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# SQL Server Connection Strings

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# 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")
- Enter the password for your **sa** User (short for System Administrator)
- **Make sure to remember the sa password!**



# SQL Server Installation

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# Authentication SQL Server

SQL Server offers 2 different Authentication methods:

- SQL Server Authentication
- Windows Authentication

Make sure to select “Mixed Mode” during Installation of SQL Server

# SQL Server Installation

SQL Server 2016 Setup

## Database Engine Configuration

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

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

HANSPH_LAPTOP\Hans-Petter (Hans-Petter)	SQL Server administrators have unrestricted access to the Database Engine.

Add Current User   Add...   Remove

< Back   Next >   Cancel

Make sure to select "Mixed Mode" during Installation of SQL Server



# SQL Server Authentication

# 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 PCs
- It may be a good idea to use "LOCALHOST" instead of your real computer name
- This assumes the application and the database is located on the same computer)

Example:

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

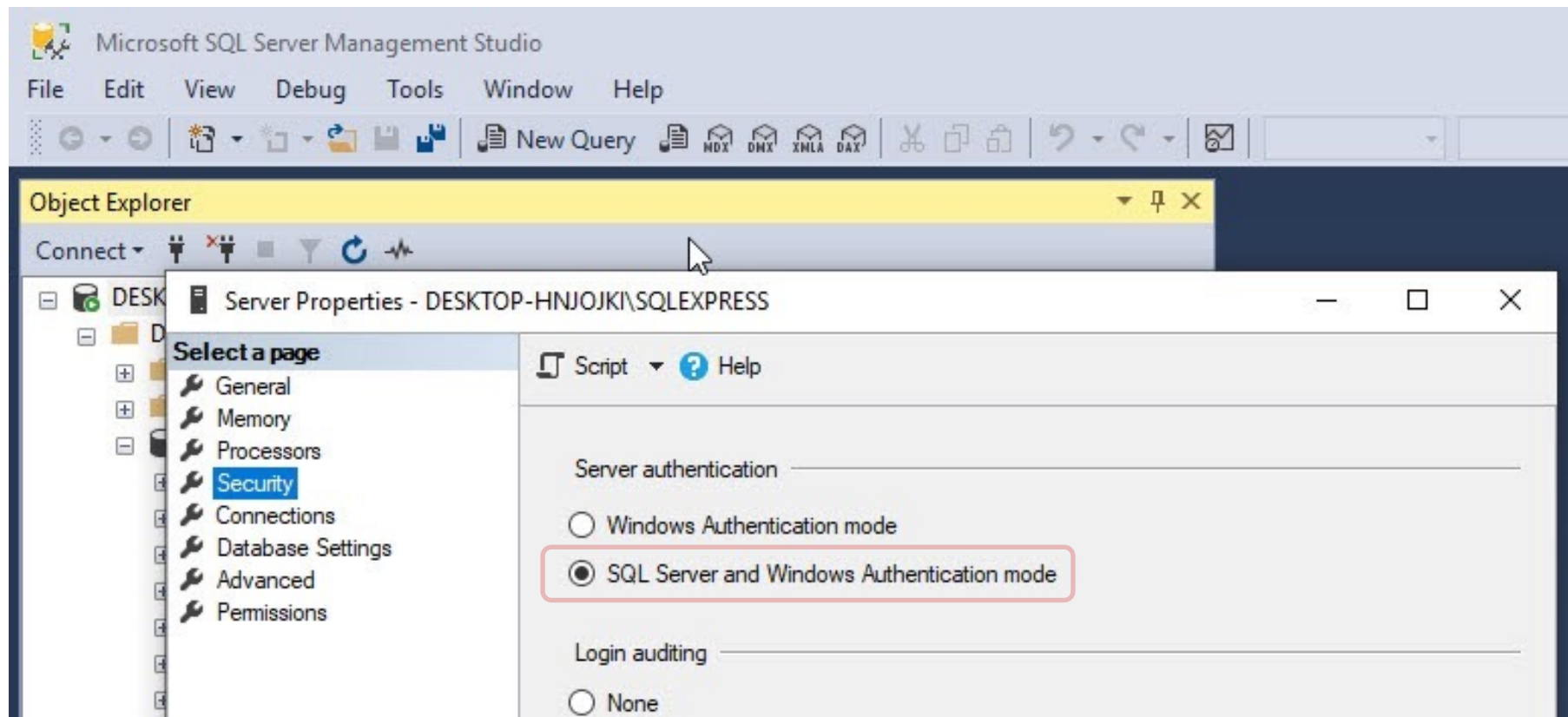
# Enable SQL Server Authentication in SSMS

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 in SSMS



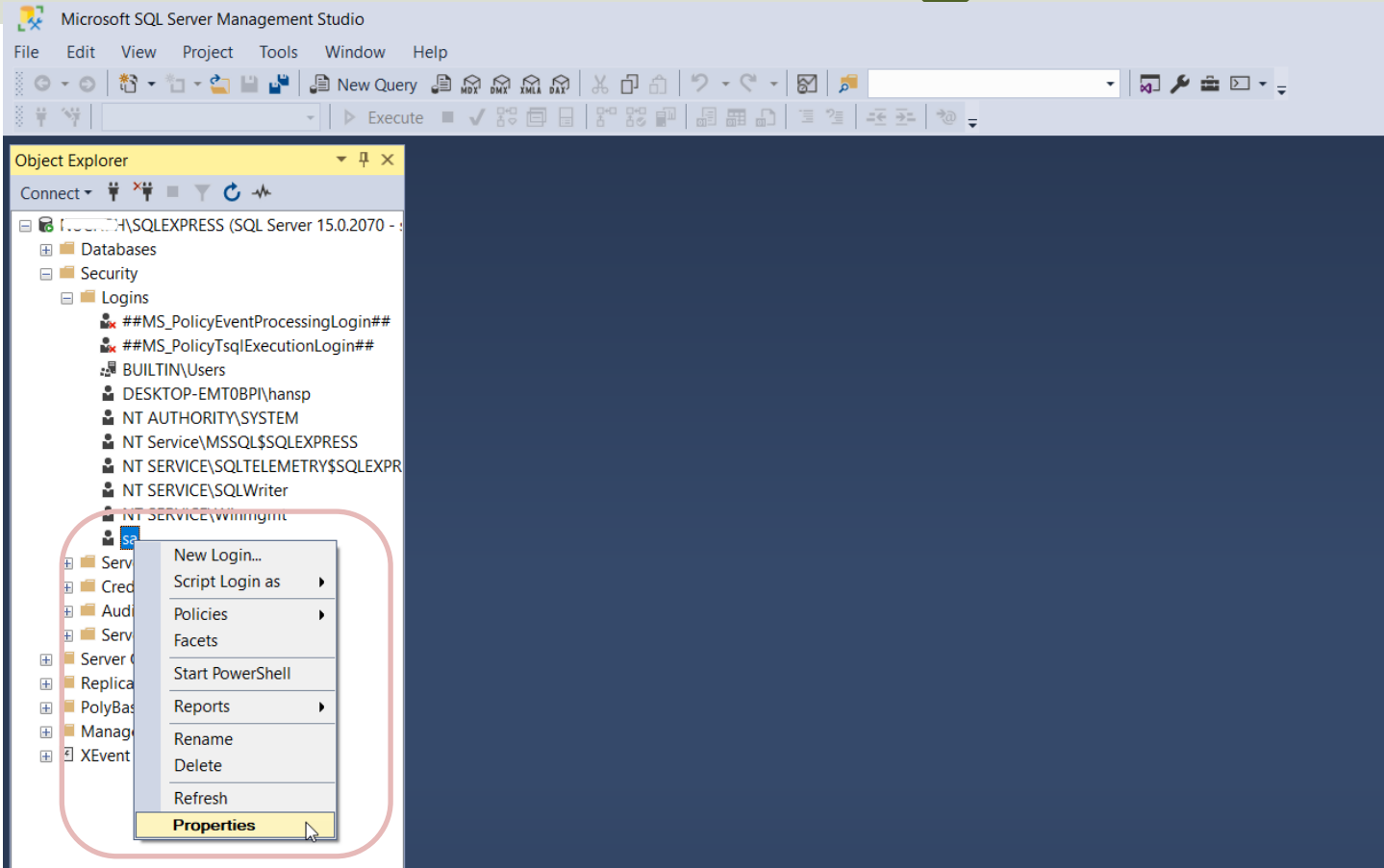
# Enable sa login

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

The image displays two screenshots of the SQL Server Enterprise Manager 'Login Properties' dialog for the 'sa' user, illustrating the steps to enable SQL Server authentication.

**Left Screenshot (General Tab):**

- Login name:** sa
- Authentication:**  SQL Server authentication (highlighted with a red box)
- Password:** [Redacted]
- Confirm password:** [Redacted] (highlighted with a red box)
- Specify old password
- Enforce password policy
- Enforce password expiration
- User must change password at next login
- Mapped to certificate
- Mapped to asymmetric key
- Map to Credential
- Mapped Credentials:** Table with columns Credential and Provider.
- Default database:** master
- Default language:** English - us\_english
- Buttons:** OK

**Right Screenshot (Status Tab):**

- Settings:** Permission to connect to database engine:  Grant,  Deny
- Login:**  Enabled,  Disabled (highlighted with a red box)
- Status:** SQL Server authentication:  Login is locked out
- Buttons:** OK, Cancel

# Create Logins in SQL Server

- “sa” (short for System Administrator) 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...»

The image shows a screenshot of Microsoft SQL Server Management Studio (SSMS) with the following components:

- Object Explorer:** The left pane shows the server hierarchy. The 'Security' folder is expanded, and the 'Logins' folder is selected. A right-click context menu is open over 'Logins', with 'New Login...' highlighted. A red arrow points from this menu item to the 'Login - New' dialog box.
- SQL Server Management Studio Interface:** The top menu bar includes File, Edit, View, Project, Tools, Window, and Help. The toolbar shows various icons for file operations and execution. The main area displays the 'Login - New' dialog box.
- Login - New Dialog Box:** This dialog is used to configure a new login. It includes:
  - Select a page:** General, Server Roles, User Mapping, Securables, Status.
  - General page:**
    - Login name:** A text input field with a search button.
    - Authentication:** Radio buttons for 'Windows authentication' (selected) and 'SQL Server authentication'.
    - Password fields:** Input fields for 'Password', 'Confirm password', and 'Old password' (with a 'Specify old password' checkbox).
    - Policy options:** Checked boxes for 'Enforce password policy', 'Enforce password expiration', and 'User must change password at next login'.
    - Advanced options:** Radio buttons for 'Mapped to certificate' and 'Mapped to asymmetric key', and a checkbox for 'Map to Credential'.
    - Mapped Credentials:** A table with columns 'Credential' and 'Provider', and an 'Add' button.
    - Default database:** A dropdown menu set to 'master'.
    - Default language:** A dropdown menu set to '<default>'.
  - Connection:** Fields for 'Server: NUCHPH\SQLSERVER' and 'Connection: sa', with a 'View connection properties' link.
  - Progress:** A 'Ready' status indicator.
  - Buttons:** 'OK' and 'Cancel' buttons at the bottom right.



# Create Logins in SQL Server

**Login - New**

Select a page: General, Server Roles, User Mapping, Securables, Status

Script Help

Login name: AppLogin

Windows authentication

SQL Server authentication

Password: [masked]

Confirm password: [masked]

Specify old password

Old password: [text box]

Enforce password policy

Enforce password expiration

User must change password at next login

Mapped to certificate

Mapped to asymmetric key

Map to Credential

Mapped Credentials

Credential	Provider
------------	----------

**Connection**

Server: NUCHPHI\SQLEXPRESS

Connection: sa

[View connection properties](#)

**Progress**

Ready

**Login - New**

Select a page: General, Server Roles, User Mapping, Securables, Status

Script Help

Users mapped to this login:

Map	Database	User	Default Schema
<input checked="" type="checkbox"/>	BOOKS	AppLogin	
<input type="checkbox"/>	CHART		
<input type="checkbox"/>	LIBRARY		
<input type="checkbox"/>	master		
<input type="checkbox"/>	model		
<input type="checkbox"/>	msdb		
<input type="checkbox"/>	tempdb		

Guest account enabled for: BOOKS

Database role membership for: BOOKS

<input type="checkbox"/>	db_accessadmin
<input type="checkbox"/>	db_backupoperator
<input checked="" type="checkbox"/>	db_datareader
<input checked="" type="checkbox"/>	db_datawriter
<input type="checkbox"/>	db_ddladmin
<input type="checkbox"/>	db_denydatareader
<input type="checkbox"/>	db_denydatawriter
<input type="checkbox"/>	db_owner
<input type="checkbox"/>	db_securityadmin
<input checked="" type="checkbox"/>	public

OK Cancel

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 is located on the same computer).

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



# Visual Studio

# Authentication 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.



# LabVIEW

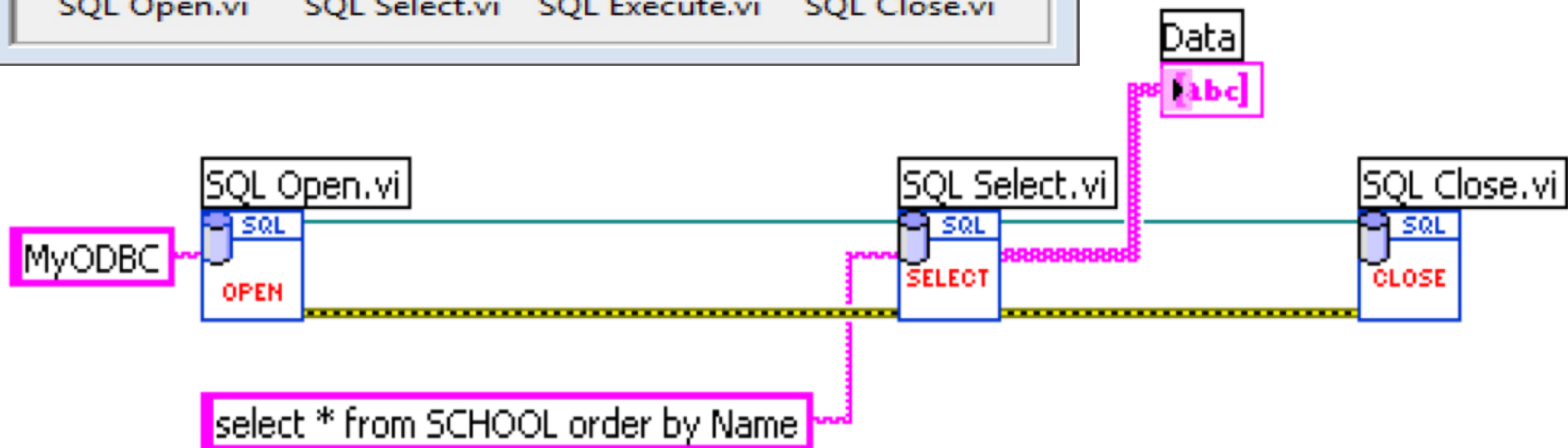
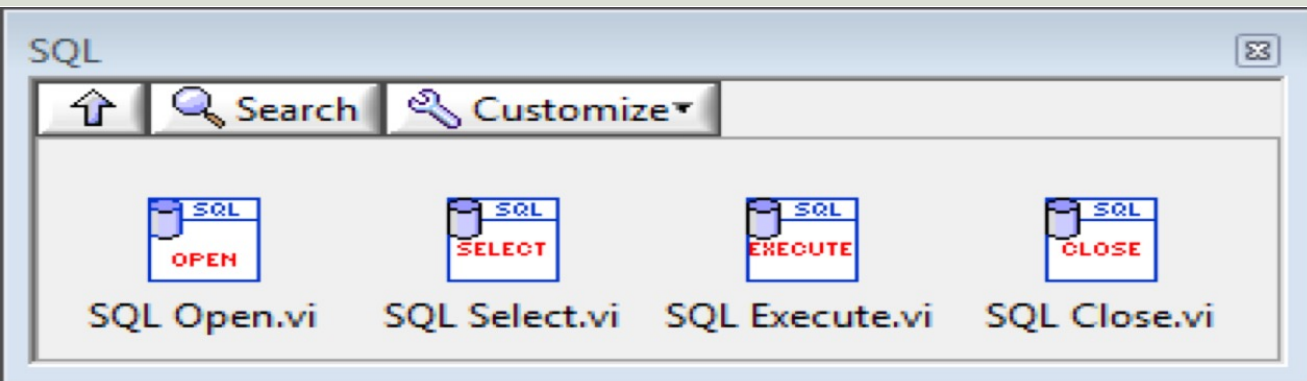
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# Database Communication in LabVIEW

- LabVIEW Database Connectivity Toolkit is included with LabVIEW professional, but it is cumbersome to use.
- It is recommended to use the LabVIEW SQL Toolkit instead. This Toolkit is very simple to use.
- [https://www.halvorsen.blog/documents/technology/database/database\\_labview.php](https://www.halvorsen.blog/documents/technology/database/database_labview.php)

# LabVIEW SQL Toolkit

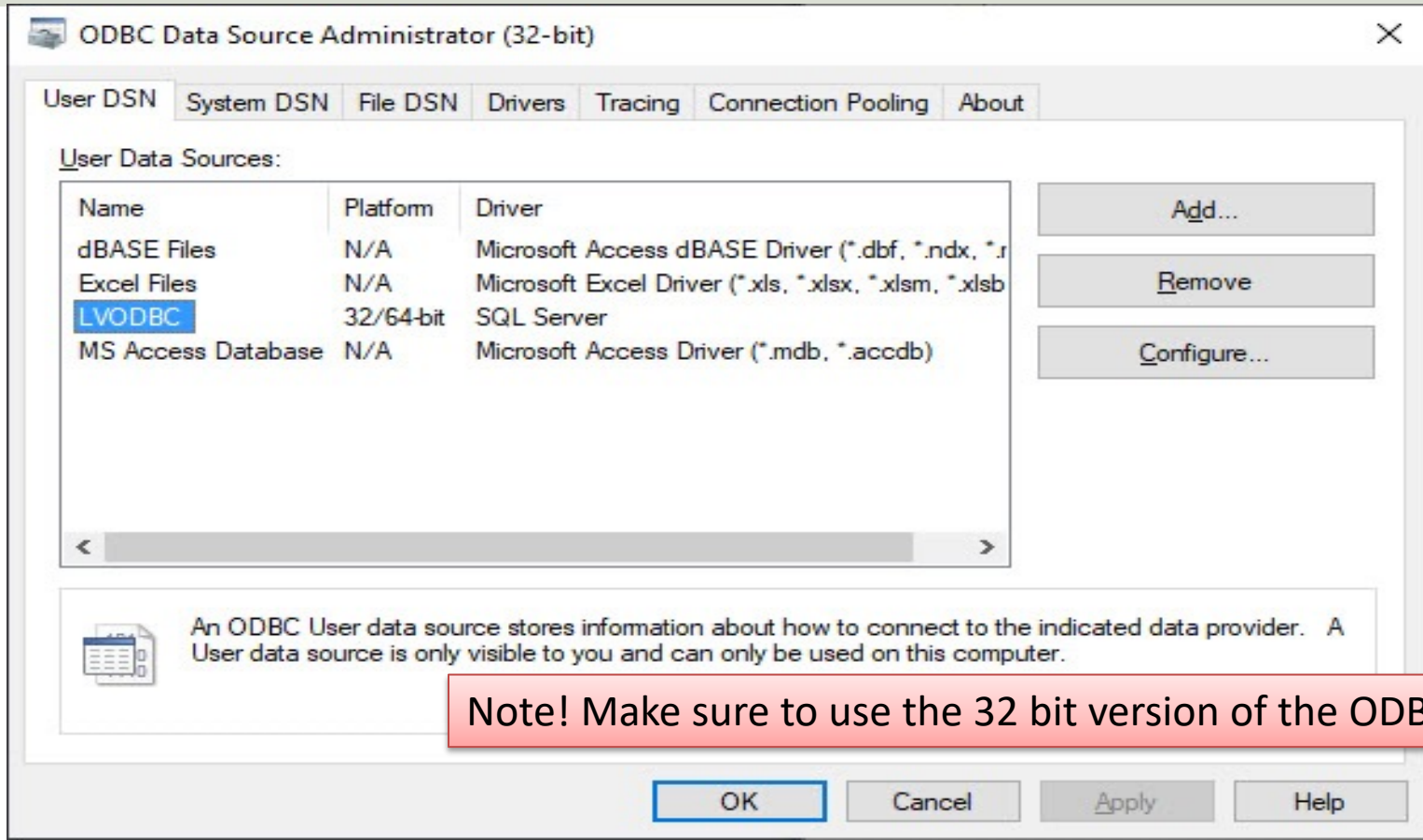




# ODBC

- ODBC (Open Database Connectivity) is a standardized interface (API) for accessing the database from a client.
- You can use this standard to communicate with databases from different vendors, such as Oracle, SQL Server, etc.
- The designers of ODBC aimed to make it independent of programming languages, database systems, and operating systems.
- In Windows 10 you find the "ODBC Data Source Administrator" tool here: Control Panel → Administrative Tools → Data Sources (ODBC).
- Then click the "Add..." button in order to create an ODBC connection to your database.

# ODBC



# Connection String

- An alternative to ODBC is to type directly type your **Connection String** for your Database. The Connection String looks like this (just replace the text MyODBC with the text below):
- **PROVIDER=SQLOLEDB;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:
- **PROVIDER=SQLOLEDB;DATA SOURCE=DELLPCWORK\SQLEXPRESS;DATABASE=MEASUREMENTS;UID=sa;PWD=Password123;**

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