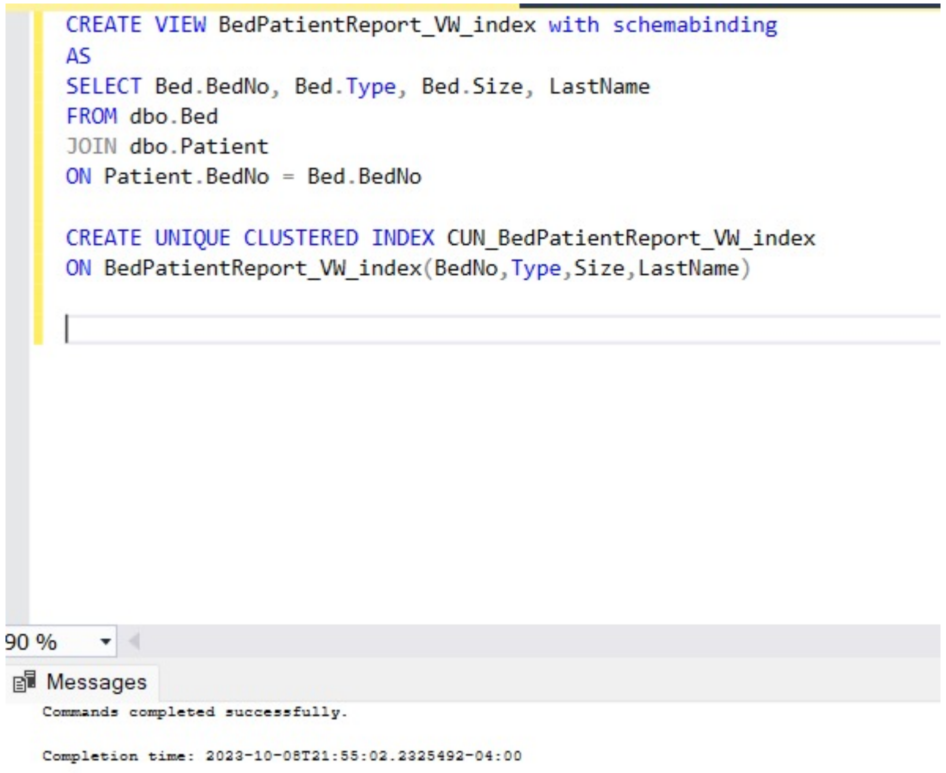
Indexing Fundamentals and Execution Plans

Creating indexed view

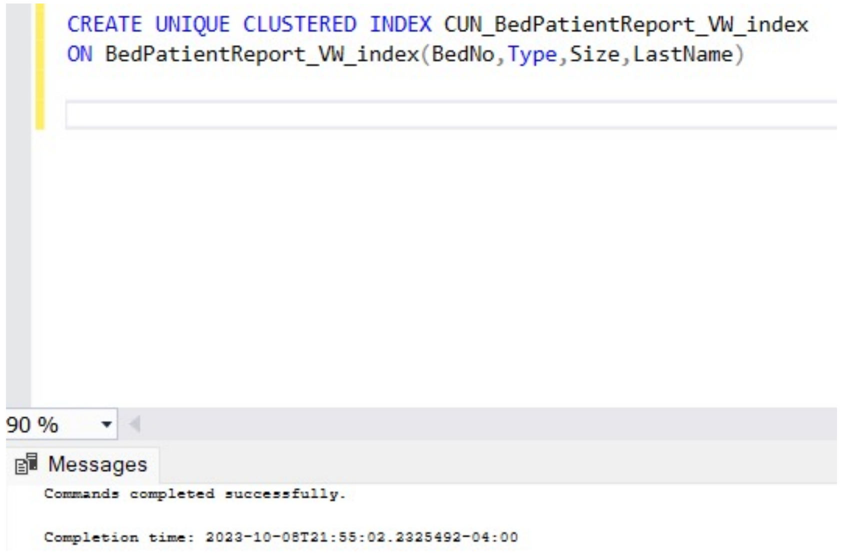


```
CREATE VIEW BedPatientReport_VW_index with schemabinding
AS
SELECT Bed.BedNo, Bed.Type, Bed.Size, LastName
FROM dbo.Bed
JOIN dbo.Patient
ON Patient.BedNo = Bed.BedNo

CREATE UNIQUE CLUSTERED INDEX CUN_BedPatientReport_VW_index
ON BedPatientReport_VW_index(BedNo,Type,Size,LastName)
```

90 %

Messages

```
Commands completed successfully.

Completion time: 2023-10-08T21:55:02.2325492-04:00
```

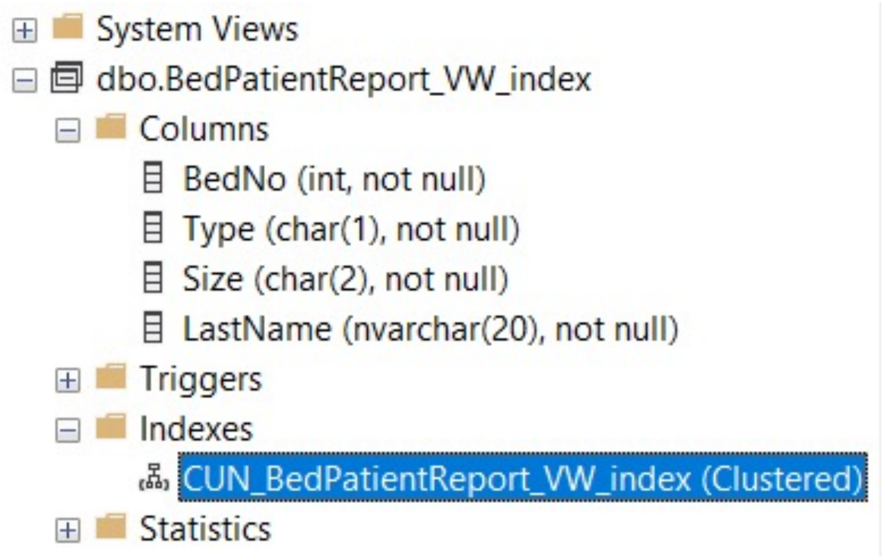


```
CREATE UNIQUE CLUSTERED INDEX CUN_BedPatientReport_VW_index
ON BedPatientReport_VW_index(BedNo,Type,Size,LastName)
```

90 %

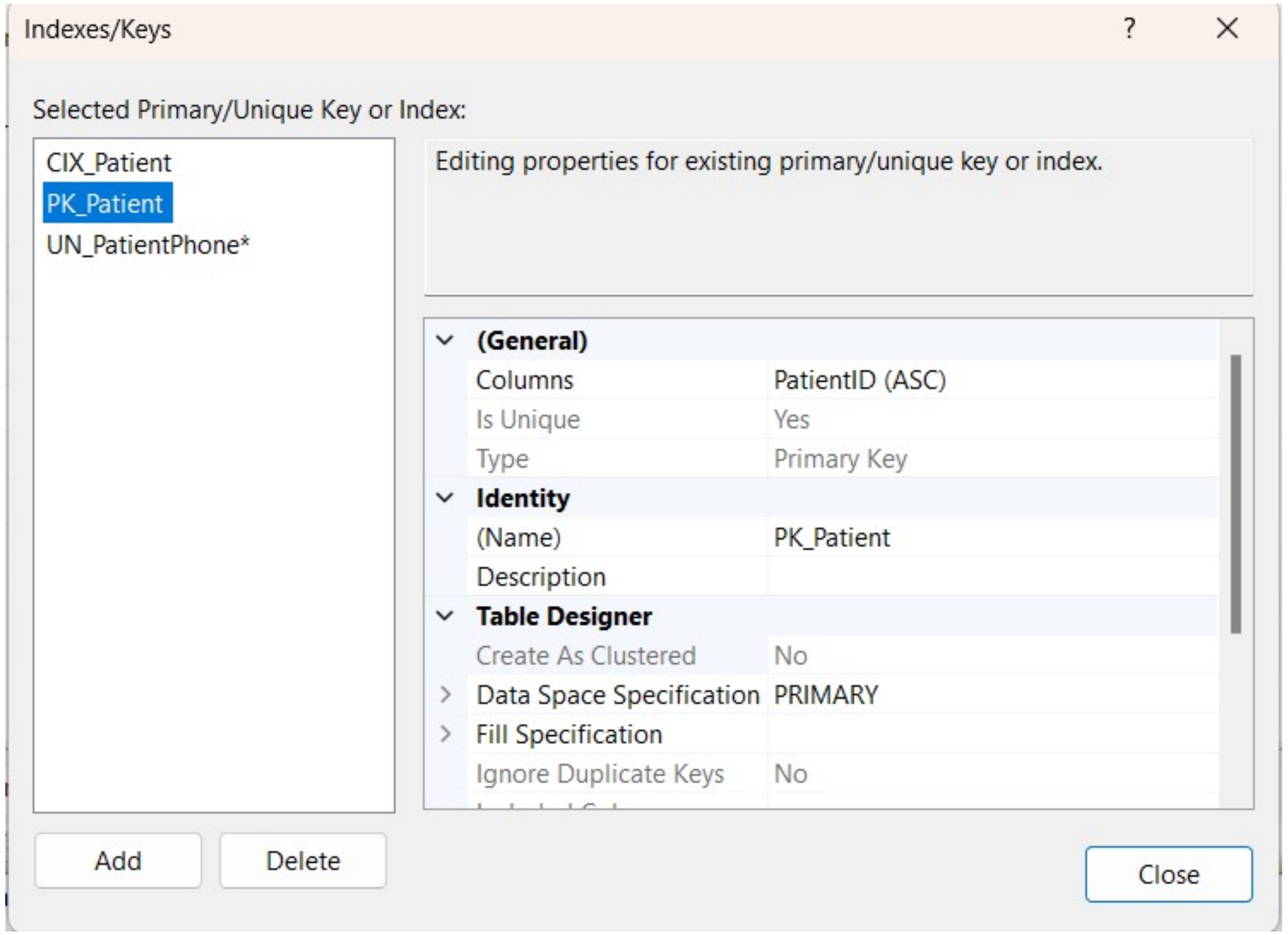
Messages

```
Commands completed successfully.

Completion time: 2023-10-08T21:55:02.2325492-04:00
```



```
System Views
dbo.BedPatientReport_VW_index
    Columns
        BedNo (int, not null)
        Type (char(1), not null)
        Size (char(2), not null)
        LastName (nvarchar(20), not null)
    Triggers
    Indexes
        CUN_BedPatientReport_VW_index (Clustered)
    Statistics
```

Set PK patientID to non-clustered



Indexes/Keys

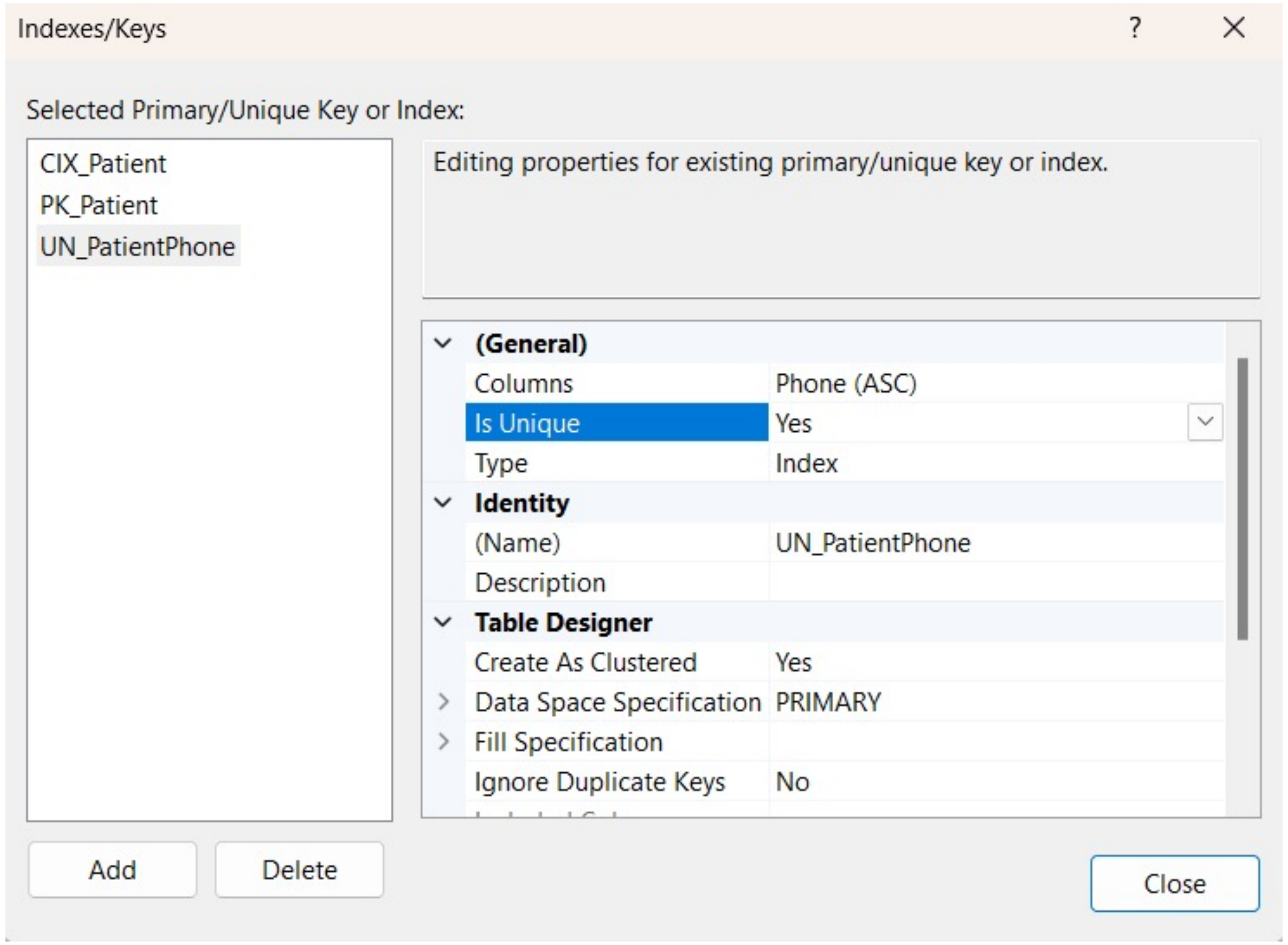
Selected Primary/Unique Key or Index:

- CIX_Patient
- PK_Patient
- UN_PatientPhone*

Editing properties for existing primary/unique key or index.

(General)	
Columns	PatientID (ASC)
Is Unique	Yes
Type	Primary Key
Identity	
(Name)	PK_Patient
Description	
Table Designer	
Create As Clustered	No
Data Space Specification	PRIMARY
Fill Specification	
Ignore Duplicate Keys	No

Set Phone column to unique key, and clustered



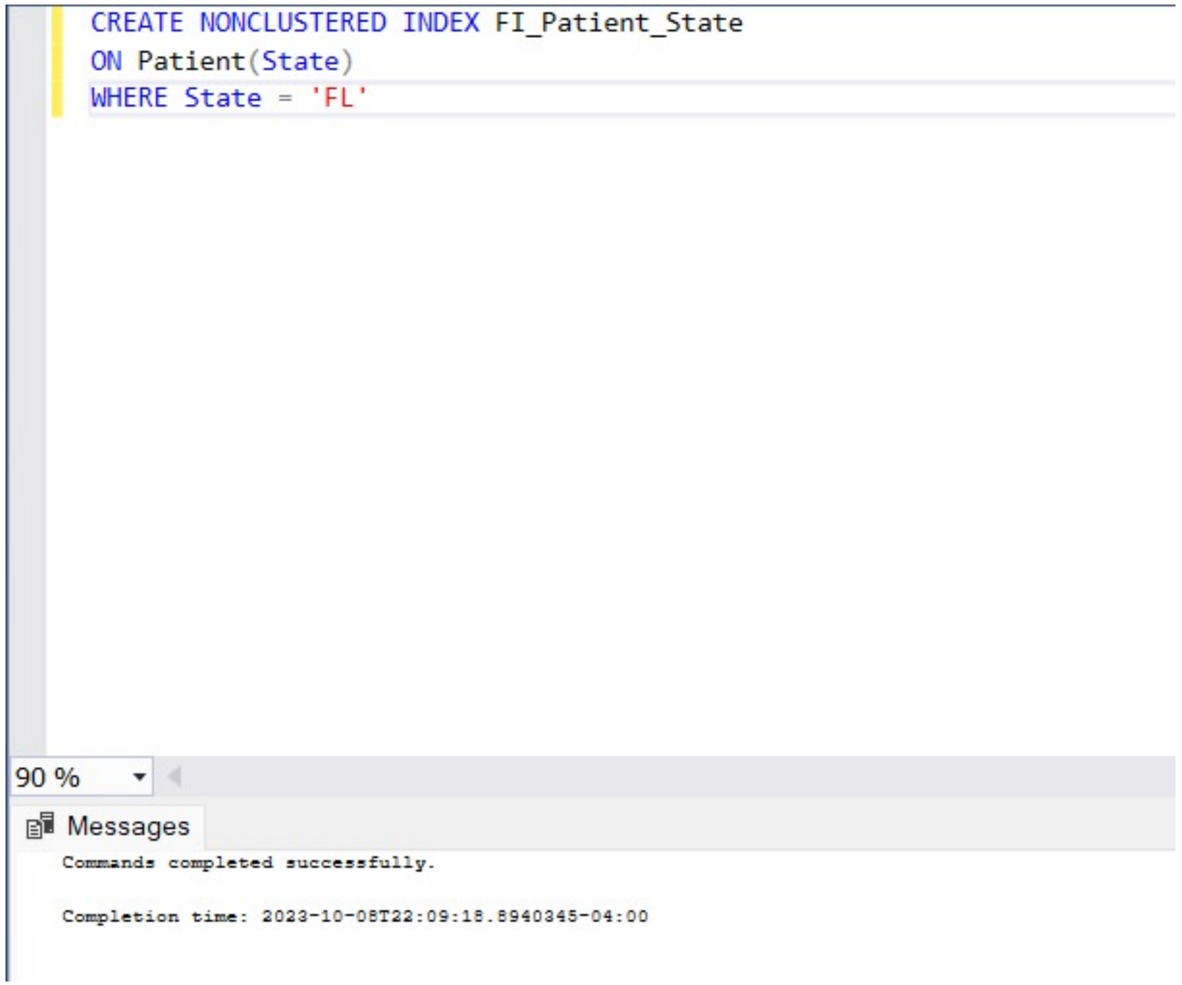
Selected Primary/Unique Key or Index:

- CIX_Patient
- PK_Patient
- UN_PatientPhone

Editing properties for existing primary/unique key or index.

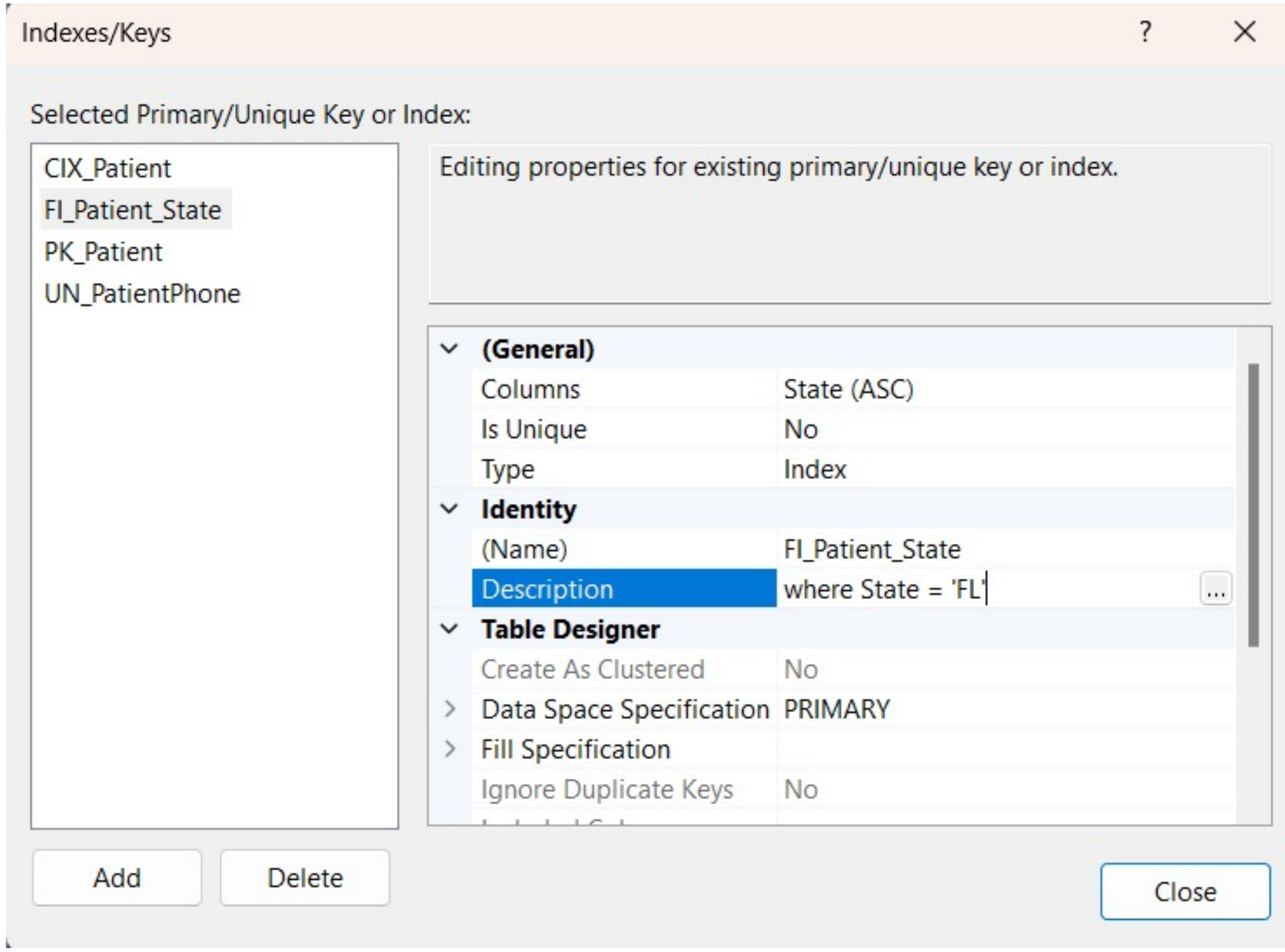
(General)	
Columns	Phone (ASC)
Is Unique	Yes
Type	Index
Identity	
(Name)	UN_PatientPhone
Description	
Table Designer	
Create As Clustered	Yes
Data Space Specification	PRIMARY
Fill Specification	
Ignore Duplicate Keys	No

Set State column to not unique, and create a filtered index to improve state selections.



```
CREATE NONCLUSTERED INDEX FI_Patient_State
ON Patient(State)
WHERE State = 'FL'
```

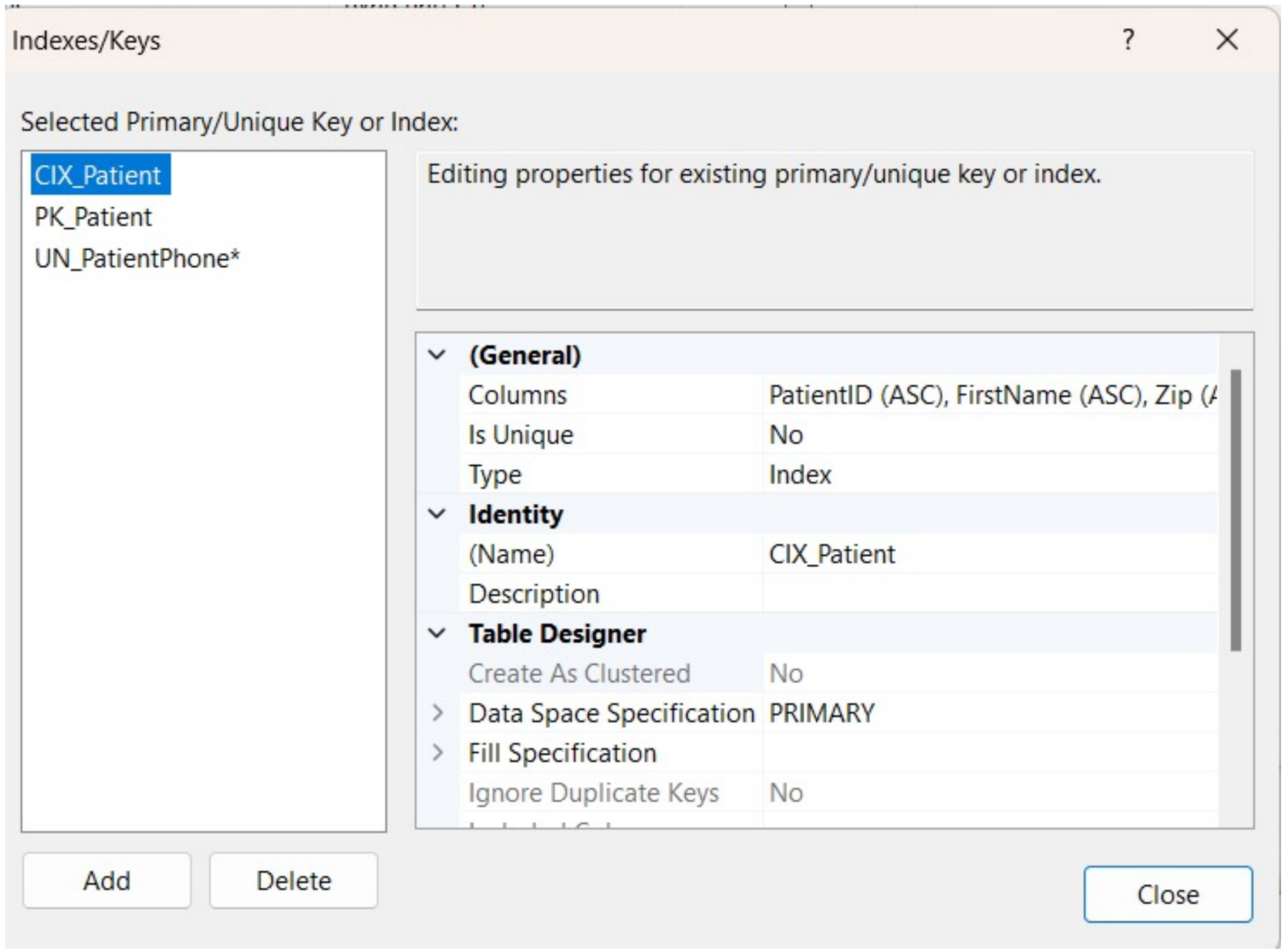
```
Commands completed successfully.

Completion time: 2023-10-08T22:09:18.8940345-04:00
```



Editing properties for existing primary/unique key or index.

(General)	
Columns	State (ASC)
Is Unique	No
Type	Index
Identity	
(Name)	FI_Patient_State
Description	where State = 'FL'
Table Designer	
Create As Clustered	No
Data Space Specification	PRIMARY
Fill Specification	
Ignore Duplicate Keys	No

Create a composite index (CIX) with any 3 columns


Indexes/Keys

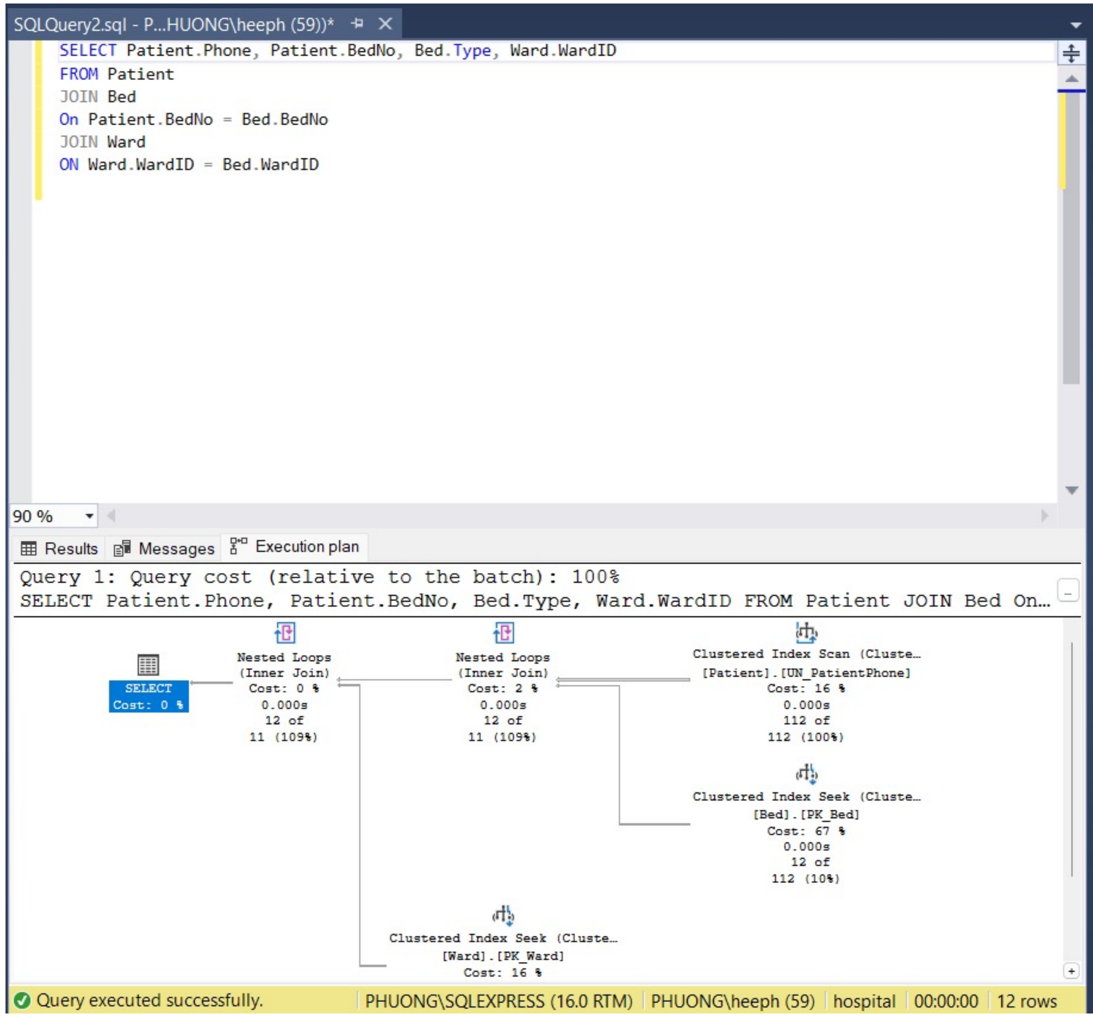
Selected Primary/Unique Key or Index:

CIX_Patient
PK_Patient
UN_PatientPhone*

Editing properties for existing primary/unique key or index.

(General)	
Columns	PatientID (ASC), FirstName (ASC), Zip (A
Is Unique	No
Type	Index
Identity	
(Name)	CIX_Patient
Description	
Table Designer	
Create As Clustered	No
Data Space Specification	PRIMARY
Fill Specification	
Ignore Duplicate Keys	No

3 Examples Select statements using the Patient table with Execution plan

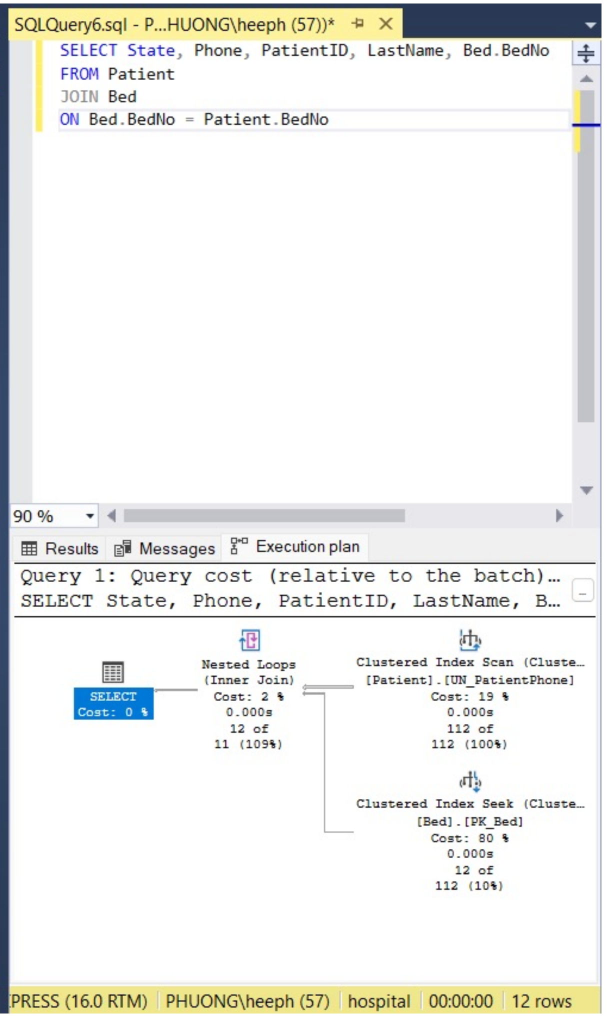


```sql
SELECT Patient.Phone, Patient.BedNo, Bed.Type, Ward.WardID
FROM Patient
JOIN Bed
On Patient.BedNo = Bed.BedNo
JOIN Ward
ON Ward.WardID = Bed.WardID
```

```
Query 1: Query cost (relative to the batch): 100%
SELECT Patient.Phone, Patient.BedNo, Bed.Type, Ward.WardID FROM Patient JOIN Bed On…
```

```
SELECT          Nested Loops      Nested Loops      Clustered Index Scan (Cluste…
Cost: 0 %       (Inner Join)      (Inner Join)      [Patient].[UN_PatientPhone]
                Cost: 0 %         Cost: 2 %         Cost: 16 %
                0.000s            0.000s            0.000s
                12 of             12 of             112 of
                11 (109%)         11 (109%)         112 (100%)

                                                    Clustered Index Seek (Cluste…
                                                    [Bed].[PK_Bed]
                                                    Cost: 67 %
                                                    0.000s
                                                    12 of
                                                    112 (10%)

                                  Clustered Index Seek (Cluste…
                                  [Ward].[PK_Ward]
                                  Cost: 16 %
```

Query executed successfully. | PHUONG\SQLEXPRESS (16.0 RTM) | PHUONG\heeph (59) | hospital | 00:00:00 | 12 rows

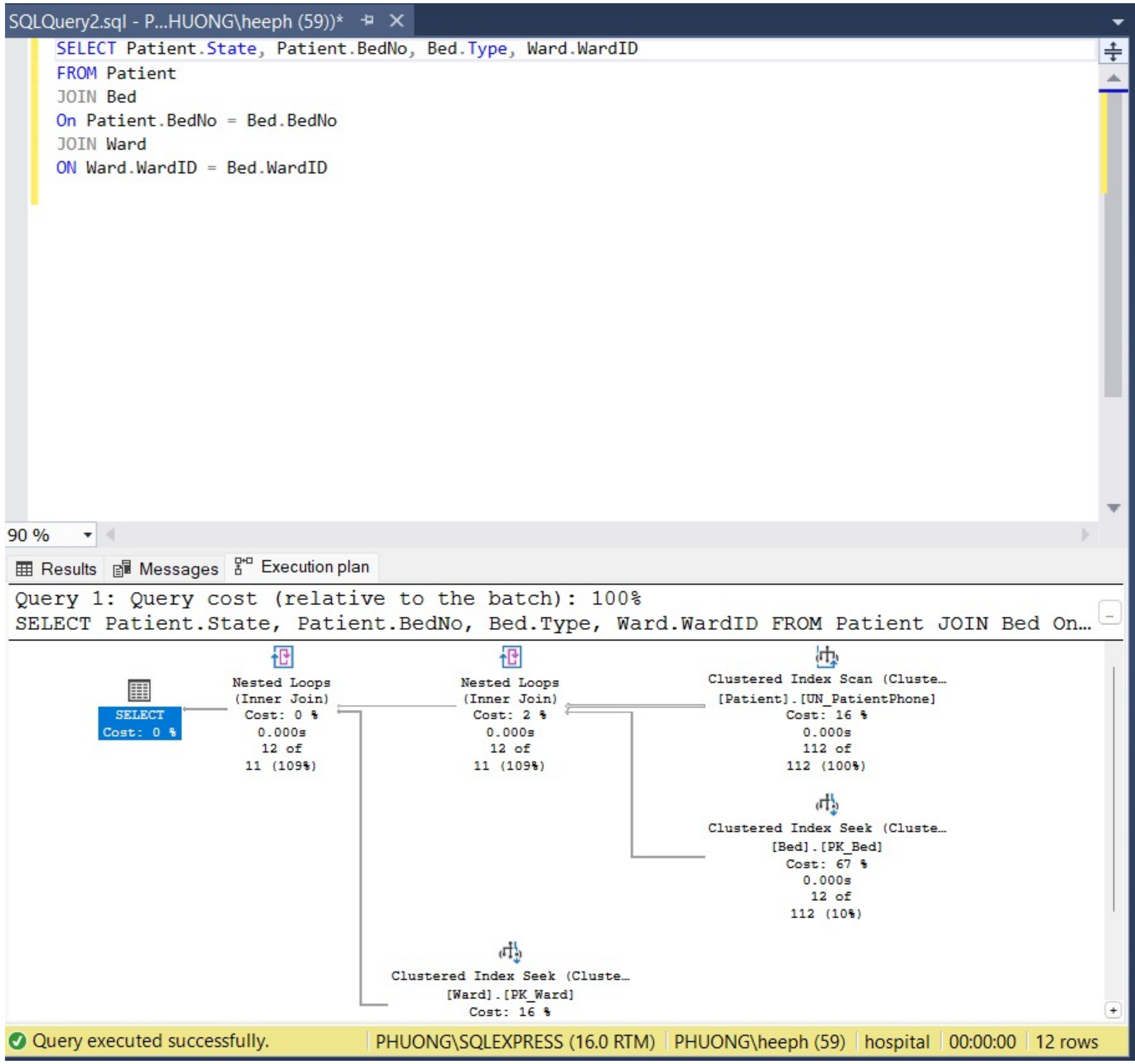


```sql
SELECT State, Phone, PatientID, LastName, Bed.BedNo
FROM Patient
JOIN Bed
ON Bed.BedNo = Patient.BedNo
```

```
Query 1: Query cost (relative to the batch)…
SELECT State, Phone, PatientID, LastName, B…
```

```
SELECT          Nested Loops      Clustered Index Scan (Cluste…
Cost: 0 %       (Inner Join)      [Patient].[UN_PatientPhone]
                Cost: 2 %         Cost: 19 %
                0.000s            0.000s
                12 of             112 of
                11 (109%)         112 (100%)

                                  Clustered Index Seek (Cluste…
                                  [Bed].[PK_Bed]
                                  Cost: 80 %
                                  0.000s
                                  12 of
                                  112 (10%)
```

PRESS (16.0 RTM) | PHUONG\heeph (57) | hospital | 00:00:00 | 12 rows

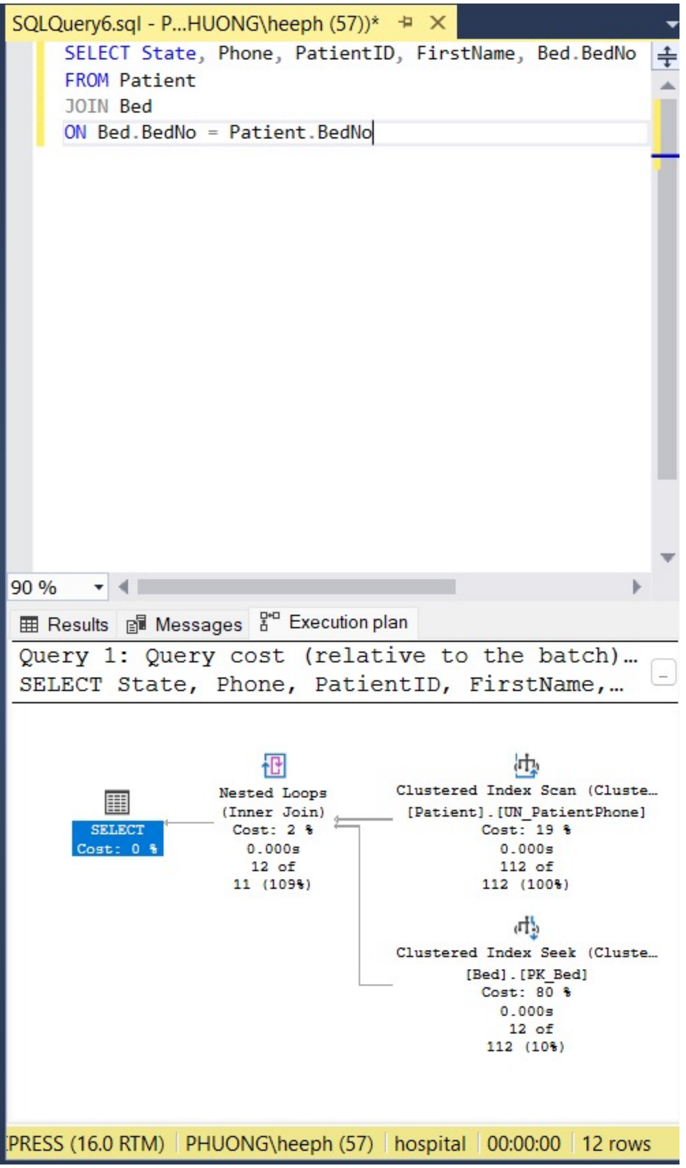


```sql
SELECT Patient.State, Patient.BedNo, Bed.Type, Ward.WardID
FROM Patient
JOIN Bed
On Patient.BedNo = Bed.BedNo
JOIN Ward
ON Ward.WardID = Bed.WardID
```

```
Query 1: Query cost (relative to the batch): 100%
SELECT Patient.State, Patient.BedNo, Bed.Type, Ward.WardID FROM Patient JOIN Bed On…
```

```
SELECT
Cost: 0 %

Nested Loops
(Inner Join)
Cost: 0 %
0.000s
12 of
11 (109%)

Nested Loops
(Inner Join)
Cost: 2 %
0.000s
12 of
11 (109%)

Clustered Index Scan (Cluste…
[Patient].[UN_PatientPhone]
Cost: 16 %
0.000s
112 of
112 (100%)

Clustered Index Seek (Cluste…
[Bed].[PK_Bed]
Cost: 67 %
0.000s
12 of
112 (10%)

Clustered Index Seek (Cluste…
[Ward].[PK_Ward]
Cost: 16 %
```

```
Query executed successfully. | PHUONG\SQLEXPRESS (16.0 RTM) | PHUONG\heeph (59) | hospital | 00:00:00 | 12 rows
```

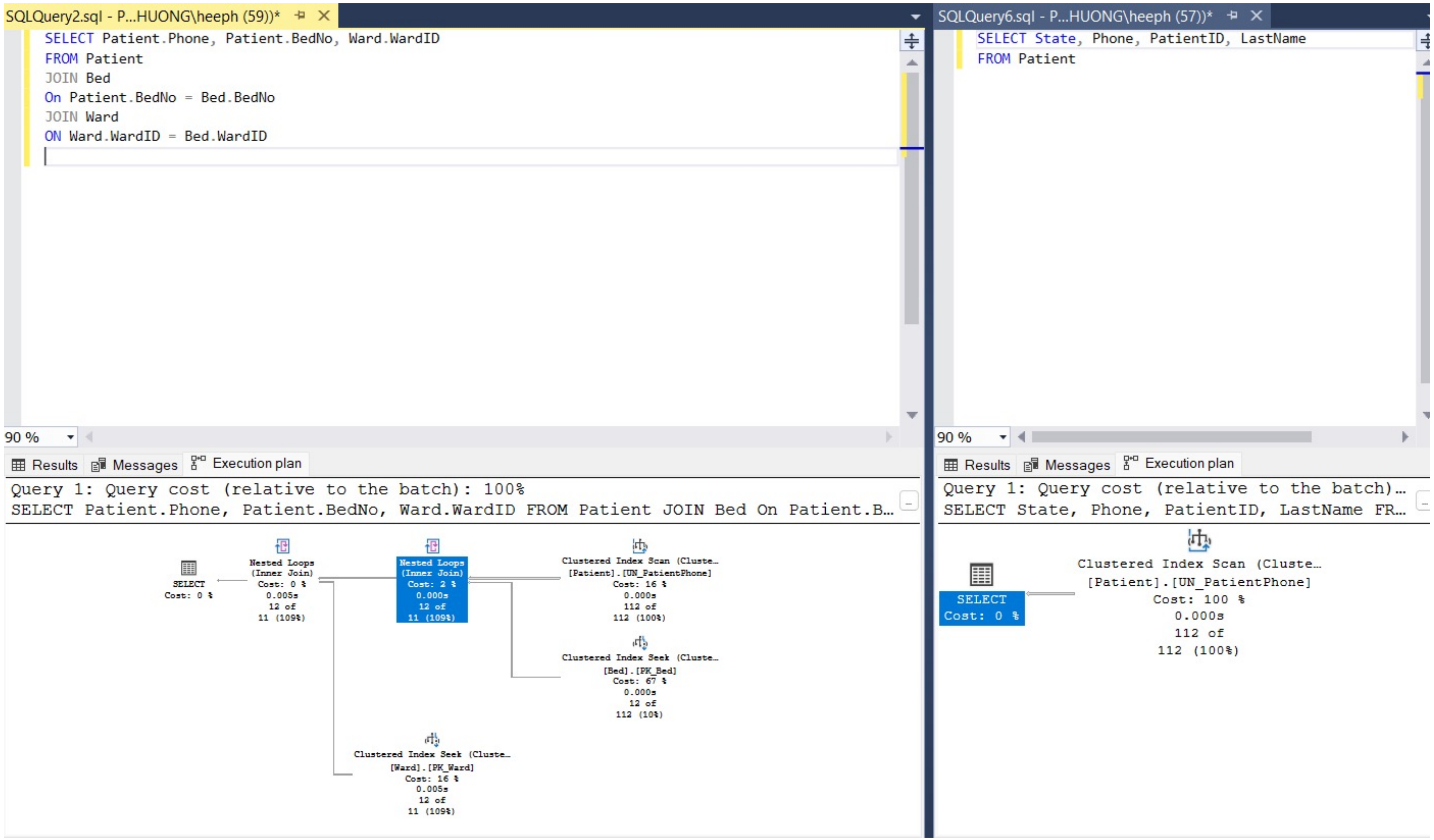


```sql
SELECT State, Phone, PatientID, FirstName, Bed.BedNo
FROM Patient
JOIN Bed
ON Bed.BedNo = Patient.BedNo
```

```
Query 1: Query cost (relative to the batch)…
SELECT State, Phone, PatientID, FirstName,…
```

```
SELECT
Cost: 0 %

Nested Loops
(Inner Join)
Cost: 2 %
0.000s
12 of
11 (109%)

Clustered Index Scan (Cluste…
[Patient].[UN_PatientPhone]
Cost: 19 %
0.000s
112 of
112 (100%)

Clustered Index Seek (Cluste…
[Bed].[PK_Bed]
Cost: 80 %
0.000s
12 of
112 (10%)
```

```
PRESS (16.0 RTM) | PHUONG\heeph (57) | hospital | 00:00:00 | 12 rows
```



```sql
SELECT Patient.Phone, Patient.BedNo, Ward.WardID
FROM Patient
JOIN Bed
On Patient.BedNo = Bed.BedNo
JOIN Ward
ON Ward.WardID = Bed.WardID
```

```
Query 1: Query cost (relative to the batch): 100%
SELECT Patient.Phone, Patient.BedNo, Ward.WardID FROM Patient JOIN Bed On Patient.B...
```

```sql
SELECT State, Phone, PatientID, LastName
FROM Patient
```

```
Query 1: Query cost (relative to the batch)...
SELECT State, Phone, PatientID, LastName FR...
```