

IT420: Database Management and Organization

Triggers and Stored Procedures (Chapter 7, 11)

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Last time

- SQL Views

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Today

- Triggers
- Stored procedures

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Triggers

- **Trigger**: stored program that is executed by the DBMS whenever a specified event occurs
- Associated with a table or view
- Three trigger types: **BEFORE**, **INSTEAD OF**, and **AFTER**
- Each type can be declared for INSERT, UPDATE, and/or DELETE

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Uses for Triggers

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Create Trigger – Generic Syntax

- CREATE TRIGGER *trigger_name*
ON *table_or_view_name*
AFTER | BEFORE | INSTEAD OF
INSERT | UPDATE | DELETE
AS
trigger_code

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Trigger for Enforcing a Data Constraint – SQL Server

Arenas (*ArenaID*, *ArenaName*, *City*, *ArenaCapacity*), *ArenaCapacity* >= 5000

```
CREATE TRIGGER minseating ON Arenas /*trigger associated to Arenas*/  
FOR INSERT /*executed after an insert*/  
AS  
DECLARE @capacity as int /*variable declarations */  
SELECT @capacity = ArenaCapacity /* get values inserted */  
FROM inserted  
  
if @capacity < 5000  
  
BEGIN  
ROLLBACK /*undo the insert*/  
Print 'Arena too small' /*message for the user*/  
END
```

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Trigger for Referential Integrity Actions – pseudo-code

```
CREATE TRIGGER EMPLOYEE_DeleteCheck  
INSTEAD OF DELETION ON DeleteEmployee  
  
DECLARE  
    rowcount int ;  
  
BEGIN  
    /* First determine if this is the last employee in the  
    department */  
    SELECT Count (*) into rowcount  
    FROM EMPLOYEE  
    WHERE EMPLOYEE : EmployeeNumber = old : EmployeeNumber  
  
    IF rowcount > 1 Then  
        /* Not last employee , allow deletion */  
        DELETE EMPLOYEE  
        WHERE EMPLOYEE : EmployeeNumber = old : EmployeeNumber  
  
    ELSE  
  
        /* Send a message to the user saying cannot delete last  
        employee in a department . */  
  
    END IF ;  
  
END ;
```

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Class Exercise

- Concerts (PerformerID, ArenaID, ConcertDate, TicketPrice)
- Define a trigger: if inserted price is below 25, print a message and change the ticket price to 25.
- Insert rows to test the trigger

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Stored Procedures

- A **stored procedure** is a program that is stored within the database and is compiled when used
- Stored procedures can receive input parameters and they can return results
- Stored procedures can be called from:
 - Standard languages
 - Scripting languages
 - SQL command prompt

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Stored Procedure Advantages

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Create And Execute Stored Procedures

- `CREATE PROCEDURE proc_name`
`AS proc_code`
- `exec proc_name [@param1 =]value1, ...`

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Stored Procedure Example

- Performers (PerformerID, PerformerName, Street, City, State, Zip)
- Procedure: Insert a performer only if same name and zip not already in the table

Performers (PerformerID, PerformerName, Street, City, State, Zip, ActivityID)

```
CREATE PROCEDURE performer_Insert IF @Count > 0
  @ID int,                          BEGIN
  @NewName char(20),                PRINT 'Performer is already in the
  @street char(20),                  Database'
  @city char(15),                    RETURN
  @state char(2),                    END
  @NewZip int
AS                                     BEGIN TRANSACTION

  DECLARE @Count as int              INSERT INTO
                                     Performers(PerformerID,
  SELECT @Count = Count(*)           PerformerName, Street, City, State,
  FROM Performers                    Zip) VALUES (@ID, @NewName,
  WHERE PerformerName                 @street, @city, @state, @NewZip)
  =@NewName AND Zip = @NewZip        PRINT 'Performer added to database'

                                     COMMIT
```

To run: `exec performer_Insert @ID = 10, @NewName = 'James Brown', @street = 'Main', @city = 'Aiken', @state = 'SC', @NewZip = 54322`

Class Exercise

- Add code to the previous procedure to prevent anyone named 'Spears' to be inserted into the DB. Print an error explicative message when that happens.
- Test the procedure (exec)

Triggers vs. Stored Procedures

- Trigger
 - Module of code that is called by the DBMS when INSERT, UPDATE, or DELETE commands are issued
 - Assigned to a table or view
 - Depending on the DBMS, may have more than one trigger per table or view
 - Triggers may issue INSERT, UPDATE, and DELETE commands and thereby may cause the invocation of other triggers
- Stored Procedure
 - Module of code that is called by a user or database administrator
 - Assigned to a database, but not to a table or a view
 - Can issue INSERT, UPDATE, and DELETE commands
 - Used for repetitive administration tasks or as part of an application

Class Exercise

- Students(Alpha, LName, FName, GPA)
- Enroll(Alpha, CourseID, Semester, Grade)
- GradeValues(LetterGrade, PointValue)

- Define a trigger to update the GPA every time the student gets a new grade, or a grade changes