completion time: 2025-05-29T22:10:30.8541247+03:00

Messages: Processed 26448 pages for database 'TestDB', file 'AdventureWorks2022' on file 1. Processed 2 pages for database 'TestDB', file 'AdventureWorks2022_log' on file 1. RESTORE DATABASE successfully processed 26450 pages in 0.099 seconds (2087.239 MB/sec). Completion time: 2025-05-29T22:16:16.5734974+03:00


```
NORECOVERY, REPLACE;

RESTORE DATABASE TestDB WITH RECOVERY;

90 %

Messages

RESTORE DATABASE successfully processed 0 pages in 0.228 seconds (0.000 MB/sec).

Completion time: 2025-05-29T22:16:55.4728136+03:00

ALTER DATABASE AdventureWorks2022
SET PARTNER = 'TCP://MSSQLServer:5022';

1 %

Messages

Commands completed successfully.

Completion time: 2025-05-29T22:46:39.7590700+03:00

ALTER DATABASE AdventureWorks2022
SET PARTNER = 'TCP://BEYZANUR2:5024';

0 %

Messages

Msg 1405, Level 16, State 1, Line 16
The database "AdventureWorks2022" is already enabled for database mirroring.

Completion time: 2025-05-29T22:52:45.1201868+03:00
```

5. Veri Temizleme ve ETL Süreçleri Tasarımı

Büyük veri kümelerinin temizlenmesi ve işlenmesi için ETL (Extract, Transform, Load) süreçlerinin oluşturulması.

- **Veri Temizleme:** Veri tabanında eksik ya da yanlış girilmiş veri olmadığından önce onları ekleyip ardından temizledim ki simüle edebileyim.

```
SQLQuery11.sql - YZANUR(bnuo (56))
-- 20 yeni BusinessEntity
DECLARE @i INT = 1;
WHILE @i <= 20
BEGIN
    INSERT INTO Person.BusinessEntity (rowguid, ModifiedDate)
    VALUES (NEWID(), GETDATE());
    SET @i += 1;
END;

-- Son 20 kayıt
SELECT TOP 20 BusinessEntityID
INTO #NewEntityIDs
FROM Person.BusinessEntity
ORDER BY BusinessEntityID DESC;

-- Hatalı verilerle 20 kayıt
INSERT INTO Person.Person (BusinessEntityID, PersonType, NameStyle, FirstName, LastName, EmailPromotion, rowguid, ModifiedDate)
SELECT
    *
    (1 row affected)
    (1 row affected)
    (1 row affected)

SQLQuery11.sql - YZANUR(bnuo (56))
ORDER BY BusinessEntityID DESC;

INSERT INTO Person.EmailAddress (BusinessEntityID, EmailAddress, rowguid, ModifiedDate)
SELECT
    BusinessEntityID,
    CASE
        WHEN number % 2 = 0 THEN 'invalid_email'
        WHEN number % 3 = 0 THEN NULL
        ELSE 'testemail@domain' -- eksik .com
    END,
    NEWID(),
    GETDATE()
FROM (
    SELECT BusinessEntityID, ROW_NUMBER() OVER (ORDER BY BusinessEntityID) AS number
    FROM #NewEntityIDs
) AS temp;

-- NULL veya boş FirstName
SELECT * FROM Person.Person
(20 rows affected)

Completion time: 2025-05-29T22:18:44.8718961+03:00

SQLQuery11.sql - YZANUR(bnuo (56))
INSERT INTO Person.EmailAddress (BusinessEntityID, EmailAddress, rowguid, ModifiedDate)
SELECT
    BusinessEntityID,
    CASE
        WHEN number % 2 = 0 THEN 'invalid_email'
        WHEN number % 3 = 0 THEN NULL
        ELSE 'testemail@domain' -- eksik .com
    END,
    NEWID(),
    GETDATE()
FROM (
    SELECT BusinessEntityID, ROW_NUMBER() OVER (ORDER BY BusinessEntityID) AS number
    FROM #NewEntityIDs
) AS temp;

-- NULL veya boş FirstName
SELECT * FROM Person.Person
(20 rows affected)

Completion time: 2025-05-29T22:18:44.8718961+03:00
```

SQLQuery11.sql - YZANUR(bnuro6) * X

```
SELECT BusinessEntityID, ROW_NUMBER() OVER (ORDER BY BusinessEntityID) AS number
FROM #NewEntityIDs
) AS temp;

-- NULL veya boş Firstname
SELECT * FROM Person.Person
WHERE Firstname IS NULL OR LTRIM(RTRIM(Firstname)) = '';

-- Geçersiz EmailAddress
SELECT * FROM Person.EmailAddress
WHERE EmailAddress IS NULL OR EmailAddress NOT LIKE '%@%.%%';
```

90 %

Results Messages

BusinessEntityID	PersonType	NameStyle	Title	FirstName	MiddleName	LastName	Suffix	EmailPromotion	AdditionalContactInfo	Demo
1	20778	EM	0	NULL	NULL	TestLast	NULL	0	NULL	Link
2	20780	EM	0	NULL	NULL	Unknown	NULL	0	NULL	Link
3	20782	EM	0	NULL	NULL	TestLast	NULL	0	NULL	Link
4	20784	EM	0	NULL	NULL	TestLast	NULL	0	NULL	Link
5	20786	EM	0	NULL	NULL	Unknown	NULL	0	NULL	Link
6	20788	EM	0	NULL	NULL	TestLast	NULL	0	NULL	Link
7	20790	EM	0	NULL	NULL	TestLast	NULL	0	NULL	Link
8	20792	EM	0	NULL	NULL	Unknown	NULL	0	NULL	Link

BusinessEntityID	EmailAddressID	EmailAddress	rowguid	ModifiedDate	
1	20780	19975	543302E4-D608-405D-9EE0-067960CEAD77	2025-05-20 21:56:13.473	
2	20786	19981	EBAA8415-82EF-462F-85EE-0356E412708	2025-05-20 21:56:13.473	
3	20792	19987	6C4EB752-809C-47C7-8B07-0058A7C42827	2025-05-20 21:56:13.473	
4	20779	19974	invalid_email	00951BC5-DDAD-4931-8FD2-47150C2772	2025-05-20 21:56:13.473
5	20781	19976	invalid_email	70B61ADD-A15C-4A55-AB95-8B78B08448E0	2025-05-20 21:56:13.473
6	20783	19978	invalid_email	A69ADE81-0125-4880-8D45-80D9663C634	2025-05-20 21:56:13.473
7	20785	19980	invalid_email	7E2CB8C2-E0F3-490C-877D-53AAB32438D	2025-05-20 21:56:13.473
8	20787	19982	invalid_email	8F79K35D-1F81-487D-AB85-207D926847F6	2025-05-20 21:56:13.473

SQLQuery11.sql - YZANUR(bnuro) (56) * X

```

-- DELETE FROM Person.EmailAddress
-- WHERE EmailAddress NOT LIKE '%@%.%%';

-- DELETE FROM Person.Person
-- WHERE BusinessEntityID IN (
--     SELECT BusinessEntityID FROM Person.EmailAddress
--     WHERE EmailAddress NOT LIKE '%@%.%%';
-- );

-- SELECT * FROM Person.Person
-- WHERE Firstname IS NULL OR LTRIM(RTRIM(Firstname)) = '';

-- SELECT * FROM Person.EmailAddress
-- WHERE EmailAddress NOT LIKE '%@%.%%';

```

90 %

Results Messages

BusinessEntityID	PersonType	NameStyle	Title	FirstName	MiddleName
BusinessEntityID	EmailAddressID	EmailAddress	rowguid	ModifiedDate	

- **Veri Dönüştürme:** Öncelikle dönüştürme yapacağım verileri ekleyip ardından hepsini tek bir formata çevirdim.

SQLQuery11.sql - YZANUR(bnuro) (56) * X

```

-- WHERE EmailAddress NOT LIKE '%@%.%%';

-- Örnek tablo ve veri
CREATE TABLE Orders (
    OrderID int,
    OrderDate varchar(50), -- farklı formatta tarih var
    Amount varchar(20),
    Currency varchar(3),
    CountryCode varchar(2)
);

INSERT INTO Orders VALUES
(101, '01/05/2025', '1000.50', 'EUR', 'DE'),
(102, '2025-05-02', '$1200.75', 'USD', 'US'),
(103, '5-3-2025', '900.00', 'USD', 'US'),
(104, '2025.05.04', '850.25', 'EUR', 'FR'),
(105, 'May 5 2025', '1500', 'GBP', 'GB');

```

90 %

Messages

(5 rows affected)

Completion time: 2025-05-20T22:11:46.7896041+03:00

```
SQLQuery11.sql --YZANUR(bnuro) (56)* X
```

```
UPDATE Orders
SET
    OrderDateStandard = COALESCE(
        TRY_CONVERT(date, OrderDate, 103),
        TRY_CONVERT(date, OrderDate, 120),
        TRY_CAST(OrderDate AS date)
    ),
    AmountStandard = CAST(REPLACE(REPLACE(Amount, '$', ''), ',', '.') AS decimal(18,2));

SELECT * FROM Orders

ALTER TABLE Orders
DROP COLUMN OrderDate

ALTER TABLE Orders
DROP COLUMN Amount

SELECT * FROM Orders
```

90 %

Results Messages

	OrderID	Currency	CountryCode	OrderDateStandard	AmountStandard
1	101	EUR	DE	2025-05-01	1000.50
2	102	USD	US	2025-05-02	1200.75
3	103	USD	US	2025-03-05	900.00
4	104	EUR	FR	2025-05-04	850.25
5	105	GBP	GB	2025-05-05	1500.00

```
SQLQuery11.sql --VZANUR(bnuro) (56) * X
-- Tarihleri ve amountları aynı formata çevirip orders'a ekleyelim
ALTER TABLE Orders ADD OrderDateStandard date NULL;
ALTER TABLE Orders ADD AmountStandard decimal(18,2) NULL;

UPDATE Orders
SET
    OrderDateStandard = COALESCE(
        TRY_CONVERT(date, OrderDate, 103),
        TRY_CONVERT(date, OrderDate, 120),
        TRY_CAST(OrderDate AS date)
    ),
    AmountStandard = CAST(REPLACE(REPLACE(Amount, '$', ''), ',', '.')) AS decimal(18,2);

SELECT * FROM Orders
```

90 %

Results Messages

OrderID	OrderDate	Amount	Currency	CountryCode	OrderDateStandard	AmountStandard	
1	101	01/05/2025	1000.50	EUR	DE	2025-05-01	1000.50
2	102	2025-05-02	\$1200.75	USD	US	2025-05-02	1200.75
3	103	5-3-2025	900.00	USD	US	2025-03-05	900.00
4	104	2025.05.04	850.25	EUR	FR	2025-05-04	850.25
5	105	May 5 2025	1500	GBP	GB	2025-05-05	1500.00

- **Veri Kalitesi Raporu:**

Veri Kalitesi Raporu

Proje: AdventureWorks2022 Veri Kalitesi İncelemesi

Tarih: 28.05.2025

Hazırlayan: Beyza Nur

1. Veri Kaynağı

- Veritabanı: AdventureWorks2022
- Tablolar: Person.Person, Person.EmailAddress, Sales.SalesOrderHeader

2. Temizlik Adımları ve Bulgular

Kategori	İncelenen Alan	Sorun Tespiti	Uygulanan Temizlik
Eksik Veri (NULL)	FirstName, EmailAddress	23 kayıt NULL içeriyor	Silindi/varsayılan atandı
Geçersiz Değerler	EmailAddress	10 kayıt @ veya .com içermiyor	Regex ile filtrelendi
Tekrarlanan Kayıtlar	BusinessEntityID, EmailAddress	12 mükerrer kayıt bulundu	Yinelenenler silindi
Tutarsız Formatlar	ModifiedDate, CurrencyRate	Tarih formatları farklı, para birimi eksik	Tarihler standardize edildi (yyyy-mm-dd), varsayılan para birimi atandı
Kodlama Hataları	CountryRegionCode	5 kayıt "UNKNOWN" içeriyor	"UNKNOWN" olanlar NULL yapıp silindi

3. ETL Sürecine Dahil Edilen Dönüşümler

- Date alanları: dd/mm/yyyy → yyyy-mm-dd
- CurrencyRate: NULL → 1.00 (USD)

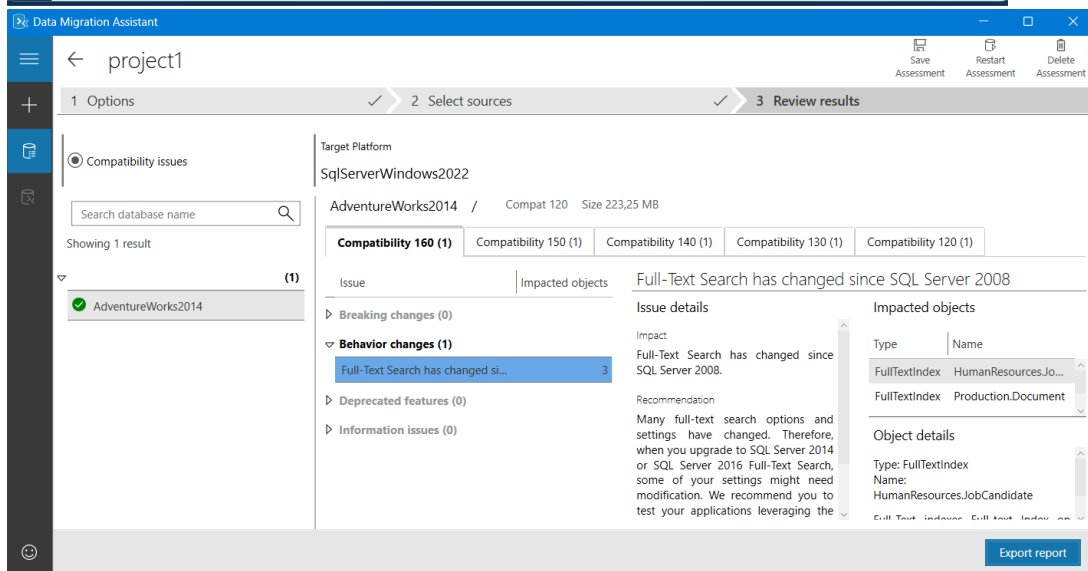
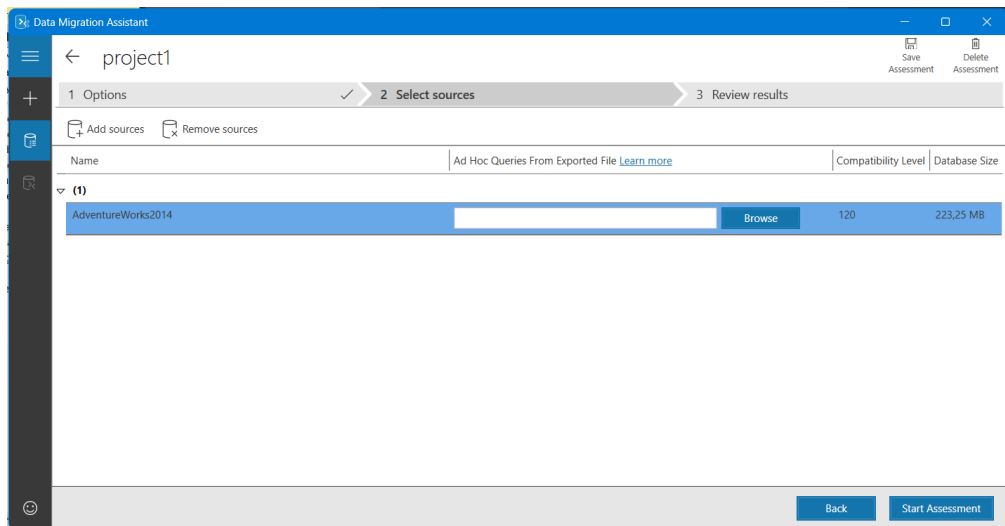
4. Sonuç ve Öneriler

- EmailAddress alanında ileride otomatik doğrulama mekanizması önerilir.
- ETL pipeline'ına veri kalitesi kontrol adımı eklenmeli (örneğin SSIS veya Python ile).

6. Veritabanı Yükseltme ve Sürüm Yönetimi

- Mevcut bir veritabanını daha yeni bir sürüme yükseltme ve sürüm kontrolü süreçleri.

- Veritabanı Yükseltme Planı:** Eski sürümden yeni sürüme geçiş için strateji oluşturdum ve uyguladım.



SQLQuery5.sql - B...\YZANUR\bnuro (69))* X SQLQuery4.sql - B...\YZANUR\bnuro (70))*

```
BACKUP DATABASE AdventureWorks2014
TO DISK = 'D:\Backup\AW2014.bak';

RESTORE DATABASE AdventureWorks2022_1
FROM DISK = 'D:\Backup\AW2014.bak'
WITH
    MOVE 'AdventureWorks2014_Data' TO 'D:\Data\AW2022.mdf',
    MOVE 'AdventureWorks2014_Log' TO 'D:\Log\AW2022.ldf';
```

90 %

Messages

```
Database 'AdventureWorks2022_1' running the upgrade step from version 942 to version 943.
Database 'AdventureWorks2022_1' running the upgrade step from version 943 to version 944.
Database 'AdventureWorks2022_1' running the upgrade step from version 944 to version 945.
Database 'AdventureWorks2022_1' running the upgrade step from version 945 to version 946.
Database 'AdventureWorks2022_1' running the upgrade step from version 946 to version 947.
Database 'AdventureWorks2022_1' running the upgrade step from version 947 to version 948.
Database 'AdventureWorks2022_1' running the upgrade step from version 948 to version 949.
Database 'AdventureWorks2022_1' running the upgrade step from version 949 to version 950.
Database 'AdventureWorks2022_1' running the upgrade step from version 950 to version 951.
Database 'AdventureWorks2022_1' running the upgrade step from version 951 to version 952.
Database 'AdventureWorks2022_1' running the upgrade step from version 952 to version 953.
Database 'AdventureWorks2022_1' running the upgrade step from version 953 to version 954.
Database 'AdventureWorks2022_1' running the upgrade step from version 954 to version 955.
Database 'AdventureWorks2022_1' running the upgrade step from version 955 to version 956.
Database 'AdventureWorks2022_1' running the upgrade step from version 956 to version 957.
RESTORE DATABASE successfully processed 24252 pages in 0.302 seconds (627.367 MB/sec).

Completion time: 2025-05-28T20:02:10.8526460+02:00
```

```
ALTER DATABASE AdventureWorks2022_1
SET COMPATIBILITY_LEVEL = 160; -- SQL Server 2022
```

90 %

Messages

Commands completed successfully.

Completion time: 2025-05-28T23:08:55.0361150+03:00

- **Test ve Geri Dönüş Planı:** Yükseltme sonrası testleri(yükseltmeden sonra veritabanında sorgu ve değişiklikler yapılabilir mi diye test edildi.) ve geri dönüş planları yapıldı.

```
SQLQuery5.sql - B...\YZANUR\bnuro (69))* X SQLQuery4.sql - B...\YZANUR\bnuro (70))* SQLQuery11.sql - B...\YZANUR\bnuro (56))*
```

```
INSERT INTO Person.BusinessEntity (rowguid, ModifiedDate)
VALUES (NEWID(), GETDATE());

SELECT TOP 1 BusinessEntityID
FROM Person.BusinessEntity
ORDER BY BusinessEntityID DESC;

INSERT INTO Person.Person (BusinessEntityID, PersonType, NameStyle, FirstName, LastName, rowguid, ModifiedDate)
VALUES (20778, 'EM', 0, 'TestFirst', 'TestLast', NEWID(), GETDATE());

SELECT FirstName, LastName
FROM Person.Person
WHERE BusinessEntityID = 20778;

UPDATE Person.Person
SET FirstName = 'UpdatedName'
WHERE BusinessEntityID = 20778;

DELETE FROM Person.Person
WHERE BusinessEntityID = 20778;
```

```
INSERT INTO Person.BusinessEntity (rowguid, ModifiedDate)
VALUES (NEWID(), GETDATE());

SELECT TOP 1 BusinessEntityID
FROM Person.BusinessEntity
ORDER BY BusinessEntityID DESC;

INSERT INTO Person.Person (BusinessEntityID, PersonType, NameStyle, FirstName, LastName, rowguid, ModifiedDate)
VALUES (20778, 'EM', 0, 'TestFirst', 'TestLast', NEWID(), GETDATE());

SELECT FirstName, LastName
FROM Person.Person
WHERE BusinessEntityID = 20778;

UPDATE Person.Person
SET FirstName = 'UpdatedName'
WHERE BusinessEntityID = 20778;

DELETE FROM Person.Person
WHERE BusinessEntityID = 20778;
```

%

Messages

(1 row affected)

Completion time: 2025-05-28T23:14:27.7358904+03:00

7. Veritabanı Güvenliği ve Erişim Kontrolü

- **Erişim Yönetimi:** Yen bir kullanıcı oluturdum ve ona sadece SELECT yetkisi verdim.

SQLQuery1.sql - B...YZANUR\bnuro (59))* ✕

```
USE AdventureWorks2022;  
GO  
CREATE USER user1 FOR LOGIN user1;
```

90 %

Messages

Commands completed successfully.

Completion time: 2025-05-30T11:36:16.3127155+03:00

```
-- Tüm tablolarda SELECT izni ver  
GRANT SELECT TO user1;  
-- Kullanıcının veri değiştirme yetkisini engelle  
DENY INSERT TO user1;  
DENY UPDATE TO user1;  
DENY DELETE TO user1;
```

90 %

Messages

Commands completed successfully.

Completion time: 2025-05-30T11:37:59.1621855+03:00

```
USE AdventureWorks2022;  
GO  
SELECT * FROM HumanResources.Employee;
```

90 %

Results Messages

	BusinessEntityID	NationalIDNumber	LoginID	OrganizationNode	Organization
1	1	295847284	adventure-works\ken0	NULL	NULL
2	2	245797967	adventure-works\terri0	0x58	1
3	3	509647174	adventure-works\roberto0	0x5AC0	2
4	4	112457891	adventure-works\rob0	0x5AD6	3
5	5	695256908	adventure-works\lgail0	0x5ADA	3
6	6	998320692	adventure-works\jossef0	0x5ADE	3
7	7	134969118	adventure-works\dylan0	0x5AE1	3
8	8	811994146	adventure-works\diane1	0x5AE158	4
9	9	658797903	adventure-works\gigi0	0x5AE168	4

```
-- reportUser oturumunda çalıştırılan sorgu  
DELETE FROM HumanResources.Employee WHERE NationalIDNumber = 295847284;
```

%

Messages

Employees cannot be deleted. They can only be marked as not current.
Msg 3609, Level 16, State 1, Line 16
The transaction ended in the trigger. The batch has been aborted.

Completion time: 2025-05-30T11:46:05.0159548+03:00

- **Veri Şifreleme:** TDE ile veritabanı şifrelendi, veriler disk üzerinde koruma altına alındı.

```
-- 1. Sertifika ve master key oluřtur
USE master;
GO
CREATE MASTER KEY ENCRYPTION BY PASSWORD = '123';
GO
CREATE CERTIFICATE TDECert WITH SUBJECT = 'TDE Sertifikası';
GO

-- 2. Veritabanına encryption anahtarı oluřtur
USE AdventureWorks2022;
GO
CREATE DATABASE ENCRYPTION KEY
WITH ALGORITHM = AES_256
ENCRYPTION BY SERVER CERTIFICATE TDECert;
GO

-- 3. Şifrelemeyi bařlat
ALTER DATABASE AdventureWorks2022 SET ENCRYPTION ON;
```

90 %

Messages

Warning: The certificate used for encrypting the database encryption key has not been ba

Completion time: 2025-05-30T11:47:45.8937719+03:00

- **Audit Logları:** SQL Server'da kullanıcı aktivitelerini takip etmek için audit özelliđi açıldı.

