



**BLM4522-AĞ TABANLI PARALEL DAĞITIM
SİSTEMLERİ**

**Konu: Veritabanı Performans Optimizasyonu ve İzleme
Veritabanı Yedekleme ve Felaketten Kurtarma Planı
Veritabanı Yedekleme ve Otomasyon Çalışması**

Hazırlayanlar: Kaan BAYRAM 21290154

Ömer Asaf DEMİR 20290240

Github hesapları: kaanceng

AsafDemir

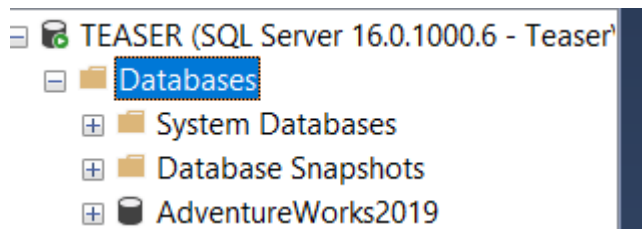
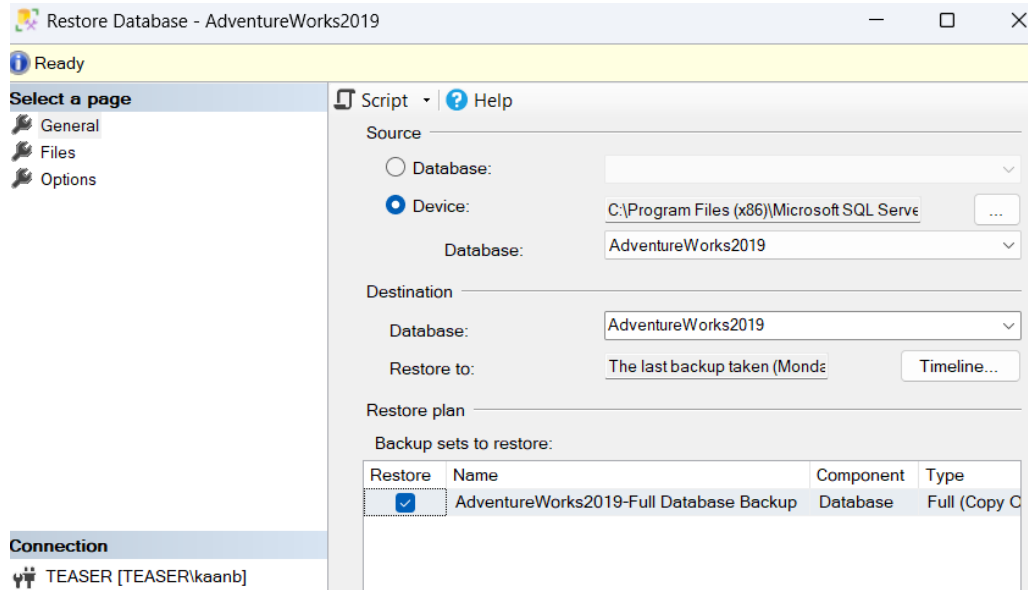
PROJE 1: Veritabanı Performans Optimizasyonu ve İzleme

Giriş:

Bu projede, SQL Server Management Studio (SSMS) ortamında AdventureWorks2019 örnek veritabanı kullanılarak bir veritabanının performansını izleme ve iyileştirme süreçleri uygulanmıştır. Amaç; sistemdeki yavaş sorguları ve performans darboğazlarını tespit edip, uygun indeksleme, sorgu optimizasyonu ve erişim yönetimi teknikleriyle verimliliği artırmaktır. Ayrıca, SQL Profiler ve Dynamic Management Views (DMV) araçları kullanılarak sistem içi kaynak tüketimi analiz edilmiştir. Elde edilen bulgular, uygulanan sorgular ve yapılan geliştirmeler ekran görüntüleriyle desteklenerek raporlanmıştır.

1. Aşama: Örnek Veritabanını Restore Etme

AdventureWorks2019.bak dosyası, SQL Server Management Studio üzerinden restore edilerek veritabanı sisteme yüklendi. Bu adım, projede kullanılacak örnek veritabanının aktif hale gelmesini sağlar.



2. AŞAMA: SQL Profiler ile İzleme

SQL Server Profiler ile çalıştırılan sorgular anlık olarak izlenmiş ve hangi sorguların sisteme daha fazla yük bindirdiği tespit edilmiştir. Events Selection ve Column Filters yardımıyla sadece AdventureWorks2019 veritabanına ait işlemler filtrelenerek izlenmiştir.

The screenshot shows the 'Trace Properties' dialog box with the 'Events Selection' tab active. The 'Trace name' is 'projesql', 'Trace provider name' is 'TEASER', and 'Trace provider type' is 'Microsoft SQL Server "2022"'. The 'version' is '16.0.1000'. The 'Use the template' dropdown is set to 'Standard (default)'. The 'Save to file' checkbox is checked, with the file path 'C:\Users\kaanb\Desktop\projesql.trc'. The 'Set maximum file size (MB)' is '5', 'Enable file rollover' is checked, and 'Server processes trace data' is unchecked. The 'Save to table' checkbox is unchecked. The 'Set maximum rows (in thousands)' is '1'. The 'Enable trace stop time' checkbox is unchecked, with the date '4/24/2025' and time '8:26:15 PM'. The 'Set trace duration (in minutes)' checkbox is checked, with the duration set to '60'.

The screenshot shows the 'Edit Filter' dialog box. The 'ApplicationName' column is selected in the left pane. The 'DatabaseName' column is selected in the right pane. The 'Like' filter is applied to 'AdventureWorks2019'. The 'Not like' filter is also visible. The 'Exclude rows that do not contain values' checkbox is unchecked. The 'OK' and 'Cancel' buttons are at the bottom.

EventClass	TextData	ApplicationName	NTUserName	LoginName	CPU	Reads	Writes	Duration	ClientProcessID	SPID	StartTime
Trace Start											2025-01-01 00:00:00
Audit Login	-- network protocol: LPC set quoted...	Microsoft SQL...	kaanb	Teaser...						20756	74 2025-01-01 00:00:00
RPC:Completed	exec sp_executesql N'SELECT ISNULL(H...	Microsoft SQL...	kaanb	Teaser...	0	0	0	0		20756	74 2025-01-01 00:00:00
SQL:BatchStarting	IF OBJECT_ID (N'[sys].[database_quer...	Microsoft SQL...	kaanb	Teaser...						20756	74 2025-01-01 00:00:00
SQL:BatchCompleted	IF OBJECT_ID (N'[sys].[database_quer...	Microsoft SQL...	kaanb	Teaser...	0	7389	0	40		20756	74 2025-01-01 00:00:00
Audit Logout		Microsoft SQL...	kaanb	Teaser...	0	7391	0	40		20756	74 2025-01-01 00:00:00
SQL:BatchCompleted	use [Adventureworks2019]	Microsoft SQL...	kaanb	Teaser...	0	0	0	0		20756	74 2025-01-01 00:00:00
RPC:Completed	exec sp_executesql N'SELECT tbl.name...	Microsoft SQL...	kaanb	Teaser...	141	16046	48	171		20756	74 2025-01-01 00:00:00
Audit Logout		Microsoft SQL...	kaanb	Teaser...	141	16046	48	173		20756	74 2025-01-01 00:00:00
SQL:BatchCompleted	use [Adventureworks2019]	Microsoft SQL...	kaanb	Teaser...	0	0	0	0		20756	74 2025-01-01 00:00:00
RPC:Completed	exec sp_executesql N'SELECT tbl.name...	Microsoft SQL...	kaanb	Teaser...	78	3300	0	118		20756	74 2025-01-01 00:00:00
Audit Logout		Microsoft SQL...	kaanb	Teaser...	78	3300	0	120		20756	74 2025-01-01 00:00:00
SQL:BatchCompleted	use [Adventureworks2019]	Microsoft SQL...	kaanb	Teaser...	0	0	0	0		20756	74 2025-01-01 00:00:00

3. AŞAMA: Dynamic Management Views (DMV) ile Performans Kontrolü

sys.dm_exec_query_stats DMV'si kullanılarak CPU ve süre açısından en çok kaynak tüketen sorgular analiz edilmiştir. Bu analiz, hangi sorguların iyileştirilmesi gerektiğini belirlemek için yapılır.

SQLQuery12.sql - T...TEASER(kaanb (54))

```

SELECT TOP 10
    total_worker_time / execution_count AS AvgCPU,
    execution_count,
    total_elapsed_time / execution_count AS AvgTime,
    (SELECT SUBSTRING(text, statement_start_offset/2 + 1,
        (CASE WHEN statement_end_offset = -1 THEN LEN(text)
            ELSE statement_end_offset END - statement_start_offset)
    FROM sys.dm_exec_sql_text(sql_handle)) AS Query_Text
FROM sys.dm_exec_query_stats
ORDER BY AvgCPU DESC;

```

100 %

Results Messages

	AvgCPU	execution_count	AvgTime	Query_Text
1	39711	1	51577	SELECT target_data FROM sys.dm_xe_sessi...
2	1457	4	1457	SELECT TOP 10 total_worker_time / execution...
3	1361	10	1362	SELECT TOP 10 total_worker_time / execution...

4. AŞAMA: İndeks Yönetimi

sys.indexes ve **sys.dm_db_missing_index_details** tabloları üzerinden var olan ve eksik indeksler analiz edilmiştir. Eksik indeksler optimize edilerek sorgu performansı artırılmıştır.

1- Mevcut indeksleri listeleme:

```
SQLQuery14.sql - T...TEASER\kaanb (54))* X
SELECT name, type_desc, is_unique, is_primary_key
FROM sys.indexes
WHERE object_id = OBJECT_ID('Person.Person');
```

100 %

Results Messages

	name	type_desc	is_unique	is_primary_key
--	------	-----------	-----------	----------------

2- Eksik indeksleri analiz etme:

```
SQLQuery15.sql - T...TEASER\kaanb (54))* X
SELECT * FROM sys.dm_db_missing_index_details;
```

100 %

Results Messages

	index_handle	database_id	object_id	equality_columns	inequality_columns	included_columns	statement
--	--------------	-------------	-----------	------------------	--------------------	------------------	-----------

3- Yeni bir indeks oluşturma:

```
SQLQuery16.sql - T...TEASER\kaanb (54))* X
USE AdventureWorks2019;
GO
SELECT name, type_desc, is_unique, is_primary_key
FROM sys.indexes
WHERE object_id = OBJECT_ID('Person.Person');
CREATE INDEX IX_LastName ON Person.Person (LastName);
```

100 %

Results Messages

	name	type_desc	is_unique	is_primary_key
1	PK_Person_BusinessEntityID	CLUSTERED	1	1
2	IX_Person_LastName_FirstName_MiddleName	NONCLUSTERED	0	0
3	AK_Person_rowguid	NONCLUSTERED	1	0
4	PXML_Person_AddContact	XML	0	0
5	PXML_Person_Demographics	XML	0	0
6	XMLPATH_Person_Demographics	XML	0	0
7	XMLPROPERTY_Person_Demographics	XML	0	0
8	XMLVALUE_Person_Demographics	XML	0	0

5. AŞAMA: Sorgu İyileştirme

İlk olarak indeks olmayan bir sorgunun çalışma planı analiz edilmiş, ardından indeks eklenerek sorgunun çalışma süresi düşürülmüş ve yeni Execution Plan ile karşılaştırılmıştır.

SQLQuery17.sql - T...TEASER(kaanb (54))													
SELECT * FROM Person.Person WHERE LastName LIKE '%son';													
100 %													
Results Messages													
	BusinessEntityID	PersonType	NameStyle	Title	FirstName	MiddleName	LastName	Suffix	EmailPromotion	AdditionalContactInfo	Demographics	rowguid	ModifiedDate
1	5	EM	0	NULL	Gail	A	Erickson	NULL	0	NULL	<IndividualSurvey xmlns="http://schemas.microso...	F343F8B4-AE3B-430C-A754-9F2231BA6FEF	2007-12-30 00:00:00
2	23	EM	0	NULL	Mary	E	Olson	NULL	0	NULL	<IndividualSurvey xmlns="http://schemas.microso...	B10CF8EB-5589-4A81-81BD-051C5759CE06	2009-01-05 00:00:00
3	43	EM	0	NULL	Nancy	A	Anderson	NULL	1	NULL	<IndividualSurvey xmlns="http://schemas.microso...	0681C8F9-D2EC-47D9-98D4-751814EAED50	2008-12-26 00:00:00
4	49	EM	0	NULL	Barry	K	Johnson	NULL	0	NULL	<IndividualSurvey xmlns="http://schemas.microso...	C828BE2E-DE93-4409-BACD-DF6042D04815	2013-11-29 00:00:00
5	167	EM	0	NULL	David	N	Johnson	NULL	0	NULL	<IndividualSurvey xmlns="http://schemas.microso...	C2C7021B-3209-45F7-8560-B3132595F9D0A	2008-11-25 00:00:00
6	206	EM	0	NULL	Stuart	V	Munson	NULL	2	NULL	<IndividualSurvey xmlns="http://schemas.microso...	CE75C886-EAC8-4818-96FA-8182AD7233CD	2008-11-25 00:00:00
7	207	EM	0	NULL	Greg	F	Alderson	NULL	0	NULL	<IndividualSurvey xmlns="http://schemas.microso...	F34921DD-55EB-46EB-A94D-68F4B080A388	2008-11-25 00:00:00
8	236	EM	0	NULL	Grant	N	Culbertson	NULL	2	NULL	<IndividualSurvey xmlns="http://schemas.microso...	242E654F-CFF1-495C-A408-1A4F2A80A847	2009-02-18 00:00:00
9	240	EM	0	NULL	Willie	T	Johnson	NULL	0	NULL	<IndividualSurvey xmlns="http://schemas.microso...	3B808CDB-0372-409A-AE40-C2177A7D82B6	2008-12-06 00:00:00
10	271	EM	0	NULL	Dan	B	Wilson	NULL	0	NULL	<IndividualSurvey xmlns="http://schemas.microso...	9F637D98-7182-4F6A-B688-1BA9F2ECCB4D	2009-01-15 00:00:00
11	277	SP	0	NULL	Jillian	NULL	Carson	NULL	1	NULL	<IndividualSurvey xmlns="http://schemas.microso...	3C4077FD-2EA1-4749-8856-8C8EECF23AE4	2011-05-24 00:00:00
12	331	SC	0	Mr.	Gregory	F.	Alderson	NULL	0	NULL	<IndividualSurvey xmlns="http://schemas.microso...	72479586-13A3-4F91-AB31-2AD2855FED2D	2012-06-30 00:00:00
13	337	SC	0	Mr.	Sean	P.	Jacobson	NULL	2	NULL	<IndividualSurvey xmlns="http://schemas.microso...	CEF1C975-E3D9-465D-91CF-FA0F3C7EBFA2	2013-06-30 00:00:00
14	345	SC	0	Mr.	Cecil	J.	Allison	NULL	0	NULL	<IndividualSurvey xmlns="http://schemas.microso...	3FB94B42-B159-4D6E-BBF1-115659144884	2011-07-01 00:00:00
15	357	SC	0	Ms.	Mae	N.	Anderson	NULL	0	NULL	<IndividualSurvey xmlns="http://schemas.microso...	FF2A1330-9211-4EC6-B355-4682EA36662D	2013-06-30 00:00:00
16	375	SC	0	Ms.	Teresa	NULL	Atkinson	NULL	0	NULL	<IndividualSurvey xmlns="http://schemas.microso...	6D3F3644-31EB-42B2-8CB1-4A970D2EFAF3	2011-08-01 00:00:00
17	449	SC	0	Ms.	Edna	J.	Benson	NULL	0	NULL	<IndividualSurvey xmlns="http://schemas.microso...	39E5E96C-C4AA-4412-AB48-B0C711115B4D	2013-07-31 00:00:00
18	451	SC	0	Mr.	Payton	P.	Benson	NULL	0	NULL	<IndividualSurvey xmlns="http://schemas.microso...	912BFF37-4777-4899-A081-0FC112B2B79C	2011-10-01 00:00:00
19	453	SC	0	Mr.	Max	NULL	Benson	NULL	0	NULL	<IndividualSurvey xmlns="http://schemas.microso...	7B630976-FD10-4DBF-97C3-DB840853145E	2011-10-01 00:00:00
20	627	SC	0	Mr.	Ty Loren	NULL	Carlson	NULL	0	NULL	<IndividualSurvey xmlns="http://schemas.microso...	2957170D-8AE7-4555-8E7F-0D9BF087AF91	2012-06-30 00:00:00
21	649	SC	0	Ms.	Pamela	A.	Carlson	NULL	2	NULL	<IndividualSurvey xmlns="http://schemas.microso...	D4ABC852-2033-4C47-B3C0-3C2DEB8F33D0	2012-06-30 00:00:00
22	759	SC	0	Mr.	Grant	NULL	Culbertson	NULL	0	NULL	<IndividualSurvey xmlns="http://schemas.microso...	D9025B48-F8A9-4D83-9873-C362DB0822D3	2011-07-01 00:00:00
23	807	SC	0	Ms.	Holly	NULL	Dickson	NULL	0	NULL	<IndividualSurvey xmlns="http://schemas.microso...	9A823A48-8715-4635-99C2-E5106983F044	2012-06-30 00:00:00
24	851	SC	0	Ms.	Jauna	E.	Elson	NULL	1	NULL	<IndividualSurvey xmlns="http://schemas.microso...	2884D7D6-7478-473E-9910-E44E384DB300	2011-05-31 00:00:00
25	859	SC	0	Ms.	Gail	NULL	Erickson	NULL	1	NULL	<IndividualSurvey xmlns="http://schemas.microso...	B668678C-3E52-4105-817F-C9832F418884	2013-07-31 00:00:00
26	861	SC	0	Mr.	Mark	B.	Erickson	NULL	2	NULL	<IndividualSurvey xmlns="http://schemas.microso...	6EC8593F-F21D-4ADF-AB22-500AA1710E27	2012-07-31 00:00:00
27	993	SC	0	Mr.	Faith	M.	Gustafson	NULL	1	NULL	<IndividualSurvey xmlns="http://schemas.microso...	C53B0FEC-1904-4895-A516-85D73512A8FF	2013-07-31 00:00:00
28	995	SC	0	Mr.	Greg	NULL	Hanson	NULL	0	NULL	<IndividualSurvey xmlns="http://schemas.microso...	273A8514-0194-4370-8360-34161F6F9569	2013-08-30 00:00:00
29	1017	SC	0	Mr.	Mark	NULL	Hanson	NULL	0	NULL	<IndividualSurvey xmlns="http://schemas.microso...	5906DA26-7B28-4615-9BC3-359C80A98DF5	2011-05-31 00:00:00
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33	1147	SC	0	Ms.	Jordan	M.	Jacobson	NULL	0	NULL	<IndividualSurvey xmlns="http://schemas.microso...	627F073A-FC32-4A7F-800A-9556201083C7	2011-08-01 00:00:00
34	1153	SC	0	Mr.	Jay	NULL	Jamison	NULL	1	NULL	<IndividualSurvey xmlns="http://schemas.microso...	18A24D70-D8E9-45FB-B5AC-E307F7C7BA79	2012-05-30 00:00:00

SQLQuery19.sql - T...TEASER(kaanb (54))													
SELECT * FROM Person.Person WHERE LastName LIKE '%son';													
100 %													
Results Messages Execution plan													
	BusinessEntityID	PersonType	NameStyle	Title	FirstName	MiddleName	LastName	Suffix	EmailPromotion	AdditionalContactInfo	Demographics	rowguid	ModifiedDate
4	49	EM	0	NULL	Barry	K	Johnson	NULL	0	NULL	<IndividualSurvey xmlns="http://schemas.microso...	CB28BE2E-DE93-4409-BACE-DF6042D04815	2013-11-29 00:00:00
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13	337	SC	0	Mr.	Sean	P.	Jacobson	NULL	2	NULL	<IndividualSurvey xmlns="http://schemas.microso...	CEF1C975-E3D9-465D-91CF-FA0F3C7EBFA2	2013-06-30 00:00:00
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34	1153	SC	0	Mr.	Jay	NULL	Jamison	NULL	1	NULL	<IndividualSurvey xmlns="http://schemas.microso...	18A24D70-D8E9-45FB-B5AC-E307F7C7BA79	2012-05-30 00:00:00
35	1163	SC	0	Mr.	Samuel	A.	Johnson	NULL	0	NULL	<IndividualSurvey xmlns="http://schemas.microso...	C12F4596-1F8D-4F99-8163-0A4B59832178	2011-07-01 00:00:00
36	1165	SC	0	Ms.	Danielle	B.	Johnson	NULL	1	NULL	<IndividualSurvey xmlns="http://schemas.microso...	6DC82614-D87A-4265-908F-67B026612775	2013-07-31 00:00:00
37	1167	SC	0	Mr.	Dean	M.	Johnson	NULL	1	NULL	<IndividualSurvey xmlns="http://schemas.microso...	2637101E-84EE-4AEE-B7C7-3771E3E4797E	2013-07-31 00:00:00

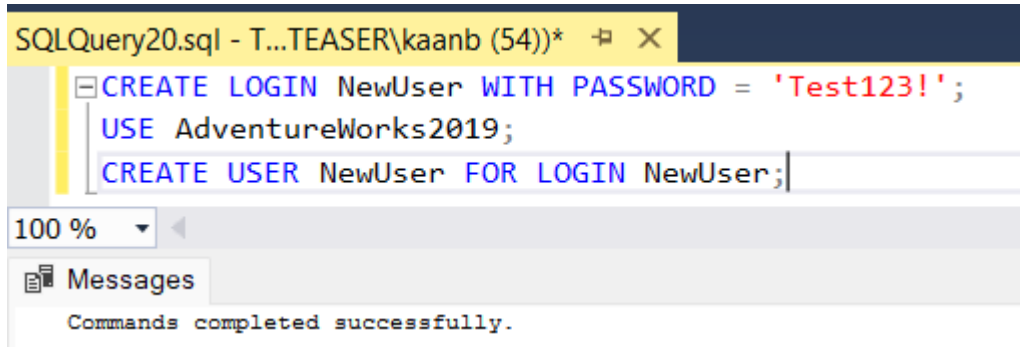
Query executed successfully.

TEASER (16.0 RTM) TEASER(kaanb (54)) AdventureWorks2019 00:00:00 1,253 rows

6. AŞAMA: Veri Yöneticisi Roller (Erişim Yönetimi)

SQL Server'da yeni bir kullanıcı oluşturulmuş ve AdventureWorks2019 veritabanına sadece okuma izni verilmiştir. Böylece veri güvenliği sağlanmış ve yetki sınırlandırması yapılmıştır.

1-Login ve user oluşturma:

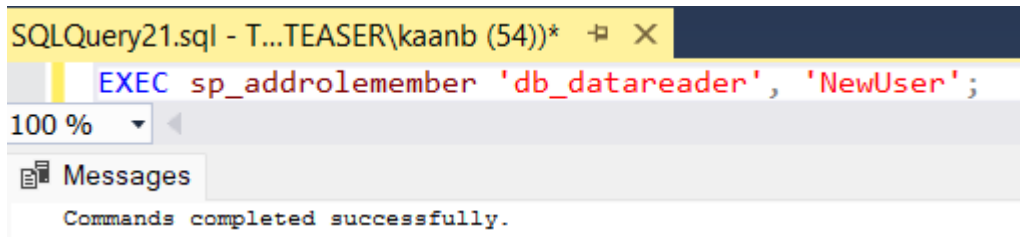
A screenshot of the SQL Server Enterprise Manager interface. The top pane shows a query window titled 'SQLQuery20.sql - T...TEASER\kaanb (54))*' with the following SQL code:

```
CREATE LOGIN NewUser WITH PASSWORD = 'Test123!';  
USE AdventureWorks2019;  
CREATE USER NewUser FOR LOGIN NewUser;
```

 The bottom pane shows the 'Messages' tab with the text 'Commands completed successfully.'

```
SQLQuery20.sql - T...TEASER\kaanb (54))*  
CREATE LOGIN NewUser WITH PASSWORD = 'Test123!';  
USE AdventureWorks2019;  
CREATE USER NewUser FOR LOGIN NewUser;  
100 %  
Messages  
Commands completed successfully.
```

2-Role ekleme:

A screenshot of the SQL Server Enterprise Manager interface. The top pane shows a query window titled 'SQLQuery21.sql - T...TEASER\kaanb (54))*' with the following SQL code:

```
EXEC sp_addrolemember 'db_datareader', 'NewUser';
```

 The bottom pane shows the 'Messages' tab with the text 'Commands completed successfully.'

```
SQLQuery21.sql - T...TEASER\kaanb (54))*  
EXEC sp_addrolemember 'db_datareader', 'NewUser';  
100 %  
Messages  
Commands completed successfully.
```

Sonuç:

Proje kapsamında yapılan çalışmalar sonucunda, SQL Server üzerinde çalışan sorguların kaynak tüketimleri analiz edilmiş, eksik indekslerin tespitiyle performans artışı sağlanmıştır. Özellikle uygun indeksleme ve sorgu iyileştirme teknikleri sayesinde sistemin işlem süreleri düşürülmüş, gereksiz yükler azaltılmıştır. Ayrıca, kullanıcı yetkilendirme işlemleri gerçekleştirilerek erişim güvenliği sağlanmıştır. Tüm işlemler GitHub platformuna yüklenmiş ve proje çıktıları dökümantasyon halinde sunulmuştur. Bu süreçler, büyük veritabanlarında yönetimsel verimliliği artırmak adına önemli bir temel oluşturmuştur.