ASP.NET Core Connection String

Hans-Petter Halvorsen

Contents

Introduction

- The Connection string is used to connect to the database
- In this tutorial we will use SQL Server, Visual Studio, C#
- We will show how we use Connection String in an ASP.NET Core Web Application

SQL Server

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SQL Server

- SQL Server is a Database System from Microsoft.
- SQL Server comes in different editions.
- SQL Server Express is recommended because it is simple to use, and it is free.

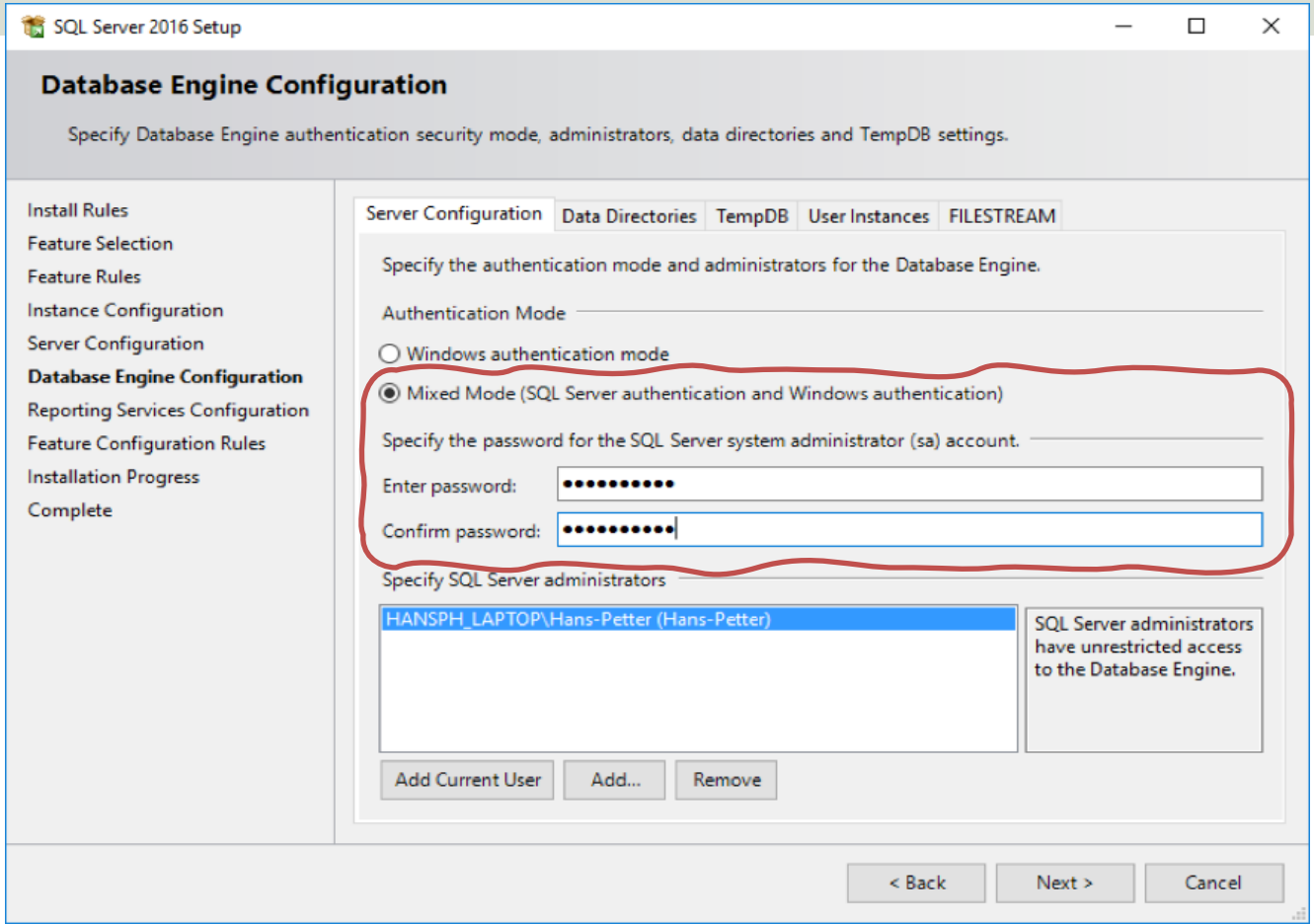
SQL Server Installation

- During the setup of SQL Server you should select "Mixed Mode" (i.e., both "SQL Server Authentication" and "Windows Authentication") and enter the password for your sa user.
- "Windows Authentication" is the default option during installation, so make sure to "Mixed Mode" (i.e., both "SQL Server Authentication" and "Windows Authentication") and enter the password for your sa user
- Make sure to remember the sa password!

SQL Server Installation - Mixed Mode

- During Installation of SQL Server: Select "**Mixed Mode**" (i.e., both SQL Server Authentication and Windows Authentication)
- Make sure to remember the "**sa**" Password!
- "sa" is short for **S**ystem **A**dministrator

SQL Server Installation - Mixed Mode



Authentication

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Visual Studio

- In WinForm Desktop Applications you should put the Connection String in the App.config file
- While for ASP.NET Core Web Applications the Connection String should be placed in the in the appSettings.json file.

Authentication Methods

SQL Server offers 2 different Authentication methods:

- SQL Server Authentication
- Windows Authentication

SQL Server Authentication

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Connection String - SQL Server Authentication

Using "SQL Server Authentication" the Connection String looks like this:

DATA SOURCE=<SQL Server Name>;DATABASE=<Database Name>;UID=sa;PWD=<Your Password>;

Replace <SQL Server Name> with the name of your SQL Server, typically "<YourComputerName>\SQLEXPRESS" if you are using SQL Server Express.

UID is a SQL Server user, here you can create your own SQL Server user inside SQL Server Management Studio or use the built-in sa user (sa=System Administrator). During the setup of SQL Server you need to select "Mixed Mode" and enter the password for your sa user.

It may look something like this:

DATA SOURCE=DELLPCWORK\\SQLEXPRESS;DATABASE=MEASUREMENTS;UID=sa;PWD=Password123;

Localhost

If you don't know the name of your PC or if you use multiple PC, it may be a good idea to use "LOCALHOST" instead of your real computer name (assuming the application and the database in located on the same computer)

```
DATA SOURCE=LOCALHOST\\SQLEXPRESS;DATABASE=MEASUREMENTS;UID=sa;PWD=Password123;
```

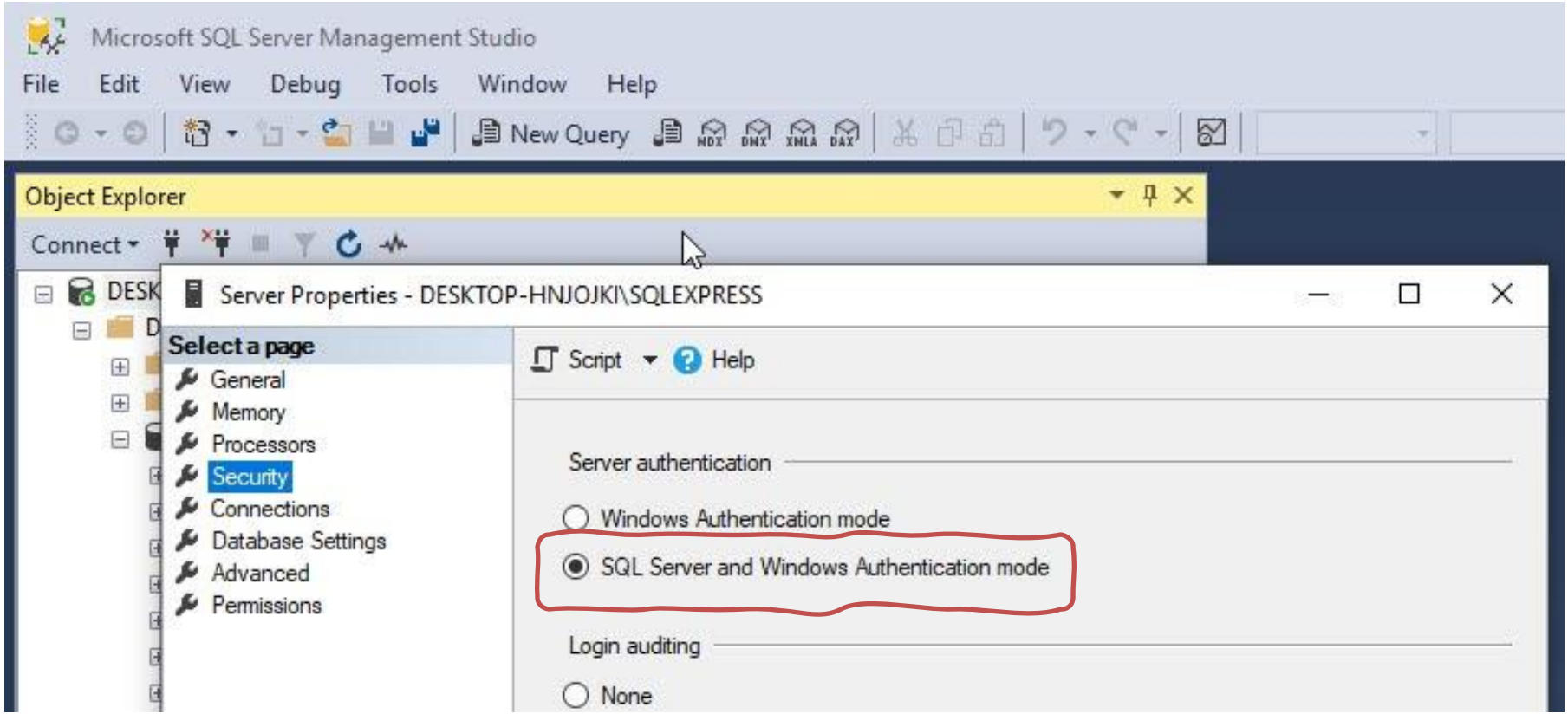
Enable SQL Server Authentication in SSMS

You can also turn on "SQL Server Authentication" in SQL Server Management Studio (SSMS) after installation of SQL Server.

To change security authentication mode, do the following steps:

1. In SQL Server Management Studio Object Explorer, right-click the server, and then click Properties.
2. On the Security page, under Server authentication, select the new server authentication mode, and then click OK.
3. In the SQL Server Management Studio dialog box, click OK to acknowledge the requirement to restart SQL Server.
4. In Object Explorer, right-click your server, and then click Restart. If SQL Server Agent is running, it must also be restarted. Or just restart your computer.

Enable SQL Server Authentication



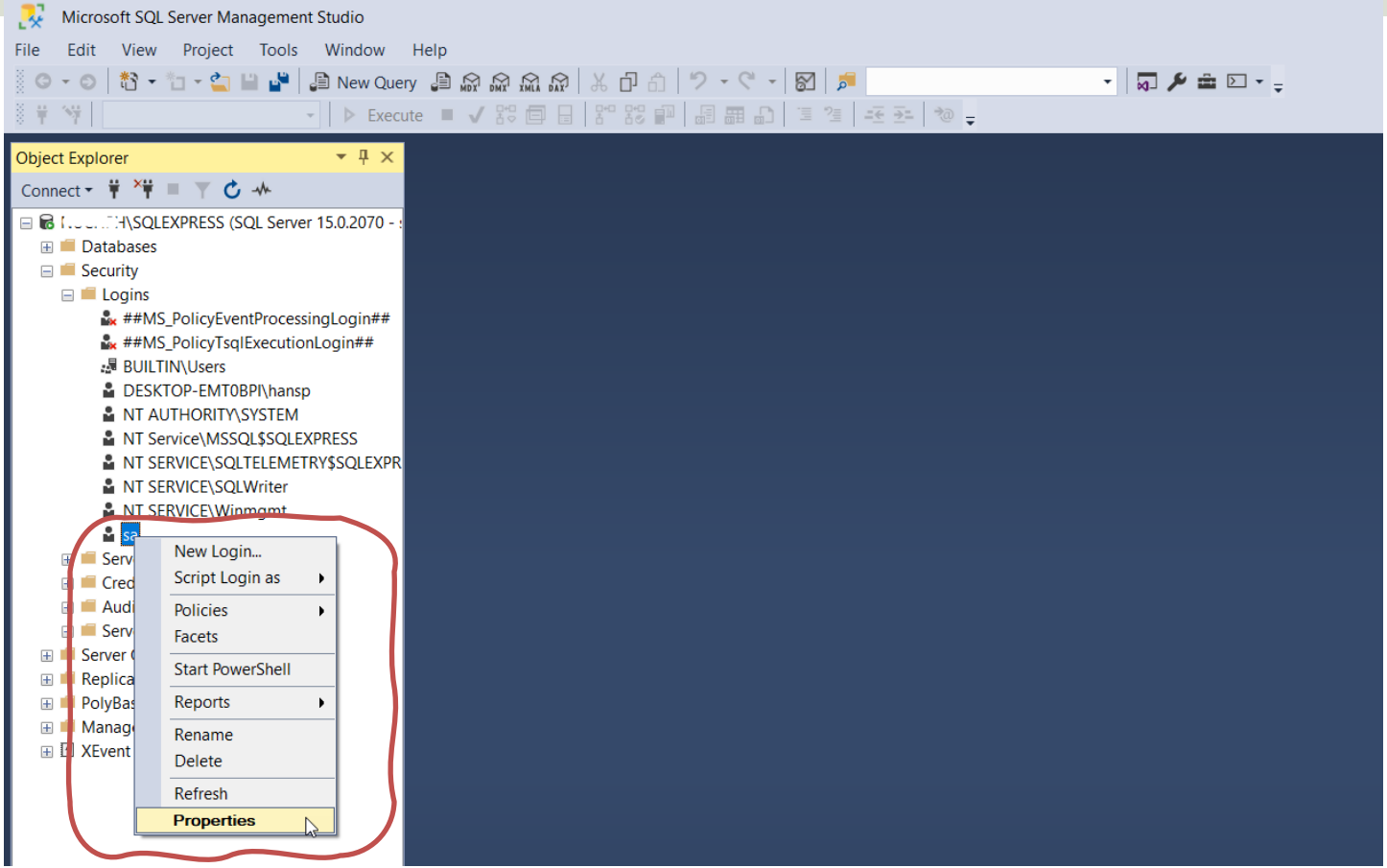
Enable sa login

Then to enable the sa login, do the following steps:

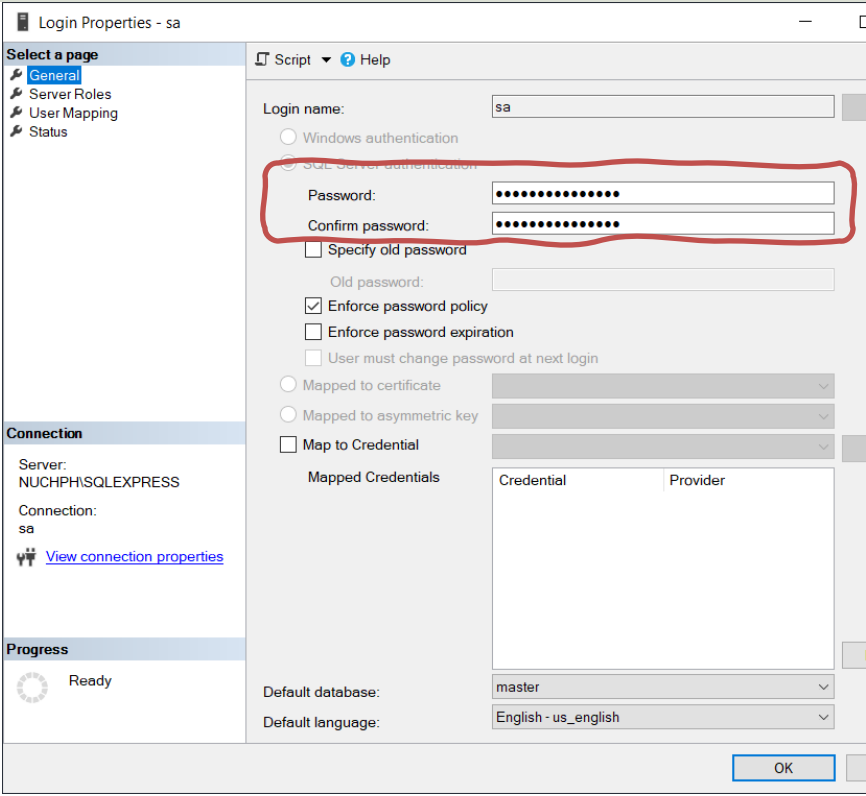
1. In Object Explorer, expand Security, expand Logins, right-click sa, and then click Properties.
2. On the General page, you might have to create and confirm a password for the login.
3. On the Status page, in the Login section, click Enabled, and then click OK.

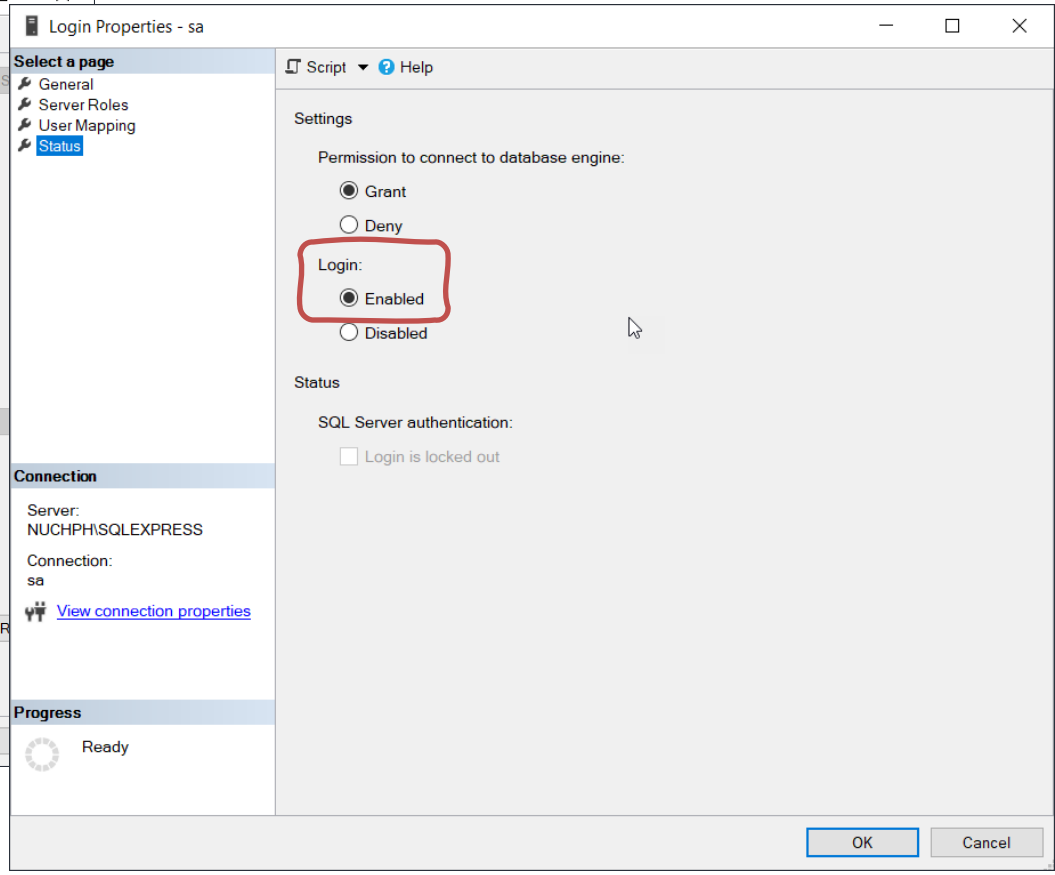
Note! You must restart your computer afterwards (well, it is enough to restart the “Sql service…”) in order to work.

Enable sa login



Enable sa login



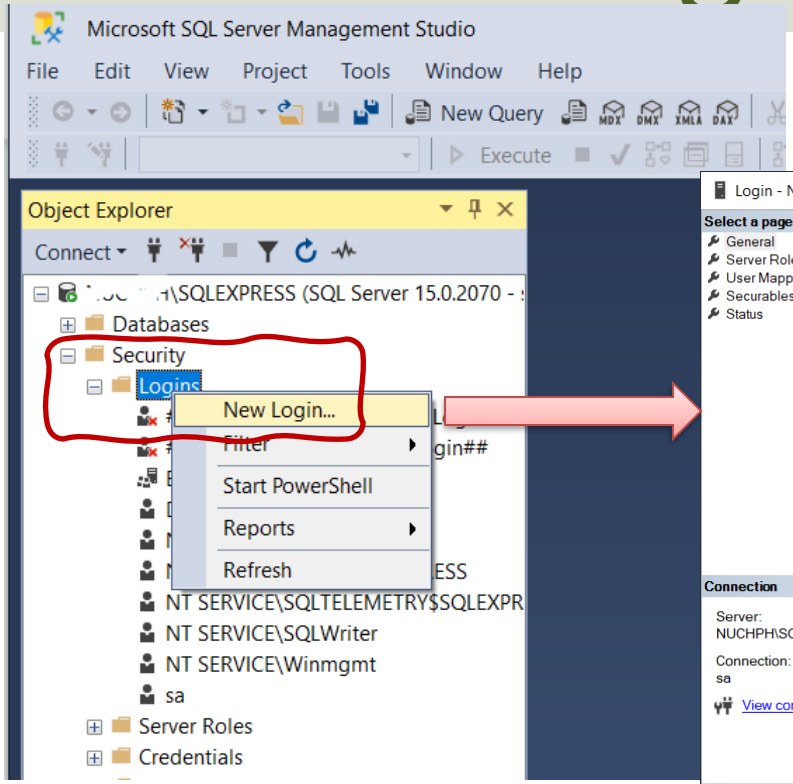


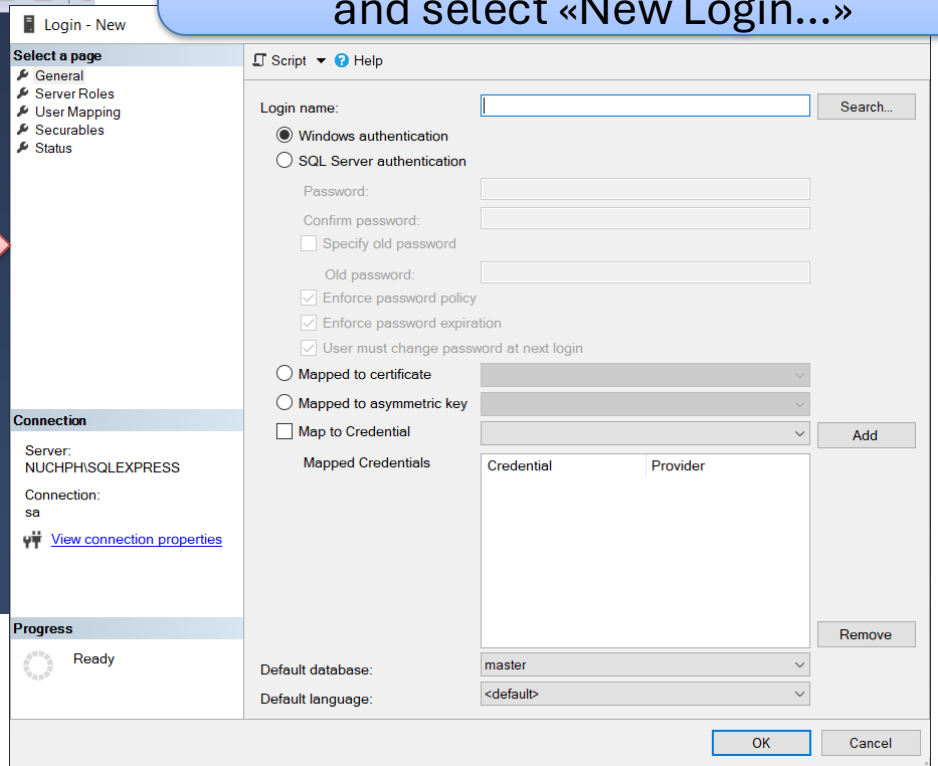
Create Logins in SQL Server

- “sa” is a built-in Login in SQL Server
- You can also create your own SQL Server Logins
- Normally you should do that rather than using the “sa” login
- “sa” have access to “everything” and in context of Data Security that is unfortunate.
- In general, you should make your own Logins that have access to only what's strictly necessary

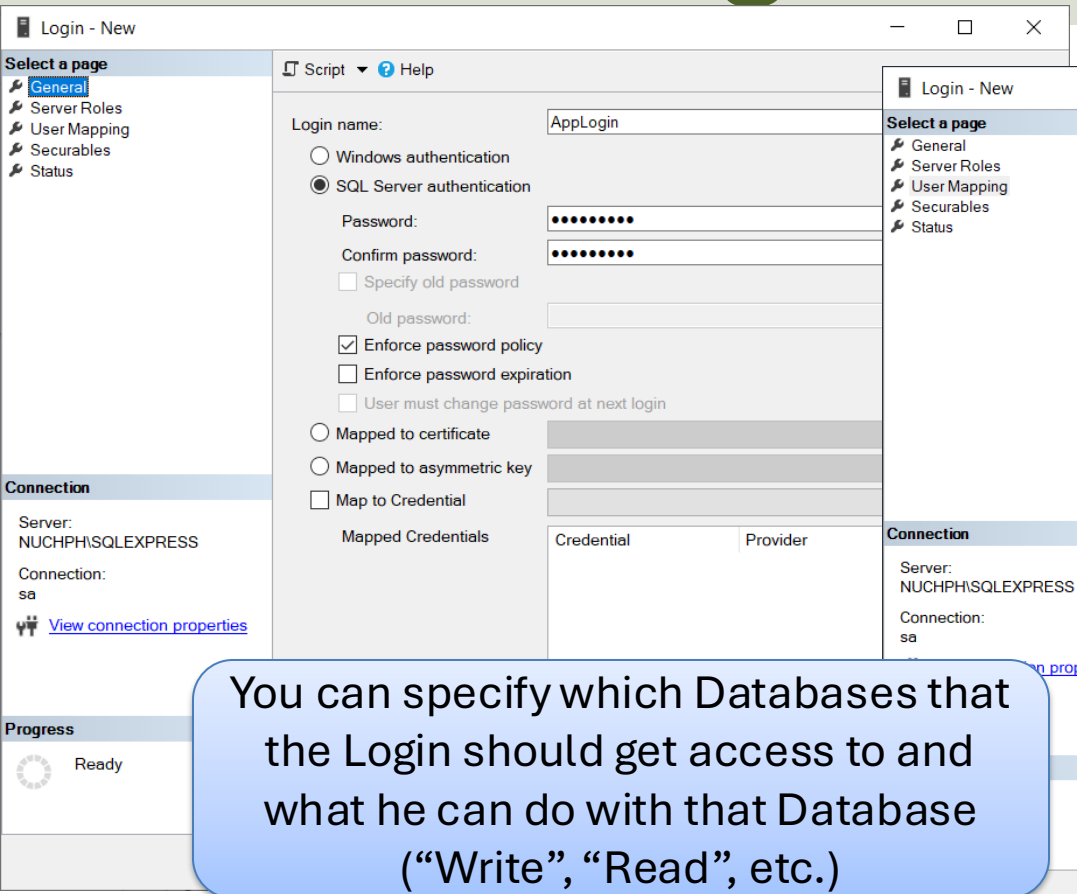
Create Logins in SQL Server

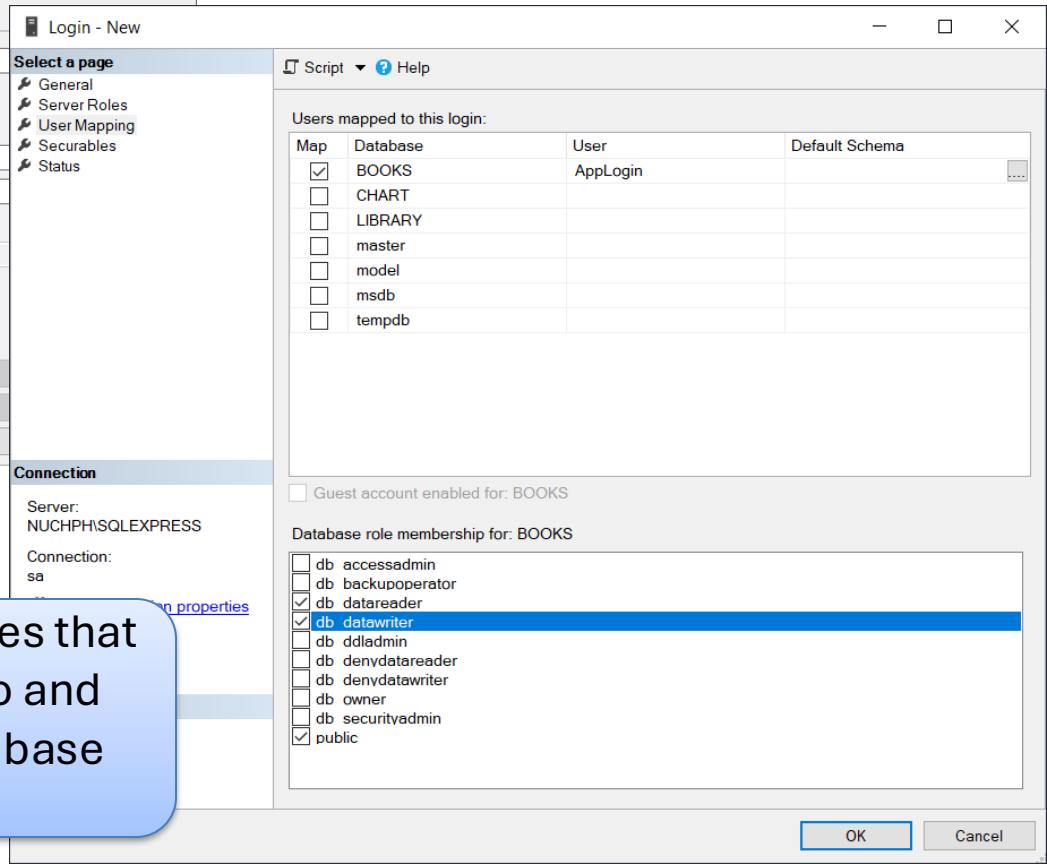
In order to create a new Login, goto «Security» and right-click on «Logins» and select «New Login...»





Create Logins in SQL Server





You can specify which Databases that the Login should get access to and what he can do with that Database (“Write”, “Read”, etc.)

Windows Authentication

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Windows Authentication

Using "Windows Authentication" the Connection String looks like this:

```
DATA SOURCE=DELLPCWORK\\SQLEXPRESS;DATABASE=MEASUREMENTS;Integrated Security = True;
```

Localhost:

If you don't know the name of your PC or if you use multiple PC, it may be a good idea to use "LOCALHOST" instead of your real computer name (assuming the application and the database in located on the same computer).

```
DATA SOURCE=LOCALHOST\\SQLEXPRESS;DATABASE=MEASUREMENTS;Integrated Security = True;
```

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ASP.NET Core

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Introduction

- **appSettings.json** is a configuration file used in ASP.NET Core Web Applications.
- It is typically used to store the Connection String to the Database.
- But it can be used to store lots of other settings that you need to use in your application.

Connection String in appSettings.json

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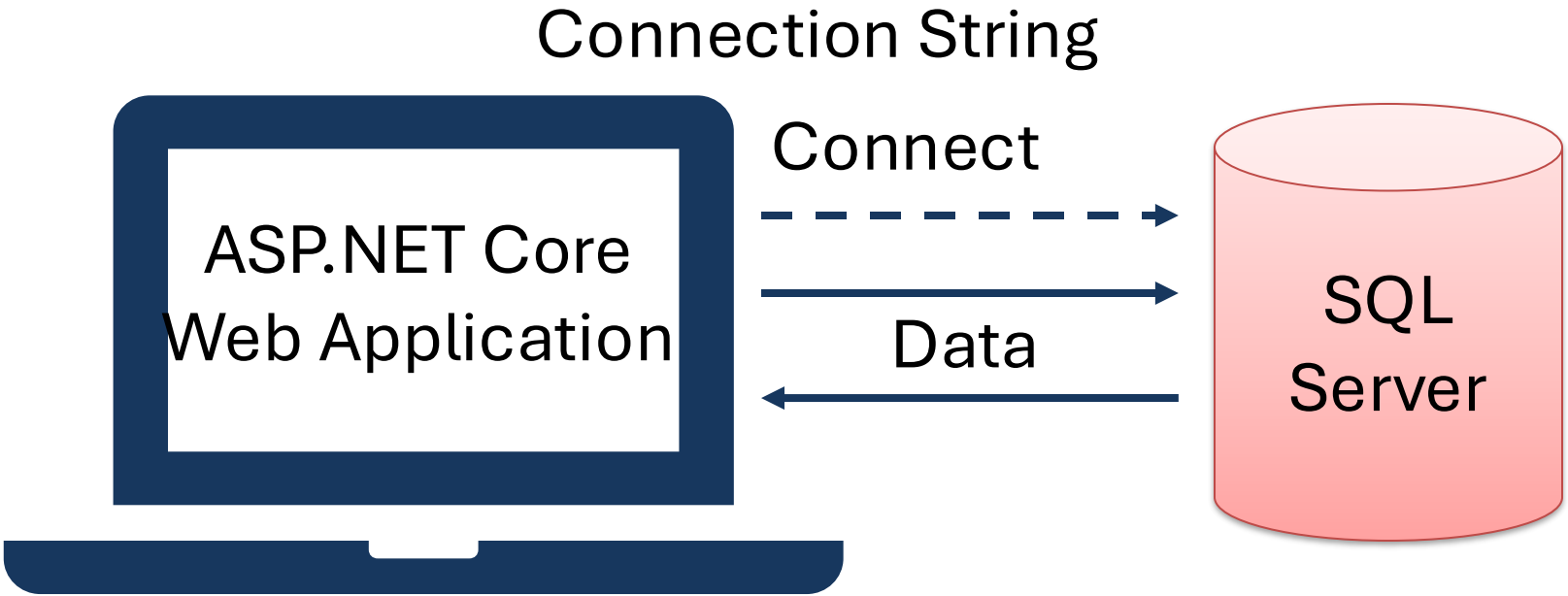
Connection String




```
ConnectionString":"DATA SOURCE=xxx; DATABASE=xxx;UID=xxx;PWD=xxx
```

appSettings.json

```
{
  "Logging": {
    "LogLevel": {
      "Default": "Information",
      "Microsoft": "Warning",
      "Microsoft.Hosting.Lifetime": "Information"
    }
  },
  "AllowedHosts": "*",

  "ConnectionStrings": {
    "ConnectionString": "DATA SOURCE=xxx;UID=xxx;PWD=xxx;DATABASE=xxx"
  }

}
```

Startup.cs

We need to add something to the “**Startup.cs**” file:

```
public void ConfigureServices(IServiceCollection services)
{
    services.AddRazorPages();

    services.AddSingleton<IConfiguration>(Configuration);
}
```

We have added:
services.AddSingleton<IConfiguration>(Configuration);

Code Example

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SQL Server

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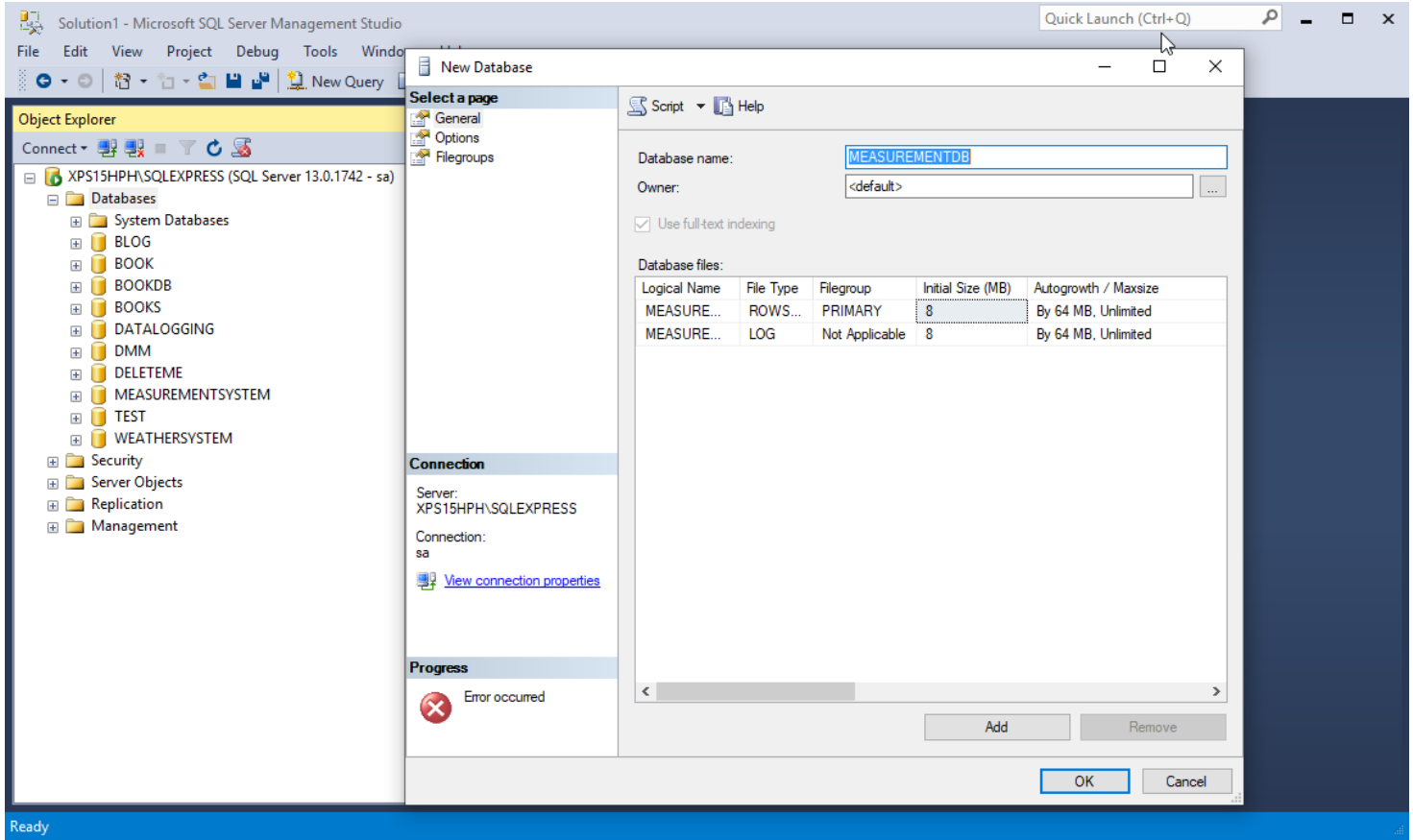
SQL Server

- We will use SQL Server in this example as our database.
- You should have SQL Server locally installed on your computer
- SQL Server Express is recommended.

SQL Server - Create Database

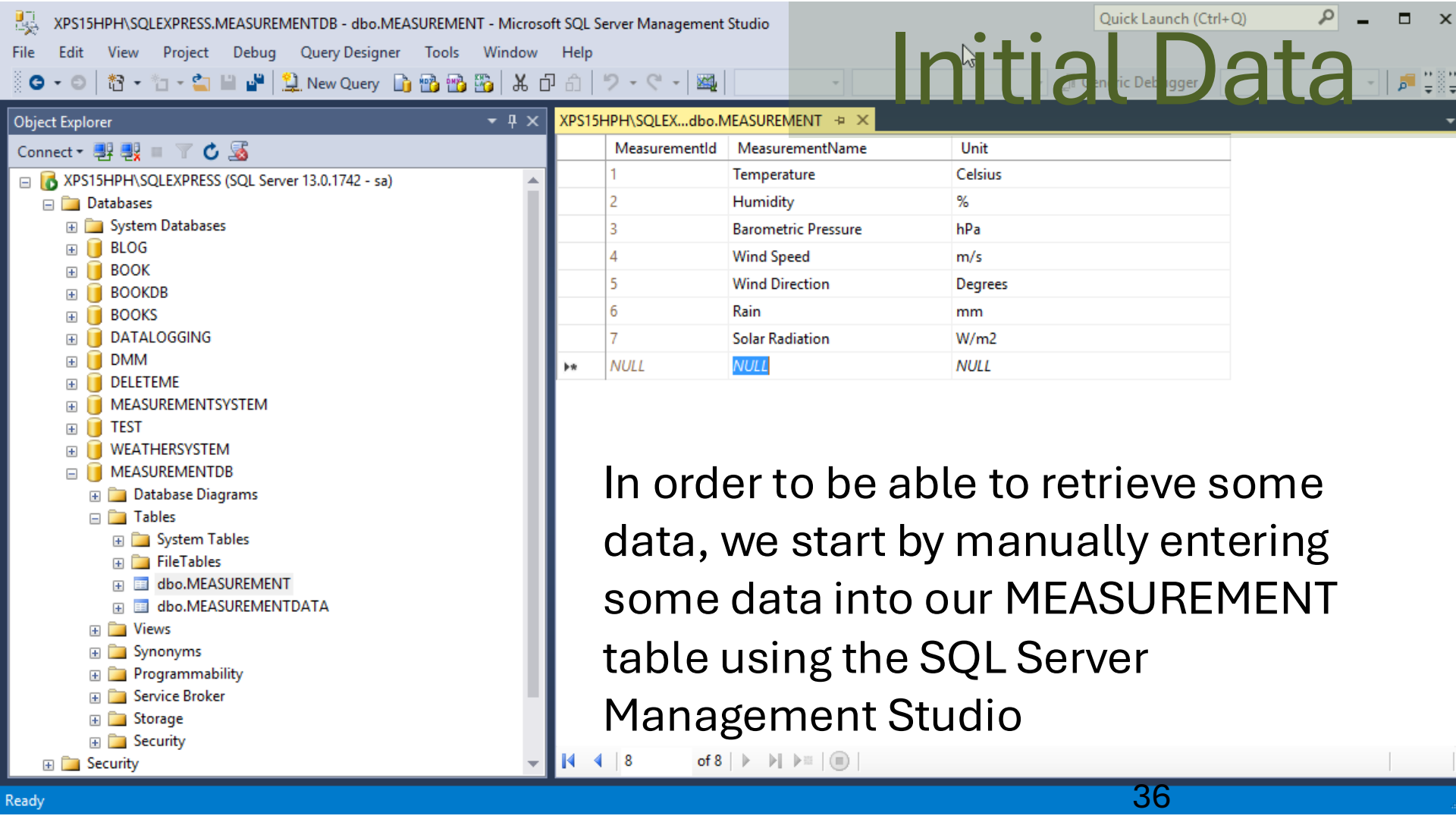


Database Table

```
CREATE TABLE [MEASUREMENT]
(
    [MeasurementId]   int  NOT NULL  IDENTITY ( 1,1 ) Primary Key,
    [MeasurementName] varchar(100) NOT NULL UNIQUE,
    [Unit]            varchar(50)  NULL
)
go
```

You can use SQL Server Management Studio in order to run this SQL Script

Initial Data



In order to be able to retrieve some data, we start by manually entering some data into our MEASUREMENT table using the SQL Server Management Studio

Visual Studio
ASP.NET Core Web Application

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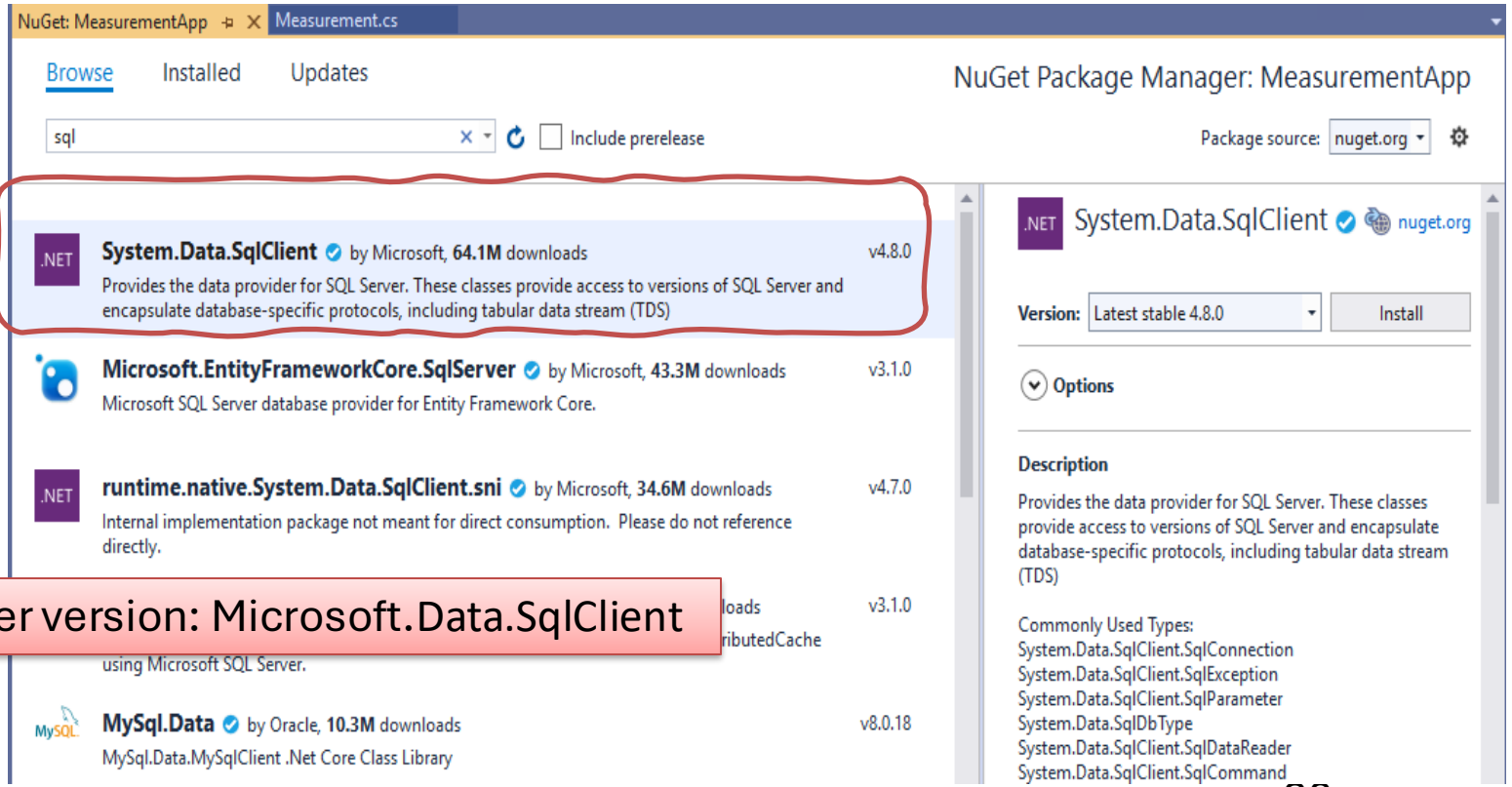
NuGet

Make sure to install the necessary NuGet package(s). We will use the **System.Data.SqlClient**



A newer version: Microsoft.Data.SqlClient

```
{
  "Logging": {
    "LogLevel": {
      "Default": "Information",
      "Microsoft": "Warning",
      "Microsoft.Hosting.Lifetime": "Information"
    }
  },
  "AllowedHosts": "*",

  "ConnectionStrings": {
    "ConnectionString": "DATA
SOURCE=xxx\\SQLEXPRESS;DATABASE=xxx;UID=sa;PWD=xxx"
  }

}
```

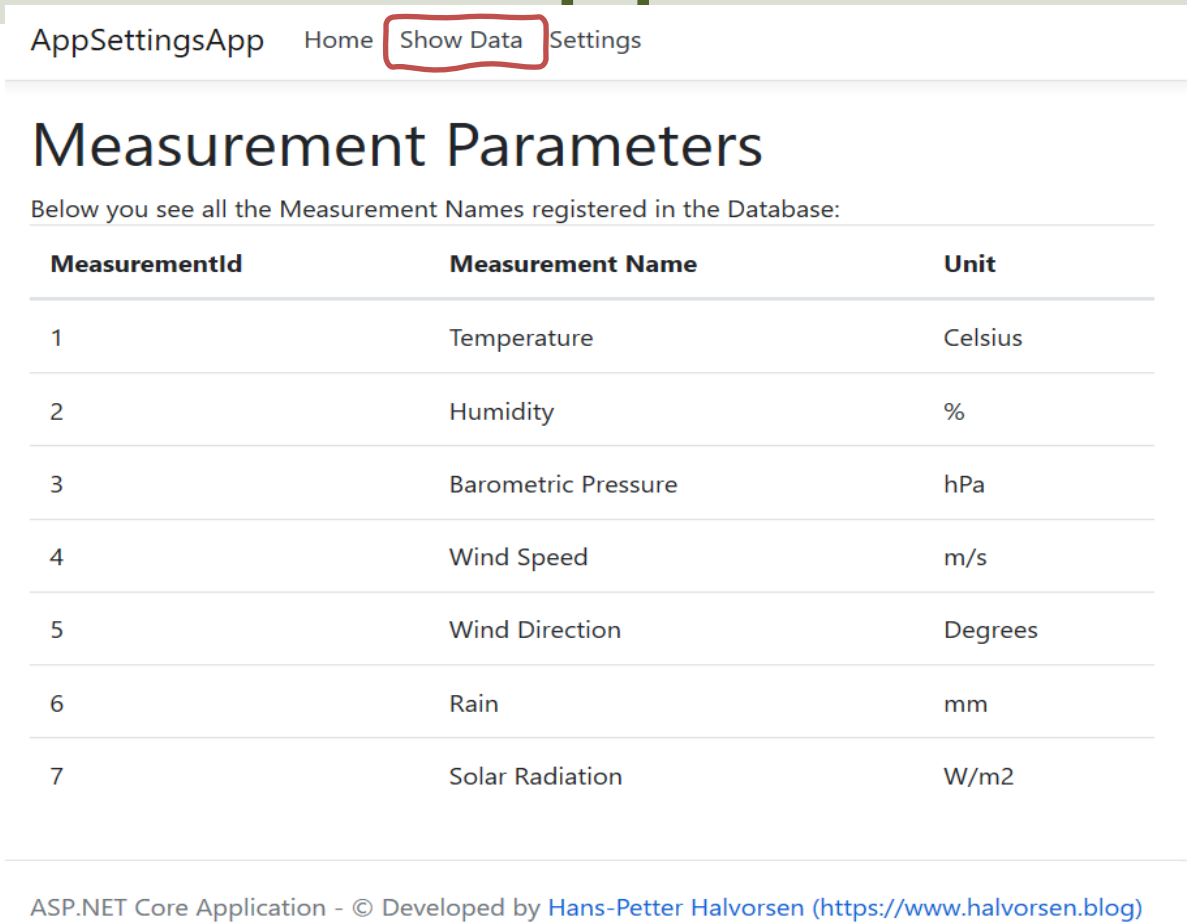
```
…
using Microsoft.Extensions.Configuration;
public class xxxModel : PageModel
{
    readonly IConfiguration _configuration;

    private string connectionString;

    public xxxModel(IConfiguration configuration)
    {
        _configuration = configuration;
    }
    …
    connectionString =
    _configuration.GetConnectionString("ConnectionString");

}
```

The Constructor

ASP.NET Core Web Application

The following Application will be demonstrated here:

We will retrieve these data from a SQL Server Database



Create Database Class

Measurement.cs

AppSettingsApp — AppSettingsApp.Models.Measurement

```
using System;
using System.Collections.Generic;
using System.Data.SqlClient;

namespace AppSettingsApp.Models
{
    9 references
    public class Measurement
    {
        2 references
        public int MeasurementId { get; set; }
        2 references
        public string MeasurementName { get; set; }
        2 references
        public string MeasurementUnit { get; set; }

        1 reference
        public List<Measurement> GetMeasurmentParameters(string connectionString)
        {

            List<Measurement> measurementParameterList = new List<Measurement>();

            SqlConnection con = new SqlConnection(connectionString);

            string sqlQuery = "select MeasurementId, MeasurementName, Unit from MEASUREMENT";

            con.Open();

            SqlCommand cmd = new SqlCommand(sqlQuery, con);

            SqlDataReader dr = cmd.ExecuteReader();

            if (dr != null)
            {
                while (dr.Read())
                {
                    Measurement measurmentParameter = new Measurement();

                    measurmentParameter.MeasurementId = Convert.ToInt32(dr["MeasurementId"]);
                    measurmentParameter.MeasurementName = dr["MeasurementName"].ToString();
                    measurmentParameter.MeasurementUnit = dr["Unit"].ToString();

                    measurementParameterList.Add(measurmentParameter);
                }
            }
```

- We start by creating a **Models** folder in our project using the Solutions Explorer
- Then we create a new Class (“**Measurement.cs**”)
- Then we create C# Code for retrieving data from the Database

“Measurement.cs”

```
using System.Data.SqlClient;

namespace MeasurementApp.Model
{
    public class Measurement
    {
        public int MeasurementId { get; set; }
        public string MeasurementName { get; set; }
        public string MeasurementUnit { get; set; }

        public List<Measurement> GetMeasurmentParameters(string connectionString)
        {
            List<Measurement> measurementParameterList = new List<Measurement>();

            SqlConnection con = new SqlConnection(connectionString);

            string sqlQuery = "select MeasurementId, MeasurementName, Unit from MEASUREMENT";

            con.Open();

            SqlCommand cmd = new SqlCommand(sqlQuery, con);

            SqlDataReader dr = cmd.ExecuteReader();

            if (dr != null)
            {
                while (dr.Read())
                {
                    Measurement measurmentParameter = new Measurement();

                    measurmentParameter.MeasurementId = Convert.ToInt32(dr["MeasurementId"]);
                    measurmentParameter.MeasurementName = dr["MeasurementName"].ToString();
                    measurmentParameter.MeasurementUnit = dr["Unit"].ToString();

                    measurementParameterList.Add(measurmentParameter);
                }
            }
            return measurementParameterList;
        }
    }
}
```

ASP.NET Web Page

An ASP.NET Core Web Page consist of the following:

- “Database.**cshtml**” - HTML/Razor code
- “Database.**cshtml.cs**” - Page Model (Code behind C# File)

“Database.cshtml.cs”

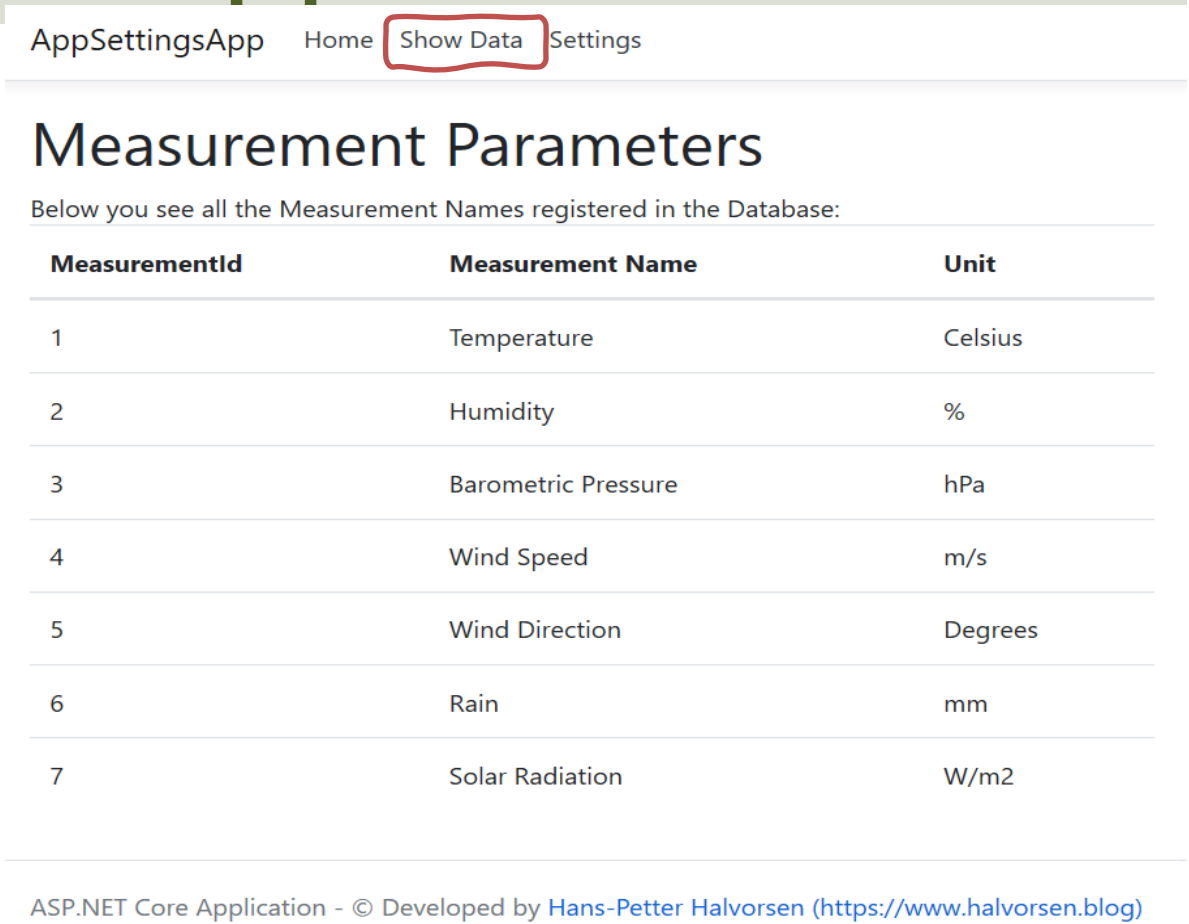
```
...
using Microsoft.Extensions.Configuration;
using AppSettingsApp.Models;

namespace AppSettingsApp.Pages
{
  public class DatabaseModel : PageModel
  {
    readonly IConfiguration _configuration;

    public List<Measurement> measurementParameterList = new List<Measurement>();

    public string connectionString;

    public DatabaseModel(IConfiguration configuration)
    {
      _configuration = configuration;
    }
    public void OnGet()
    {
      GetData();
    }

    void GetData()
    {
        Measurement measurement = new Measurement();

        connectionString = _configuration.GetConnectionString("ConnectionString");

        measurementParameterList = measurement.GetMeasurmentParameters(connectionString);
    }
  }
}
```

“Database.cshtml”

```
...

<div>

  <h1>Measurement Parameters</h1>

  Below you see all the Measurement Names registered in the Database:

  <table class="table">
    <thead>
      <tr>
        <th>MeasurementId</th>
        <th>Measurement Name</th>
        <th>Unit</th>
      </tr>
    </thead>
    <tbody>
      @foreach (var measurement in Model.measurementParameterList)
      {
        <tr>
          <td> @measurement.MeasurementId</td>
          <td> @measurement.MeasurementName</td>
          <td> @measurement.MeasurementUnit</td>
        </tr>
      }
    </tbody>
  </table>

</div>
```

Run the Application

Now we can run the Application



Resources

- https://docs.microsoft.com/en-us/dotnet/framework/data/adonet/connection-string-syntax
- https://docs.microsoft.com/en-us/aspnet/core/fundamentals/configuration

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