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SQL Server 2016

Step-by-step Installation

Hans-Petter Halvorsen

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:

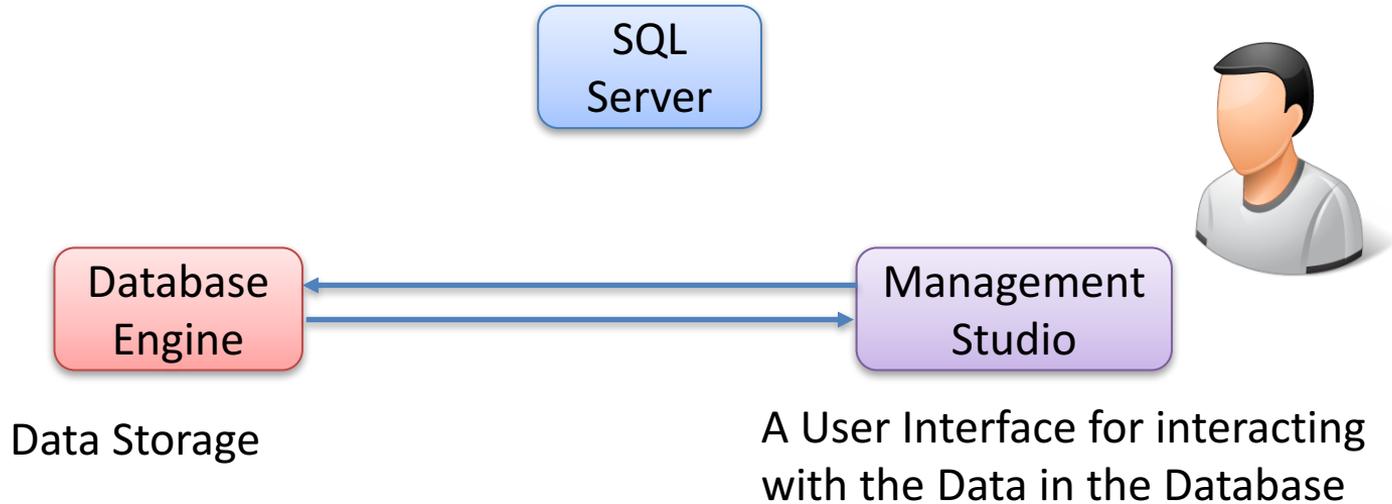
- Bank/Account systems
- Information in Web pages such as Facebook, Wikipedia, YouTube, etc.
- ... lots of other examples! (Give me 5 examples)

Database Management Systems (DBMS)

Here are some examples:

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

SQL Server



The Database Engine is the core service for storing, processing, and securing data.

The Database Engine and the Management Studio can be on the same computer or on different computers. From the Management Studio you can connect to a local Database Engine or a Database Engine located in a network.

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).

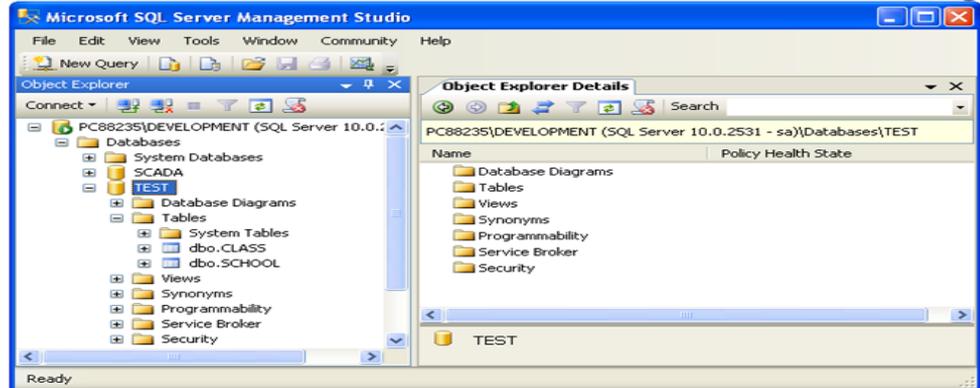


Database Engine



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

SQL Server 2016 Express Edition

You need to install the following components:

- Step 1: Database Engine
- Step 2: Management Studio

Database Engine

A database engine (or storage engine) is the underlying software component that a database management system (DBMS) uses to create, read, update and delete (CRUD) data from a database.

The Database Engine is the core service for storing, processing, and securing data.

SQL Server Management Studio (SSMS)

1 Your SQL Server

2 Your Database

3 New Query

4 Write your Query here

5 The Results from your Query

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

Where do you find the Installation Files?

SQL Server 2016 Express Edition

<https://www.microsoft.com/en-us/download/details.aspx?id=52679>

Microsoft® SQL Server® 2016 Express

Select Language:

English

Download

Microsoft® SQL Server® 2016 Express is a powerful and reliable free data management system that delivers a rich and reliable data store for lightweight Web Sites and desktop applications.

+ Details

+ System Requirements

+ Install Instructions

+ Additional Information

SQL Server 2016

Step 1: Install Database Engine

Installation Type

SQL Server 2016 Express Edition

What's New?



Select an installation type:

Basic

Select Basic installation type to install the SQL Server Database Engine feature with default configuration.

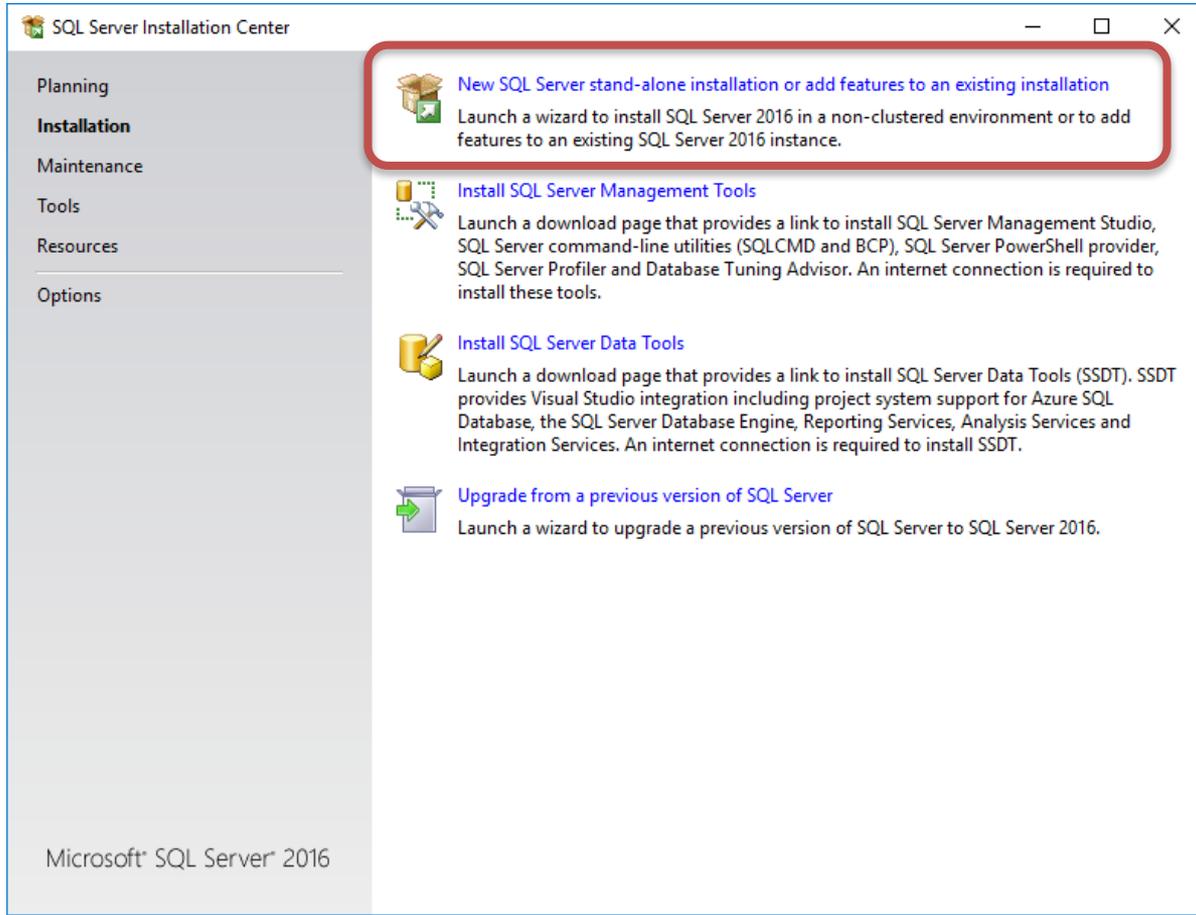
Custom

Select Custom installation type to step through the SQL Server installation wizard and choose what you want to install. This installation type is detailed and takes longer than running the Basic install.

Download Media

Download SQL Server setup files now and install them later on a machine of your choice.

New SQL stand-alone installation



SQL Server Installation Center

Planning

Installation

Maintenance

Tools

Resources

Options

 [New SQL Server stand-alone installation or add features to an existing installation](#)
Launch a wizard to install SQL Server 2016 in a non-clustered environment or to add features to an existing SQL Server 2016 instance.

 [Install SQL Server Management Tools](#)
Launch a download page that provides a link to install SQL Server Management Studio, SQL Server command-line utilities (SQLCMD and BCP), SQL Server PowerShell provider, SQL Server Profiler and Database Tuning Advisor. An internet connection is required to install these tools.

 [Install SQL Server Data Tools](#)
Launch a download page that provides a link to install SQL Server Data Tools (SSDT). SSDT provides Visual Studio integration including project system support for Azure SQL Database, the SQL Server Database Engine, Reporting Services, Analysis Services and Integration Services. An internet connection is required to install SSDT.

 [Upgrade from a previous version of SQL Server](#)
Launch a wizard to upgrade a previous version of SQL Server to SQL Server 2016.

Microsoft® SQL Server® 2016

License Terms

SQL Server 2016 Setup

License Terms

To install SQL Server 2016, you must accept the Microsoft Software License Terms.

License Terms

- Global Rules
- Product Updates
- Install Setup Files
- Install Rules
- Feature Selection
- Feature Rules
- Feature Configuration Rules
- Installation Progress
- Complete

MICROSOFT SOFTWARE LICENSE TERMS

MICROSOFT SQL SERVER 2016 EXPRESS

These license terms are an agreement between Microsoft Corporation (or based on where you live, one of its affiliates) and you. Please read them. They apply to the software named above, which includes the media on which you received it, if any. The terms also apply to any Microsoft

- updates,
- supplements,
- Internet-based services, and
- support services.

I accept the license terms.

SQL Server 2016 transmits information about your installation experience, as well as other usage and performance data, to Microsoft to help improve the product. To learn more about SQL Server 2016 data processing and privacy controls, please see the [Privacy Statement](#).

Copy Print

< Back Next > Cancel

Install Rules

SQL Server 2016 Setup

Install Rules

Setup rules identify potential problems that might occur while running Setup. Failures must be corrected before Setup can continue.

Install Rules

- Feature Selection
- Feature Rules
- Instance Configuration
- Server Configuration
- Database Engine Configuration
- Reporting Services Configuration
- Consent to install Microsoft R ...
- Feature Configuration Rules
- Installation Progress
- Complete

Operation completed. Passed: 4. Failed 0. Warning 1. Skipped 0.

Hide details << Re-run

[View detailed report](#)

Rule	Status
 Fusion Active Template Library (ATL)	Passed
 Consistency validation for SQL Server registry keys	Passed
 Computer domain controller	Passed
 Microsoft .NET Application Security	Passed
 Windows Firewall	Warning

< Back Next > Cancel

Feature Selection

SQL Server 2016 Setup

Feature Selection

Select the Express features to install.

Install Rules

Feature Selection

Feature Rules

Instance Configuration

Server Configuration

Database Engine Configuration

Reporting Services Configuration

Feature Configuration Rules

Installation Progress

Complete

Features:

Instance Features

- Database Engine Services
- SQL Server Replication
- R Services (In-Database)
- Full-Text and Semantic Extractions for Search
- Reporting Services - Native

Shared Features

- Client Tools Connectivity
- Client Tools Backwards Compatibility
- Client Tools SDK
- Documentation Components
- SQL Client Connectivity SDK
- LocalDB

Select All Unselect All

Instance root directory: C:\Program Files\Microsoft SQL Server\

Shared feature directory: C:\Program Files\Microsoft SQL Server\

Shared feature directory (x86): C:\Program Files (x86)\Microsoft SQL Server\

Feature description:

Includes the Database Engine, the core service for storing, processing and securing data. The Database Engine provides controlled access and rapid transaction processing.

Prerequisites for selected features:

Already installed:

- Windows PowerShell 3.0 or higher
- Microsoft Visual Studio 2010 Redistributable

Disk Space Requirements

Drive C: 2660 MB required, 10681 MB available

< Back Next > Cancel

Instance Configuration

SQL Server 2016 Setup

Instance Configuration

Specify the name and instance ID for the instance of SQL Server. Instance ID becomes part of the installation path.

Install Rules
Feature Selection
Feature Rules
Instance Configuration
Server Configuration
Database Engine Configuration
Reporting Services Configuration
Feature Configuration Rules
Installation Progress
Complete

Default instance
 Named instance:

Instance ID:

SQL Server directory: C:\Program Files\Microsoft SQL Server\120\...
Reporting Services directory: C:\Program Files\Microsoft SQL Server\120\...

Installed instances:

Instance Name	Instance ID	Features	Edition	Version
SQLEXPRESS	MSSQL12.SQLEXP... MSSQL12.0\SQLEXPRESS	SQLEngine, SQLEn...	Express	12.1.4232.0
CITADEL	MSSQL10_50.CITA... MSSQL10.50\CITADEL	SQLEngine	Express	10.51.2500.0
<Shared Compone...		SSMS, Adv_SSMS, ...		12.1.4232.0

< Back Next > Cancel

Normally you select "Default instance"

Don't change the Default Instance ID, which is "MSSQLSERVER"

Instance Configuration

SQL Server 2016 Setup

Instance Configuration

Specify the name and instance ID for the instance of SQL Server. Instance ID becomes part of the installation path.

Install Rules
Feature Selection
Feature Rules
Instance Configuration
Server Configuration
Database Engine Configuration
Reporting Services Configuration
Feature Configuration Rules

Default instance

Named instance:

Instance ID:

SQL Server directory: C:\Program Files\Microsoft SQL Server\MSSQL13.SQLSERVER2016

Insta
Com

Instance Name	Instance ID	Features	Edition	Version
SQLEXPRESS	MSSQL12.SQLEXP...	SQLEngine,SQLEn...	Express	12.1.4232.0
CITADEL	MSSQL10_50.CITA...	SQLEngine	Express	10.51.2500.0
<Shared Compone...		SSMS, Adv_SSMS, ...		12.1.4232.0

< Back Next > Cancel

If you already have a SQL Database, you should select "Named instance"

Server Configuration

SQL Server 2016 Setup

Server Configuration

Specify the service accounts and collation configuration.

Install Rules
Feature Selection
Feature Rules
Instance Configuration
Server Configuration
Database Engine Configuration
Reporting Services Configuration
Feature Configuration Rules
Installation Progress
Complete

Service Accounts Collation

Microsoft recommends that you use a separate account for each SQL Server service.

Service	Account Name	Password	Startup Type
SQL Server Database Engine	NT Service\MSSQL\$SQL...		Automatic ▾
SQL Server Reporting Services	NT Service\ReportServer...		Automatic ▾
SQL Full-text Filter Daemon Launc...	NT Service\MSSQLFDLa...		Manual
SQL Server Browser	NT AUTHORITY\LOCAL...		Automatic ▾

Grant Perform Volume Maintenance Task privilege to SQL Server Database Engine Service

This privilege enables instant file initialization by avoiding zeroing of data pages. This may lead to information disclosure by allowing deleted content to be accessed.

[Click here for details](#)

< Back **Next >** Cancel

Database Engine Configuration

SQL Server 2016 Setup

Database Engine Configuration

Specify Database Engine authentication security mode, administrators, data directories and TempDB settings.

Install Rules
Feature Selection
Feature Rules
Instance Configuration
Server Configuration
Database Engine Configuration
Reporting Services Configuration
Feature Configuration Rules
Installation Progress
Complete

Server Configuration | Data Directories | TempDB | User Instances | FILESTREAM

Specify the authentication mode and administrators for the Database Engine.

Authentication Mode

Windows authentication mode

Mixed Mode (SQL Server authentication and Windows authentication)

Specify the password for the SQL Server system administrator (sa) account.

Enter password: [.....]

Confirm password: [.....]

Specify SQL Server administrators

HANSFELAPTOP\HANS-FELTER (HANS-FELTER)
--

SQL Server administrators have unrestricted access to the Database Engine.

Add Current User | Add... | Remove

< Back | Next > | Cancel

Select Mixed Mode

Enter a Password for the sa user
Make sure to remember it!

Complete

SQL Server 2016 Setup

Complete

Your SQL Server 2016 installation completed successfully with product updates.

Install Rules
Feature Selection
Feature Rules
Instance Configuration
Server Configuration
Database Engine Configuration
Reporting Services Configuration
Feature Configuration Rules
Installation Progress
Complete

Information about the Setup operation or possible next steps:

Feature	Status
✓ Client Tools Connectivity	Succeeded
✓ Client Tools SDK	Succeeded
✓ Client Tools Backwards Compatibility	Succeeded
✓ Reporting Services - Native	Succeeded
✓ Database Engine Services	Succeeded
✓ Full-Text and Semantic Extractions for Search	Succeeded

Details:

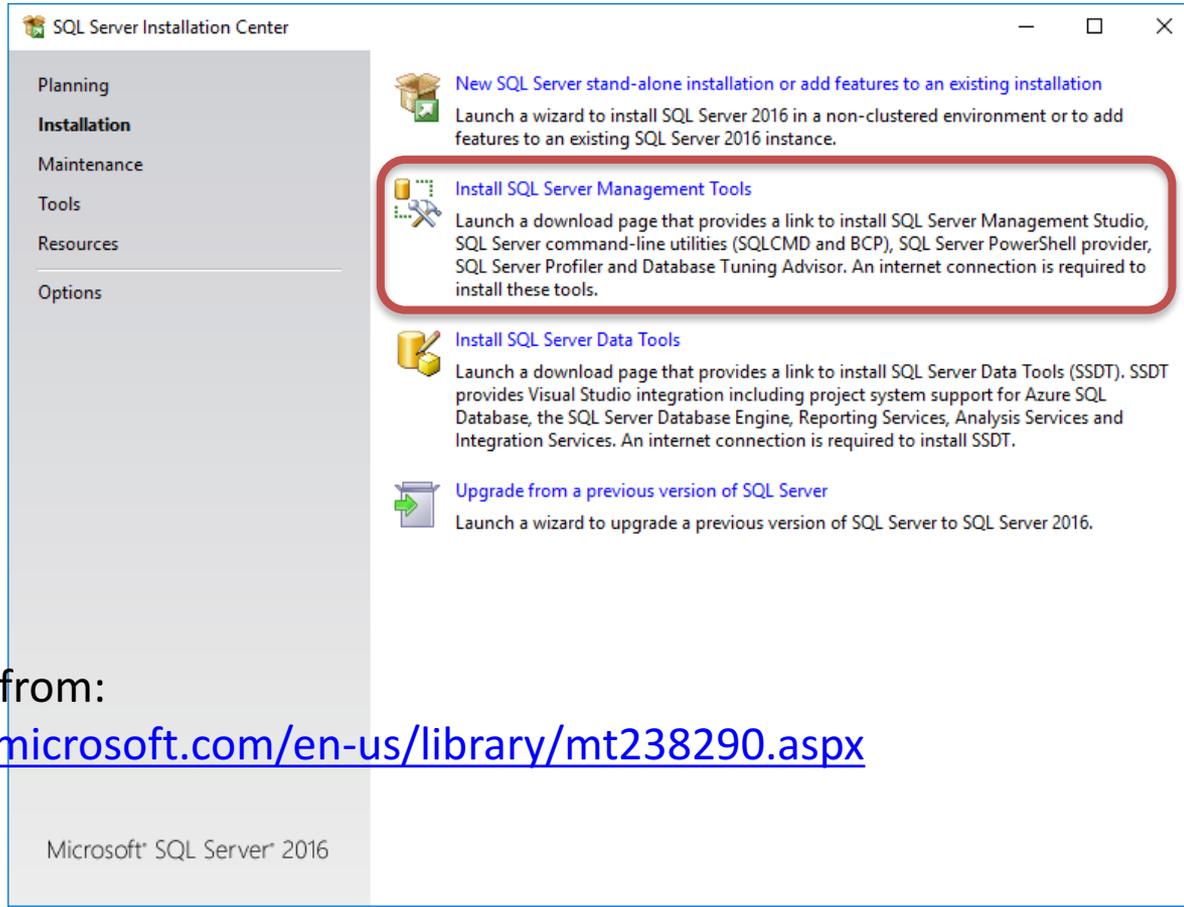
Summary log file has been saved to the following location:
C:\Program Files\Microsoft SQL Server\130\Setup Bootstrap\Log\20161111_085824_Summary_hansph_laptop_20161111_085824.txt

Close

SQL Server 2016

Step 2: Install Management Studio

Install SQL Server Management Studio



Also available from:

<https://msdn.microsoft.com/en-us/library/mt238290.aspx>

Download SQL Server Management Studio

... > SQL Server > SQL Server Tools > SQL Server Management Tools (including SSMS) ▾

Download SQL Server Management Studio (SSMS)

SQL Server Management Studio - Changelog (SSMS)

SQL Server Management Studio - Release Notes

Previous SQL Server Management Studio Releases

SQL Server Management Studio - License Terms

- ▶ Use SQL Server Management Studio
- ▶ Object Explorer
- ▶ Template Explorer
- ▶ Solution Explorer
- ▶ F1 Help for Server Connections (SQL Server Management Studio)
- ▶ Visual Database Tools
- ▶ SQL Server Management Studio Menu Help
- ▶ SQL Server Agent

Download SQL Server Management Studio (SSMS)

Updated: October 26, 2016

SQL Server Management Studio (SSMS) is an integrated environment for accessing, configuring, managing, administering, and developing all components of SQL Server. SSMS combines a broad group of graphical tools with a number of rich script editors to provide developers and administrators of all skill levels access to SQL Server. This release features improved compatibility with previous versions of SQL Server, a stand-alone web installer, and toast notifications within SSMS when new releases become available.



Download SQL Server Management Studio (SSMS)

[Download SQL Server Management Studio \(16.5\)](#)

Note

- SSMS releases are now branded numerically, not by months.
- This generally available release of SSMS is free and does not require a SQL Server license to install and use.

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[SQL Server Management Studio](#)

Changelog

Previous releases

Feedback

See Also

SQL Server Management Studio



Version Information

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Microsoft | Developer Network

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Downloads ▾ Programs ▾ Community ▾ Documentation ▾

... > SQL Server > SQL Server Tools > SQL Server Management Tools (including SSMS) ▾

Download SQL Server Management Studio (SSMS)

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SQL Server Management Studio

Version Information

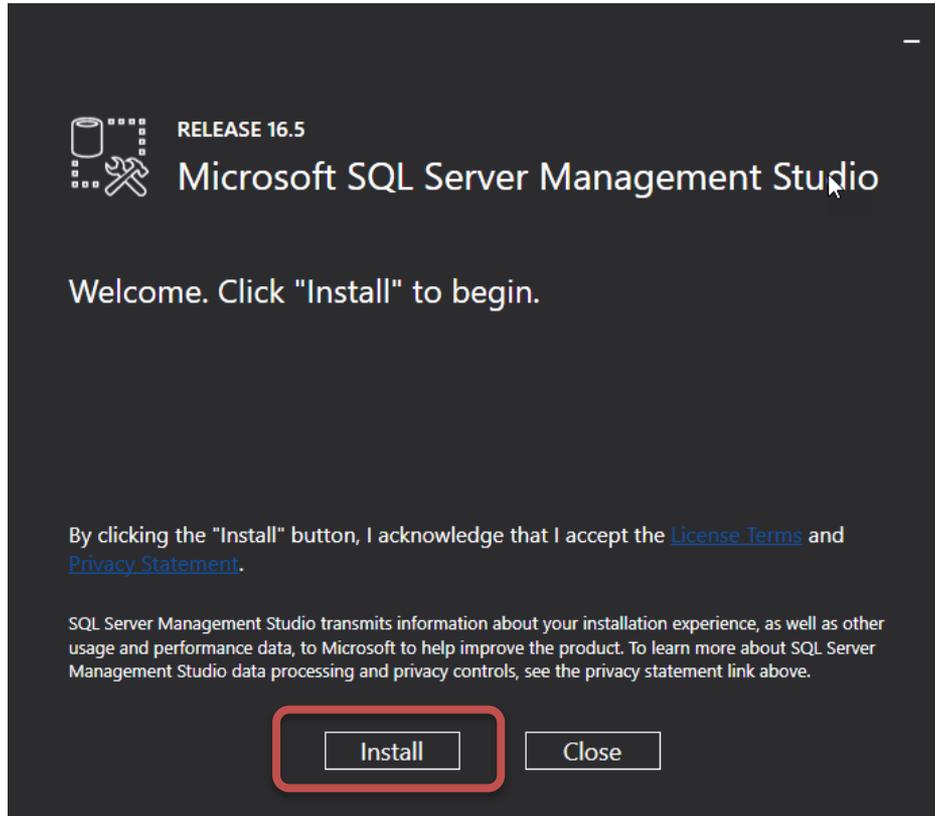
SSMS-Setup-ENU.exe finished downloading. [Run](#) [Open folder](#) [View downloads](#) [×](#)

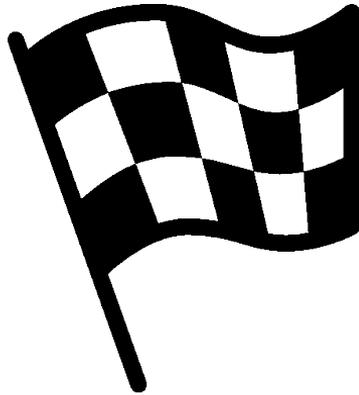
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- [SQL Server Management Studio](#)
- [Changelog](#)
- [Previous releases](#)
- [Feedback](#)
- [See Also](#)

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Export (0)
Share

Install SQL Server Management Studio





The SQL Server Installation is finished

SQL Server 2016

Step 3: Start using SQL Server

SQL Server Management Studio (SSMS)

1 Your SQL Server

2 Your Database

3 New Query

4 Write your Query here

5 The Results from your Query

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

Create a New Database

1

2

Database name: LIBRARYSYSTEM

Owner: <default>

Use full-text indexing

Database files:

Logical Name	File Type	Filegroup	Initial Size (MB)	Autogrowth	Path
LIBRARYSY...	Rows ...	PRIMARY	3	By 1 MB, unrestricted growth	C:\Hans-Petter\MSSQL\DAT
LIBRARYSY...	Log	Not Applicable	1	By 10 percent, unrestricted growth	C:\Hans-Petter\MSSQL\DAT

Connection

Server: PC88235\DEVELOPMENT

Connection: sa

[View connection properties](#)

Progress

Ready

Add Remove

OK Cancel

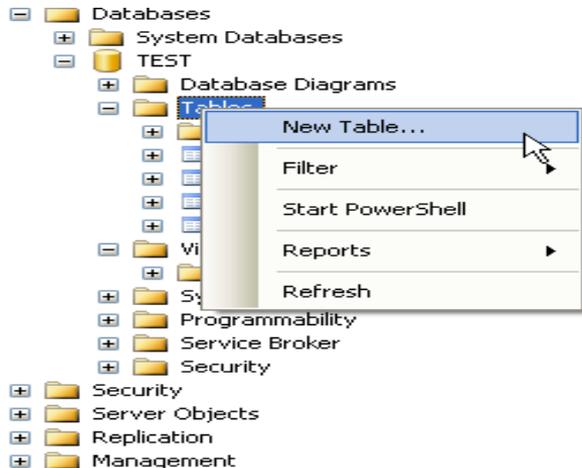
Name you database according to your Project

Create Tables with the Management Studio

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.

Structured Query Language

SQL (Structured Query Language) is a database computer language designed for managing data in relational database management systems (RDBMS).

We have 4 different Query Types: **INSERT**, **SELECT**, **UPDATE** and **DELETE**

- **insert** into STUDENT (Name , Number, SchoolId)
values ('John Smith', '100005', 1)
- **select** SchoolId, Name from SCHOOL
- **select** * from SCHOOL where SchoolId > 100
- **update** STUDENT set Name='John Wayne' **where** StudentId=2
- **delete** from STUDENT **where** SchoolId=3

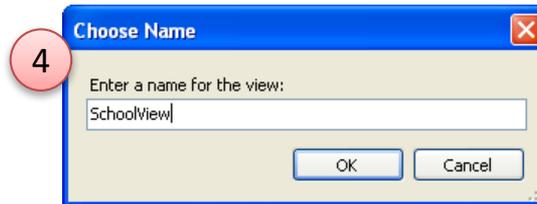
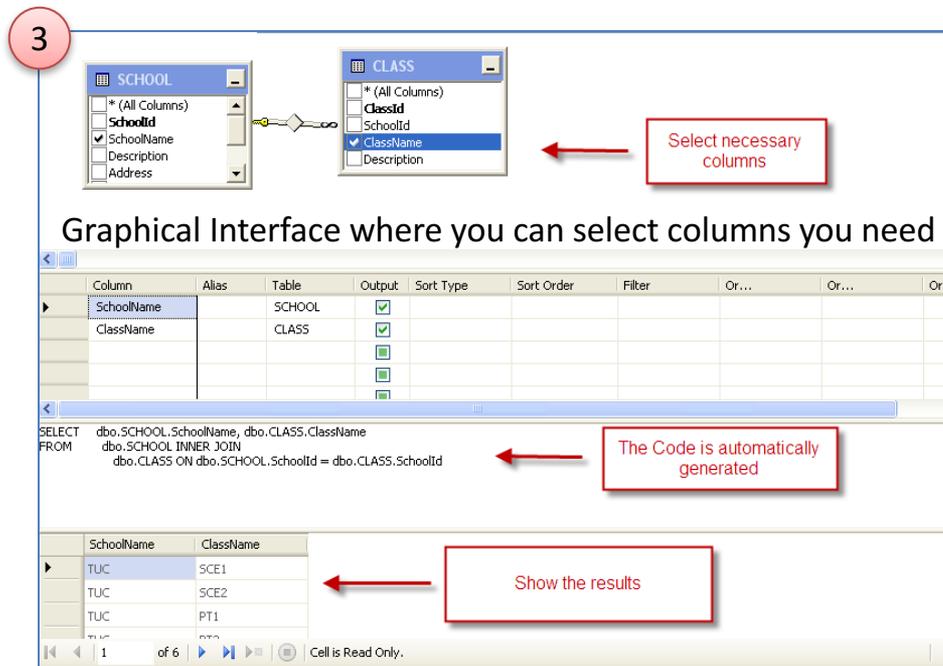
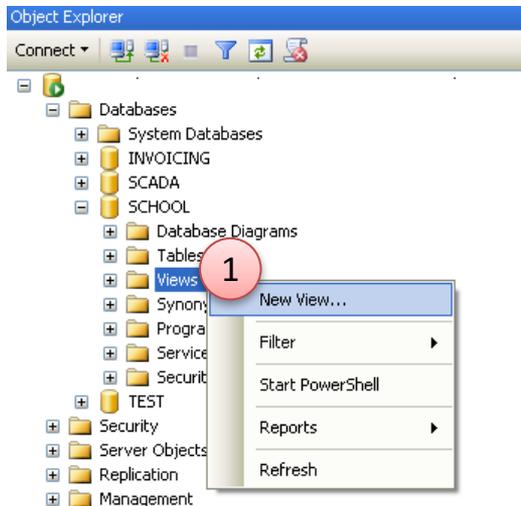
Insert Data into the Tables using SQL

Example:

```
insert into STUDENT (Name , Number, SchoolId)  
values ('John Smith', '100005', 1)
```

...

Create Views using Management Studio



Save the View

Create Views using SQL

1

Create View:

```
IF EXISTS (SELECT name
           FROM sysobjects
           WHERE name = 'CourseData'
           AND type = 'V')
    DROP VIEW CourseData
GO

CREATE VIEW CourseData
AS

SELECT
SCHOOL.SchoolId,
SCHOOL.SchoolName,
COURSE.CourseId,
COURSE.CourseName,
COURSE.Description

FROM
SCHOOL
INNER JOIN COURSE ON SCHOOL.SchoolId = COURSE.SchoolId
GO
```

A View is a “virtual” table that can contain data from multiple tables

This part is not necessary – but if you make any changes, you need to delete the old version before you can update it

The Name of the View

Inside the View you join the different tables together using the **JOIN** operator

2

Using the View:

You can Use the View as an ordinary table in Queries :

```
select * from CourseData
```

	SchoolId	SchoolName	CourseId	CourseName	Description
1	1	TUC	1	Industrial IT	The best course ever
2	1	TUC	2	Control with Implementation	Control Theory
3	1	TUC	3	Systems and Control Laboratory	Practical Lav course

Create Stored Procedures

Create Stored Procedure:

```
IF EXISTS (SELECT name
           FROM sysobjects
           WHERE name = 'StudentGrade'
           AND type = 'P')
DROP PROCEDURE StudentGrade
```

GO

```
CREATE PROCEDURE StudentGrade
```

```
@Student varchar(50),
```

```
@Course varchar(10),
```

```
@Grade varchar(1)
```

AS

```
DECLARE
```

```
@StudentId int,
```

```
@CourseId int
```

```
select StudentId from STUDENT where StudentName =
@Student
```

```
select CourseId from COURSE where CourseName = @Course
```

```
insert into GRADE (StudentId, CourseId, Grade)
```

```
values (@StudentId, @CourseId, @Grade)
```

```
GO
```

A Stored Procedure is like Method in C# - it is a piece of code with SQL commands that do a specific task – and you reuse it

This part is not necessary – but if you make any changes, you need to delete the old version before you can update it

Procedure Name

Input Arguments

Internal/Local Variables

Note! Each variable starts with @

SQL Code (the “body” of the Stored Procedure)

Using the Stored Procedure:

```
execute StudentGrade 'John Wayne', 'SCE2006', 'B'
```

Start using SQL Server

1. Tutorial: **SQL Server Management Studio**
<https://msdn.microsoft.com/en-us/library/bb934498.aspx>
2. Tutorial: Getting Started with the Database Engine
<https://msdn.microsoft.com/en-us/library/ms345318.aspx>
3. Tutorial: Writing Transact-SQL Statements
<https://msdn.microsoft.com/en-us/library/ms365303.aspx>

Videos

- Introduction to Database Systems
<https://www.youtube.com/watch?v=n75iPNrzN-o>
- Introduction to ERwin
<https://www.youtube.com/watch?v=P3n6hRNup8Y>
- Introduction to SQL Server
<https://www.youtube.com/watch?v=SIR4KOhAG1U>
- Database Views and Stored Procedures
https://www.youtube.com/watch?v=SHELF_iQUeU
- Database Development
<https://www.youtube.com/watch?v=Pu9TgTZ9Y5c>

<https://www.youtube.com/playlist?list=PLdb-TcK6Aqj0PedGwO7CUI6WBRyia7EQh>

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