

Lab 13: Triggers**Nidhi Surya Prakash****SUID:215895619****Purpose:**

Create a trigger.

Create a trigger¹ on insert/delete/update of the Enrollment table:**Scripts common:**

```
select * from nsuryapr.CourseEnrollment
select * from nsuryapr.Courses
```

- a. when inserting a new record, update the Courses table's OpenSeats for the course into which the student is being enrolled.

Script:

```
CREATE TRIGGER courseTriggers2 ON nsuryapr.CourseEnrollment
AFTER INSERT
AS
SET NOCOUNT ON;
BEGIN
DECLARE @OpenSeats INTEGER
DECLARE @CourseId INTEGER
SELECT @CourseId = i.CourseId from inserted i;
UPDATE nsuryapr.Courses
SET OpenSeats = OpenSeats - 1
WHERE CourseId = @CourseId
END;
```

Insert statement

```
Insert into nsuryapr.CourseEnrollment(StudentId ,CourseId)
Select NTID,courseId from nsuryapr.users,nsuryapr.Courses where NTID = '01-HJPotter' AND CourseId = 4
```

¹ You can create 3 triggers, one per action. If you create a single trigger that can do all 3, you get an extra 5% bonus.

Execution of script:

The screenshot shows the SQL Server Management Studio interface. On the left is the Object Explorer pane titled 'SERVERS' with a search bar. It lists several database objects under 'nsingh02' and 'nsuryapr'. The 'nsuryapr.CourseEnrollment' object is expanded, showing its columns (EnrollmentId, StudentId, CourseId, FinalGrade), keys, constraints, triggers, indexes, and statistics. On the right is the 'SQLQuery_2' window containing the following T-SQL code:

```
1 CREATE TRIGGER courseTriggers2 ON nsuryapr.CourseEnrollment
2 AFTER INSERT
3 AS
4 SET NOCOUNT ON;
5 BEGIN
6 DECLARE @OpenSeats INTEGER
7 DECLARE @CourseId INTEGER
8 SELECT @CourseId = i.CourseId FROM inserted i;
9 UPDATE nsuryapr.Courses
10 SET OpenSeats = OpenSeats - 1
11 WHERE CourseId = @CourseId
12 END;
13
14
```

The 'MESSAGES' pane at the bottom shows the execution results:

```
11:34:12 PM Started executing query at Line 1
Commands completed successfully.
Total execution time: 00:00:00.005
```

Course enrollment table before execution:

The screenshot shows the SQL Server Management Studio interface. The 'SERVERS' pane on the left lists database objects. The 'nsuryapr.CourseEnrollment' object is selected and expanded, showing its columns (EnrollmentId, StudentId, CourseId, FinalGrade). The 'RESULTS' pane on the right displays the data from the 'CourseEnrollment' table:

	EnrollmentId	StudentId	CourseId	FinalGrade
1	1	01-HJPotter	1	96
2	2	01-HJPotter	4	91
3	3	03-HGranger	1	92
4	4	03-HGranger	4	99
5	5	02-RBWeasley	1	91
6	6	02-RBWeasley	4	88
7	7	01-HJPotter	2	NULL
8	8	03-HGranger	6	NULL
9	9	03-HGranger	2	NULL

The 'MESSAGES' pane at the bottom shows the execution results:

```
11:20:19 PM Started executing query at Line 1
(9 rows affected)
Total execution time: 00:00:00.008
```

Courses table before changes:

The screenshot shows the Object Explorer on the left with the 'nsuryapr' database selected. In the center, two queries are running in separate panes. The top pane contains the following SQL code:

```
1 select * from nsuryapr.CourseEnrollment
2 select * from nsuryapr.Courses
```

The bottom pane displays the results of the second query, showing the following data:

CourseId	CourseCode	CourseTitle	Faculty	OpenSeats
1	DADA101	Defence Again...	16-Rhagid	3
2	DADA201	Defence Again...	16-Rhagid	1
3	DADA301	Defence Again...	16-Rhagid	1
4	CHMS101	Charms BASIC	11-Fflitwick	2
5	CHMS201	Charms INTER...	11-Fflitwick	0
6	CHMS301	Charms ADVA...	11-Fflitwick	4
7	HOM101	History of Magi...	NULL	10

At the bottom of the interface, there are status indicators and a toolbar.

After changes (I executed it twice) – inserted '01-HJPotter' to course 4

The screenshot shows the same environment as the previous one. The Object Explorer on the left shows the 'nsuryapr' database. The central area shows the following SQL code in the top pane:

```
1 select * from nsuryapr.CourseEnrollment
2 select * from nsuryapr.Courses
3
4 Insert into nsuryapr.CourseEnrollment(StudentId ,CourseId)
5 Select NTID,courseId from nsuryapr.users,nsuryapr.Courses where NTID = '01-HJPotter' AND CourseId = 4
6
7
```

The bottom pane shows the results of the second query, which now includes a new row for course 4:

CourseId	CourseCode	CourseTitle	Faculty	OpenSeats
1	DADA101	Defence Again...	16-Rhagid	3
2	DADA201	Defence Again...	16-Rhagid	1
3	DADA301	Defence Again...	16-Rhagid	1
4	CHMS101	Charms BASIC	11-Fflitwick	2
5	CHMS201	Charms INTER...	11-Fflitwick	0
6	CHMS301	Charms ADVA...	11-Fflitwick	4
7	HOM101	History of Magi...	NULL	10
8	CHMS401	Charms 401	11-Fflitwick	1

At the bottom of the interface, there are status indicators and a toolbar.

Servers

Search server names

- > nsingh02.CourseEnrollment
- > nsingh02.CourseGrade
- > nsingh02.Courses
- > nsingh02.LetterGrades
- > nsingh02.Users
- nsuryapr.CourseEnrollment
 - Columns
 - Keys
 - Constraints
 - Triggers
 - Indexes
 - Statistics
- nsuryapr.CourseGrade
- nsuryapr.Courses
 - Columns
 - Keys
 - Constraints
 - Triggers
 - Indexes

LCS-VC-MSSQL.ad.syr.edu SQLQuery_2 ● SQLQuery_1 ●

```
1 select * from nsuryapr.CourseEnrollment
2 select * from nsuryapr.Courses
3
4 Insert into nsuryapr.CourseEnrollment(StudentId ,CourseId)
5 Select NTID,courseId from nsuryapr.users,nsuryapr.Courses where NTID = '01-HJPotter' AND CourseId = 4
6
7
```

RESULTS

EnrollmentId	StudentId	CourseId	FinalGrade
2	2	01-HJPotter	4
3	3	03-HJGranger	1
4	4	03-HJGranger	4
5	5	02-RBWeasley	1
6	6	02-RBWeasley	4
7	7	01-HJPotter	2
8	8	03-HJGranger	6
9	9	03-HJGranger	2
10	10	01-HJPotter	4
11	11	01-HJPotter	4

MESSAGES

11:37:01 PM Started executing query at Line 1
(11 rows affected)
Total execution time: 00:00:00.007

11 rows 00:00:00 LCS-VC-MSSQL.ad.syr.edu : CSE581labs Ln 2, Col 1 (40 selected) Spaces: 4 UTF-8 LF SQL MSSQL ⚡ 1

Servers

Search server names

- > nsingh02.CourseEnrollment
- > nsingh02.CourseGrade
- > nsingh02.Courses
- > nsingh02.LetterGrades
- > nsingh02.Users
- nsuryapr.CourseEnrollment
 - Columns
 - Keys
 - Constraints
 - Triggers
 - Indexes
 - Statistics
- nsuryapr.CourseGrade
- nsuryapr.Courses
 - Columns
 - Keys
 - Constraints
 - Triggers
 - Indexes

LCS-VC-MSSQL.ad.syr.edu SQLQuery_2 ● SQLQuery_1 ●

```
1 select * from nsuryapr.CourseEnrollment
2 select * from nsuryapr.Courses
3
4 Insert into nsuryapr.CourseEnrollment(StudentId ,CourseId)
5 Select NTID,courseId from nsuryapr.users,nsuryapr.Courses where NTID = '01-HJPotter' AND CourseId = 4
6
7
```

RESULTS

CourseId	CourseCode	CourseTitle	Faculty	OpenSeats
1	DADA101	Defence Again...	16-Rhagrid	3
2	DADA201	Defence Again...	16-Rhagrid	1
3	DADA301	Defence Again...	16-Rhagrid	1
4	CHMS101	Charms BASIC	11-Fflitwick	0
5	CHMS201	Charms INTER...	11-Fflitwick	0
6	CHMS301	Charms ADVA...	11-Fflitwick	4
7	HOM101	History of Magi...	NULL	10

MESSAGES

11:37:39 PM Started executing query at Line 2
(7 rows affected)
Total execution time: 00:00:00.006

7 rows 00:00:00 LCS-VC-MSSQL.ad.syr.edu : CSE581labs Ln 3, Col 1 (31 selected) Spaces: 4 UTF-8 LF SQL MSSQL ⚡ 1

- b. when deleting a record, update the Courses table's OpenSeats for the course from which the student was deleted.

SCRIPT:

```

CREATE TRIGGER courseTiggers3 ON nsuryapr.CourseEnrollment
AFTER DELETE
AS
SET NOCOUNT ON;
BEGIN
DECLARE @OpenSeats INTEGER
DECLARE @CourseId INTEGER
SELECT @CourseId = d.CourseId FROM deleted d;
UPDATE nsuryapr.Courses
SET OpenSeats = OpenSeats + 1
WHERE CourseId = @CourseId
END;

```

Delete statement

```

Delete from nsuryapr.CourseEnrollment where StudentId = '01-HJPotter' AND
CourseId = 4

```

Execution of script:

```

14 CREATE TRIGGER courseTiggers3 ON nsuryapr.CourseEnrollment
15 AFTER DELETE
16 AS
17 SET NOCOUNT ON;
18 BEGIN
19 DECLARE @OpenSeats INTEGER
20 DECLARE @CourseId INTEGER
21 SELECT @CourseId = d.CourseId FROM deleted d;
22 UPDATE nsuryapr.Courses
23 SET OpenSeats = OpenSeats + 1
24 WHERE CourseId = @CourseId
25 END;

```

Execution of delete

The screenshot shows the SQL Server Management Studio interface. On the left is the Object Explorer pane titled 'SERVERS' with a search bar. It lists several database objects under 'nsuryapr.CourseEnrollment' and 'nsuryapr.Courses'. The 'Columns' node is expanded under both. In the center is the 'SQLQuery_2' window containing the following SQL code:

```
1 select * from nsuryapr.CourseEnrollment
2 select * from nsuryapr.Courses
3
4 Insert into nsuryapr.CourseEnrollment(StudentId ,CourseId)
5 Select NTID,courseId from nsuryapr.users,nsuryapr.Courses where NTID = '01-HJPotter' AND CourseId = 4
6
7 Delete from nsuryapr.CourseEnrollment where StudentId = '01-HJPotter' AND CourseId = 4
8
```

Below the code, the 'MESSAGES' pane shows the execution results:

```
1:14:54 AM Started executing query at Line 7
(3 rows affected)
Total execution time: 00:00:00.045
```

At the bottom, status information includes '0 rows 00:00:00 LCS-VC-MSSQL.ad.syr.edu : CSE581labs Ln 8, Col 1 (87 selected) Spaces: 4 UTF-8 LF SQL MSSQL'.

Course enrollment table after execution: deleted '01-HJPotter' from course 4

The screenshot shows the SQL Server Management Studio interface. The 'RESULTS' pane displays the contents of the 'nsuryapr.CourseEnrollment' table after the deletion:

EnrollmentId	StudentId	CourseId	FinalGrade
1	01-HJPotter	1	96
2	03-HJGranger	1	92
3	03-HJGranger	4	99
4	02-RBWeasley	1	91
5	02-RBWeasley	4	88
6	01-HJPotter	2	NULL
7	03-HJGranger	6	NULL
8	03-HJGranger	2	NULL

The 'MESSAGES' pane shows the execution results:

```
1:15:24 AM Started executing query at Line 1
(8 rows affected)
Total execution time: 00:00:00.057
```

At the bottom, status information includes '8 rows 00:00:00 LCS-VC-MSSQL.ad.syr.edu : CSE581labs Ln 2, Col 1 (40 selected) Spaces: 4 UTF-8 LF SQL MSSQL'.

Courses table after execution:

The screenshot shows the SSMS interface with the following details:

- Servers:** LCS-VC-MSSQL.ad.syr.edu
- SQL Query:** SQLQuery_2 (CSE581labs)
- Code:**

```
1 select * from nsuryapr.CourseEnrollment
2 select * from nsuryapr.Courses
3
4 Insert into nsuryapr.CourseEnrollment(StudentId ,CourseId)
5 Select NTID,courseId from nsuryapr.users,nsuryapr.Courses where NTID = '01-HJPotter' AND CourseId = 4
6
7 Delete from nsuryapr.CourseEnrollment where StudentId = '01-HJPotter' AND CourseId = 4
8
```
- Results:** A table showing course enrollment data.

CourseId	CourseCode	CourseTitle	Faculty	OpenSeats
1	DADA101	Defence Again...	16-Rhagrid	3
2	DADA201	Defence Again...	16-Rhagrid	1
3	DADA301	Defence Again...	16-Rhagrid	1
4	CHMS101	Charms BASIC	11-Fflitwick	1
5	CHMS201	Charms INTER...	11-Fflitwick	0
6	CHMS301	Charms ADVA...	11-Fflitwick	4
7	HOM101	History of Magi...	NULL	10

- Messages:**
 - Started executing query at Line 2 (7 rows affected)
 - Total execution time: 00:00:00.042
- Bottom Status Bar:** 7 rows 00:00:00 LCS-VC-MSSQL.ad.syr.edu : CSE581labs Ln 3, Col 1 (31 selected) Spaces: 4 UTF-8 LF SQL MSSQL

- c. if an update happened on the CourseId (student switched courses), adjust the Courses table's OpenSeats accordingly.

SCRIPT:

```
CREATE TRIGGER courseTriggers4 ON nsuryapr.CourseEnrollment
AFTER INSERT,DELETE
AS
SET NOCOUNT ON;
BEGIN
DECLARE @CourseId INTEGER
DECLARE @CourseId2 INTEGER
SELECT @CourseId = i.CourseId from inserted i;
SELECT @CourseId2 = d.CourseId from deleted d;
UPDATE nsuryapr.Courses
SET OpenSeats = OpenSeats - 1
WHERE CourseId = @CourseId
UPDATE nsuryapr.Courses
SET OpenSeats = OpenSeats + 1
WHERE CourseId = @CourseId
END;
```

Update statement:

```
Update nsuryapr.CourseEnrollment
set CourseId=6, FinalGrade=null
WHERE StudentId='02-RBWeasley' and CourseId =4
```

```
Update nsuryapr.CourseEnrollment
set CourseId=2, FinalGrade=null
WHERE StudentId='03-HJGranger' and CourseId =6
```

Script execution

The screenshot shows the SSMS interface with the following details:

- Servers:** LCS-VC-MSSQL.ad.syr.edu
- Query panes:** SQLQuery_2 (active), SQLQuery_1
- Text pane content:**

```
27 CREATE TRIGGER courseTiggers4 ON nsuryapr.CourseEnrollment
28 AFTER INSERT,DELETE
29 AS
30 SET NOCOUNT ON;
31 BEGIN
32 DECLARE @CourseId INTEGER
33 DECLARE @CourseId2 INTEGER
34 SELECT @CourseId = i.CourseId from inserted i
35 SELECT @CourseId2 = d.CourseId from deleted d
36 UPDATE nsuryapr.Courses
37 SET OpenSeats = OpenSeats - 1
38 WHERE CourseId = @CourseId
39 UPDATE nsuryapr.Courses
40 SET OpenSeats = OpenSeats + 1
41 WHERE CourseId = @CourseId2
42 END;
```
- Messages pane:**

2:08:29 AM Started executing query at Line 22
Commands completed successfully.
Total execution time: 00:00:00.043
- Status bar:** 0 rows 00:00:00 LCS-VC-MSSQL.ad.syr.edu : CSE581labs Ln 42, Col 5 (418 selected) Spaces: 4 UTF-8 LF SQL MSSQL

Update statement execution:

The screenshot shows the SSMS interface with the following details:

- Servers:** LCS-VC-MSSQL.ad.syr.edu
- Query panes:** SQLQuery_2 (active), SQLQuery_1
- Text pane content:**

```
1 select * from nsuryapr.CourseEnrollment
2 select * from nsuryapr.Courses
3
4 Insert into nsuryapr.CourseEnrollment(StudentId ,CourseId)
5 Select NTID,courseId from nsuryapr.users,nsuryapr.Courses where NTID = '01-HJPotter' AND CourseId = 4
6
7 Delete from nsuryapr.CourseEnrollment where StudentId = '01-HJPotter' AND CourseId = 4
8
9 Update nsuryapr.CourseEnrollment
10 set CourseId=6, FinalGrade=null
11 WHERE StudentId='02-RBWeasley' and CourseId =4
12
```
- Messages pane:**

1:40:03 AM Started executing query at Line 9
(1 row affected)
Total execution time: 00:00:00.051
- Status bar:** 0 rows 00:00:00 LCS-VC-MSSQL.ad.syr.edu : CSE581labs Ln 11, Col 47 (111 selected) Spaces: 4 UTF-8 LF SQL MSSQL

Servers

```

1 select * from nsuryapr.CourseEnrollment
2 select * from nsuryapr.Courses
3
4 Insert into nsuryapr.CourseEnrollment(StudentId ,CourseId)
5 Select NTID,courseId from nsuryapr.users,nsuryapr.Courses where NTID = '01-HJPotter' AND CourseId = 4
6
7 Delete from nsuryapr.CourseEnrollment where StudentId = '01-HJPotter' AND CourseId = 4
8
9 Update nsuryapr.CourseEnrollment
10 set CourseId=2, FinalGrade=null
11 WHERE StudentId='03-HJGranger' and CourseId =6
12

```

MESSAGES

2:14:58 AM Started executing query at Line 9
(1 row affected)
Total execution time: 00:00:00.046

0 rows 00:00:00 LCS-VC-MSSQL.ad.syr.edu : CSE581labs Ln 12, Col 1 (112 selected) Spaces: 4 UTF-8 LF SQL MSSQL 😊 1

CourseEnrollment table after execution

Servers

```

1 select * from nsuryapr.CourseEnrollment
2 select * from nsuryapr.Courses
3
4 Insert into nsuryapr.CourseEnrollment(StudentId ,CourseId)
5 Select NTID,courseId from nsuryapr.users,nsuryapr.Courses where NTID = '01-HJPotter' AND CourseId = 4
6
7 Delete from nsuryapr.CourseEnrollment where StudentId = '01-HJPotter' AND CourseId = 4
8
9 Update nsuryapr.CourseEnrollment
10 set CourseId=6, FinalGrade=null
11 WHERE StudentId='02-RBWeasley' and CourseId =4
12

```

EnrollmentId	StudentId	CourseId	FinalGrade
1	01-HJPotter	1	96
2	03-HJGranger	1	92
3	03-HJGranger	4	99
4	02-RBWeasley	1	91
5	02-RBWeasley	6	NULL
6	01-HJPotter	2	NULL
7	03-HJGranger	6	NULL
8	03-HJGranger	2	NULL

MESSAGES

1:40:23 AM Started executing query at Line 1
(8 rows affected)
Total execution time: 00:00:00.041

8 rows 00:00:00 LCS-VC-MSSQL.ad.syr.edu : CSE581labs Ln 2, Col 1 (40 selected) Spaces: 4 UTF-8 LF SQL MSSQL 😊 1

Servers

Search server names

```

1 select * from nsuryapr.CourseEnrollment
2 select * from nsuryapr.Courses
3
4 Insert into nsuryapr.CourseEnrollment(StudentId ,CourseId)
5 Select NTID,courseId from nsuryapr.users,nsuryapr.Courses where NTID = '01-HJPotter' AND CourseId = 4
6
7 Delete from nsuryapr.CourseEnrollment where StudentId = '01-HJPotter' AND CourseId = 4
8
9 Update nsuryapr.CourseEnrollment
10 set CourseId=2, FinalGrade=null
11 WHERE StudentId='03-HJGranger' and CourseId =6
12

```

RESULTS

	Enrollmentid	Studentid	Courseld	FinalGrade
1	1	01-HJPotter	1	96
2	3	03-HJGranger	1	92
3	4	03-HJGranger	4	99
4	5	02-RBWeasley	1	91
5	6	02-RBWeasley	6	NULL
6	7	01-HJPotter	2	NULL
7	8	03-HJGranger	2	NULL
8	9	03-HJGranger	2	NULL

MESSAGES

2:15:11 AM Started executing query at Line 1
(8 rows affected)
Total execution time: 00:00:00.061

8 rows 00:00:00 LCS-VC-MSSQL.ad.syr.edu : CSE581labs Ln 2, Col 1 (40 selected) Spaces: 4 UTF-8 LF SQL MSSQL 😊 1

Courses table after execution

Servers

Search server names

```

1 select * from nsuryapr.CourseEnrollment
2 select * from nsuryapr.Courses
3
4 Insert into nsuryapr.CourseEnrollment(StudentId ,CourseId)
5 Select NTID,courseId from nsuryapr.users,nsuryapr.Courses where NTID = '01-HJPotter' AND CourseId = 4
6
7 Delete from nsuryapr.CourseEnrollment where StudentId = '01-HJPotter' AND CourseId = 4
8
9 Update nsuryapr.CourseEnrollment
10 set CourseId=6, FinalGrade=null
11 WHERE StudentId='02-RBWeasley' and CourseId =4
12

```

RESULTS

	Courseld	CourseCode	CourseTitle	Faculty	OpenSeats
1	1	DADA101	Defence Again...	16-Rhagrid	3
2	2	DADA201	Defence Again...	16-Rhagrid	1
3	3	DADA301	Defence Again...	16-Rhagrid	1
4	4	CHMS101	Charms BASIC	11-Filtwick	1
5	5	CHMS201	Charms INTER...	11-Filtwick	0
6	6	CHMS301	Charms ADVA...	11-Filtwick	4
7	7	HOM101	History of Magi...	NULL	10

MESSAGES

1:41:02 AM Started executing query at Line 2
(7 rows affected)
Total execution time: 00:00:00.100

7 rows 00:00:00 LCS-VC-MSSQL.ad.syr.edu : CSE581labs Ln 3, Col 1 (31 selected) Spaces: 4 UTF-8 LF SQL MSSQL 😊 1