



Introduction to SQL Server

Hans-Petter Halvorsen



Introduction to Database Systems

Hans-Petter Halvorsen, M.Sc.

Database Systems

- A Database is a structured way to store lots of information. The information is stored in different tables.
- - “Everything” today is stored in databases!

Examples:

- Bank/Account systems
- Information in Web pages such as Facebook, Wikipedia, YouTube, etc.
- ... lots of other examples! (Give me 5 examples)

Old fashion Database (Data-storage) Systems



Not too long ago, this was the only data-storage device most companies needed. Those days are over.

Database Management Systems (DBMS)

- Oracle
- MySQL
- MariaDB
- Sybase
- Microsoft Access
- Microsoft SQL Server
- ... (we have hundreds different DBMS)



SQL Server

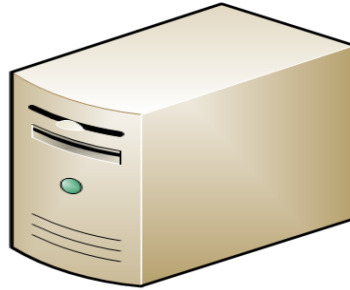
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SQL Server Editions

- SQL Server Standard
- SQL Server Enterprise
- etc.
- SQL Server Express (Free)
 - Download for free from Internet

Microsoft SQL Server

SQL Server consists of a **Database Engine** and a **Management Studio**. The **Database Engine** has no graphical interface - it is just a service running in the background of your computer (preferable on the server). The **Management Studio** is graphical tool for configuring and viewing the information in the database. It can be installed on the server or on the client (or both).

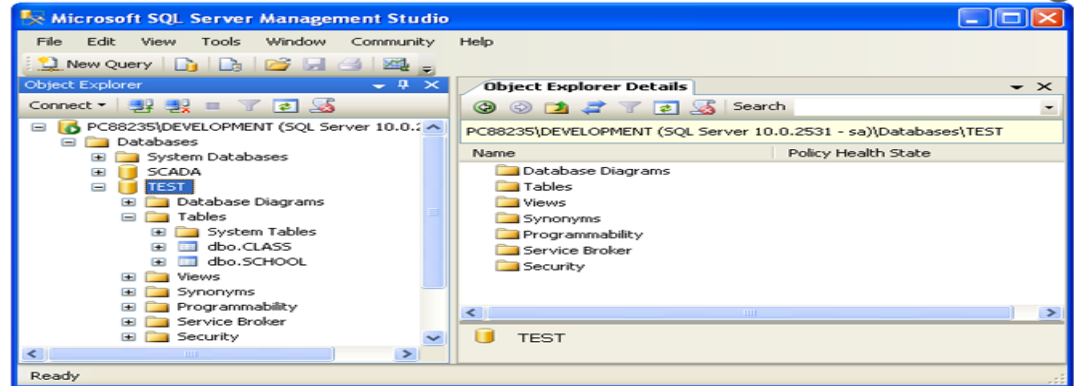


Database Engine



A Service running on the computer in the background

Management Studio



A Graphical User Interface to the database used for configuration and management of the database

Microsoft SQL Server Management Studio

1 Your SQL Server

2 Your Database

3 New Query

4 Write your Query here

5 The Results from your Query

SQLQuery1.sql - P....SCHOOL (sa (52))*

```
select * from SCHOOL
```

SchoolId	SchoolName	Description	Address	Phone	PostCode	PostAddress
1	TUC	The best school	Telemark	NULL	NULL	NULL
2	MIT	OK School	USA	NULL	NULL	NULL
3	NTNU	The second best school	Trondheim	NULL	NULL	NULL
4	University of Oslo	The third best school	Oslo	NULL	NULL	NULL

Query executed successfully. | PC88235\DEVELOPMENT (10.50 ... | sa (52) | SCHOOL | 00:00:00 | 4 rows

Properties

Current connection parameters

Aggregate Status

Connection f: ...

Elapsed time 00:00:00.0270016

Finish time 20.03.2012 08:28:15

Name PC88235\DEVELOPMENT

Rows returned 4

Start time 20.03.2012 08:28:15

State Open

Connection

Connection n PC88235\DEVELOPMENT

Connection Details

Connection e 00:00:00.0270016

Connection fi 20.03.2012 08:28:15

Connection n 4

Connection s 20.03.2012 08:28:15

Connection s Open

Display name PC88235\DEVELOPMENT

Login name sa

Server name PC88235\DEVELOPMENT

Server version 10.50.1600

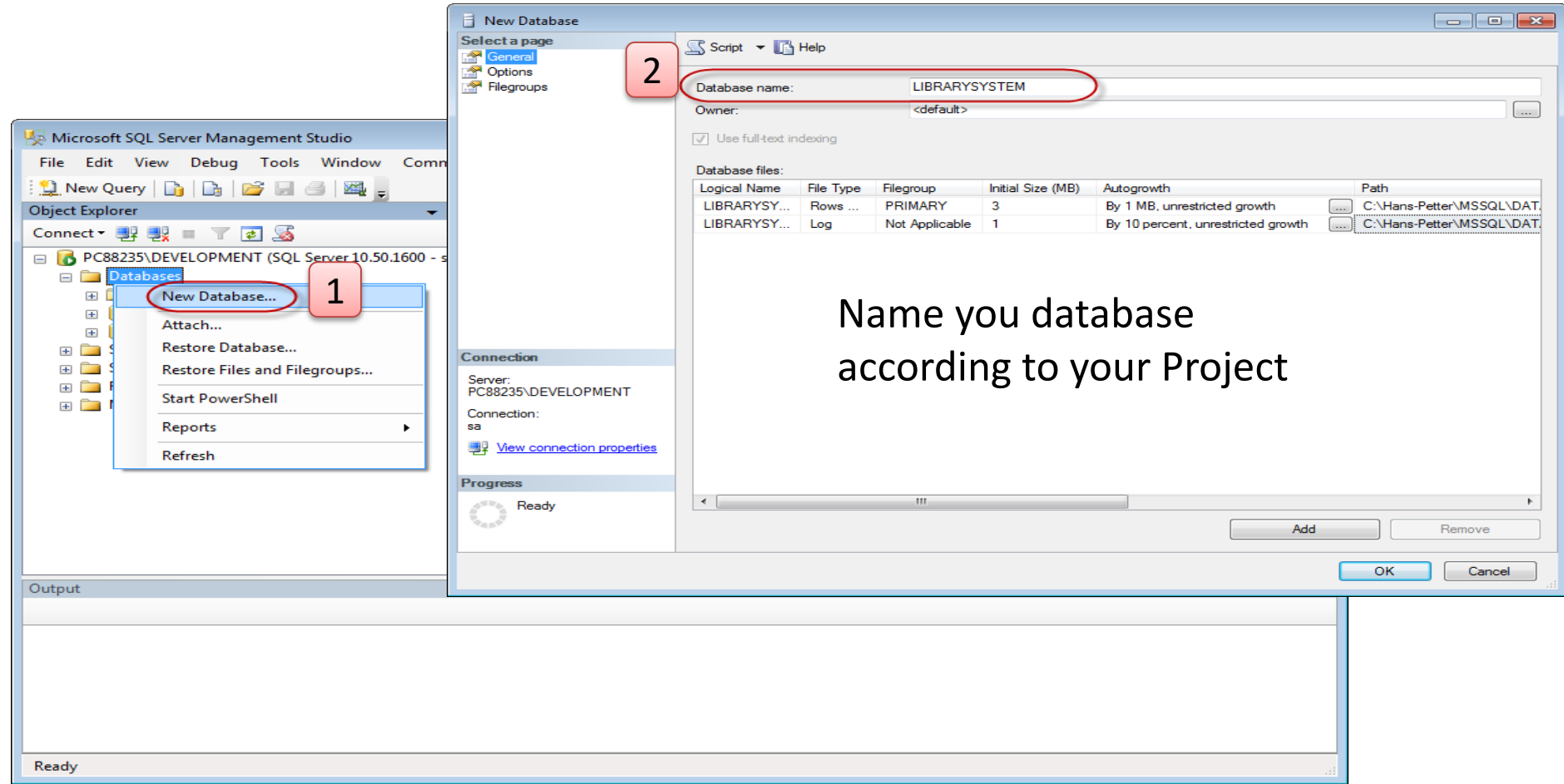
Session Tracir

SPID 52

Name

The name of the connection.

Microsoft SQL Server – Create a New Database



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Lets Create a Database from Scratch



Database Design

Designing the Tables

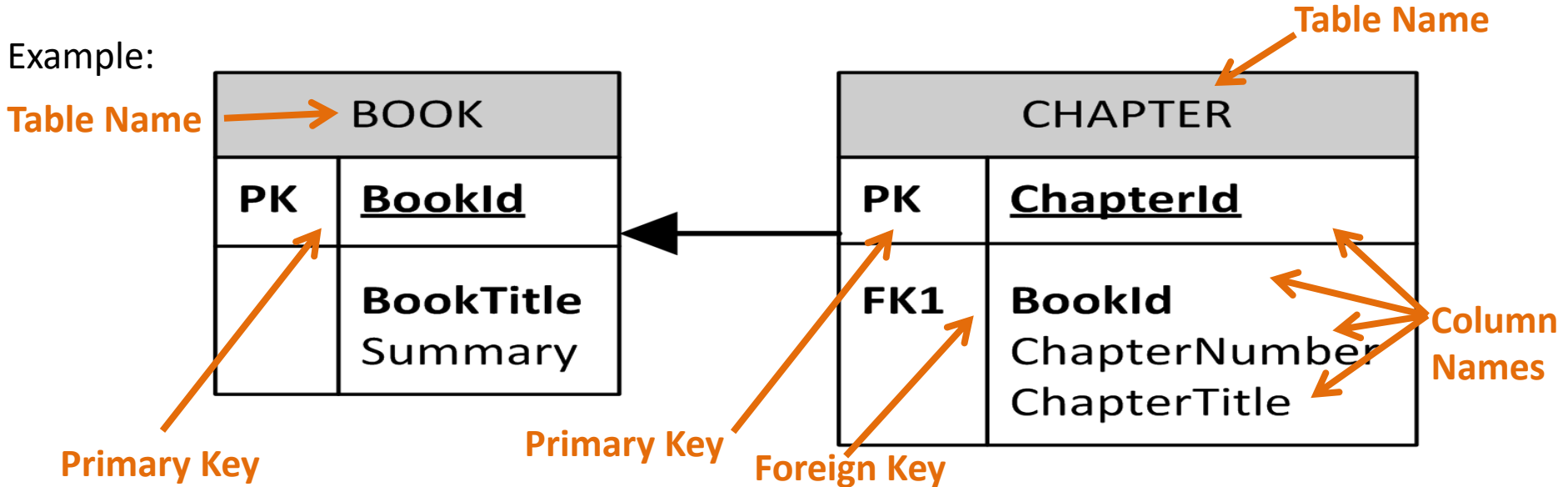
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Database Design – ER Diagram

ER Diagram (Entity-Relationship Diagram)

- Used for Design and Modeling of Databases.
- Specify Tables and relationship between them (**Primary Keys** and **Foreign Keys**)

Example:



Relational Database. In a relational database all the tables have one or more relation with each other using Primary Keys (PK) and Foreign Keys (FK). Note! You can only have one PK in a table, but you may have several FK's.

Database - “Best Practice”

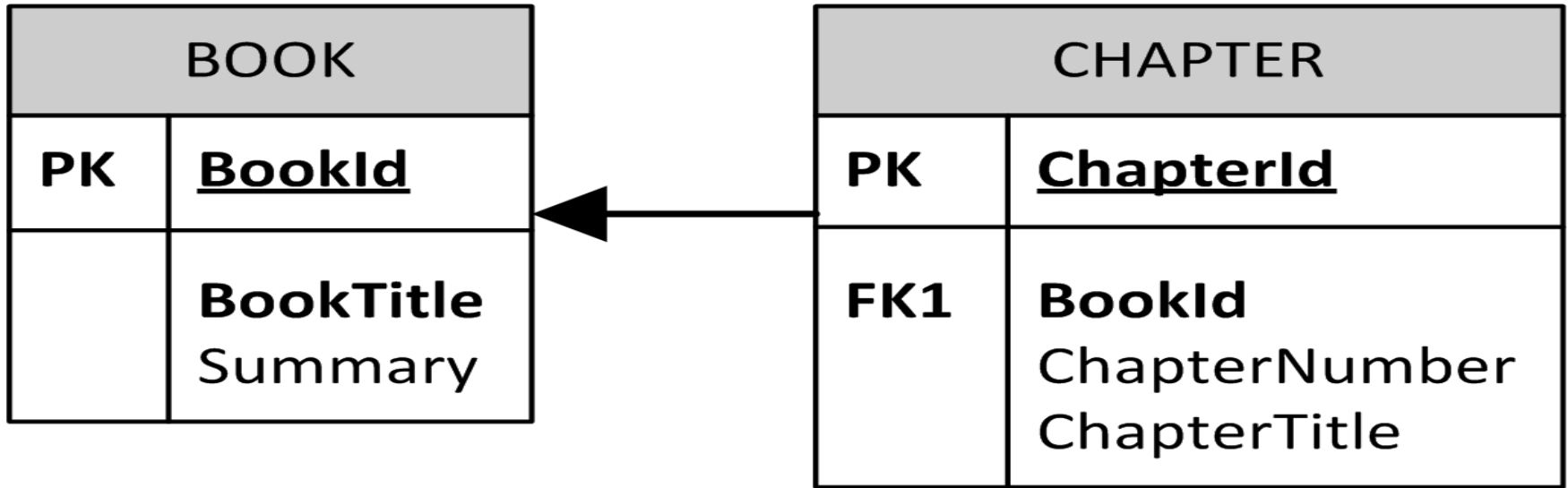
- **Tables:** Use upper case and singular form in table names – not plural, e.g., “STUDENT” (not students)
- **Columns:** Use Pascal notation, e.g., “StudentId”
- **Primary Key:**
 - If the table name is “COURSE”, name the Primary Key column “CourseId”, etc.
 - “Always” use Integer and Identity(1,1) for Primary Keys. Use UNIQUE constraint for other columns that needs to be unique, e.g. RoomNumber
- Specify **Required** Columns (NOT NULL) – i.e., which columns that need to have data or not
- Standardize on few/these **Data Types:** *int, float, varchar(x), datetime, bit*
- Use English for table and column names
- Avoid abbreviations! (Use RoomNumber – not RoomNo, RoomNr, ...)



Create Tables in SQL Server

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Creating Tables - Example

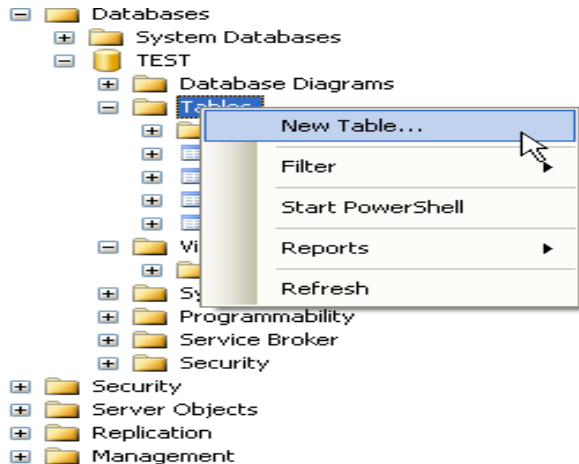


Create Tables using the Designer Tools in SQL Server

Even if you can do “everything” using the SQL language, it is sometimes easier to do something in the designer tools in the Management Studio in SQL Server.

Instead of creating a script you may as well easily use the designer for creating tables, constraints, inserting data, etc.

1 Select “New Table ...”:



2 Next, the table designer pops up where you can add columns, data types, etc.

	Column Name	Data Type	Allow Nulls
▶ ?	CustomerId	int	<input type="checkbox"/>
	CustomerNumber	int	<input type="checkbox"/>
	LastName	varchar(50)	<input type="checkbox"/>
	FirstName	varchar(50)	<input type="checkbox"/>
	AreaCode	int	<input checked="" type="checkbox"/>
	Address	varchar(50)	<input checked="" type="checkbox"/>
	Phone	varchar(20)	<input checked="" type="checkbox"/>
			<input type="checkbox"/>

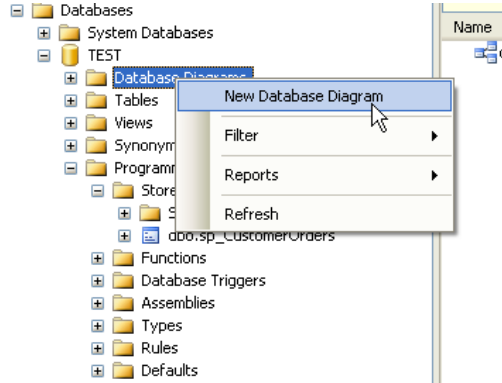
In this designer we may also specify constraints, such as primary keys, unique, foreign keys, etc.



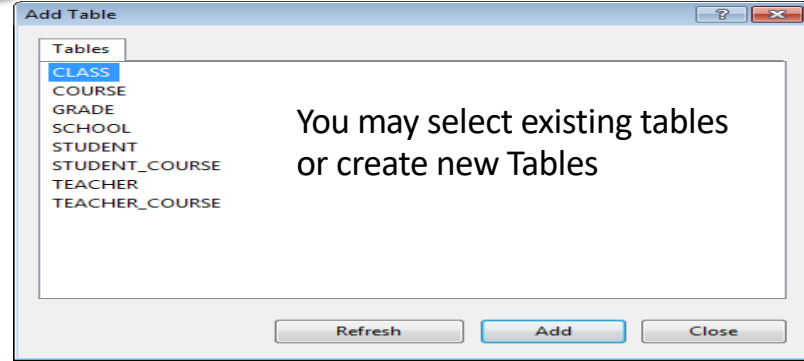
Lets Create the Example from Scratch

Create Tables with the “Database Diagram”

1

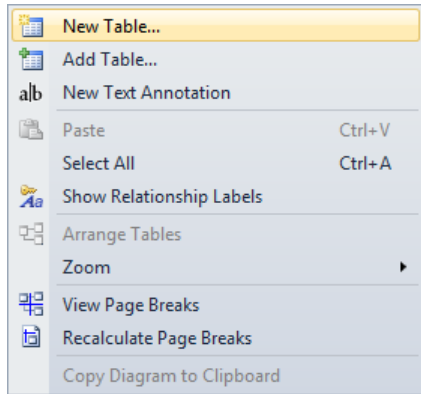


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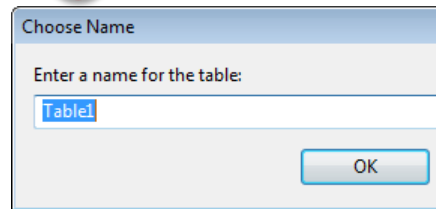


3

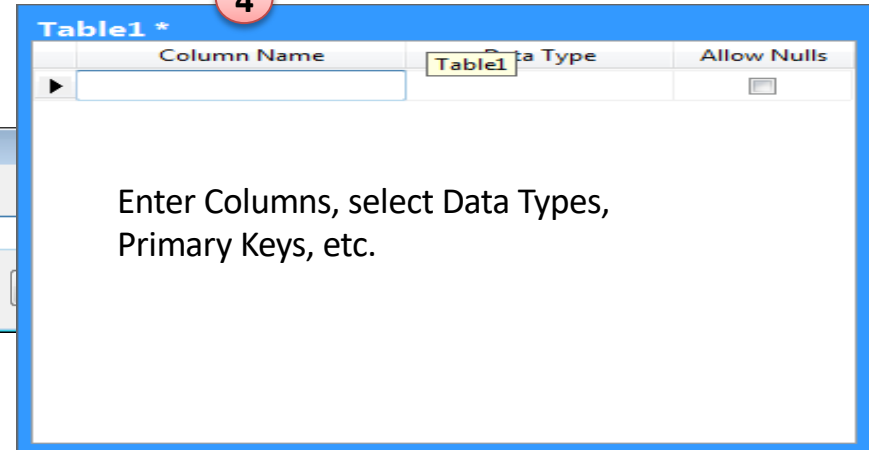
Create New Table



5



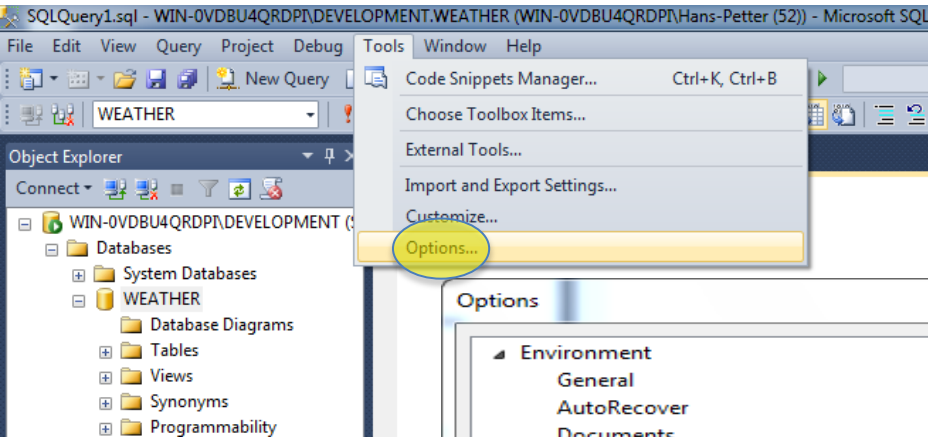
4



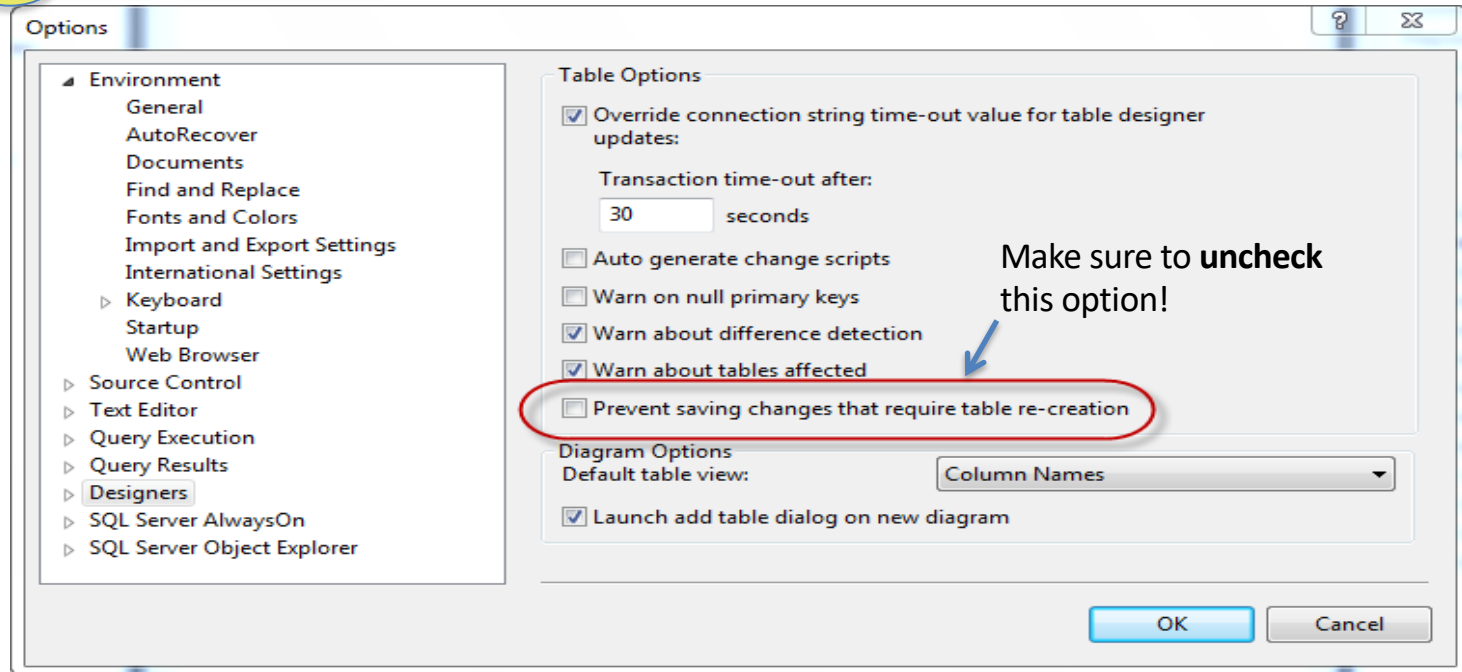
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Lets Create the Example from Scratch

Creating Tables with Microsoft SQL Server



Do you get an error when trying to change your tables?



Lets Add more Tables...

- AUTHOR
- PUBLISHER
- CATEGORY (e.g., Programming, Control Systems, ..)
- ...

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Lets Create the Example from Scratch



Insert Data into Tables

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Insert Data into Tables

2 Methods:

- Insert Data using the Management Studio
- Insert Data using SQL (Structured Query language)

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Lets Create the Example from Scratch

Hans-Petter Halvorsen

University of South-Eastern Norway

www.usn.no

E-mail: hans.p.halvorsen@usn.no

Web: <https://www.halvorsen.blog>

