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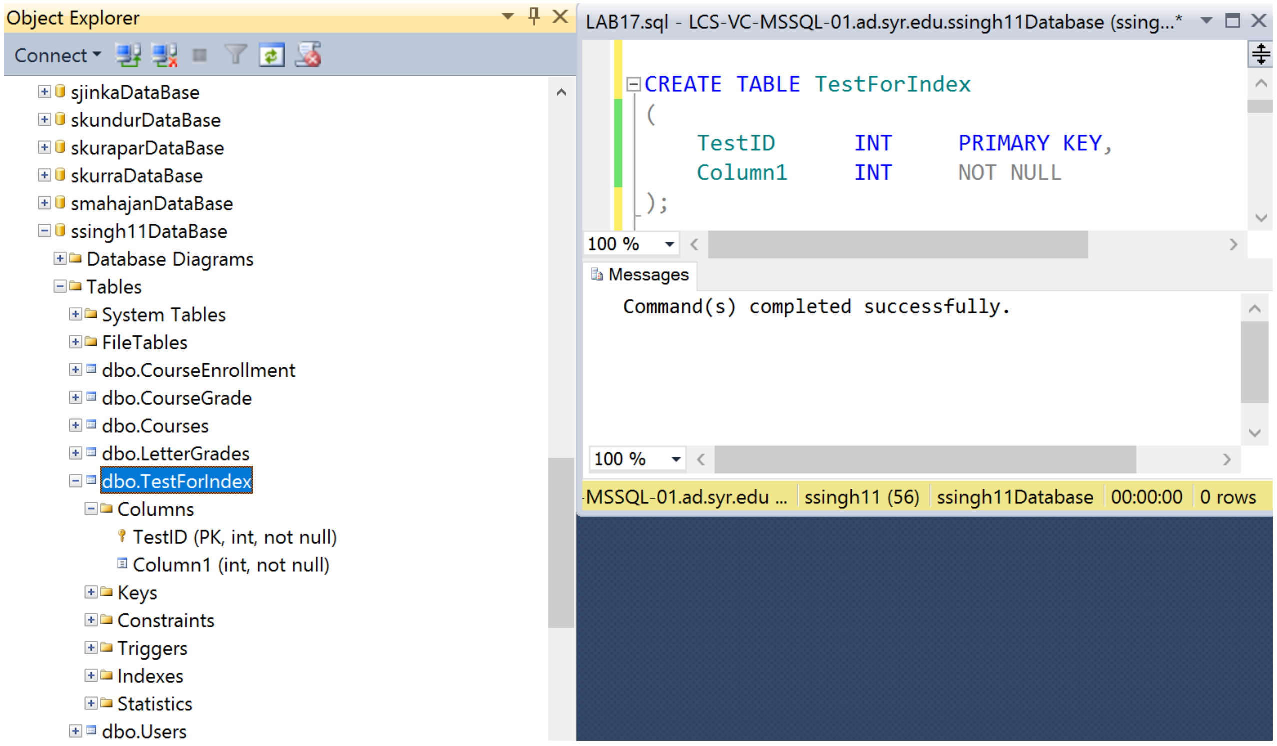
Lab 17: Performance tuning with Indexes.

1. Create the following table:

```
CREATE TABLE TestForIndex
(
        TestID              INT          PRIMARY KEY,
        Column1             INT          NOT NULL
);
```

Answer:



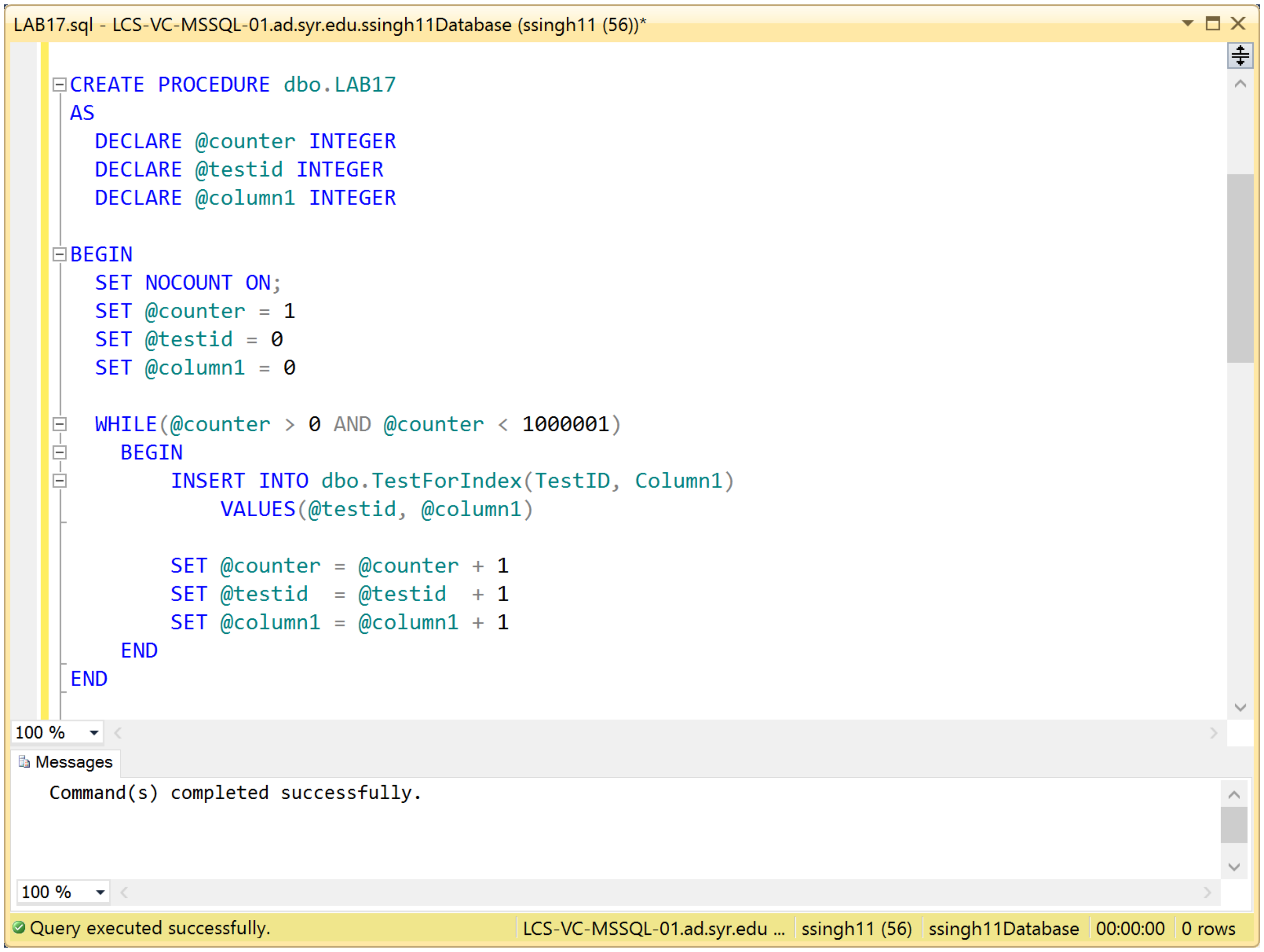
```
CREATE TABLE TestForIndex
(
    TestID      INT     PRIMARY KEY,
    Column1     INT     NOT NULL
);
```

```
Command(s) completed successfully.
```

2. Write a stored procedure that will insert 1 million records into the TestForIndex table. The values for both testId and column1 should start at 0 and increase by 1.

Answer:

```
CREATE PROCEDURE dbo.LAB17
AS
  DECLARE @counter INTEGER
  DECLARE @testid INTEGER
  DECLARE @column1 INTEGER

BEGIN
  SET NOCOUNT ON;
  SET @counter = 1
  SET @testid = 0
  SET @column1 = 0

  WHILE(@counter > 0 AND @counter < 1000001)
    BEGIN
            INSERT INTO dbo.TestForIndex(TestID, Column1)
                  VALUES(@testid, @column1)

            SET @counter = @counter + 1
            SET @testid  = @testid  + 1
            SET @column1 = @column1 + 1
    END
END
```



LAB17.sql - LCS-VC-MSSQL-01.ad.syr.edu.ssingh11Database (ssingh11 (56))*

```
CREATE PROCEDURE dbo.LAB17
AS
  DECLARE @counter INTEGER
  DECLARE @testid INTEGER
  DECLARE @column1 INTEGER

BEGIN
  SET NOCOUNT ON;
  SET @counter = 1
  SET @testid = 0
  SET @column1 = 0

  WHILE(@counter > 0 AND @counter < 1000001)
    BEGIN
        INSERT INTO dbo.TestForIndex(TestID, Column1)
            VALUES(@testid, @column1)

        SET @counter = @counter + 1
        SET @testid  = @testid  + 1
        SET @column1 = @column1 + 1
    END
END
```

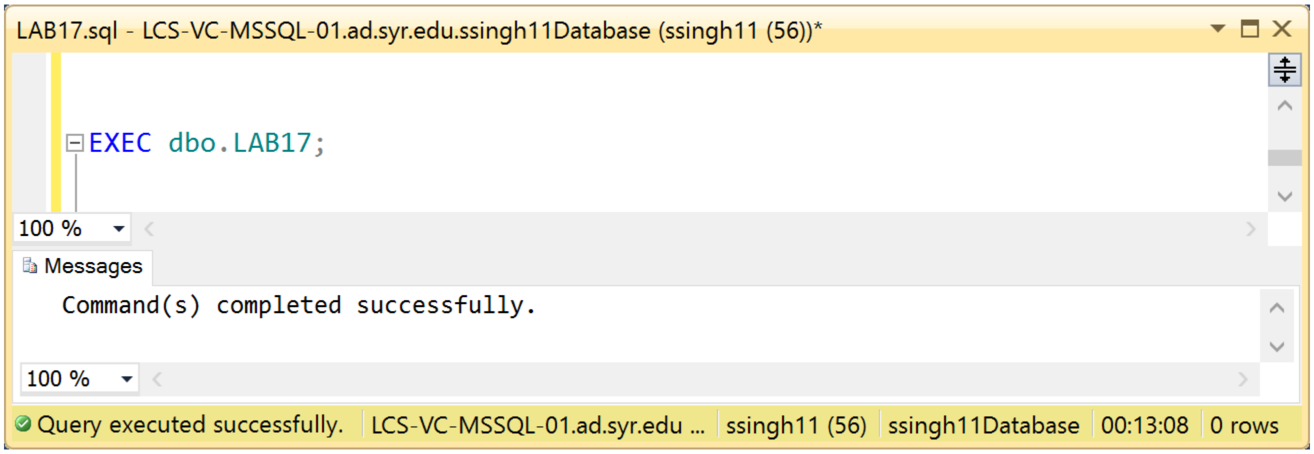
```
Command(s) completed successfully.
```

Query executed successfully. | LCS-VC-MSSQL-01.ad.syr.edu ... | ssingh11 (56) | ssingh11Database | 00:00:00 | 0 rows

3. Execute the SP. Once it finishes running, verify that the data was inserted.

Answer:

```
EXEC dbo.LAB17;
```



LAB17.sql - LCS-VC-MSSQL-01.ad.syr.edu.ssingh11Database (ssingh11 (56))*

```
EXEC dbo.LAB17;
```

100 %

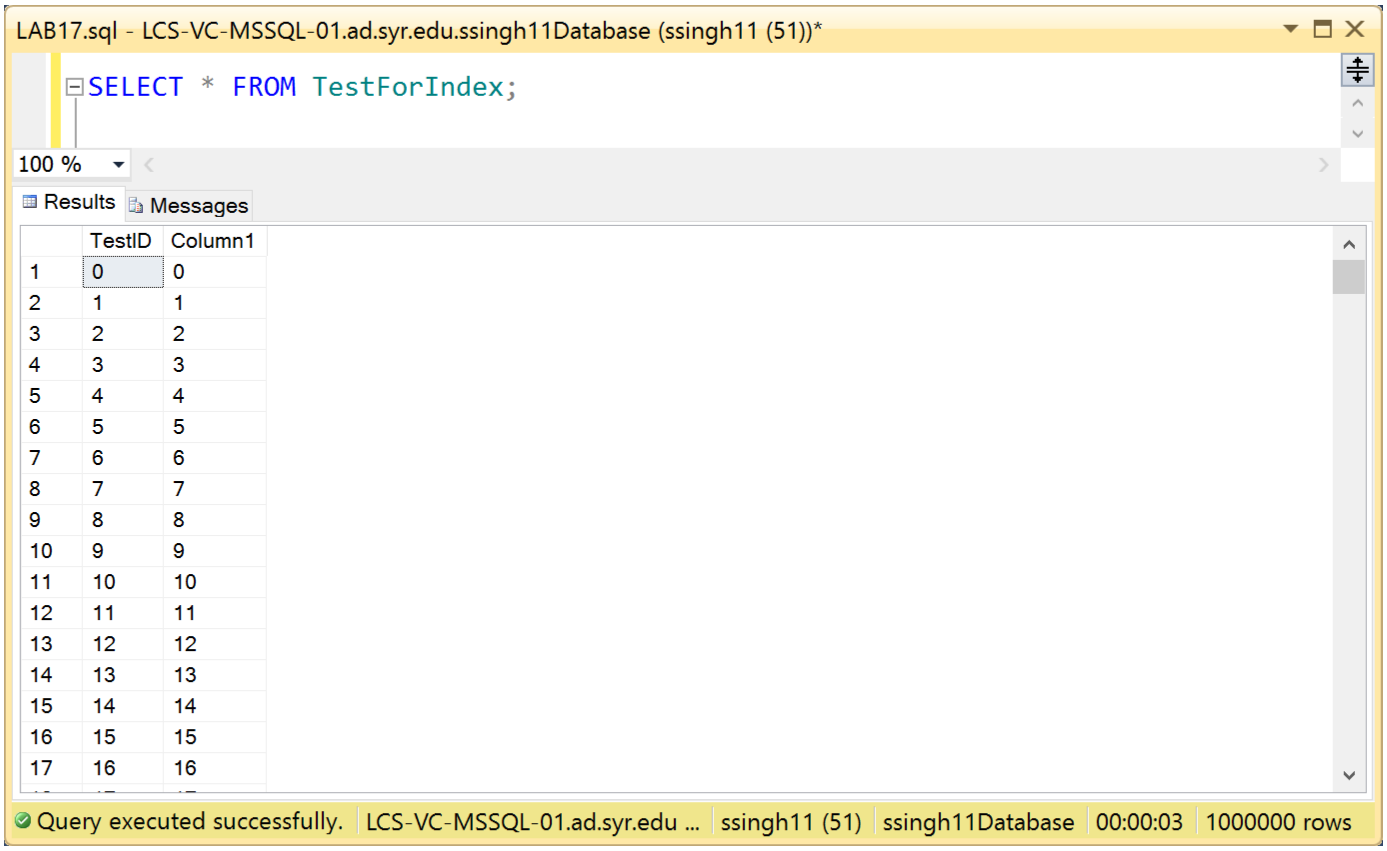
Messages

```
Command(s) completed successfully.
```

100 %

Query executed successfully. | LCS-VC-MSSQL-01.ad.syr.edu ... | ssingh11 (56) | ssingh11Database | 00:13:08 | 0 rows

```
SELECT * FROM TestForIndex;
```



LAB17.sql - LCS-VC-MSSQL-01.ad.syr.edu.ssingh11Database (ssingh11 (51))*

```
SELECT * FROM TestForIndex;
```

100 %

Results | Messages

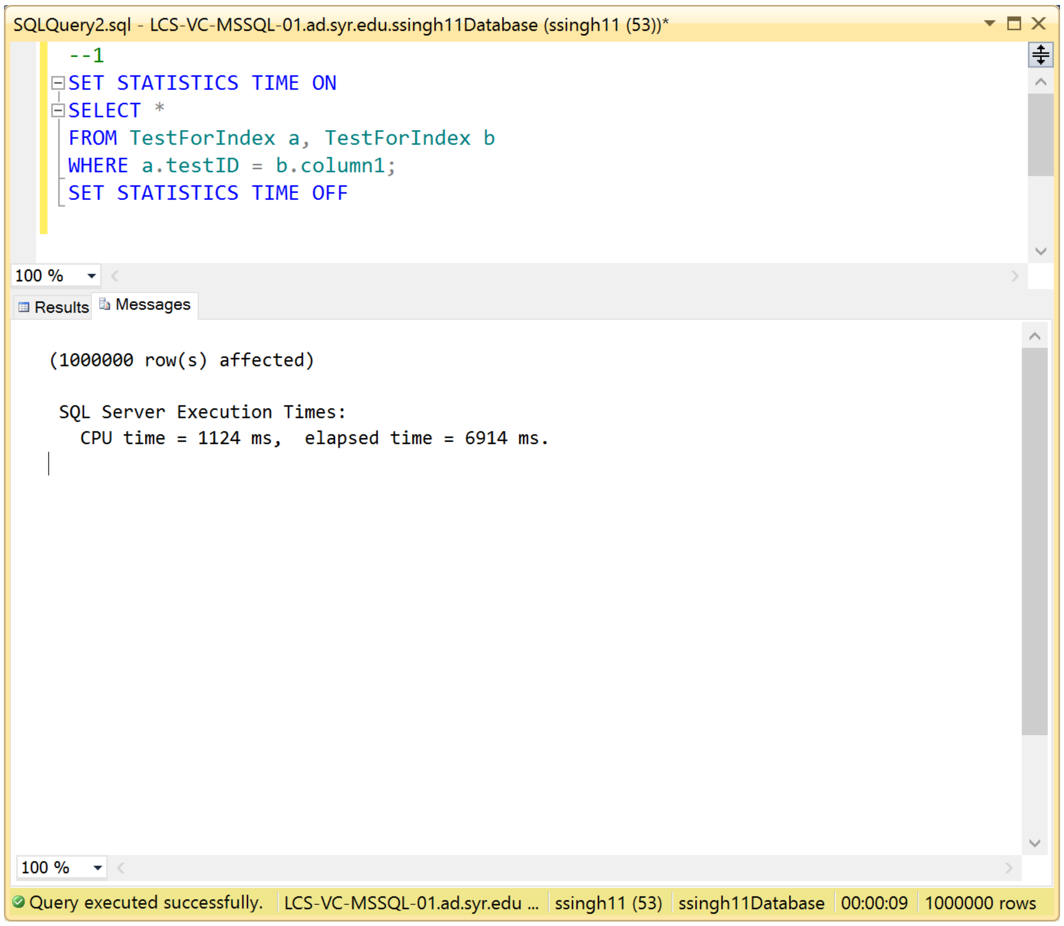
	TestID	Column1
1	0	0
2	1	1
3	2	2
4	3	3
5	4	4
6	5	5
7	6	6
8	7	7
9	8	8
10	9	9
11	10	10
12	11	11
13	12	12
14	13	13
15	14	14
16	15	15
17	16	16

Query executed successfully. | LCS-VC-MSSQL-01.ad.syr.edu ... | ssingh11 (51) | ssingh11Database | 00:00:03 | 1000000 rows

4. Run the following selects from the table, take note of the time it took to select the data. Run each statement 10 times, Average out the rest of the runs (for both the CPU time and the overall times).

```
SET STATISTICS TIME ON
SELECT *
      FROM TestForIndex a, TestForIndex b
      WHERE a.testID = b.column1;
SET STATISTICS TIME OFF
```

INDEX	CPU TIME	ELAPSED TIME
1	1124 ms	6914 ms
2	1295 ms	3830 ms
3	1248 ms	3462 ms
4	1294 ms	3780 ms
5	1232 ms	4243 ms
6	1311 ms	3719 ms
7	1591 ms	5578 ms
8	1310 ms	4672 ms
9	1326 ms	4174 ms
10	1311 ms	4106 ms
Average	1304.2	4447.8


SQLQuery2.sql - LCS-VC-MSSQL-01.ad.syr.edu.ssingh11Database (ssingh11 (53))*

```
--1
SET STATISTICS TIME ON
SELECT *
FROM TestForIndex a, TestForIndex b
WHERE a.testID = b.column1;
SET STATISTICS TIME OFF
```

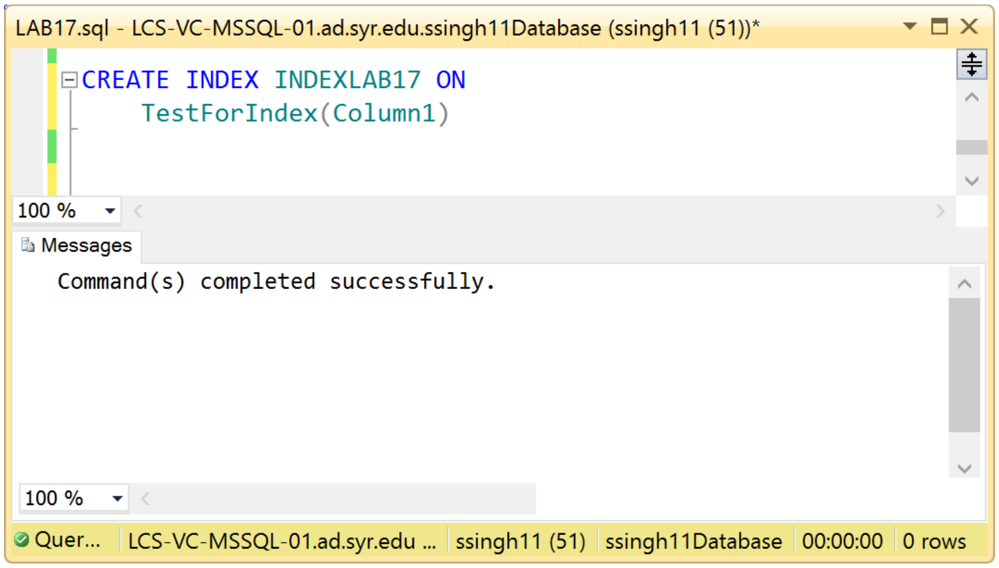
```
(1000000 row(s) affected)

 SQL Server Execution Times:
   CPU time = 1124 ms,  elapsed time = 6914 ms.
```

Query executed successfully. | LCS-VC-MSSQL-01.ad.syr.edu ... | ssingh11 (53) | ssingh11Database | 00:00:09 | 1000000 rows

5. Create an index on the column1 column.

Answer:

```
CREATE INDEX INDEXLAB17 ON
       TestForIndex(Column1)
```



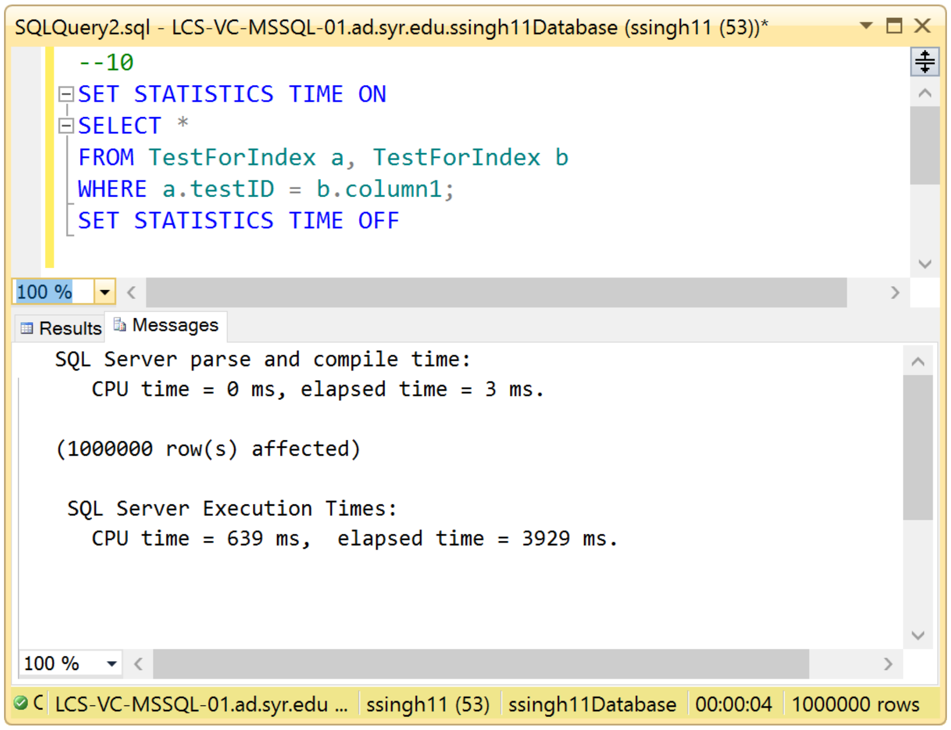
LAB17.sql - LCS-VC-MSSQL-01.ad.syr.edu.ssingh11Database (ssingh11 (51))*

```
CREATE INDEX INDEXLAB17 ON
     TestForIndex(Column1)
```

```
Command(s) completed successfully.
```

6. Run the selects again, following the same process as in #4.

INDEX	CPU TIME	ELAPSED TIME
1	656	4718
2	578	3705
3	390	4160
4	421	3521
5	577	4432
6	593	4353
7	515	4347
8	531	5614
9	593	4094
10	639	3929
Average:	549.3	4287.3


SQLQuery2.sql - LCS-VC-MSSQL-01.ad.syr.edu.ssingh11Database (ssingh11 (53))*
100 %
Results
Messages
100 %
LCS-VC-MSSQL-01.ad.syr.edu ...
ssingh11 (53)
ssingh11Database
00:00:04
1000000 rows

```
--10
SET STATISTICS TIME ON
SELECT *
FROM TestForIndex a, TestForIndex b
WHERE a.testID = b.column1;
SET STATISTICS TIME OFF
```

```
SQL Server parse and compile time:
   CPU time = 0 ms, elapsed time = 3 ms.

(1000000 row(s) affected)

 SQL Server Execution Times:
   CPU time = 639 ms,  elapsed time = 3929 ms.
```

7. Compute the difference (percentage change and actual change) between the indexed and non-indexed runs. Make sure that the performance increased as expected.

% change in CPU Time = (1304.2 – 549.3) /1304.2 = 754.9/1304.2 = 0.57882 = 0.57882 * 100 = **<u>57.8 %</u>**

% change in Elapesd Time = (4447.8-4287.3)/ 4447.8 =0.03608 * 100 = **<u>3.6 %</u>**