# Problems with our database

select \* from tblEmployee where EmployeeNumber = 2001

select T.EmployeeNumber as TEmployeeNumber,

 E.EmployeeNumber as EEmployeeNumber,

 sum(Amount) as SumAmount

from tblTransaction AS T

LEFT JOIN tblEmployee AS E

ON T.EmployeeNumber = E.EmployeeNumber

group by T.EmployeeNumber, E.EmployeeNumber

order by EEmployeeNumber

BEGIN TRAN

UPDATE tblEmployee

SET DateOfBirth = '2101-01-01'

WHERE EmployeeNumber = 537

select \* from tblEmployee ORDER BY DateOfBirth DESC

ROLLBACK TRAN

BEGIN TRAN

UPDATE tblEmployee

SET EmployeeGovernmentID = 'aaaa'

WHERE EmployeeNumber BETWEEN 530 AND 539

select \* from tblEmployee ORDER BY EmployeeGovernmentID ASC

ROLLBACK TRAN

insert into tblEmployee

select NULL, EmployeeFirstName, EmployeeMiddleName, EmployeeLastName, EmployeeGovernmentID, DateOfBirth, Department

from tblEmployee

# What are constraints?

INSERT INTO tblEmployee

values (2001, 'FirstName', 'M', 'LastName', 'AB123456C', '1994-01-01', 'Commerical')

INSERT INTO tblEmployee

values (null, 'AnotherFirstName', 'N', 'AnotherLastName', 'AB123457C', '1994-01-02', 'Finance')

delete from tblEmployee

Where EmployeeNumber > 2000

# Unique constraints in action

alter table tblEmployee

ADD CONSTRAINT unqGovernmentID UNIQUE (EmployeeGovernmentID);

select EmployeeGovernmentID, count(EmployeeGovernmentID) as MyCount from tblEmployee

group by EmployeeGovernmentID

having count(EmployeeGovernmentID)>1

select \* from tblEmployee where EmployeeGovernmentID IN ('HN513777D', 'TX593671R')

begin tran

delete from tblEmployee

where EmployeeNumber < 3

delete top(2) from tblEmployee

where EmployeeNumber in (131, 132)

select \* from tblEmployee where EmployeeGovernmentID IN ('HN513777D', 'TX593671R')

commit tran

alter table tblTransaction

add constraint unqTransaction UNIQUE (Amount, DateOfTransaction, EmployeeNumber)

delete from tblTransaction

where EmployeeNumber = 131

insert into tblTransaction

VALUES (1,'2015-01-01', 131)

insert into tblTransaction

VALUES (1,'2015-01-01', 131)

alter table tblTransaction

Drop constraint unqTransaction

create table tblTransaction2

(Amount smallmoney not null,

DateOfTransaction smalldatetime not null,

EmployeeNumber int not null,

CONSTRAINT unqTransaction2 UNIQUE (Amount,DateOfTransaction,EmployeeNumber))

drop table tblTransaction2

# Default constraints in action

alter table tblTransaction

add DateOfEntry datetime

alter table tblTransaction

add constraint defDateOfEntry DEFAULT GETDATE() for DateOfEntry;

delete from tblTransaction where EmployeeNumber < 3

insert into tblTransaction(Amount, DateOfTransaction, EmployeeNumber)

values (1, '2014-01-01', 1)

insert into tblTransaction(Amount, DateOfTransaction, EmployeeNumber, DateOfEntry)

values (2, '2014-01-02', 1, '2013-01-01')

select \* from tblTransaction where EmployeeNumber < 3

create table tblTransaction2

(Amount smallmoney not null,

DateOfTransaction smalldatetime not null,

EmployeeNumber int not null,

DateOfEntry datetime null CONSTRAINT tblTransaction2\_defDateOfEntry DEFAULT GETDATE())

insert into tblTransaction2(Amount, DateOfTransaction, EmployeeNumber)

values (1, '2014-01-01', 1)

insert into tblTransaction2(Amount, DateOfTransaction, EmployeeNumber, DateOfEntry)

values (2, '2014-01-02', 1, '2013-01-01')

select \* from tblTransaction2 where EmployeeNumber < 3

drop table tblTransaction2

alter table tblTransaction

drop column DateOfEntry

alter table tblTransaction

drop constraint defDateOfEntry

BEGIN TRAN

ALTER TABLE tblTransaction

ADD DateOfEntry datetime

DEFAULT GETDATE() WITH VALUES

SELECT \* FROM tblTransaction

ROLLBACK TRAN

# Check constraints in practice

alter table tblTransaction

add constraint chkAmount check (Amount>-1000 and Amount < 1000)

insert into tblTransaction

values (1010, '2014-01-01', 1)

alter table tblEmployee with nocheck

add constraint chkMiddleName check

(REPLACE(EmployeeMiddleName,'.','') = EmployeeMiddleName or EmployeeMiddleName is null)

alter table tblEmployee

drop constraint chkMiddleName

begin tran

 insert into tblEmployee

 values (2003, 'A', 'B.', 'C', 'D', '2014-01-01', 'Accounts')

 select \* from tblEmployee where EmployeeNumber = 2003

rollback tran

alter table tblEmployee with nocheck

add constraint chkDateOfBirth check (DateOfBirth between '1900-01-01' and getdate())

begin tran

 insert into tblEmployee

 values (2003, 'A', 'B', 'C', 'D', '2115-01-01', 'Accounts')

 select \* from tblEmployee where EmployeeNumber = 2003

rollback tran

create table tblEmployee2

(EmployeeMiddleName varchar(50) null, constraint CK\_EmployeeMiddleName check

(REPLACE(EmployeeMiddleName,'.','') = EmployeeMiddleName or EmployeeMiddleName is null))

drop table tblEmployee2

alter table tblEmployee

drop chkDateOfBirth

alter table tblEmployee

drop chkMiddleName

alter table tblTransaction

drop chkAmount

# Primary Key – In Practice

alter table tblEmployee

add constraint PK\_tblEmployee PRIMARY KEY (EmployeeNumber)

insert into tblEmployee(EmployeeNumber, EmployeeFirstName, EmployeeMiddleName, EmployeeLastName,

EmployeeGovernmentID, DateOfBirth, Department)

values (2004, 'FirstName', 'MiddleName', 'LastName', 'AB12345FI', '2014-01-01', 'Accounts')

delete from tblEmployee

where EmployeeNumber = 2004

alter table tblEmployee

drop constraint PK\_tblEmployee

create table tblEmployee2

(EmployeeNumber int CONSTRAINT PK\_tblEmployee2 PRIMARY KEY IDENTITY(1,1),

EmployeeName nvarchar(20))

insert into tblEmployee2

values ('My Name'),

('My Name')

select \* from tblEmployee2

delete from tblEmployee2

truncate table tblEmployee2

insert into tblEmployee2(EmployeeNumber, EmployeeName)

values (3, 'My Name'), (4, 'My Name')

SET IDENTITY\_INSERT tblEmployee2 ON

insert into tblEmployee2(EmployeeNumber, EmployeeName)

values (38, 'My Name'), (39, 'My Name')

SET IDENTITY\_INSERT tblEmployee2 OFF

drop table tblEmployee2

select @@IDENTITY

select SCOPE\_IDENTITY()

select IDENT\_CURRENT('dbo.tblEmployee2')

create table tblEmployee3

(EmployeeNumber int CONSTRAINT PK\_tblEmployee3 PRIMARY KEY IDENTITY(1,1),

EmployeeName nvarchar(20))

insert into tblEmployee3

values ('My Name'),

('My Name')

# Foreign key – in practice

BEGIN TRAN

ALTER TABLE tblTransaction ALTER COLUMN EmployeeNumber INT NULL

ALTER TABLE tblTransaction ADD CONSTRAINT DF\_tblTransaction DEFAULT 124 FOR EmployeeNumber

ALTER TABLE tblTransaction WITH NOCHECK

ADD CONSTRAINT FK\_tblTransaction\_EmployeeNumber FOREIGN KEY (EmployeeNumber)

REFERENCES tblEmployee(EmployeeNumber)

ON UPDATE CASCADE

ON DELETE set default

--UPDATE tblEmployee SET EmployeeNumber = 9123 Where EmployeeNumber = 123

DELETE tblEmployee Where EmployeeNumber = 123

SELECT E.EmployeeNumber, T.\*

FROM tblEmployee as E

RIGHT JOIN tblTransaction as T

on E.EmployeeNumber = T.EmployeeNumber

where T.Amount IN (-179.47, 786.22, -967.36, 957.03)

ROLLBACK TRAN

# Creating views

select 1

go

create view ViewByDepartment as

select D.Department, T.EmployeeNumber, T.DateOfTransaction, T.Amount as TotalAmount

from tblDepartment as D

left join tblEmployee as E

on D.Department = E.Department

left join tblTransaction as T

on E.EmployeeNumber = T.EmployeeNumber

where T.EmployeeNumber between 120 and 139

--order by D.Department, T.EmployeeNumber

go

create view ViewSummary as

select D.Department, T.EmployeeNumber as EmpNum, sum(T.Amount) as TotalAmount

from tblDepartment as D

left join tblEmployee as E

on D.Department = E.Department

left join tblTransaction as T

on E.EmployeeNumber = T.EmployeeNumber

group by D.Department, T.EmployeeNumber

--order by D.Department, T.EmployeeNumber

go

select \* from ViewByDepartment

select \* from ViewSummary

# Altering and dropping views

USE [70-461]

GO

--if exists(select \* from sys.views where name = 'ViewByDepartment')

if exists(select \* from INFORMATION\_SCHEMA.VIEWS

where [TABLE\_NAME] = 'ViewByDepartment' and [TABLE\_SCHEMA] = 'dbo')

 drop view dbo.ViewByDepartment

go

CREATE view [dbo].[ViewByDepartment] as

select D.Department, T.EmployeeNumber, T.DateOfTransaction, T.Amount as TotalAmount

from tblDepartment as D

left join tblEmployee as E

on D.Department = E.Department

left join tblTransaction as T

on E.EmployeeNumber = T.EmployeeNumber

where T.EmployeeNumber between 120 and 139

--order by D.Department, T.EmployeeNumber

GO

# Adding new rows to views

begin tran

insert into ViewByDepartment(EmployeeNumber,DateOfTransaction,TotalAmount)

values (132,'2015-07-07', 999.99)

select \* from ViewByDepartment order by Department, EmployeeNumber

rollback tran

begin tran

select \* from ViewByDepartment order by EmployeeNumber, DateOfTransaction

--Select \* from tblTransaction where EmployeeNumber in (132,142)

update ViewByDepartment

set EmployeeNumber = 142

where EmployeeNumber = 132

select \* from ViewByDepartment order by EmployeeNumber, DateOfTransaction

--Select \* from tblTransaction where EmployeeNumber in (132,142)

rollback tran

USE [70-461]

GO

--if exists(select \* from sys.views where name = 'ViewByDepartment')

if exists(select \* from INFORMATION\_SCHEMA.VIEWS

where [TABLE\_NAME] = 'ViewByDepartment' and [TABLE\_SCHEMA] = 'dbo')

 drop view dbo.ViewByDepartment

go

CREATE view [dbo].[ViewByDepartment] as

select D.Department, T.EmployeeNumber, T.DateOfTransaction, T.Amount as TotalAmount

from tblDepartment as D

left join tblEmployee as E

on D.Department = E.Department

left join tblTransaction as T

on E.EmployeeNumber = T.EmployeeNumber

where T.EmployeeNumber between 120 and 139

WITH CHECK OPTION

--order by D.Department, T.EmployeeNumber

GO

# Deleting rows in views

SELECT \* FROM ViewByDepartment

delete from ViewByDepartment

where TotalAmount = 999.99 and EmployeeNumber = 132

GO

CREATE VIEW ViewSimple

as

SELECT \* FROM tblTransaction

GO

BEGIN TRAN

delete from ViewSimple

where EmployeeNumber = 132

select \* from ViewSimple

ROLLBACK TRAN

# Creating an indexed view

USE [70-461]

GO

--if exists(select \* from sys.views where name = 'ViewByDepartment')

if exists(select \* from INFORMATION\_SCHEMA.VIEWS

where [TABLE\_NAME] = 'ViewByDepartment' and [TABLE\_SCHEMA] = 'dbo')

 drop view dbo.ViewByDepartment

go

CREATE view [dbo].[ViewByDepartment] with schemabinding as

select D.Department, T.EmployeeNumber, T.DateOfTransaction, T.Amount as TotalAmount

from dbo.tblDepartment as D

inner join dbo.tblEmployee as E

on D.Department = E.Department

inner join dbo.tblTransaction as T

on E.EmployeeNumber = T.EmployeeNumber

where T.EmployeeNumber between 120 and 139

GO

CREATE UNIQUE CLUSTERED INDEX inx\_ViewByDepartment on dbo.ViewByDepartment(EmployeeNumber, Department)

begin tran

drop table tblEmployee

rollback tran

# Creating an AFTER trigger

ALTER TRIGGER TR\_tblTransaction

ON tblTransaction

AFTER DELETE, INSERT, UPDATE

AS

BEGIN

 --insert into tblTransaction2

 select \*, 'Inserted' from Inserted

 --insert into tblTransaction2

 select \*, 'Deleted' from Deleted

END

GO

BEGIN TRAN

insert into tblTransaction(Amount, DateOfTransaction, EmployeeNumber)

VALUES (123,'2015-07-10', 123)

--delete tblTransaction

--where EmployeeNumber = 123 and DateOfTransaction = '2015-07-10'

ROLLBACK TRAN

GO

DISABLE TRIGGER TR\_tblTransaction ON tblTransaction;

GO

ENABLE TRIGGER TR\_tblTransaction ON tblTransaction;

GO

DROP TRIGGER TR\_tblTransaction;

GO

# Creating an INSTEAD OF trigger

alter TRIGGER tr\_ViewByDepartment

ON dbo.ViewByDepartment

INSTEAD OF DELETE

AS

BEGIN

 declare @EmployeeNumber as int

 declare @DateOfTransaction as smalldatetime

 declare @Amount as smallmoney

 select @EmployeeNumber = EmployeeNumber, @DateOfTransaction = DateOfTransaction, @Amount = TotalAmount

 from deleted

 --SELECT \* FROM deleted

 delete tblTransaction

 from tblTransaction as T

 where T.EmployeeNumber = @EmployeeNumber

 and T.DateOfTransaction = @DateOfTransaction

 and T.Amount = @Amount

END

begin tran

--SELECT \* FROM ViewByDepartment where TotalAmount = -2.77 and EmployeeNumber = 132

delete from ViewByDepartment

where TotalAmount = -2.77 and EmployeeNumber = 132

SELECT \* FROM ViewByDepartment where TotalAmount = -2.77 and EmployeeNumber = 132

rollback tran

# Nested triggers

ALTER TRIGGER TR\_tblTransaction

ON tblTransaction

AFTER DELETE, INSERT, UPDATE

AS

BEGIN

 if @@NESTLEVEL = 1

 begin

 select \*,'TABLEINSERT' from Inserted

 select \*, 'TABLEDELETE' from Deleted

 end

END

GO

BEGIN TRAN

insert into tblTransaction(Amount, DateOfTransaction, EmployeeNumber)

VALUES (123,'2015-07-10', 123)

ROLLBACK TRAN

begin tran

--SELECT \* FROM ViewByDepartment where TotalAmount = -2.77 and EmployeeNumber = 132

delete from ViewByDepartment

where TotalAmount = -2.77 and EmployeeNumber = 132

--SELECT \* FROM ViewByDepartment where TotalAmount = -2.77 and EmployeeNumber = 132

rollback tran

EXEC sp\_configure 'nested triggers';

EXEC sp\_configure 'nested triggers',0;

RECONFIGURE

GO

# Update functions

ALTER TRIGGER TR\_tblTransaction

ON tblTransaction

AFTER DELETE, INSERT, UPDATE

AS

BEGIN

 IF @@ROWCOUNT > 0

 BEGIN

 select \* from Inserted

 select \* from Deleted

 END

END

GO

insert into tblTransaction(Amount, DateOfTransaction, EmployeeNumber)

VALUES (123,'2015-07-11', 123)

SELECT \* FROM ViewByDepartment where TotalAmount = -2.77 and EmployeeNumber = 132

begin tran

delete from ViewByDepartment

where TotalAmount = -2.77 and EmployeeNumber = 132

rollback tran

ALTER TRIGGER TR\_tblTransaction

ON tblTransaction

AFTER DELETE, INSERT, UPDATE

AS

BEGIN

 --SELECT COLUMNS\_UPDATED()

 IF UPDATE(Amount) -- if (COLUMNS\_UPDATED() & POWER(2,1-1)) > 0

 BEGIN

 select \* from Inserted

 select \* from Deleted

 END

END

go

begin tran

--SELECT \* FROM ViewByDepartment where TotalAmount = -2.77 and EmployeeNumber = 132

update ViewByDepartment

set TotalAmount = +2.77

where TotalAmount = -2.77 and EmployeeNumber = 132

rollback tran

# Handling multiple rows in a session

-- Bad code - only allows 1 row to be deleted

alter TRIGGER tr\_ViewByDepartment

ON dbo.ViewByDepartment

INSTEAD OF DELETE

AS

BEGIN

 declare @EmployeeNumber as int

 declare @DateOfTransaction as smalldatetime

 declare @Amount as smallmoney

 select @EmployeeNumber = EmployeeNumber, @DateOfTransaction = DateOfTransaction, @Amount = TotalAmount

 from deleted

 --SELECT \* FROM deleted

 delete tblTransaction

 from tblTransaction as T

 where T.EmployeeNumber = @EmployeeNumber

 and T.DateOfTransaction = @DateOfTransaction

 and T.Amount = @Amount

END

begin tran

SELECT \* FROM ViewByDepartment where EmployeeNumber = 132

delete from ViewByDepartment

where EmployeeNumber = 132

SELECT \* FROM ViewByDepartment where EmployeeNumber = 132

rollback tran

-- Good code - allows multiple rows to be deleted

alter TRIGGER tr\_ViewByDepartment

ON dbo.ViewByDepartment

INSTEAD OF DELETE

AS

BEGIN

 SELECT \*, 'To Be Deleted' FROM deleted

 delete tblTransaction

 from tblTransaction as T

 join deleted as D

 on T.EmployeeNumber = D.EmployeeNumber

 and T.DateOfTransaction = D.DateOfTransaction

 and T.Amount = D.TotalAmount

END

GO

begin tran

SELECT \*, 'Before Delete' FROM ViewByDepartment where EmployeeNumber = 132

delete from ViewByDepartment

where EmployeeNumber = 132 --and TotalAmount = 861.16

SELECT \*, 'After Delete' FROM ViewByDepartment where EmployeeNumber = 132

rollback tran