

**INFO-H-415**

**Lab 1**

**SQL Server Triggers (1)**

# SQL Server Triggers : Types

- Triggered **directly** after an instruction (i.e. not after each row or each transaction)
- **AFTER triggers** : triggered after the instruction takes place
- **INSTEAD OF trigger** : does not execute the instruction, executes in place of it

# SQL Server Triggers : Syntax

```
CREATE TRIGGER <name> ON <table>  
{AFTER|INSTEAD OF} <list of events>  
AS  
<transact-SQL-statements>
```

- events : INSERT, DELETE, UPDATE

# SQL Server Triggers : Tables

- Inside the `<transact-SQL-statements>`:
  - Tables **INSERTED** and **DELETED** can be used
  - Since the trigger is at the instruction level, these tables can contain many rows
- On **DELETE** :
  - **DELETED** contains the removed rows
- On **INSERT** :
  - **INSERTED** contains the new rows
- On **UPDATE** :
  - **DELETED** contains the rows before the modification
  - **INSERTED** contains the rows after the modification

# Example

- **Employee**(Name, Salary, Department)  
Department references Department.DeptNo
- **Department**(DeptNo, Manager)  
Manager references Employee.Name
- The salary of an employee cannot be greater than that of his manager.
- When can it happen?

# Example

- The salary of an employee cannot be greater than that of his manager.
- When can it happen?
  - When adding an employee
  - When modifying an employee salary
  - When modifying an employee department
  - When modifying the manager of a department

# Example

**Employee**(Name, Salary, Department)  
**Department**(DeptNo, Manager)

- When adding an employee:

```
CREATE TRIGGER salaryEmployee ON Employee
AFTER INSERT
AS
IF EXISTS (
    SELECT * FROM Inserted NewE, Department D, Employee Mgr
    WHERE NewE.Department = D.DeptNo and
          D.Manager = Mgr.Name and
          Mgr.Salary < NewE.Salary
)
BEGIN
    RAISERROR 13000 'The salary of an employee
    cannot be greater than that of his manager'
    ROLLBACK
END
```

# Procedure

- Suppose that the database is initially consistent.
- Determine when a constraint can be violated.
- Then, decide on an action to be taken
  - Abort or repair
- Write the trigger
- Test the trigger, by editing the data in a way that violates the constraint

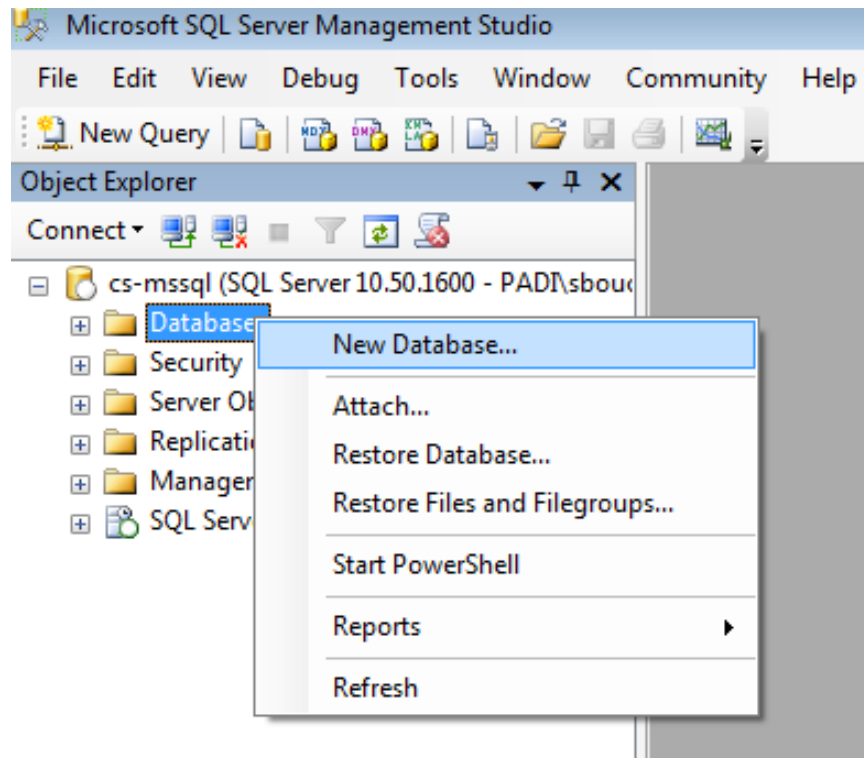


# Testing

- Microsoft SQL Server 2008 R2
  - SQL Server Management Studio
- Server name: cs-mssql



# Create database



Database name:

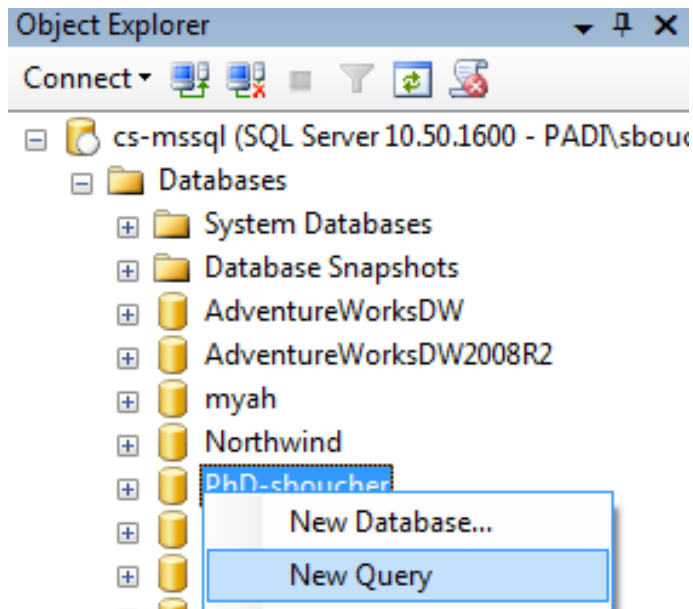
PhD\_sboucher|

Owner:




<default>



# Load schema



## Session 1 : Exercises "PhD"

- ▶  [Recap \(French version\)](#)
- ▶  [Recap \(English version\)](#)
- ▶  [SQL Server Scripts](#)

<http://cs.ulb.ac.be/public/teaching/infoh415/tp>

# Load schema

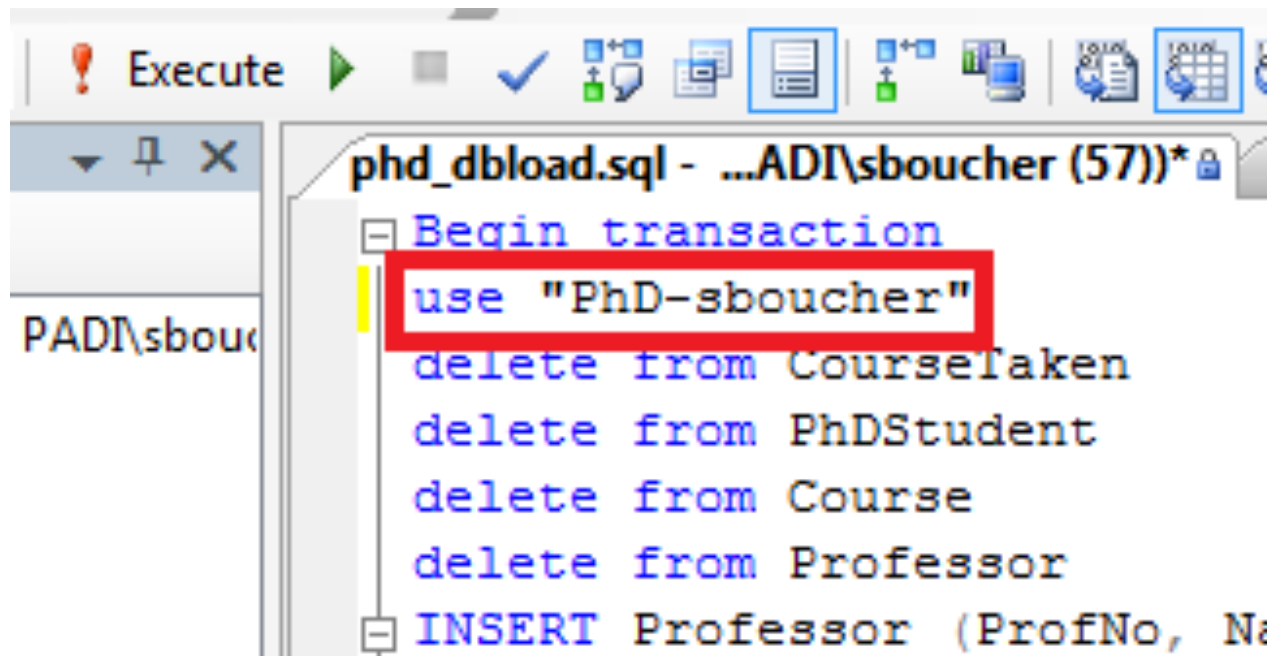
Nom	Type
phd_createtable	Microsoft SQL Server Q
phd_dbload	Microsoft SQL Server Q

The screenshot shows the Microsoft SQL Server Management Studio interface. The main window displays a SQL query script for creating two tables: `Professor` and `PhDStudent`. The `Execute` button in the toolbar is highlighted with a red box. The Object Explorer on the left shows the server structure, including the `PhD-sboucher` database.

```
create table Professor (  
  ProfNo char(5) not null,  
  Name varchar(25) not null,  
  Laboratory varchar(25) not null,  
  constraint PK_Professor primary key (ProfNo)  
)  
  
create table PhDStudent (  
  StudentNo char(9) not null,  
  Name varchar(25) not null,  
  Laboratory varchar(25),  
  Supervisor char(5),
```

# Load db

Nom	Type
phd_createtable	Microsoft SQL Server Q
phd_dbload	Microsoft SQL Server Q



The screenshot shows the SQL Server Enterprise Manager interface. The top toolbar includes an 'Execute' button with a green play icon. Below the toolbar, a query window titled 'phd\_dbload.sql - ...ADI\sboucher (57))\*' is open. The SQL code in the window is as follows:

```
Begin transaction
use "PhD-sboucher"
delete from CourseTaken
delete from PhDStudent
delete from Course
delete from Professor
INSERT Professor (ProfNo, Na
```

The line `use "PhD-sboucher"` is highlighted with a red rectangular box.