BellHawk®

Real-Time Work-in-Process Data Collection & Materials Tracking Software

www.BellHawk.com

DEX2 Installation Guide

Contents

Introduction

The BellHawk DEX (Data Exchange) interface is now the standard interface to the BellHawk Work-in-Process Data Collection and Materials Tracking software. It replaces all prior interfaces, which directly communicated with the BellHawk database. These are now reserved for use of the BellHawk software development team.

The DEX interface comes in two primary versions:

- DEX2 - which is intended for installation on Windows Workstation based PCs (currently Windows 10 Pro or IIOT operating system) and is intended for use as a regular Windows program under user control for exchanging data between BellHawk running at a remote data center and a SQL Server Express database installed on the PC.

- MDEX - which is based on the MilramX automated data exchange platform and is intended for installation on a Windows Server computer. It is intended for unattended 24x7 operation under remote control through a web-browser interface.

The intention is that users can test out their interfaces or custom report generation using a Windows Workstation based PC and then transition to the use of MDEX for regular operational use, if needed. This is made possible by the use of identical DEX databases and DTOs (Data Transfer Objects) in both versions.

This installation manual is for the PC version of DEX. It is intended for use by IT support people and for "Tech Savvy" end users who have administrative access rights to their PC, which will be needed for the installation procedure.

DEX only requires a standard external outbound Internet connection to communicate with the BellHawk website, such as you would use with any web-browser. It does not require any special

"holes" in the organization's Internet firewall for inbound communications, as all inbound data is fetched from BellHawk in response to requests from DEX.

There can be multiple DEX and MDEX interfaces communicating with a single copy of BellHawk at the same time. This enables custom interfaces and custom reporting to be implemented in multiple manufacturing plants and warehouses in different geographic locations. Each copy of DEX requires its own BellHawk Device Access License (DAL) login.

If run frequently to transfer large amounts of data, these remote DEX and MDEX data exchanges can present a significant processing load to the BellHawk server. As such, mechanisms are in place to throttle the speed of data exchanges, to ensure that small amounts of data can be exchanged quickly but larger amounts of data are exchanged slowly but reliably.

When BellHawk is being used as part of the BellHawk Online Service these throttling mechanisms are used to ensure that the use of DEX by any one user does not "hog" the processor to the detriment of other clients using a shared BellHawk Online server. As a result, users should not expect rapid transfers of large amounts of data, such as inventory snapshots, and should plan to do these overnight.

For IT departments installing BellHawk on their own servers, these throttling mechanisms can be used to tune the system so that web-service transfers do not overwhelm the use of the system for barcode data collection.

The source code of the DTOs is available, as part of a DEX2 developer kit, for use by .Net programmers who wish to modify the DTOs. This includes modifying the DTOs so they directly exchange data, using the DEX ODBC adaptors, with the databases of their ERP or accounting systems rather then indirectly through the DEX store and forward interface.

These customized DTOs can then be integrated into a custom automated MilramX data exchange interface between BellHawk and the client's ERP or accounting system.

DEX2 Technology
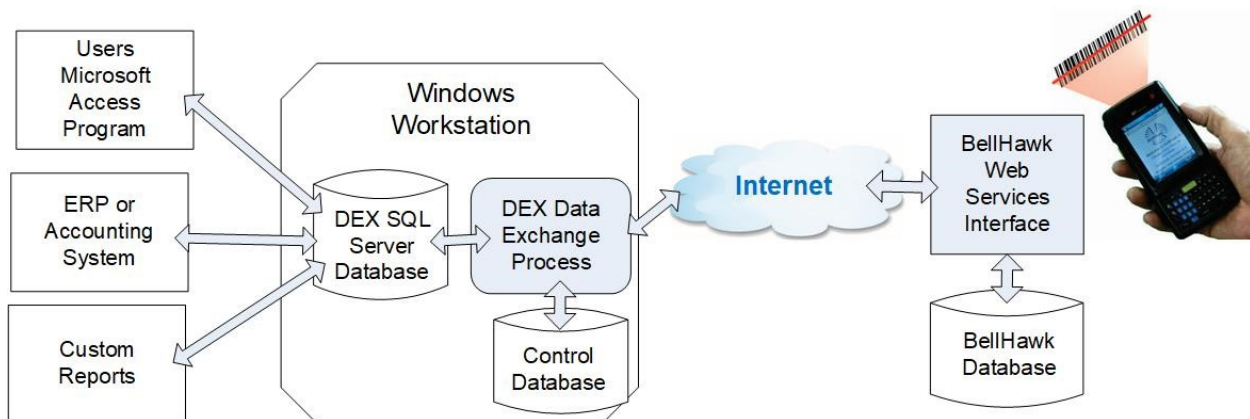
The DEX2 interface consists of two Microsoft SQL server databases and a DEX data exchange program, which are designed to run on a Windows Workstation or Windows Server computer. The main DEX database contains all the data to be transferred to BellHawk in separate tables and also contains all the different history data captured by BellHawk, again in separate tables.

The Control database contains tables, which are used to control the transfer of data between the DEX program and BellHawk. There is also a table in which errors are logged.

Users can control the flow of data through the DEX2 user interface. This flow of data can also be controlled by linking the Control database tables to a program like Access, using SQL Server Management Studio, or writing their own code to control the flow of data. Typically, once setup, there is no need to change the Control database, except to add additional transfers, as needed.

Unless very large amounts of data are to be retained in the DEX database, the free SQL Server Express database server can be used for the DEX database.

For simplicity, the DEX program is run as a user program, and has a simple user interface to control its running as well as showing any errors that may occur. The MDEX version of this program is available to run automatically as a Windows Service once the interface is working as planned.

Distribution

DEX2 is distributed as two zipped SQL Server database backups (1) (3) and one install script (2) for the DEX2 program. These should be copied to a convenient directory folder on the user's computer.

The zipped files (1) and (3) contain .bak backups for the DEX (4) and DEXControl (5) databases which, after extraction, can be used to setup the DEX and DEXControl databases, as described in the next section.
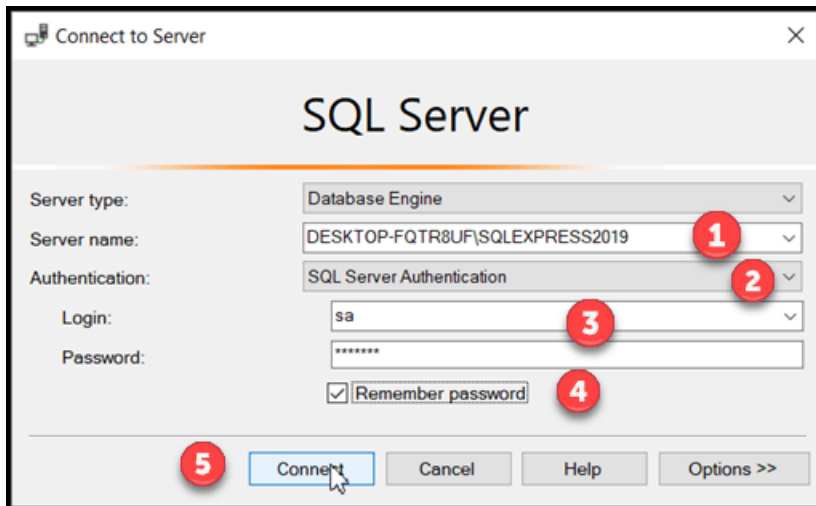
Database Setup

The databases used by DEX2 require installation on a Microsoft SQL Server, using SQL Server Management Studio.

DEX2 can use the free version of Microsoft's SQL Server Express and the Management Studio, which can be downloaded and installed on the computer to be used for running DEX, as described in Appendix A. Alternately the DEX2 databases can be installed on a Microsoft SQL Server accessible over the local area network.

In setting up an instance of SQL Server to be used by DEX2, it is critical to use a custom, not standard, installation procedure so as the enable the databases using this instance to use mixed mode, with a SQL Server user name and password, used to access the databases.

The installation shown here is based on using a local copy of SQL Server Express and Manager.

The first step is run SQL Server Management Computer and connect to the Database Server you are using:


In connecting:

1. Select (1) the name of the SQL Server instance that you will be using

2. Select (2) SQL Server authentication

3. Enter (3) the user name and password for a user of the database that has the right to create new databases. If you are doing a local installation using SQL Server Express, this will normally be the "sa" System Administrator account and password you setup when installing SQL Server Express with Mixed mode access on your local computer.

4. I find it useful to select the check box to remember the password (4) when using a locally installed version of SQL Server.
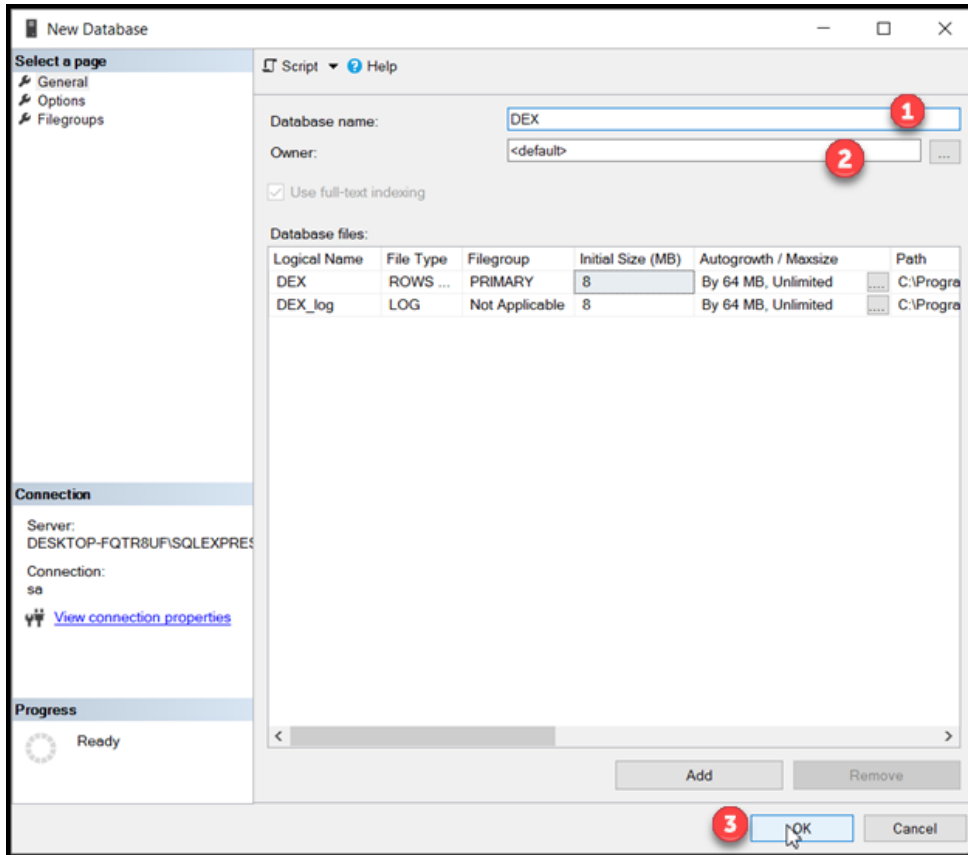
5. Select Connect (5)

If this is using a fresh install of SQL Server express, this will bring you to a screen listing all the existing systems databases.
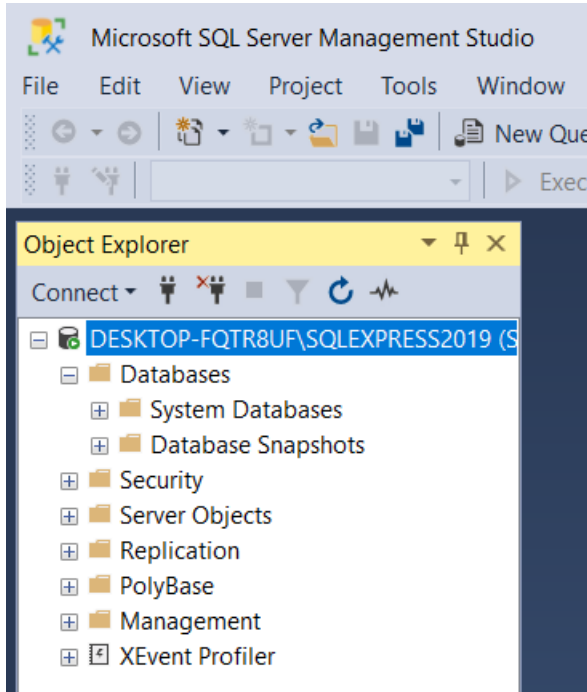
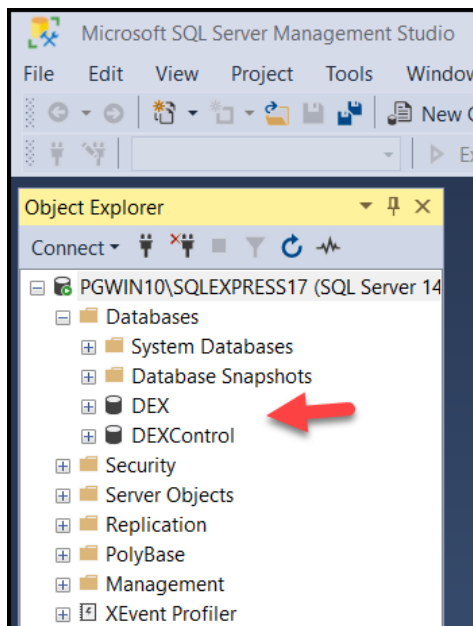Then right click on Databases (1) and select New Database (2)
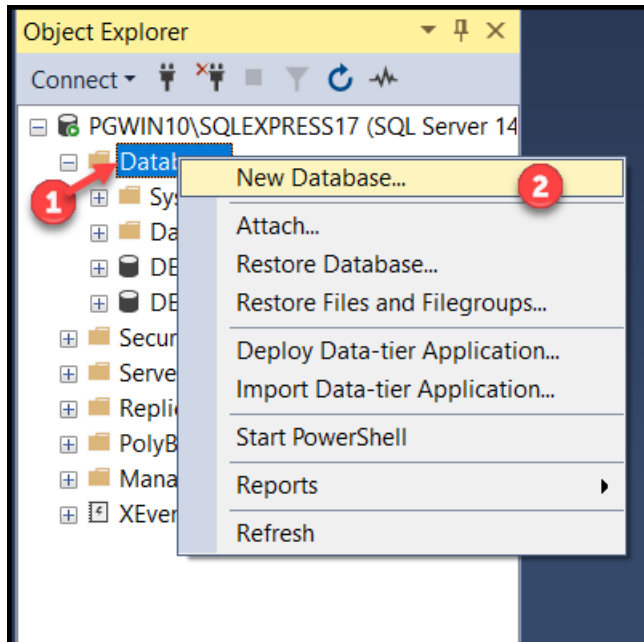
This will bring you to the New Database setup screen

Enter the name of the first database "DEX" here (1) and leave the Owner (2) as the "sa" default and then click on OK (3) to complete the setup.
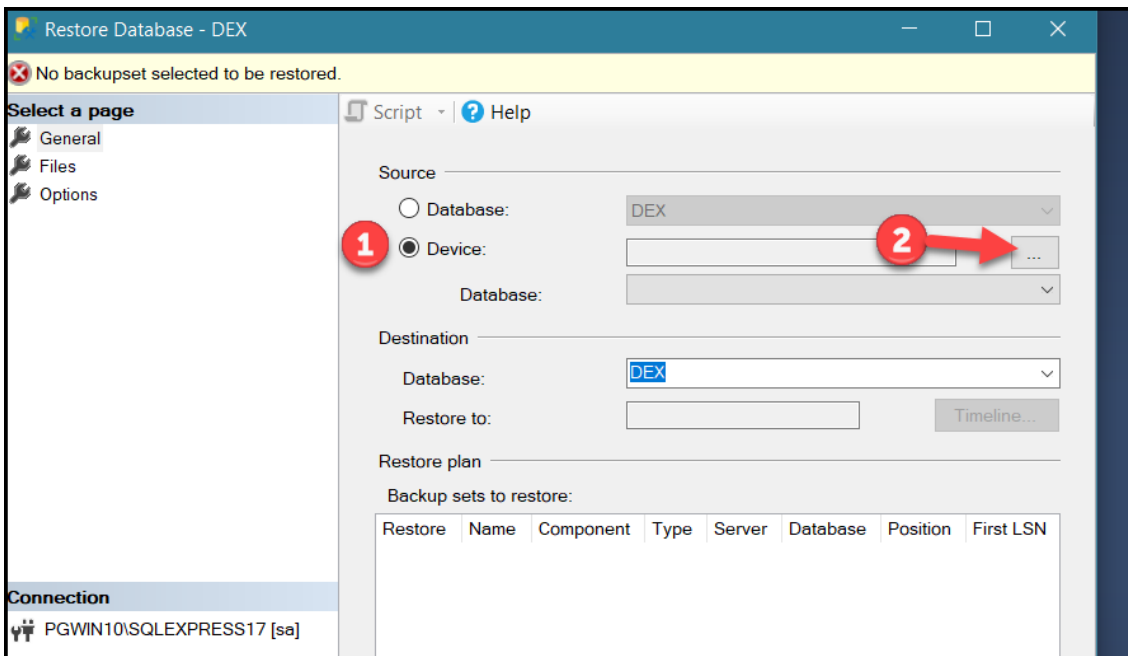
Repeat this process to create a database named "DEXControl", when you should see:

The next step is to restore these databases from the .bak files supplied as part of the distribution:

To do this, right click on the database name, select Tasks and then Restore and then Database as shown below:
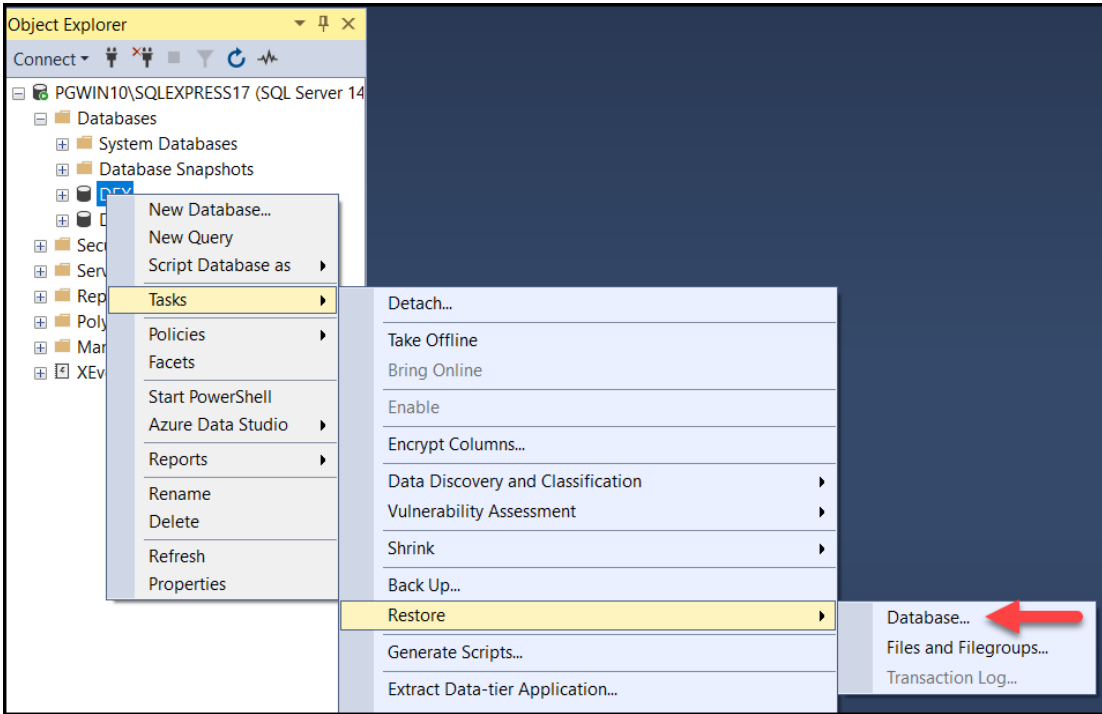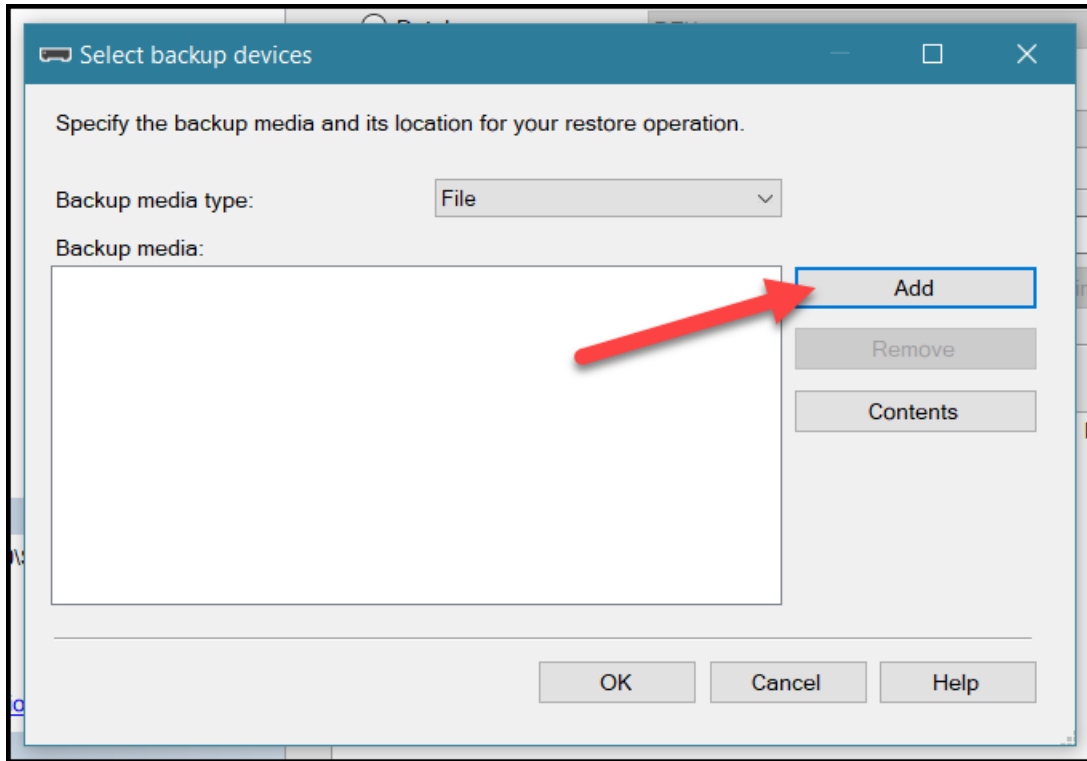

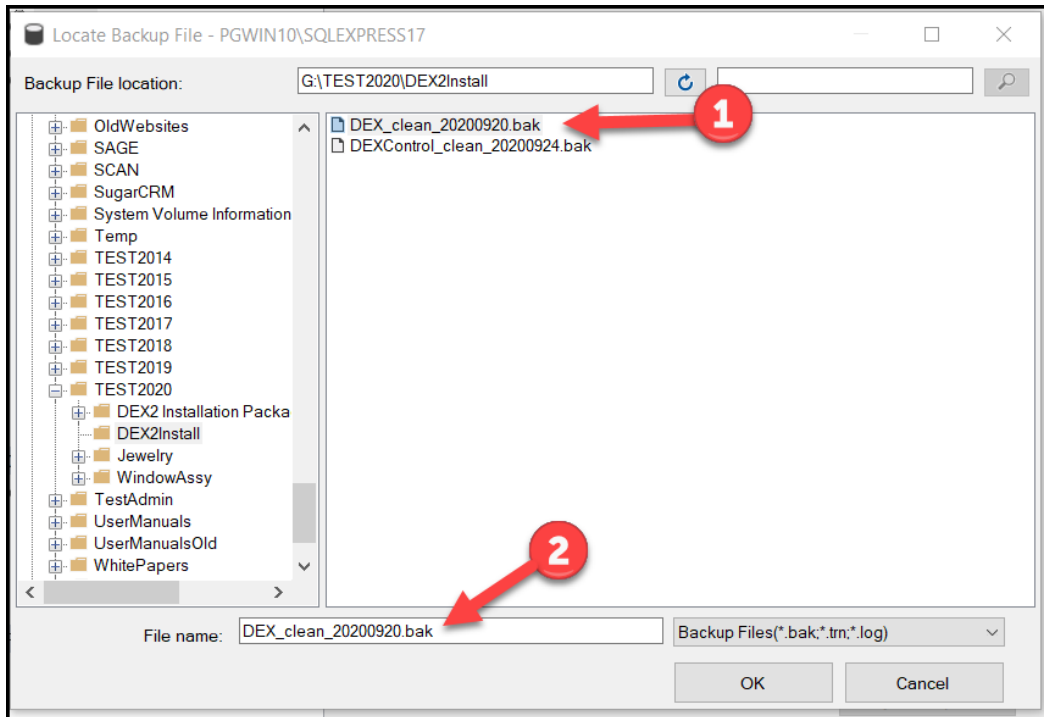This will bring up the Restore Database screen, shown below:

Select Device (1) as the source of the backup and then the ellipses (2) to select the backup file.

Then select import file, by clicking on the Add button:

Then navigate to the folder where you unpacked the database backups using the right hand panel

and select the backup file (1) and make sure that the correct file name appears in the Filename box (2) and then click OK to select this file.

This will bring you back to the Select Backup Devices screen 9 (above) with the selected file name shown in the Backup Media box. Then click on the OK button and this will bring you back to the main Restore Database page (as shown previously) with the selected backup file listed as the Backup Set to Restore.
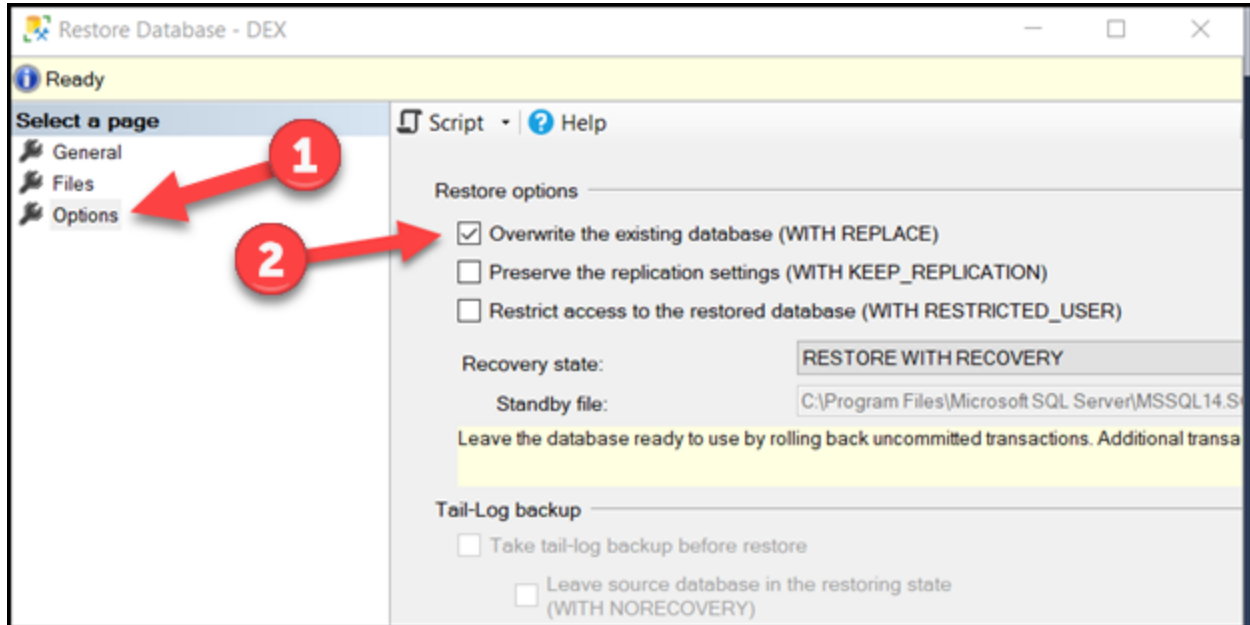
From here, select the Options page (1) and then check "Overwrite Existing Database, with Replace".(2)

Then click [OK] and restore will take place

Do the same for DEXControl database.

You can now use SQL Server Management Studio to see the tables in each of these databases and to see their contents.

Setting up the DEX Program

Having setup the DEX and DEXControl databases, the next step is to install the DEX Program itself. This is done by running the DEX2.msi program by double clicking on it, which brings up the installation wizard shown here:
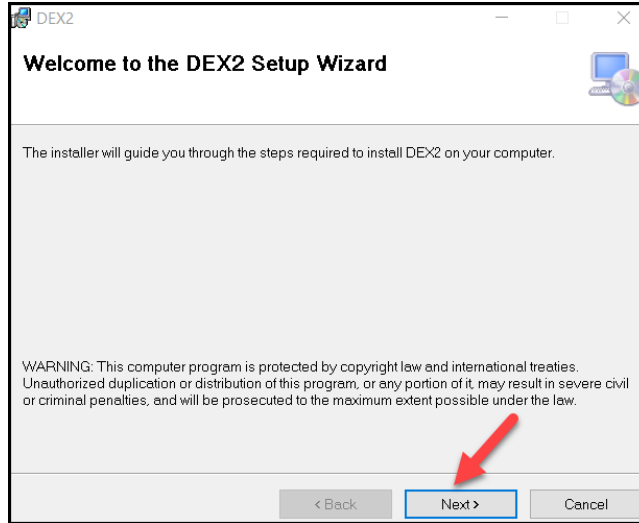

Click on [Next] and then select the installation folder, which defaults to the BellHawk/DEX2 folder in C:\Program Files (x86). Please note that this is a system folder and you will be asked for the Windows 10 system administrator user name and password to complete this installation.

You could also install this in your local Documents folder, which will not require the system administrator password, but then it will only be accessible to the local user account doing the install.
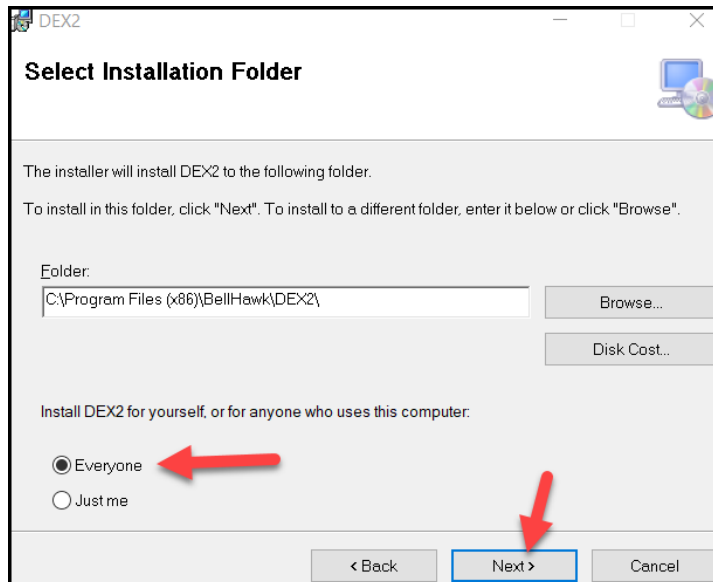
You can select whether this install is just for your use or for Everyone on the computer. Generally, I recommend Everyone so that DEX2 can be run from any user account.
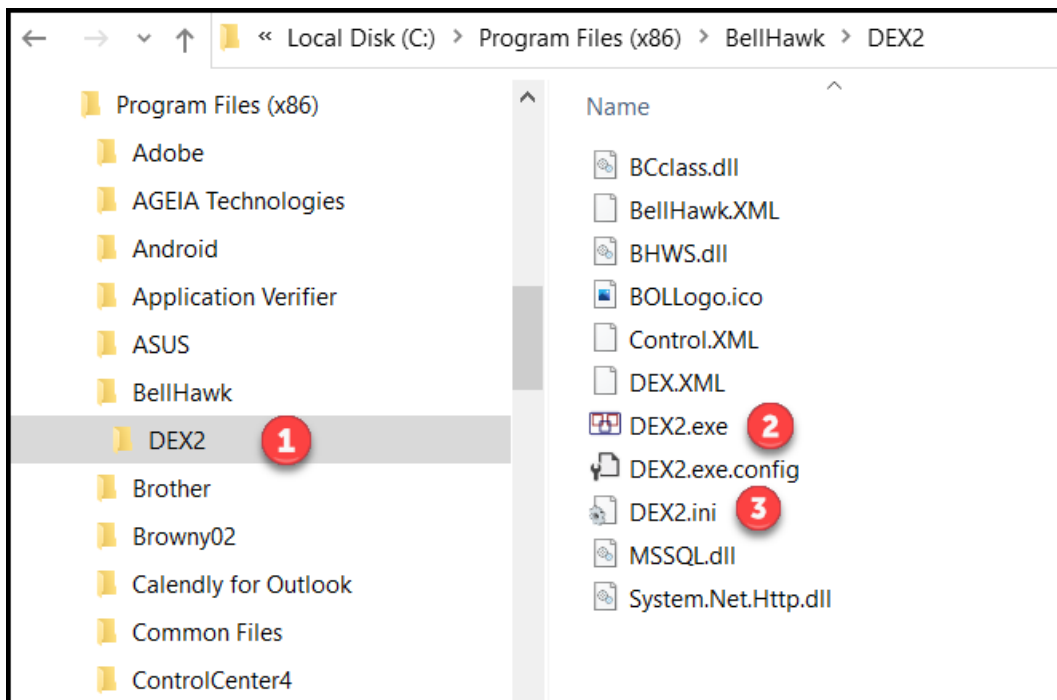
Then click [Next] and Confirm Installation by clicking on [Next] again:
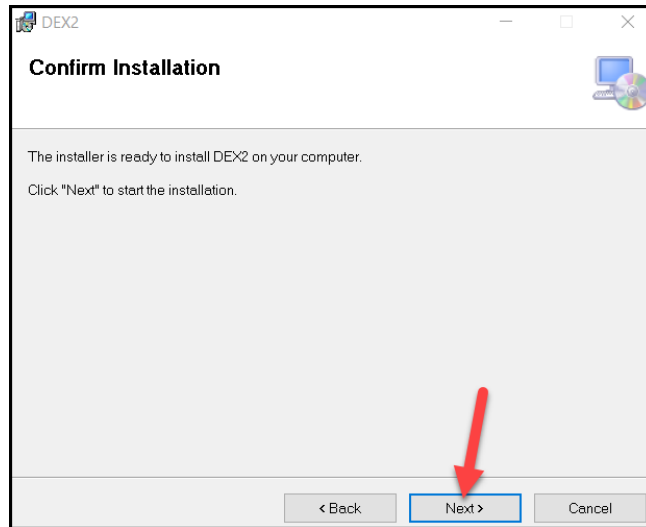
You will then get a message that the installation was successful.

Setting up DEX2

After running the DEX2.msi install process, you can access the DEX2 installation folder, providing that you have appropriate access privileges.
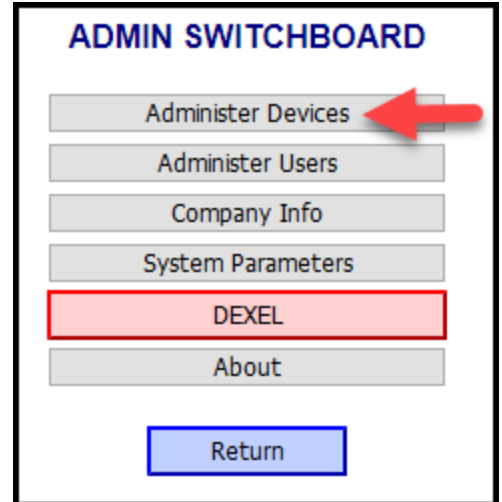

The install will create a BellHawk folder in C:Program Files (x86) with a sub-folder for DEX2. Inside this folder (1) you will find the DEX2.exe (2) program along with supporting libraries and files. You will also find the DEX2.ini file (3) which needs setting up for your specific installation.

Creating a BellHawk Device Login

ADMIN SWITCHBOARD

Administer Devices

Administer Users

Company Info

System Parameters

DEXEL

About

Return

Every instance of DEX2 needs a corresponding device login, which DEX2 will use to remotely login to BellHawk. It is important to use a separate login for each version of DEX2 (which requires a DAL license) otherwise data uploads and downloads will become confused.

To setup a device, login as a BellHawk administrator, go to the system administrator's switchboard, and select Administer Devices. This will bring up a list of existing devices. Select [Add] button from this screen, which will bring up the following screen:

ADD DEVICE

Device Name

DEXUser ①

New Password

•••••••• ②

Confirm Password

••••••••

Device Type

System ③

☑ Shared Device ④

Device Location (optional)

⑤

Add   Copy   Return

Delete

On this screen:

(1) Enter the User Name for the DEX 2 login

(2) Enter the Password for the DEX 2 login

(3) Select "System" as the Device Type

(4) Make this a Shared Device

(5) Click on Add to Add the device

Setting Up DEX2.ini

This can be done by using Notepad to edit this file. Note do not use an editor such as Word as it will insert formatting characters into the file and cause errors.

If you are not doing the installation as a systems administrator, and this is installed in the Program Files (x86) folder, which is a systems folder, you will need to give yourself permission to write back an edited version of this file into a system folder.

```
[Control]
XMLFile = Control.XML
; Replace the values on the next 4 lines with your DEXControl database/login settings
Server = SERVER\SQLSERVER2017        (1)
Database = DEXControl
UserID = *******                     (2)
Password = *********
SingleProcessMode = True
LogFolder = "C:\Users\Public\Documents\Log Files\DEX2"    (3)
DebugLevel = 0

[Adaptors]
Adaptors = BellHawk,DEX

[BellHawk]
XMLFile = BellHawk.XML
Interface = BHWS
; BellHawk URL and web service login credentials
URL = https://v8DEXtest.kti-bol.com/    (4)
UserID = DEXuser                        (5)
Password = DEXpwd

[DEX]
XMLFile = DEX.XML
Interface = MSSQL
; Replace the values on the next 4 lines with your DEX database/login settings
Server = SERVER\SQLSERVER2017        (1)
Database = DEX
UserID = *******                     (2)
Password = *********
```

To edit the .ini file, proceed as follows:

1. Change Server name to SQL Server instance (1) that you are using. This consists of your computer name followed by a back-slash, followed by the server instance you are using. Do not put a back slash in front of the computer name.

2. Change UserID and Password (2) to that of a user that can read and write these SQL Server databases. If this is using a local installation of SQL Server Express this will typically be the "sa" user, with the password you setup when you installed SQL Server Express in Mixed mode.

3. Change location of Log folder (3) if needed. The daily log file is a record of all errors and informational messages which can be examined to help in debugging transfers.

4. DebugLevel can be set to higher levels, as explained in user manual for more detailed error reporting. Level 0 only reports errors, not warnings or other information.

5. Setup URL for the BellHawk website (4) you are using

6. Enter the UserID and Password setup for the Device login, which will be used for this instance of DEX2, in the .ini file where shown (4) and (5)
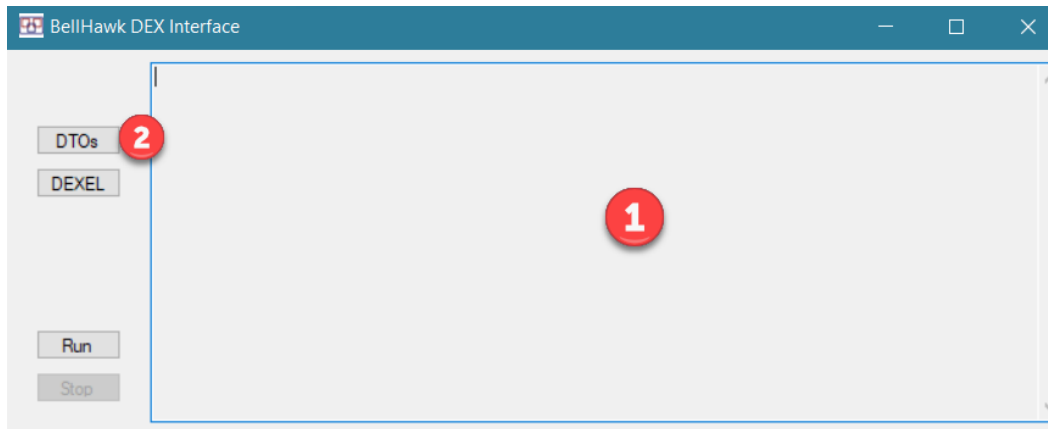
Please note that the first line of the .ini file is blank and should be left that way.

Running DEX2

The DEX2 installation program places a DEX2 icon on the user's desktop screen

Clicking on this causes the DEX2 program to be run and the screen below shown:

If there are errors in the installation setup then error messages resulting from DEX2 initialization will appear in the scrolling text box (1).

If no errors appear after about 30 seconds, then click on the [DTOs] button (2) which will cause DEX2 to access its Control Database. If there are errors then these will appear in the textbox area (1), otherwise the screen shown below will appear:
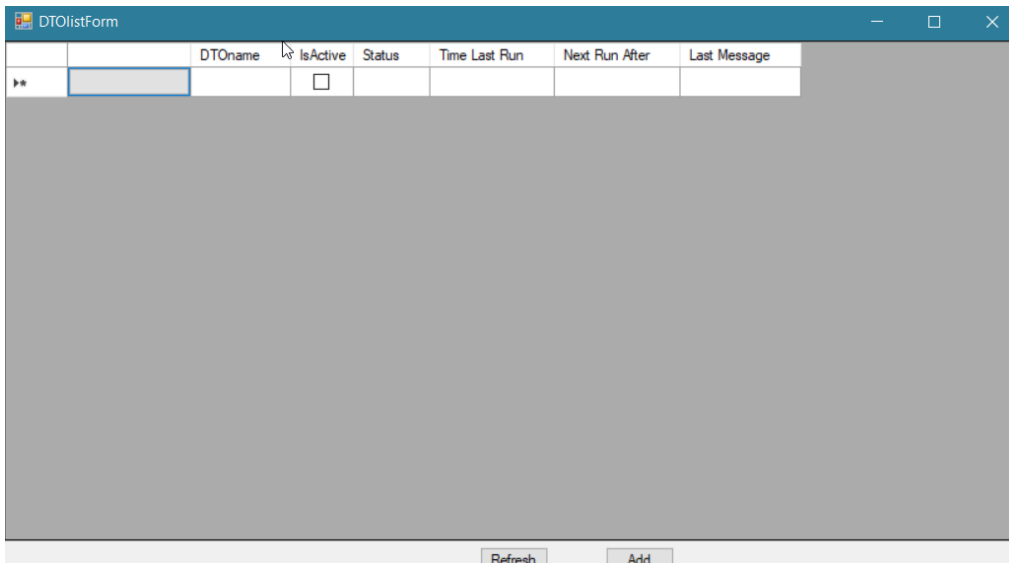
 If this appears then the program installation has been performed correctly.

This does not mean that the login information in the initialization file for the DEX database or the connection to BellHawk are correct, as these can only be verified by attempting to perform a data transfer, as described in the DEX User Manual.

Once the DTOs for the required data transfers have been setup, as described in the DEX User Manual, these DTOs can be started running by clicking on the [Run] button.

DEX2 then reads the .ini and attempts to initialize its adaptors. If there are any errors or warnings these appear in the scrolling text box (1).

DEX2 then schedules DTOs for execution based on the setup data in the Control database. Again, if there are any errors with accessing the DEX or DEXControl databases they are reported in the scrolling text box. Also, if there are errors in DTO execution, they are reported in this text window.

More details about errors are also available in the daily log file, such as the SQL calls and resultant errors. This log file is located where setup in the .ini file. Also, if needed, warnings can be shown, by setting DEBUG=1 and all transfers can be logged by setting DEBUG=2 in the initialization file.

Finally, DEX2 can be stopped running by selecting the [Stop] button. This waits until the currently running DTO has completed execution before stopping running any more DTOs. Running DTOs again can be resumed by selecting the [Run] button.

Please note that the [X] button, to exit from DEX2 is only active when DEX2 is in stopped state to avoid interrupting DTOs in the middle of their execution.

Final Comments

This installation guide is for setting up DEX2 on a PC without SQL Server already installed. If an existing SQL Server is used, possibly remotely accessed over the local area network, then further changes may need to be made by a knowledgeable IT person using software such as SQL Server Configuration Manager.

If the DEX2.exe program needs to be reinstalled (such as for an update) then the existing DEX2.exe program should be uninstalled first using Windows Control Panel.

By default, DEX2 is installed in C:\Program Files (x86)\BellHawk\DEX2. If uninstalling DEX2 prior to reinstallation, save away your DEX2.ini file from this folder and then restore it after installing the new DEX2 update, as this update will overwrite the existing DEX2.ini file.

Appendix A
Installing SQL Server Express Database Server

The following is intended to provide guidance to an IT person or someone who is "Tech Savvy" and has administrator access privileges for the computer. The specifics of the installation may change over time, as Microsoft changes its software,Fi but it is important to make the settings the same as described below as DEX has specific requirements, which are not the same as the default installation settings for SQL Server Express.

In general, it is a good idea to reboot your computer and make sure all updates have been installed before proceeding with installing SQL Server, otherwise the install may fail (especially of the main database engine).

The free SQL Server Express and SQL Server Manager can be installed from the Microsoft website: https://www.microsoft.com/en-us/sql-server/sql-server-downloads

On this site select the link to download SQL Server Express:
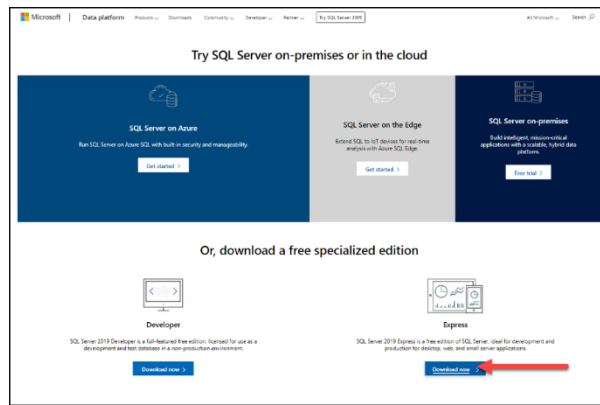
This will download an executable installer program, which you should choose to Run (exact details of download will depend on the web-browser in use). This will bring up the installation screen shown below.

Choose the Custom installation not the Basic, which will not work with DEX2.
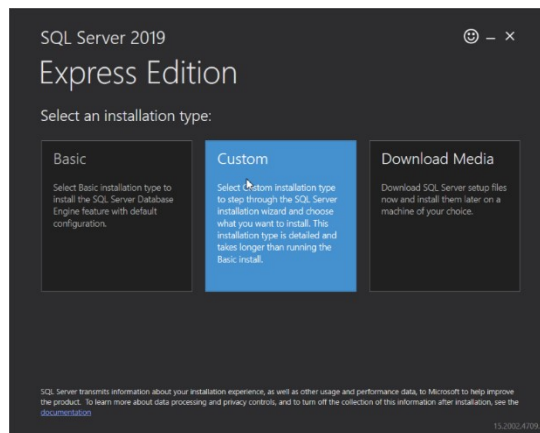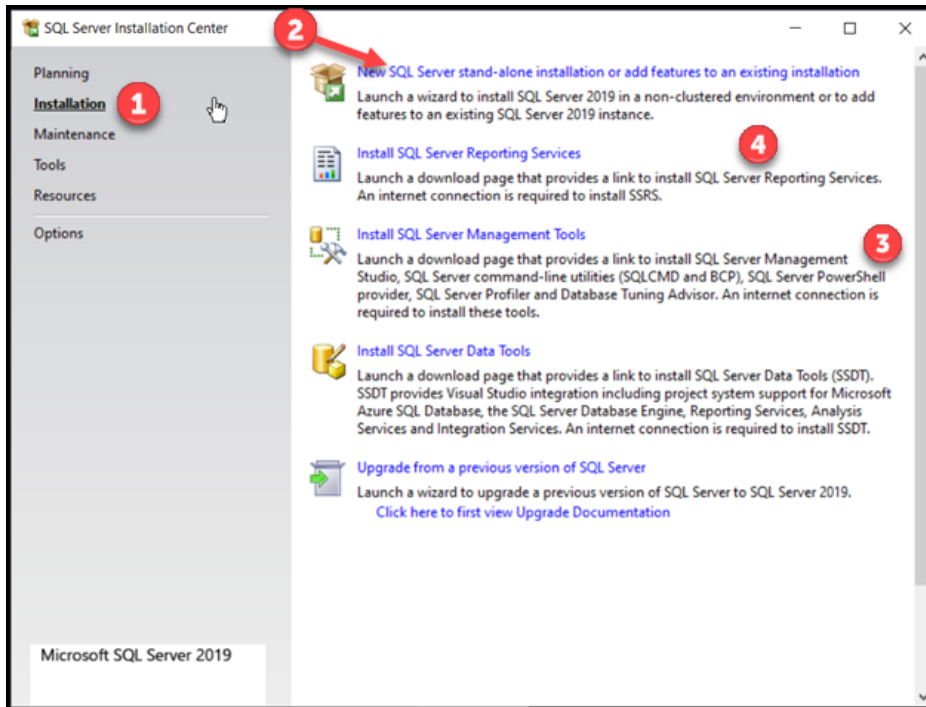
This will then bring up a screen requesting where the SQL Server Express can download its installation files. Generally the default is OK.
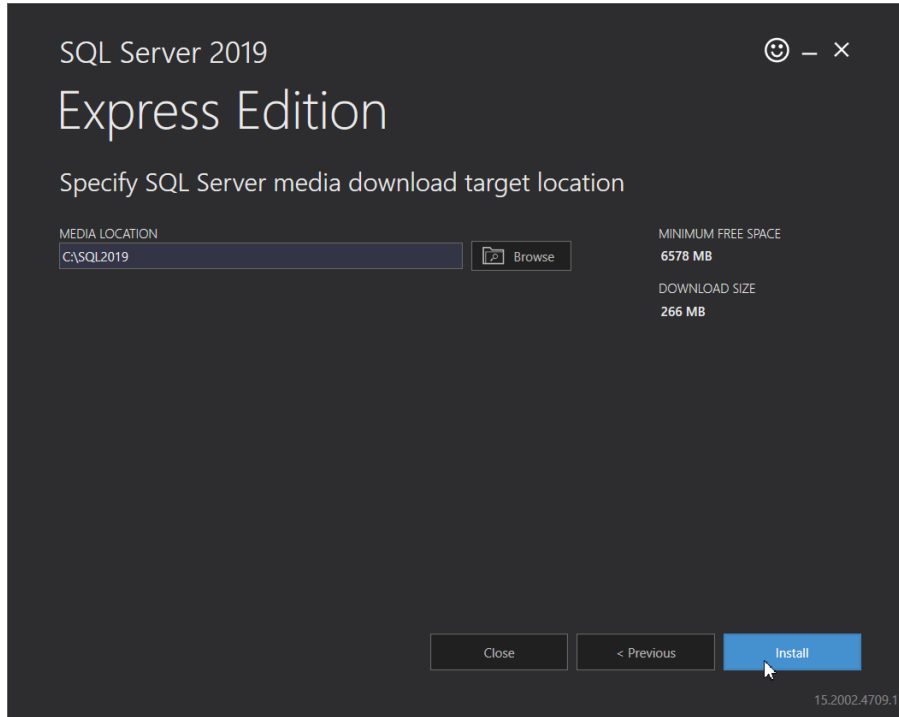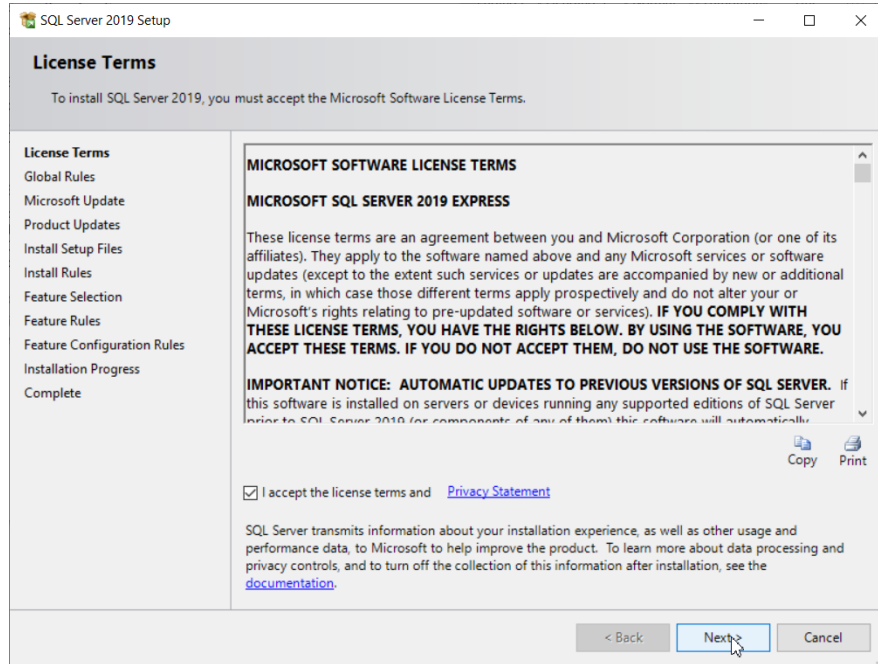

Then click on [Install] to start the installation process. Which will bring up the following screen.


Here, select the Installation Tab (1) of not already selected and then click on the first link (2) to install SQL Server Express.

Subsequently you may return to this screen to install the SQL Server Management Studio (3) or the SSRS reporting tools (4).

Selecting a new installation leads to a screen on which to accept Microsoft's licensing terms and conditions:

You will need to accept these and then click [Next]. This will lead to a screen asking whether to check for updates before performing the installation. In general, this is a good idea although it may slow down the installation process while updates are downloaded.
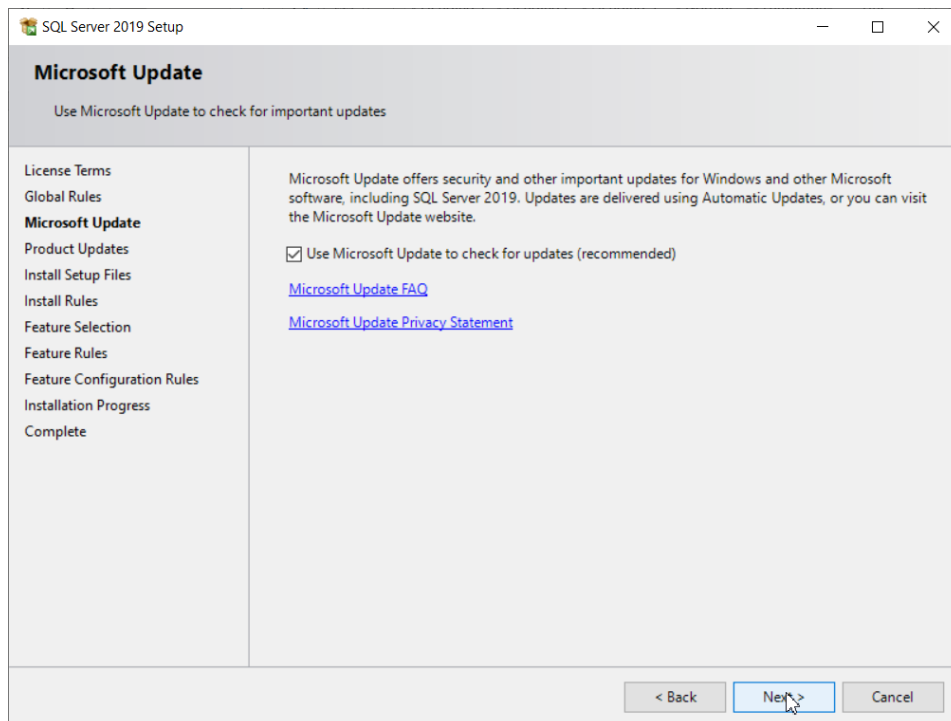
When you click next, the installer checks that all necessary updates have been installed on your computer and all other conditions are satisfied for a successful install.
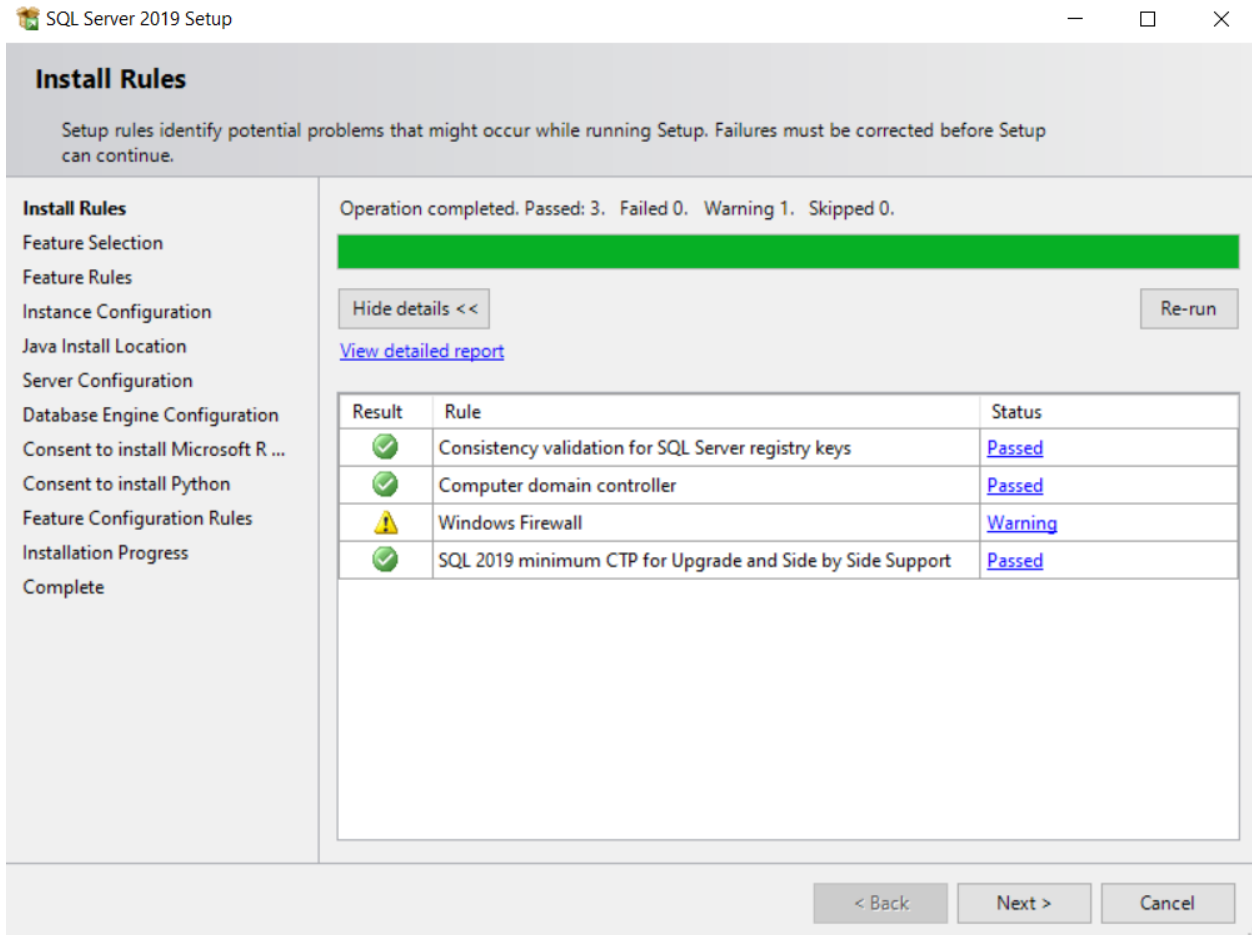
These consistency checks should all be green except possibly for the Windows Firewall warning, which is typically for a the lack of an inbound Port 1433 setting, which is needed for remote access to the new database from other systems on the same LAN.

You can ignore this for a local installation but may subsequently need to enable port 1433 TCP inbound communications if you wish to access the DEX or DEXControl databases from other computers.

Click [Next] and you will get the ability to select which features you want to install.
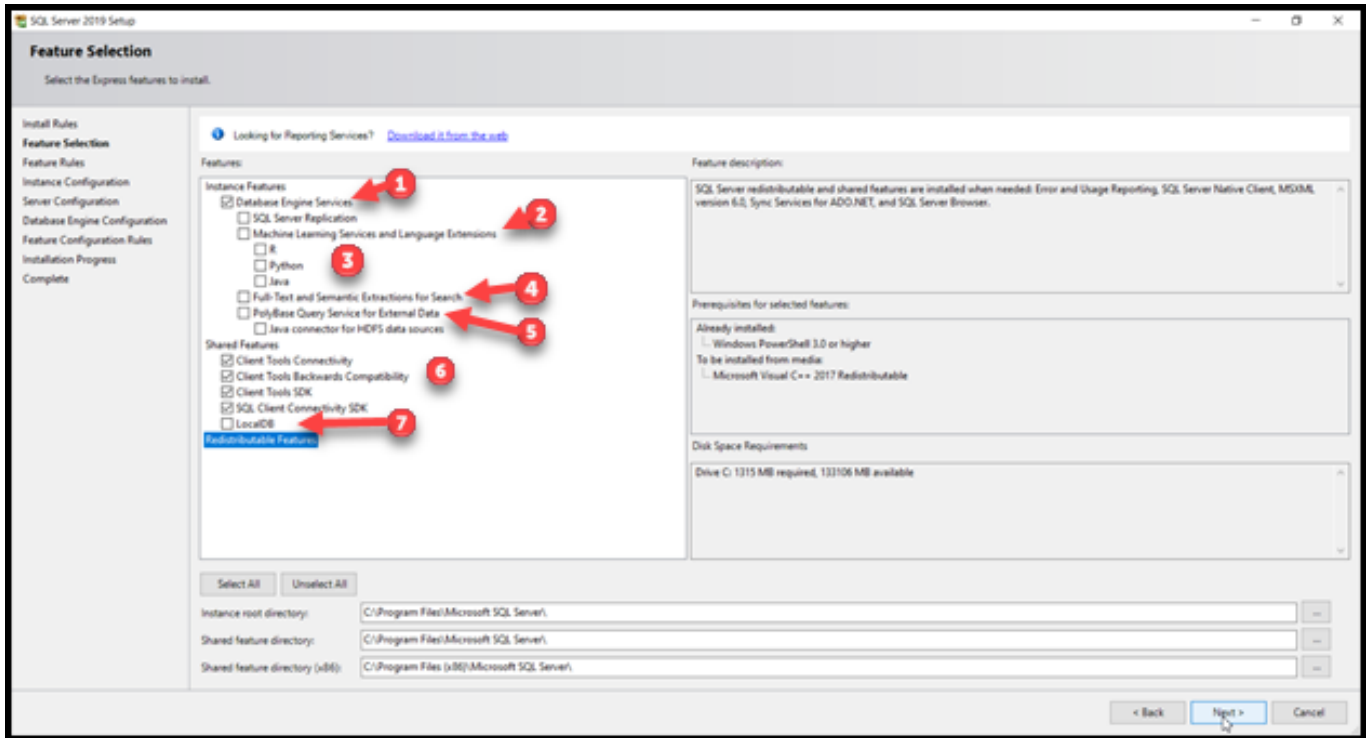

Commentary:

1. You must select the Database Engine (1)

2. You will not need SQL Server replication (2) for DEX to work

3. You will not need the Machine Learning (3) features to use DEX

4. You will not need full-text searches (4) or Polybase (5) for DEX

5. You may need some of these tools (6) for remote access to the DEX databases from other applications but generally we install them at this time.

6. Do not check LocalDB (7) as DEX will not run.

Other than that, leave everything as-is and click [Next].
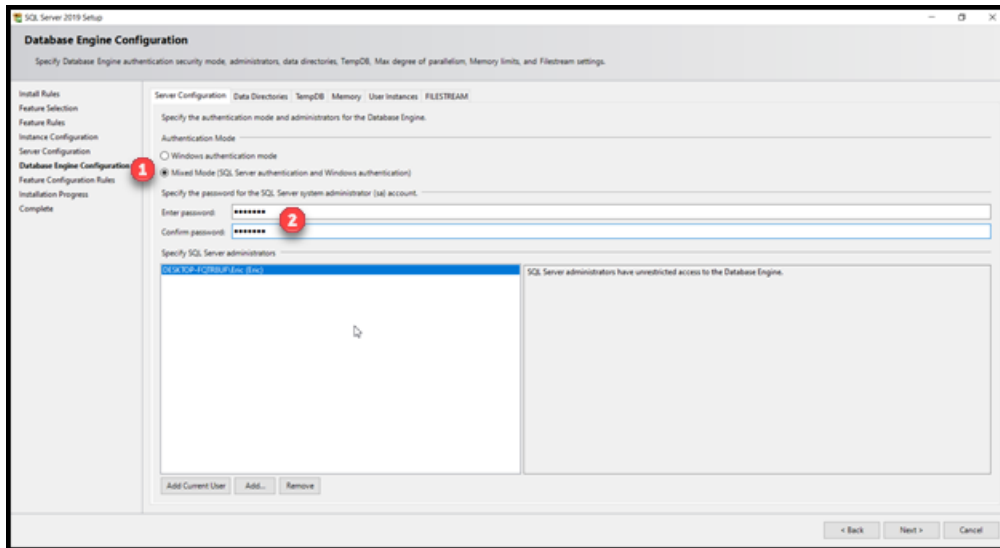
On the next, Instance Configuration screen:
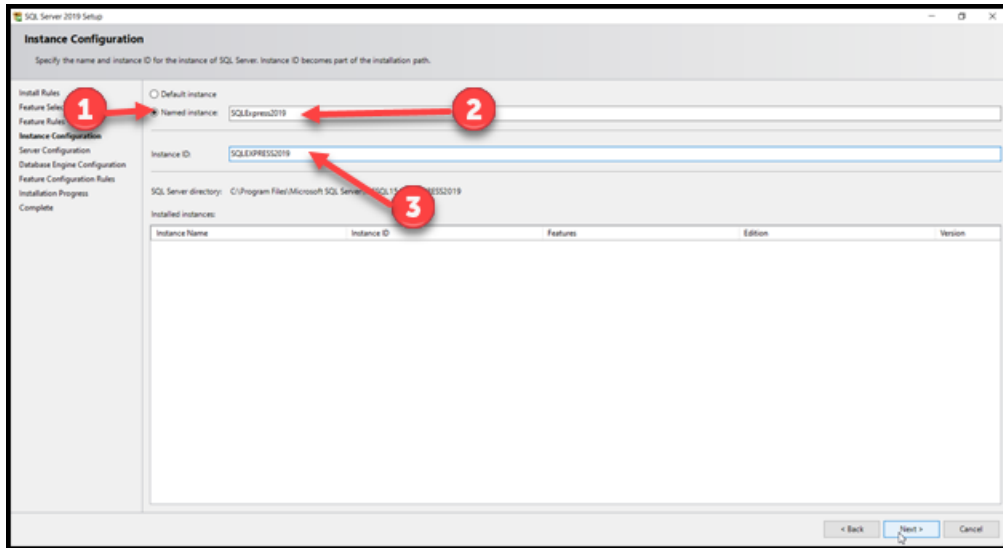
1. Select Named Instance (1)

2. Enter a meaningful Instance Name (2)

3. Generally, leave the system to provide an Instance ID (3).

Click [Next] and this will lead to the Server Configuration Screen, where no further changes are needed for DEX.
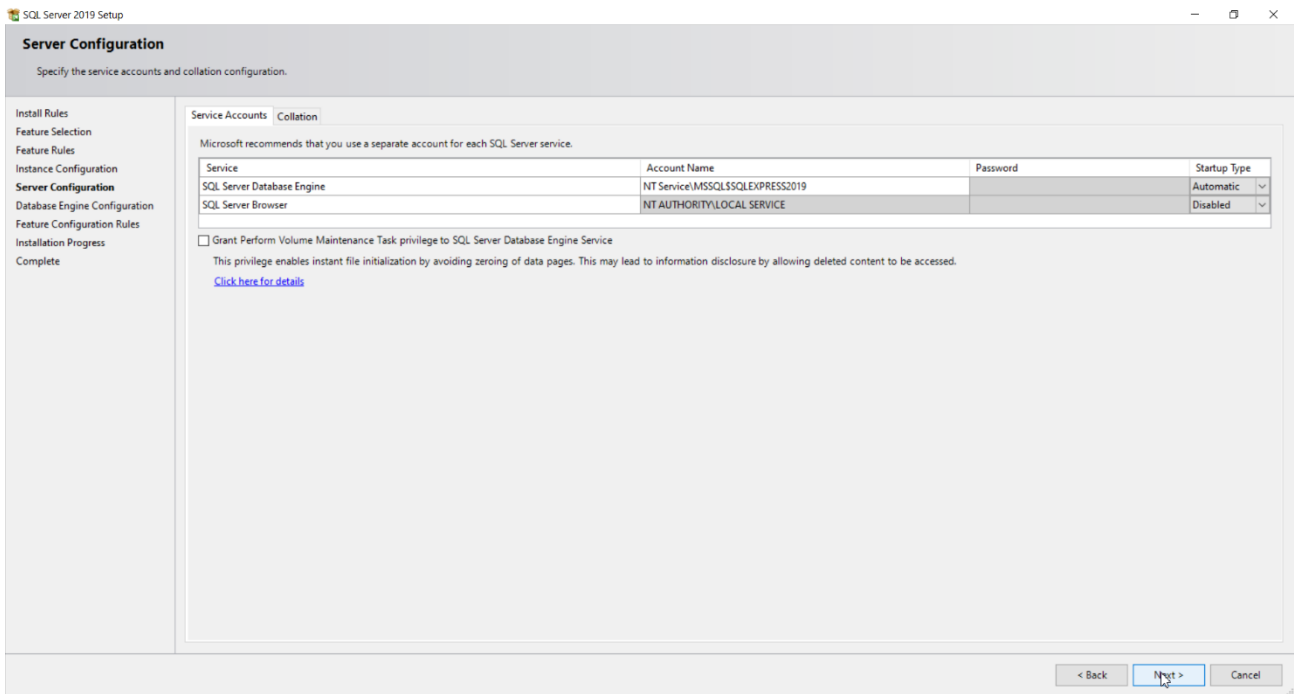
Click [Next] to come to the Database Engine Configuration screen:

Select the Server tab, if not already selected.

Here it is critical that you select Mixed mode (1) and then enter the SQL Server Administrator "sa" password (2) that you will enter into the .ini initialization file for DEX2.exe. This is how DEX2 knows how to login to the DEX and DEXControl databases.

For most purposes, you can ignore the settings on the other tabs on this screen.

Then click [Next] and your installation will proceed. This will take quite some time, depending on your processor speed and whether you are using an SSD hard-drive.

You can then proceed to download the SQL Server Management Studio. This can be done by running the same install script as before and clicking on the link for installing SQL Server Management Studio (SSMS) or you can go to the prior download page

https://www.microsoft.com/en-us/sql-server/sql-server-downloads

and select the link near bottom left to go a web-page from which to download SSMS.

Clicking on the downloads link for SSMS will download an executable program which, when run, will lead to an installation screen. Click on the [Install] button and SSMS will be installed.