SQL Server Express Installation Guide

Version 01
For SQL Server 2016 Express

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Introduction

Although it may seem initially daunting, installing and starting to use a real world database is not difficult, and is not time consuming, especially with SQL Server. You can have SQL Server up and running in as little as 20 minutes by following these SQL Server installation instructions, which lead you through the process step-by-step. These instructions are used by students enrolled in the Master of Science in Computer Information Systems and other Computer Science Department programs both on-campus and online. The document begins with a discussion of SQL Server, connecting to the SQL Server web site, downloading and installing SQL Server, then using a client to connect to your database. The examples in the main document are for the Microsoft Windows family, including Windows Windows 7, Windows 8, and Windows 10. If you would like to install SQL Server on a Mac (OS X), please first follow the instructions in Appendix A, then continue with the rest of this installation guide. It is our hope that you find this install guide quick and easy to use.

You may be surprised to know that SQL Server Express is quite usable for many of our classes. Although Express has limitations on database size, computing capacity, and available features, the core SQL engine is the same as with other SQL Server versions, and it provides for an easier install and a lighter load on your computer. Microsoft has mostly maintained upward compatibility for SQL between SQL Server versions for many years, so if you have ready access to an older SQL Server installation, version 2008R2, 2012 or 2016, you will also be able to use it. Microsoft is continually updating Microsoft.com, so the screens that you see on Microsoft.com will probably be a little different than what is shown in this document. If you can't determine how to proceed because what you see is too different, or if something goes wrong, ask your facilitator or instructor for help. Have fun!

SQL Server Overview

You or may not have various opinions about SQL Server and other database systems, but you can be confident that SQL Server has many of the advanced features available in relational and object-relational database management systems, and that SQL Server is widely used worldwide. SQL Server supports many of the ANSI/ISO SQL standards, so when you learn SQL Server you are mainly close to the portable standards. SQL Server, developed by Microsoft, runs on Windows platforms, and recently on Linux as well. ***SQL Server runs on ordinary machines.*** SQL Server runs on the largest multiprocessors, but also runs very well on ordinary PCs. SQL Server is scalable, and supports both clustering and cloud computing to surpass the performance and reliability of any single platform. SQL Server is an in-demand, capable database system.

SQL Server Hardware Requirements

SQL Server Express installations on Windows require at least 512MB of RAM, but preferably 1GB.

SQL Server Developer Edition

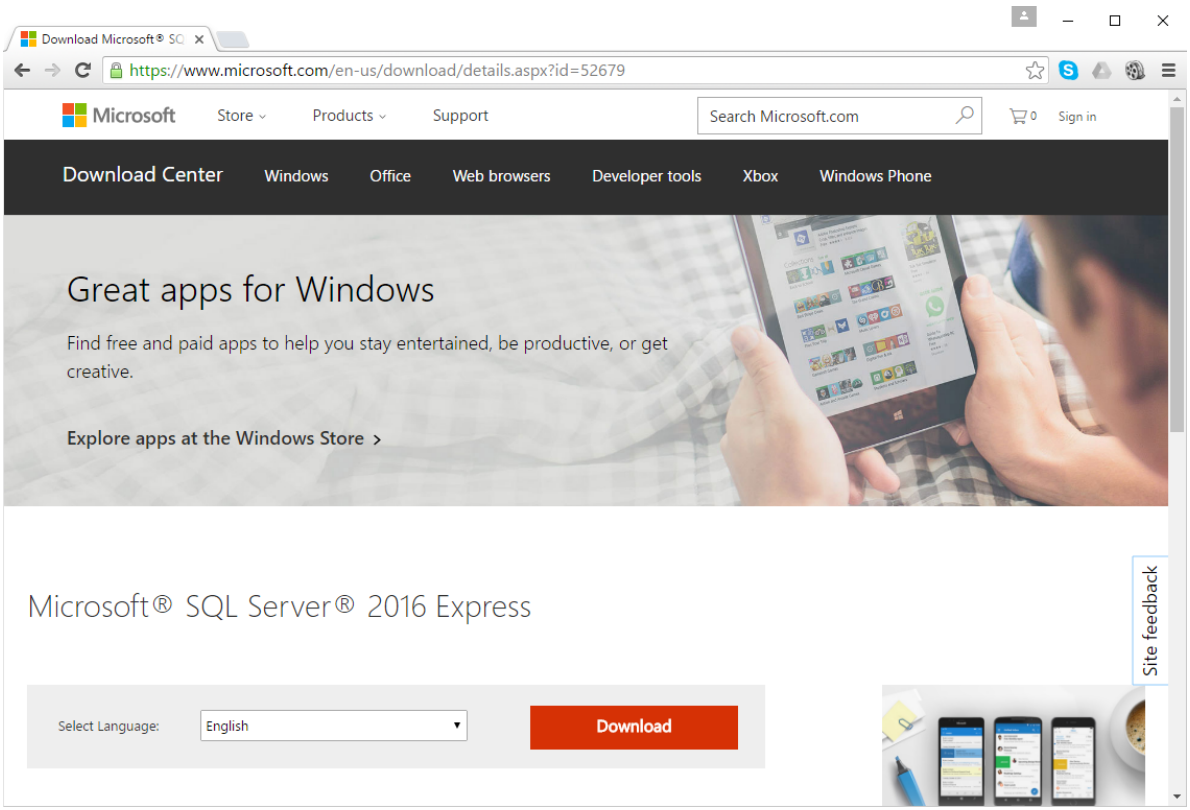
This guide covers installation of the Express edition of SQL Server which is suitable for most classes. If your class requires the full version, or if you would rather install the full edition for your own learning, follow the instructions in the *SQL Server Installation Guide* instead of the instructions in this document.

Downloading SQL Server

This section guides you through downloading SQL Server Express from Microsoft's website.

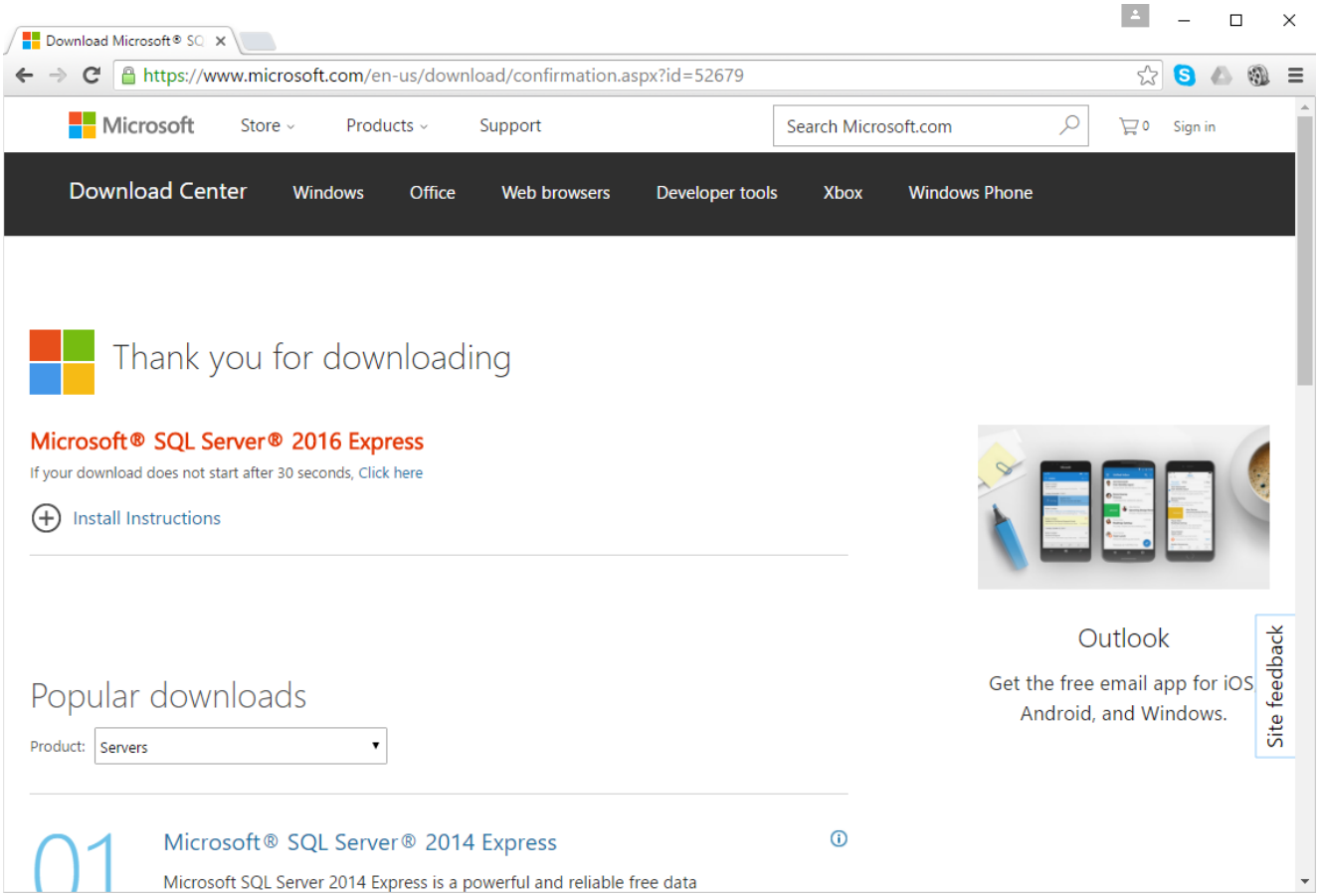
Step 1: Accessing the URL

Browse to address https://www.microsoft.com/en-us/download/details.aspx?id=52679 (if the URL has become outdated, just search for "SQL Server Express 2016" on Google). You will see a screen similar to the following:

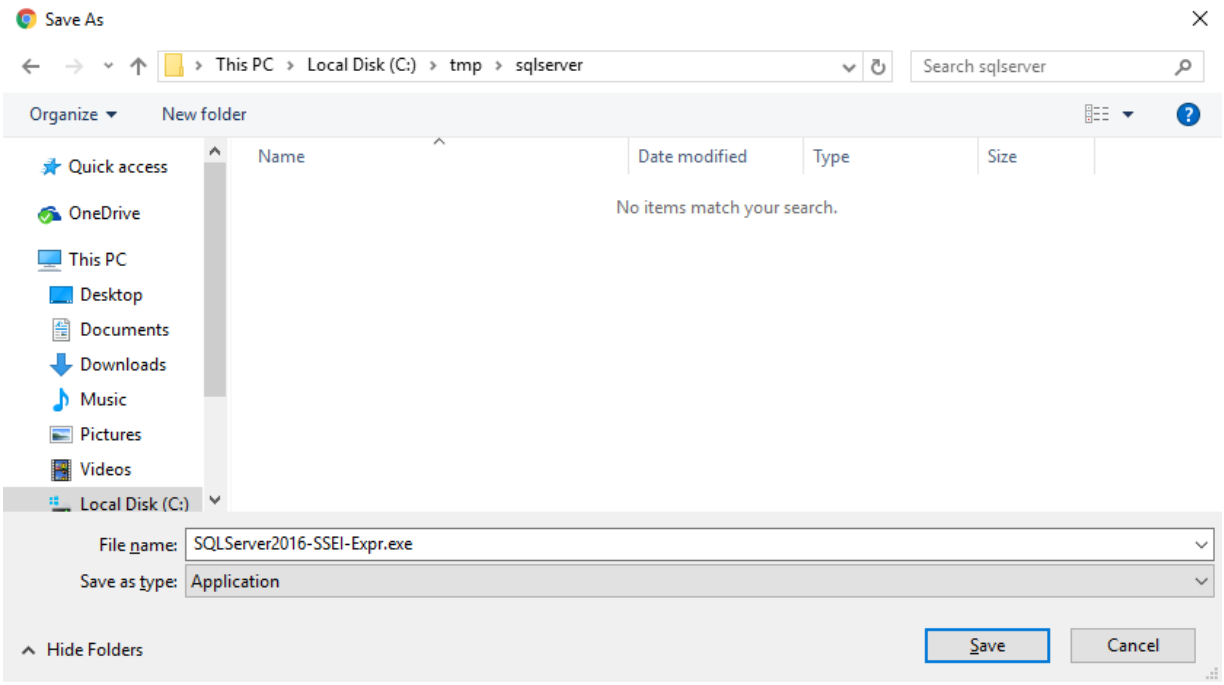


Step 2: Downloading the Installer

Click on the "Download" button, and you will then see a screen similar to the following:



The download file dialog should appear automatically. In this case we save to C:\tmp\sqlserver, but you can save the file any location you will remember:

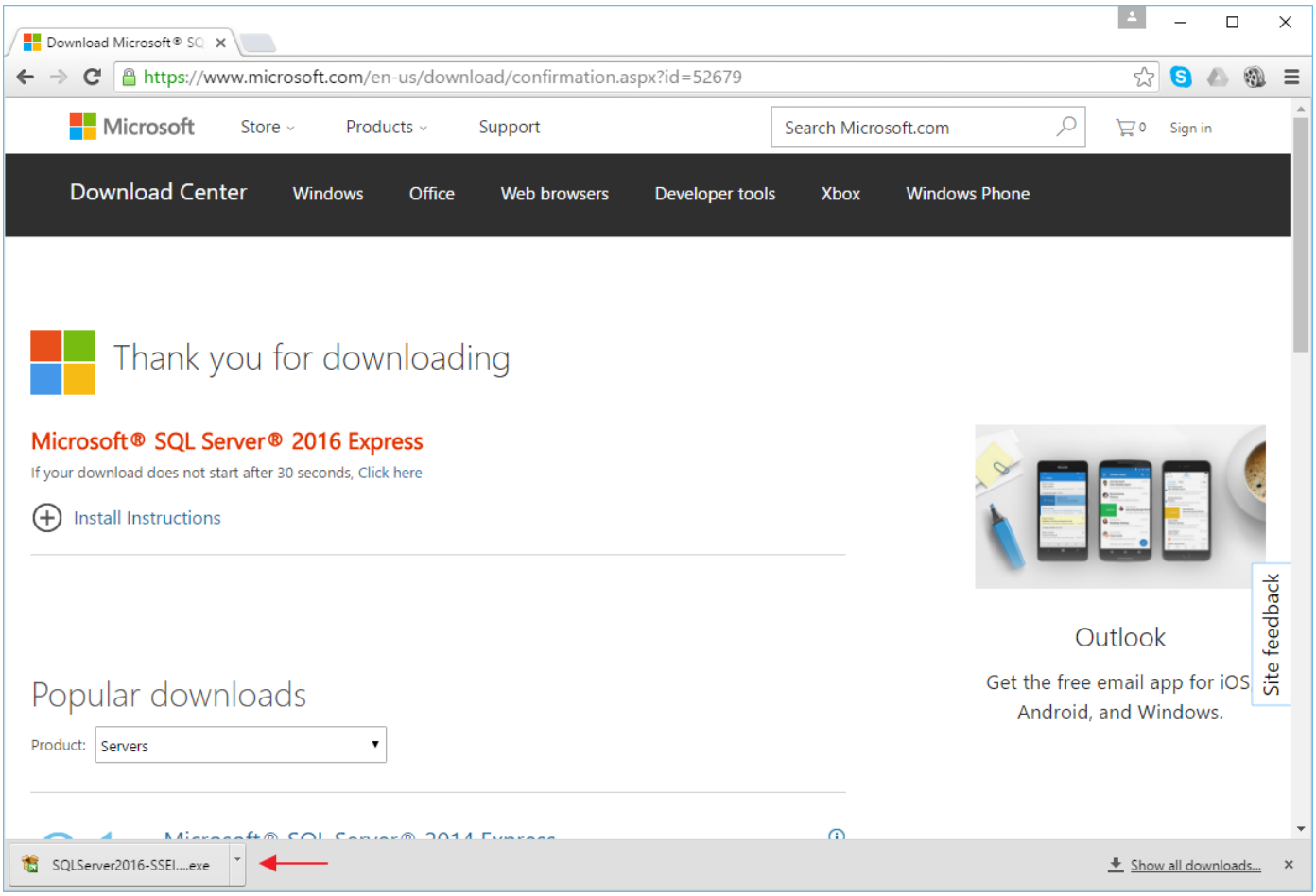


Installing SQL Server

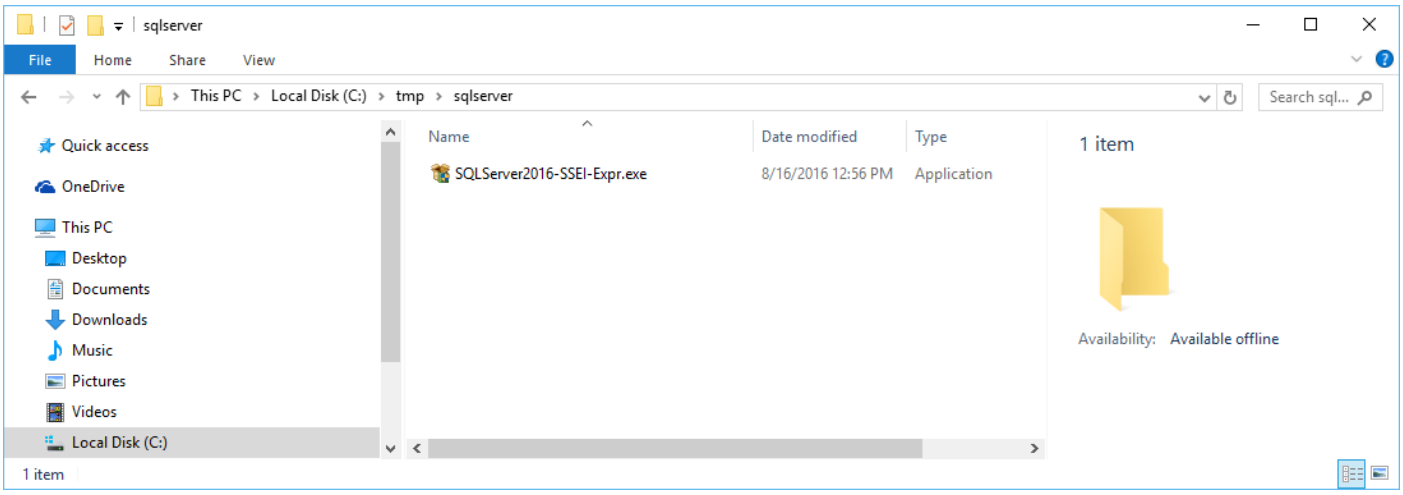
Now that you've downloaded the installer, you'll need to execute it and follow the on-screen prompts to install SQL Server.

Step 3: Starting the Installer

Many web browsers give the option of executing a recently downloaded file directly from the browser. If your browser gives you that option, that will likely be the quickest and easiest. For example, Google Chrome gives the option as illustrated below, and all that's needed is to click on the filename.

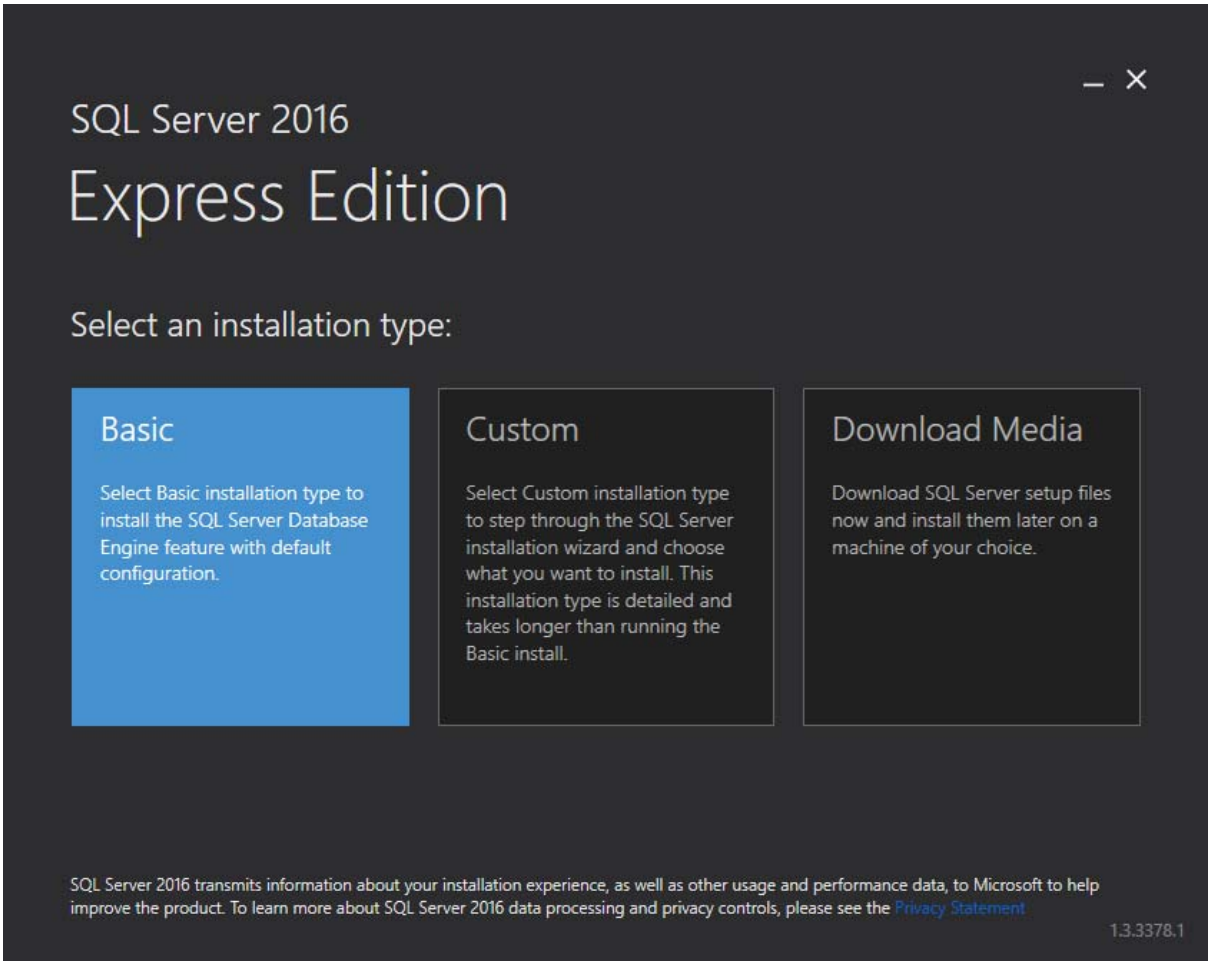


Alternatively, browse to your download location in Windows Explorer, then execute the file by double-clicking the file.

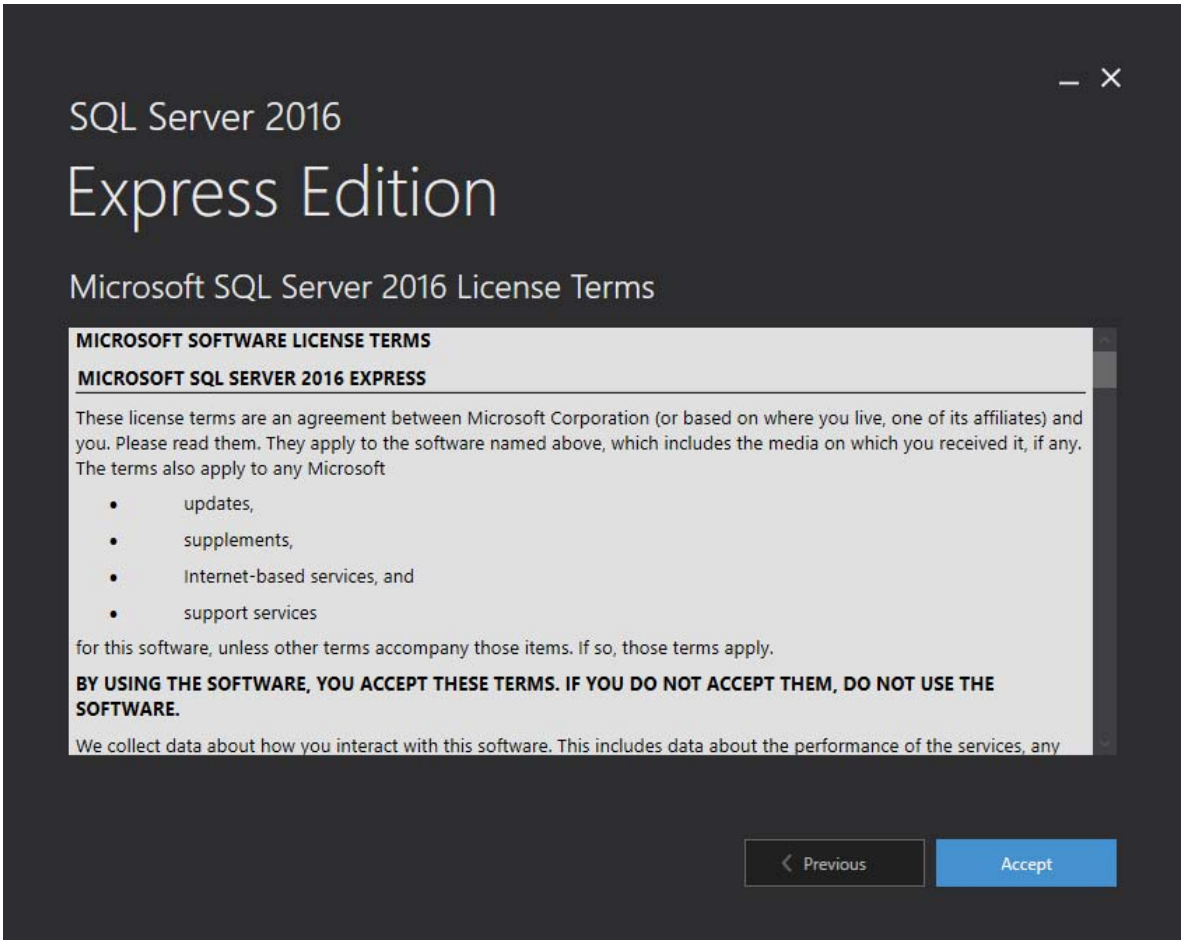


Step 4: Progressing Through the Installation Wizard

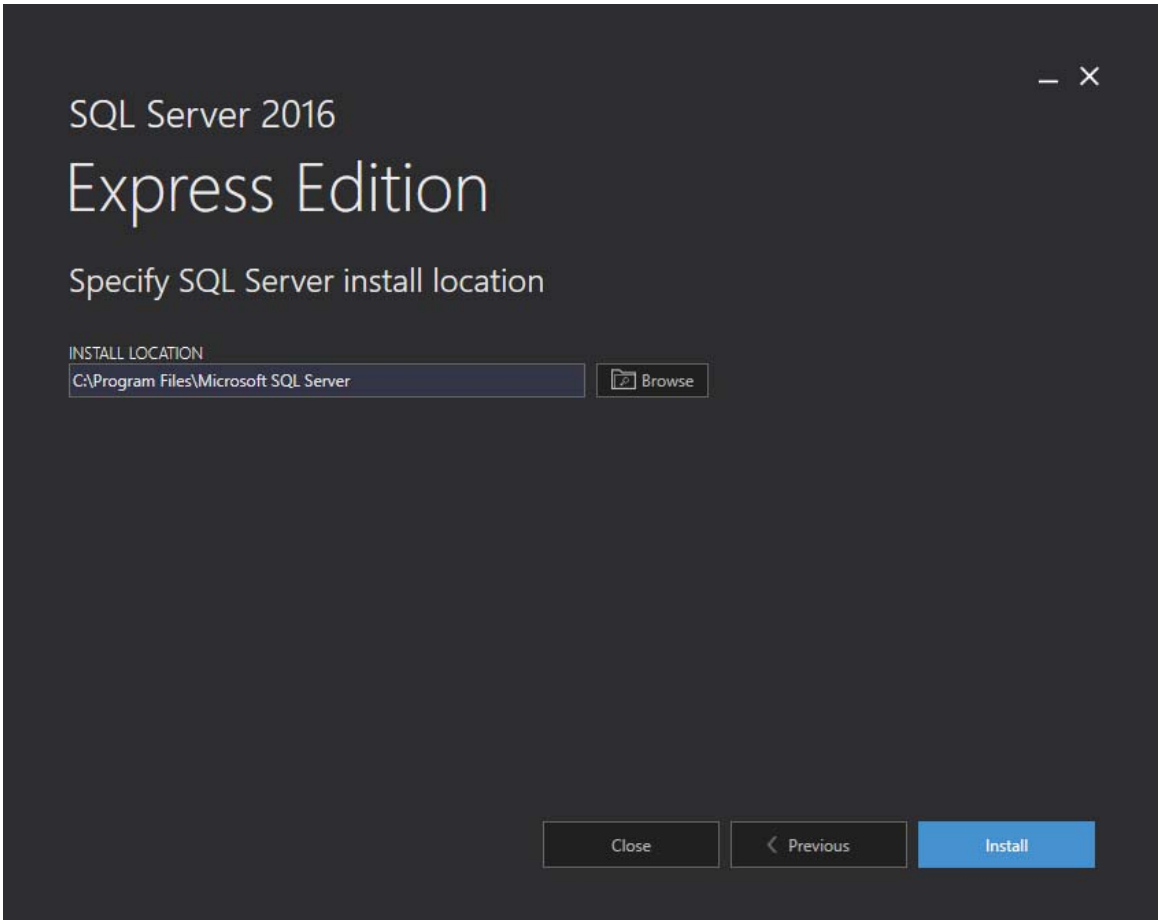
Upon execution, the installer will display an installation wizard as something similar to the following:



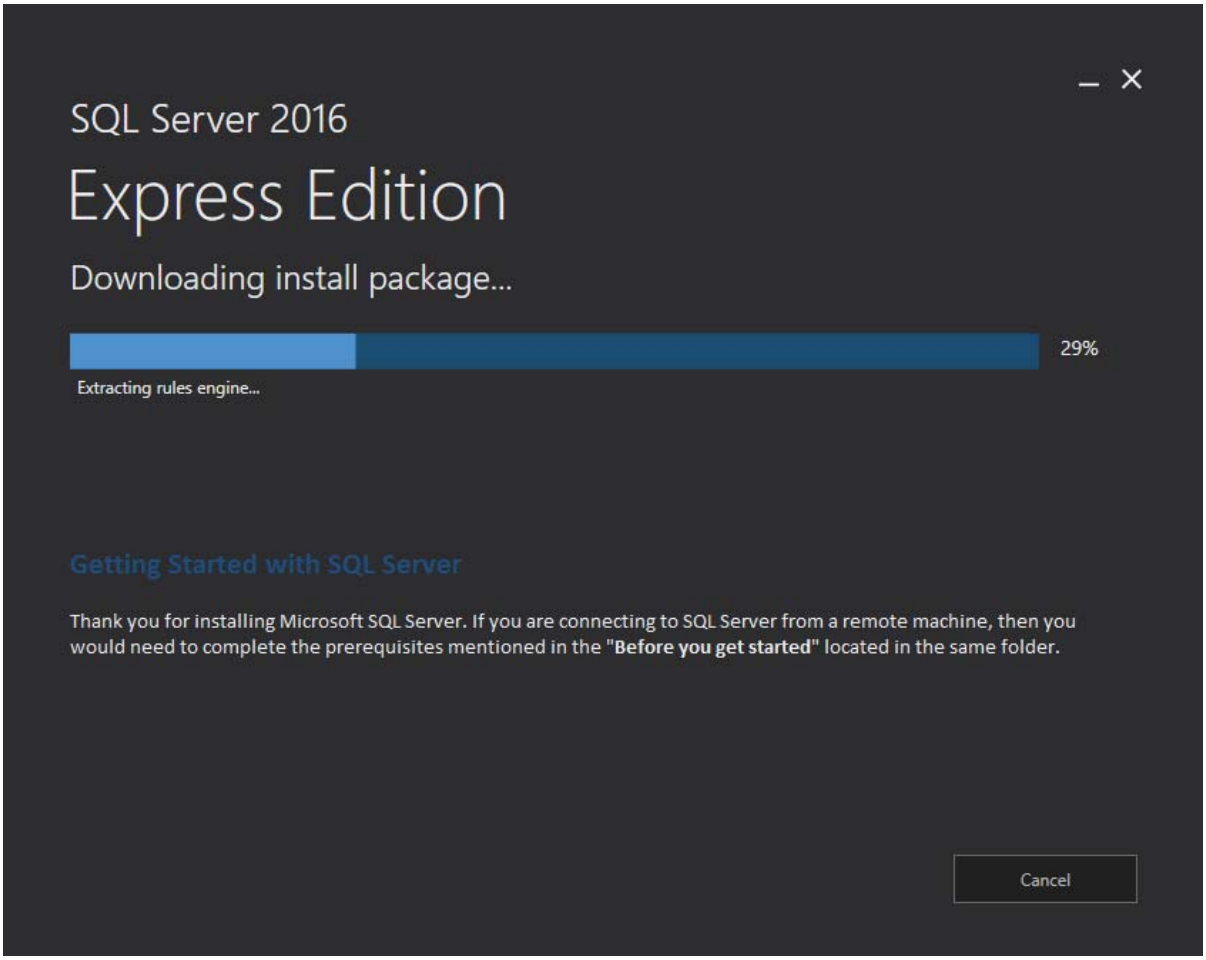
Click “Basic” to install the default version of SQL Server. Next, accept the license terms.



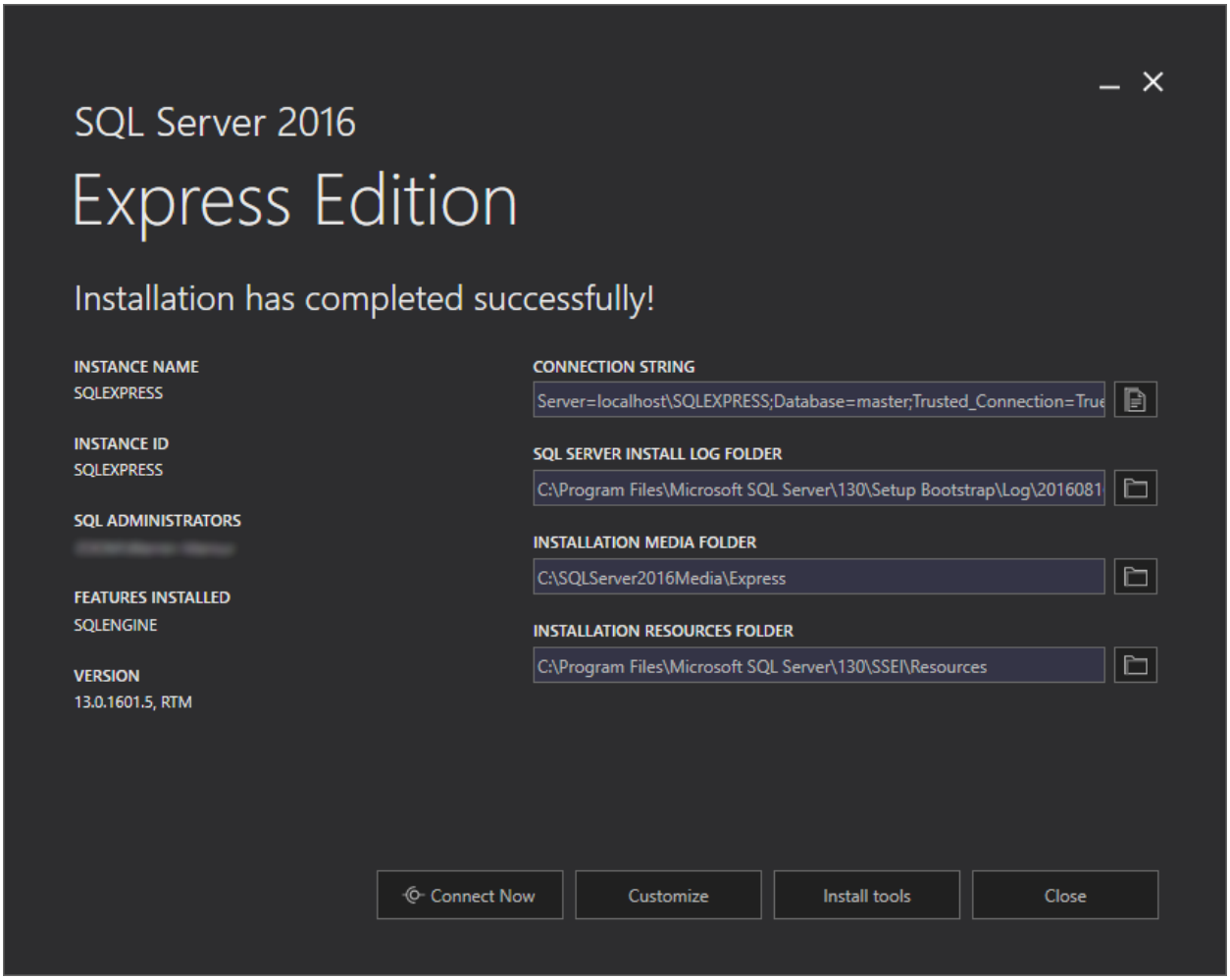
The wizard will present a choice of install locations as shown in the following screenshot.



The default location is fine, so just click the “Install” button. The installation process now begins. You will see a progress window similar the following until the installation is complete.



When the installation is complete, you will see a window similar to the following.



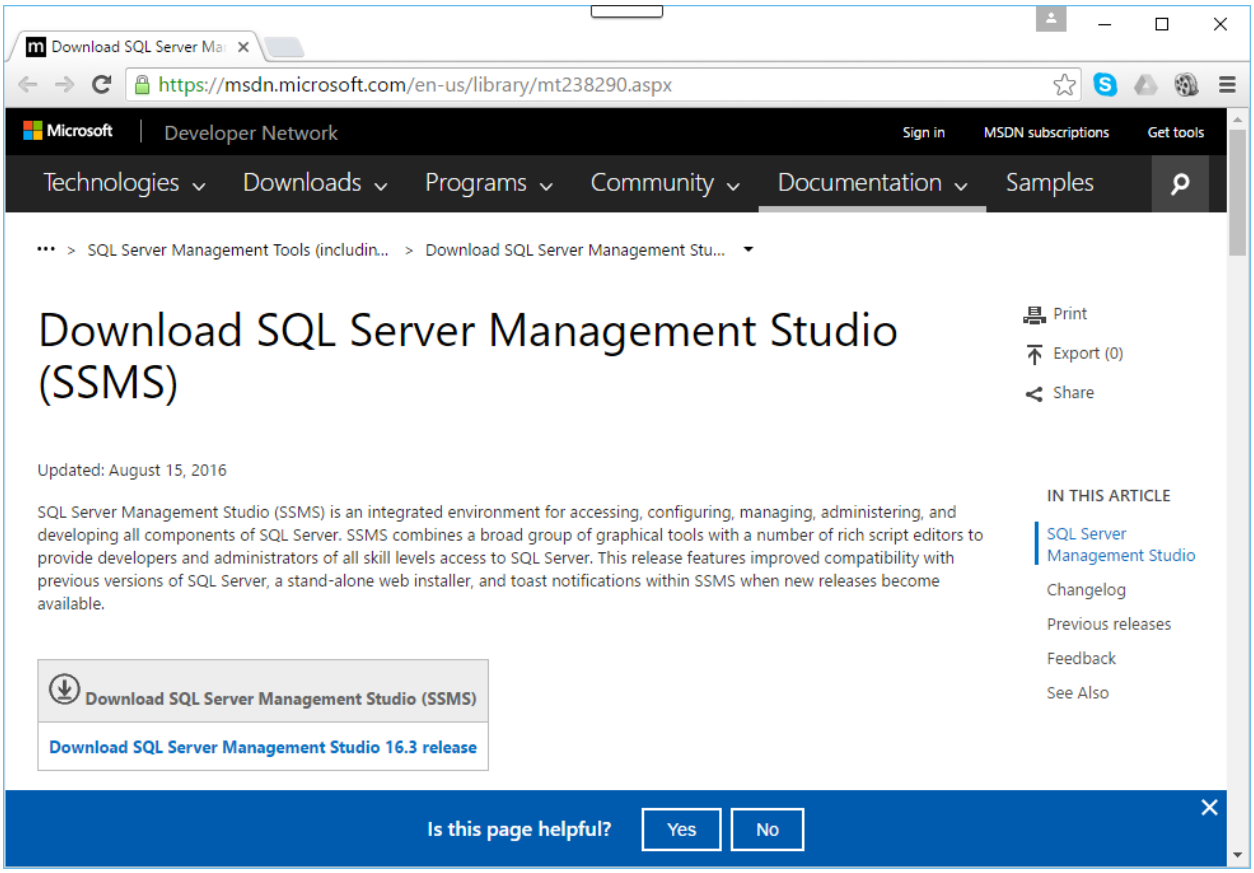
Do not close the window just yet! You'll still need the window to install SQL Server Management Studio. However, you have successfully installed SQL Server Express at this point, so congratulations! It was really that easy!

Installing SQL Server Management Studio

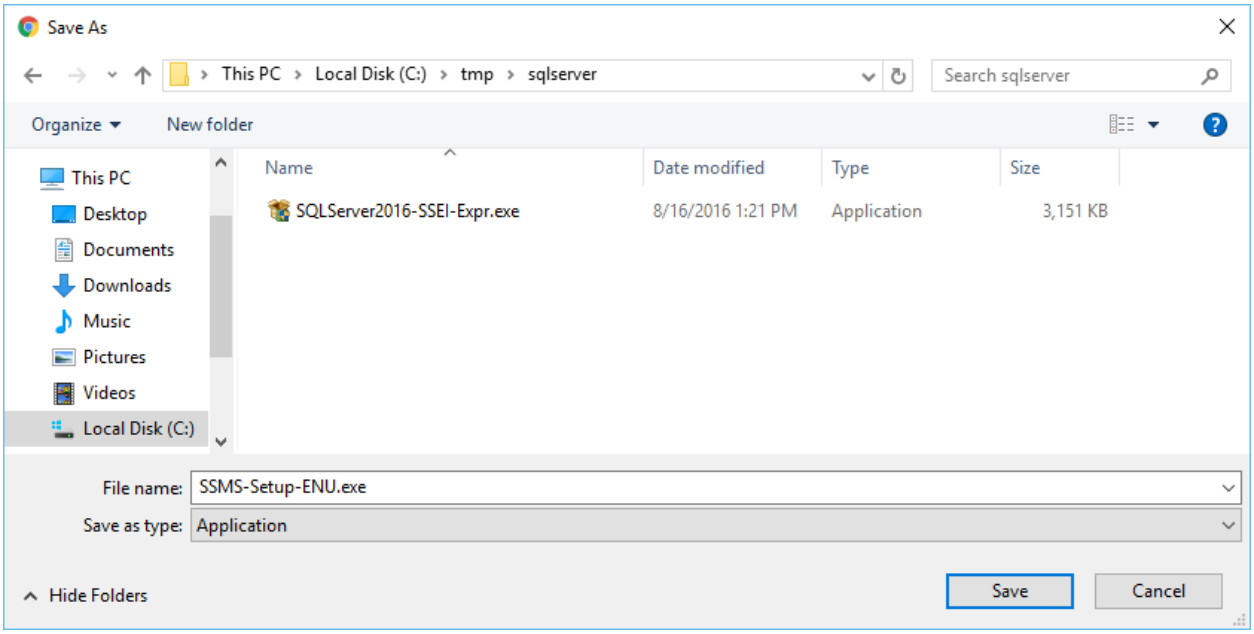
You may be curious as to why you need to install something else other than SQL Server itself. SQL Server, like other modern relational databases, uses a client-server architecture. The database itself is the server and contains all of the data and the capability to add, modify, delete, and access the data. A client is needed to connect to the database and perform specific commands. The most popular client by far for SQL Server is SQL Server Management Studio (SSMS), which you will install in this section. SSMS is very capable and provides many powerful conveniences and capabilities.

Step 5: Downloading SSMS

On the window that is up from step 4, click the "Install tools" button. Doing so will open a download page in your web browser for SSMS, similar to the below.

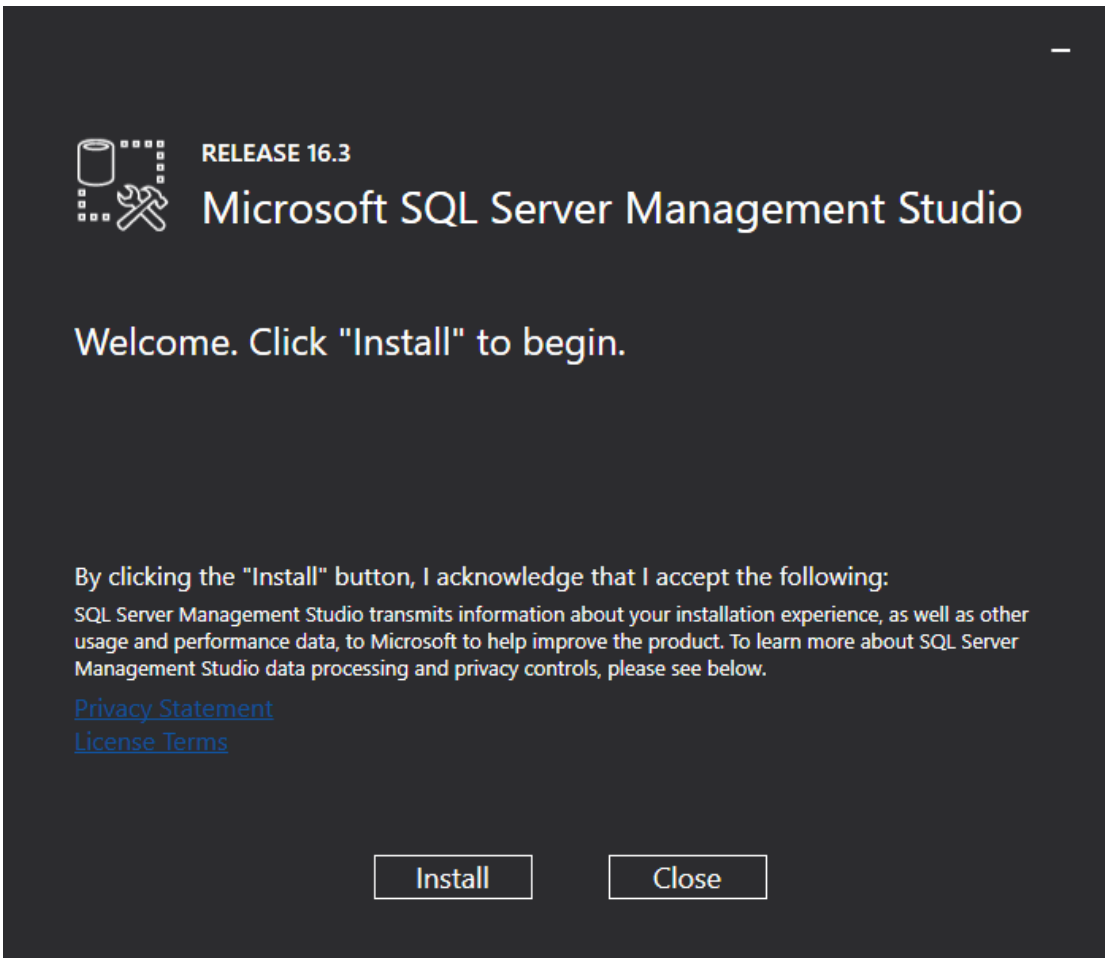


Click the “Download SQL Server Management Studio…” link to download its installer, and save the file to a location you can remember. In the screenshot below, we save it to C:\tmp\sqlserver, the same place as the SQL Server installer was saved.

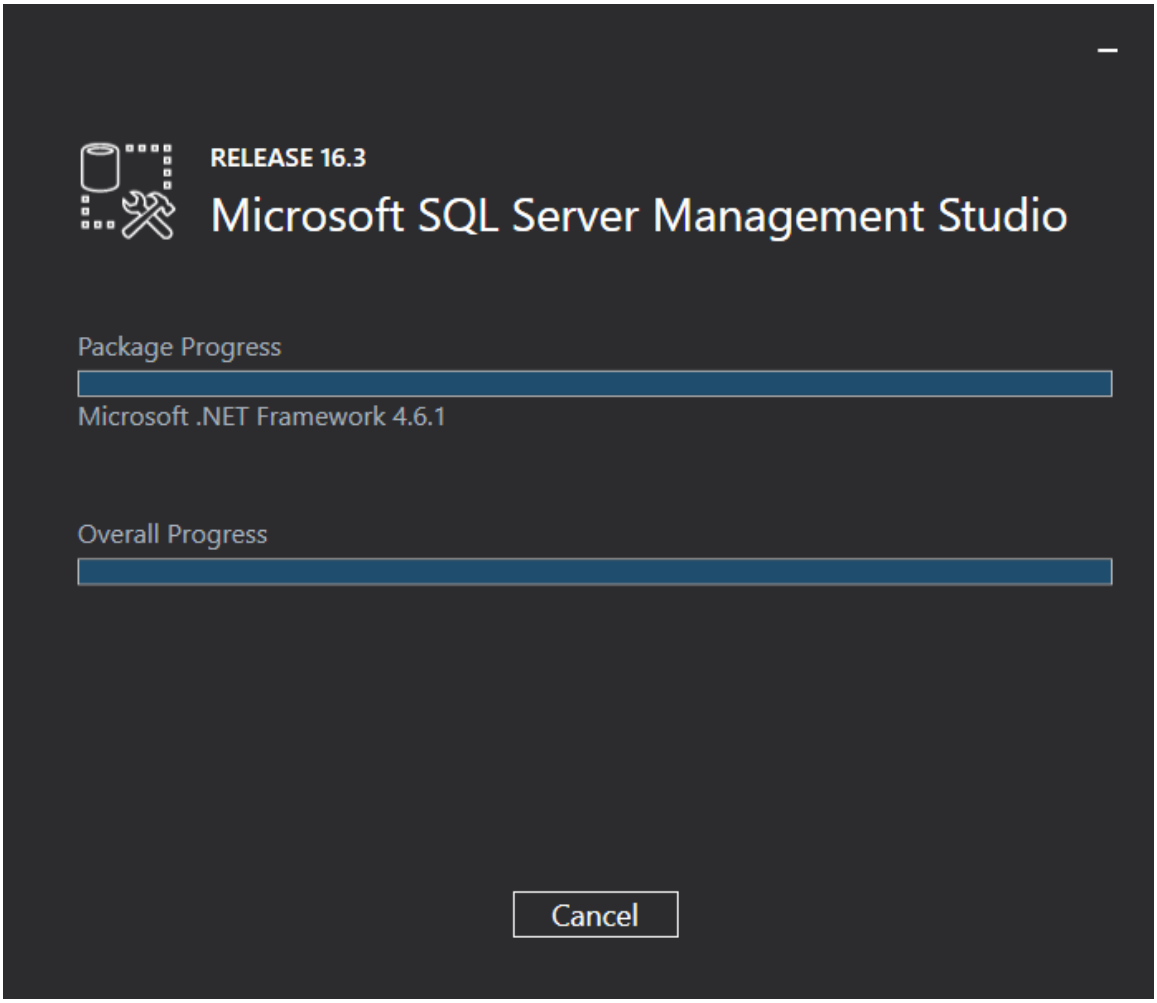


Step 6: Completing the SSMS Install

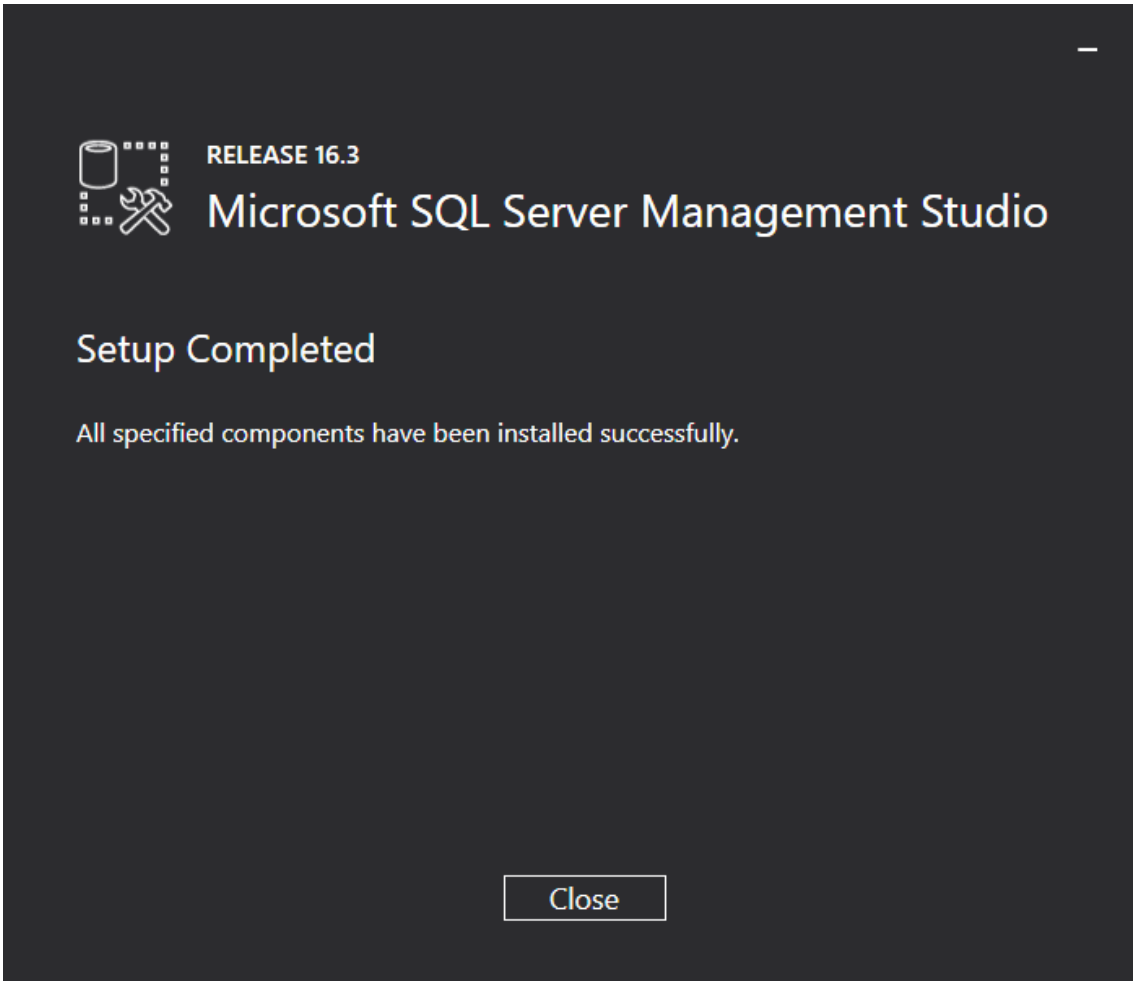
Once downloaded, run the SSMS installer from your browser, or directly by double clicking it in Windows Explorer. The first screen that appear is shown below.



Click the “Install” button to begin. A progress screen will appear similar to the following.



Let it progress through until completion, then you will see a screen indicating successful setup, similar to the below.



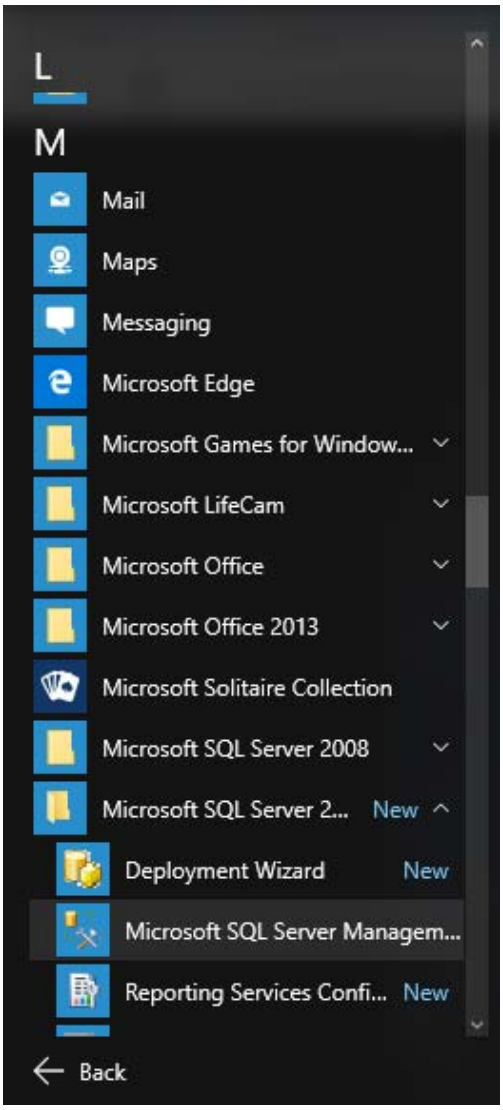
Congratulations! SSMS is now installed. You may now close this window, as well as the SQL Server Express installation Window from Step 4.

Using your Database to Complete Assignments

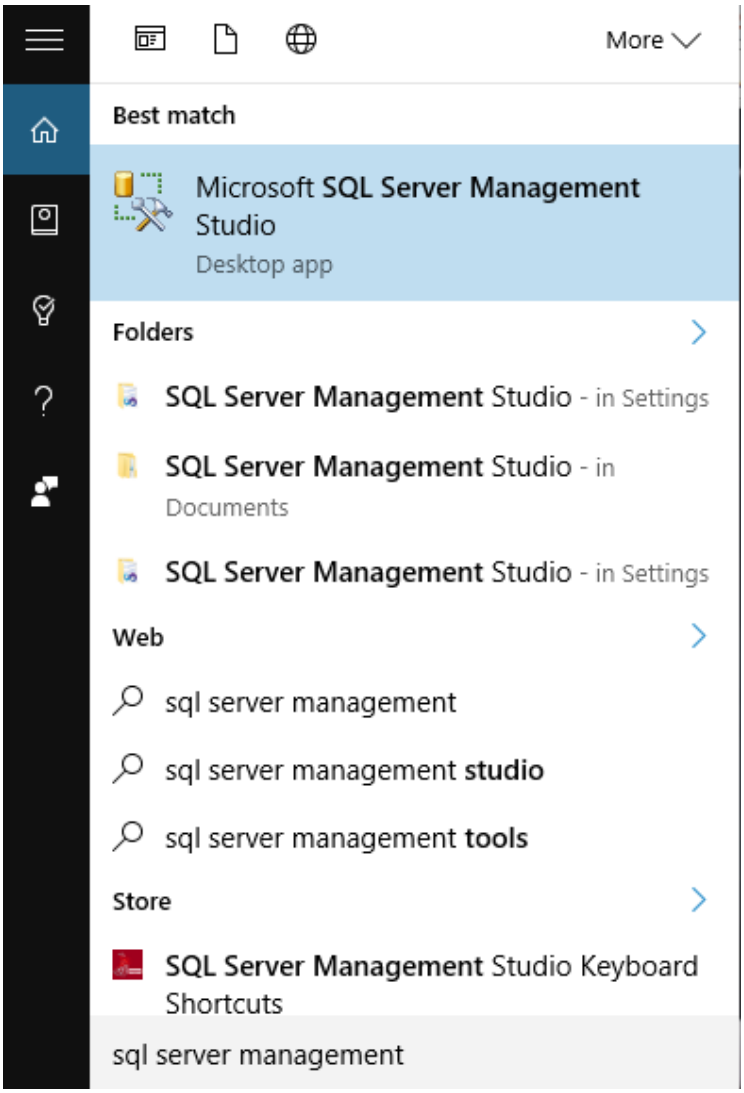
You have installed both SQL Server and SSMS. There are just a few more steps you need in order to start using your database to complete assignments -- connecting to your database and creating a database for assignments.

Step 7: Connecting to your Database

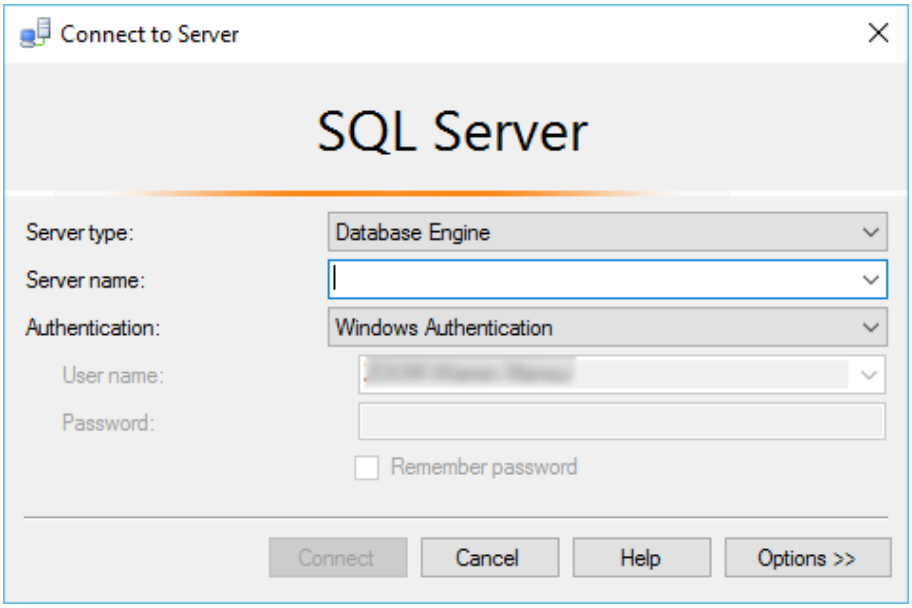
To do anything at all with your database, you must first connect to it. SSMS is accessible under All apps/Microsoft SQL Server 2016/Microsoft SQL Server Management Studio, as illustrated in the screenshot below.



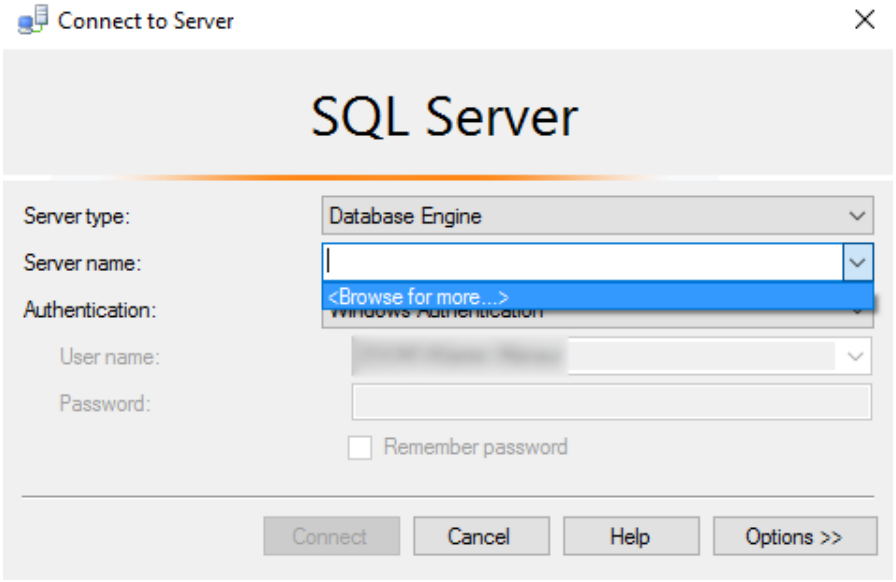
Alternatively, you can use your operating system's search function as well, as illustrated below.



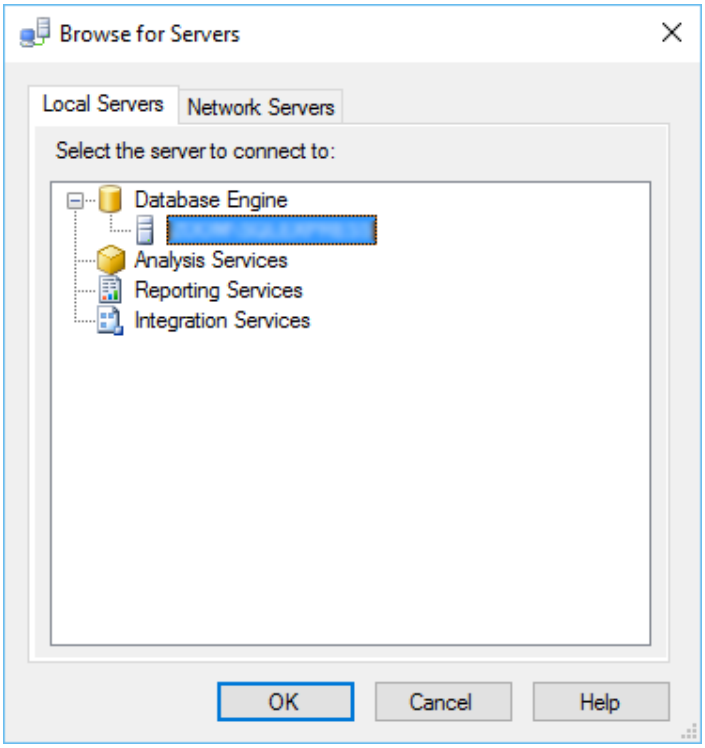
Click on the icon to run SSMS. When SSMS first runs, it will ask you for the server name, as illustrated below.



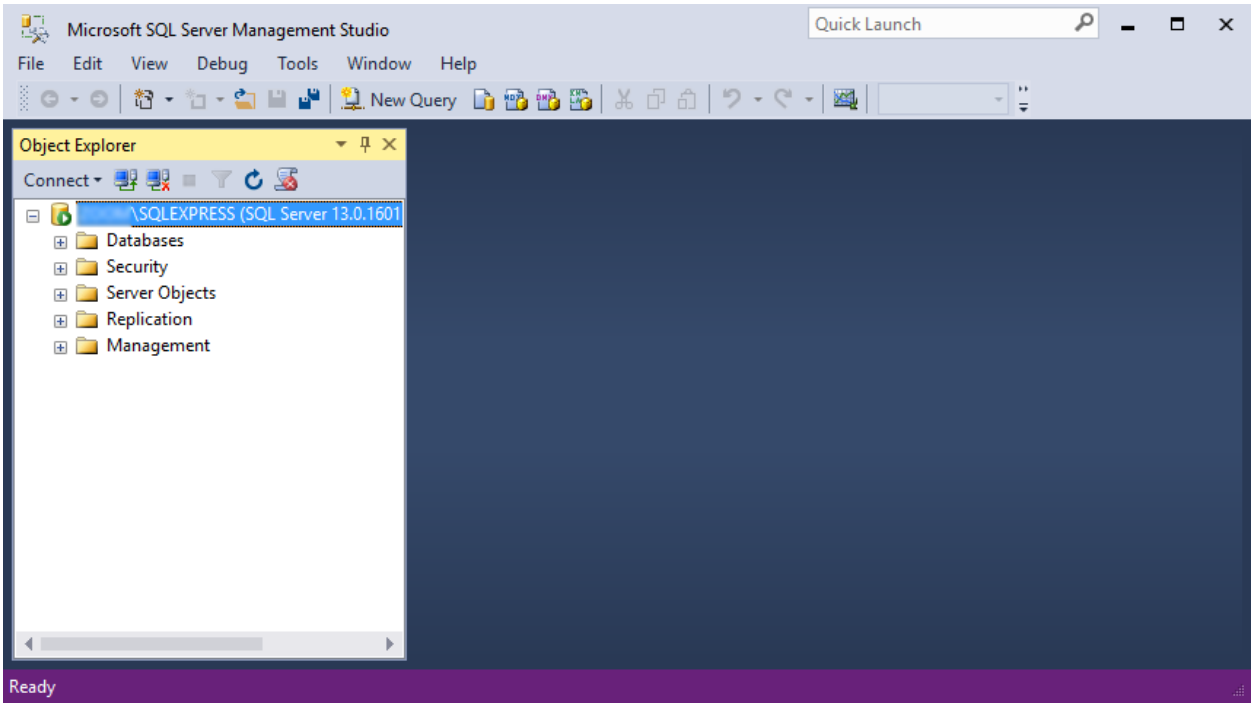
Click the down arrow icon, , then select "<Browse for more…> to browse for your server name, as illustrated below.



Under "Local Servers", expand "Database Engine" and select the SQL Server instance you just installed. It will be of the form YourMachineName\SQLEXPRESS, as illustrated below.



Click the “OK” button to fill in the server name, then click the “Connect” button to connect. After doing so, you will see a connection to your database on the left-hand side, under “Object Explorer”, similar to the below screenshot.

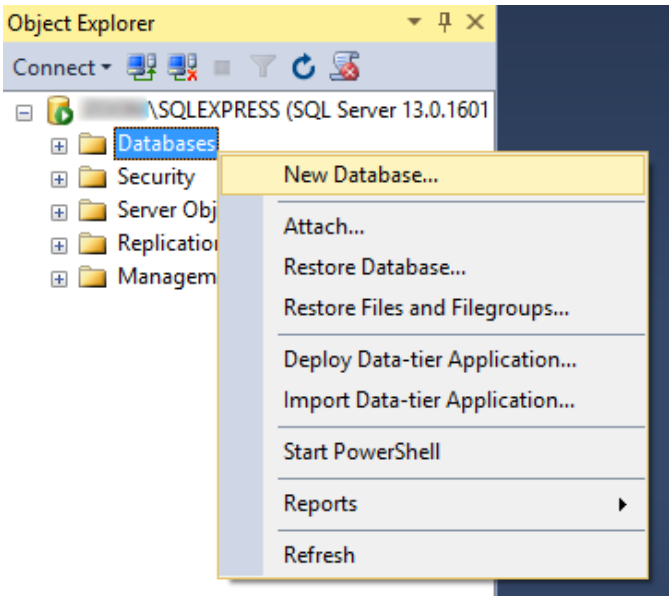


You have just connected to your database through SQL Server Management Studio!

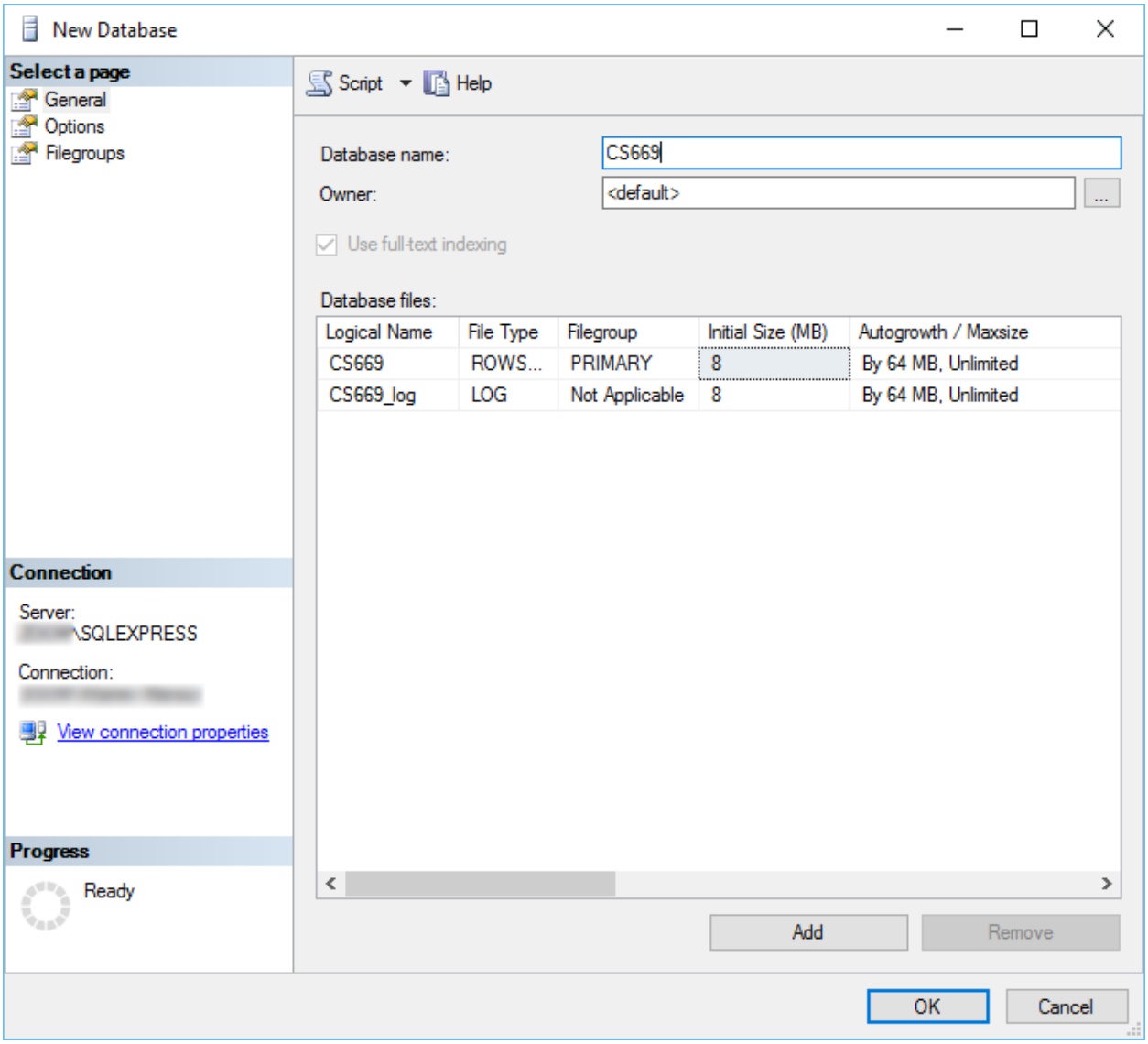
Step 8: Creating a Database for your Assignments

You are almost ready to begin working on assignments, but one more step is needed: creating a database. Now to be sure, there is already a default database called “master”, but it is perilous to use that database for anything of substance. Master is a system database which contains information about the server’s configuration; that database is critical to the operation of SQL Server itself, and if it gets corrupted, or runs out of space, the entire SQL Server instance is at risk. System databases are often located on drives with limited space, and if we need to fail over our instance to another instance, we cannot usually restore the master itself since each instance has its own configuration. Suffice it to say, for assignments it is prudent to create another database.

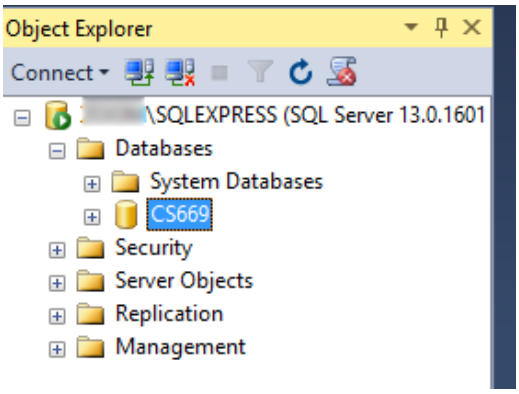
To get started, first right-click on “Databases” in the Object Explorer, and click “New Database…” from the context menu, as illustrated below.



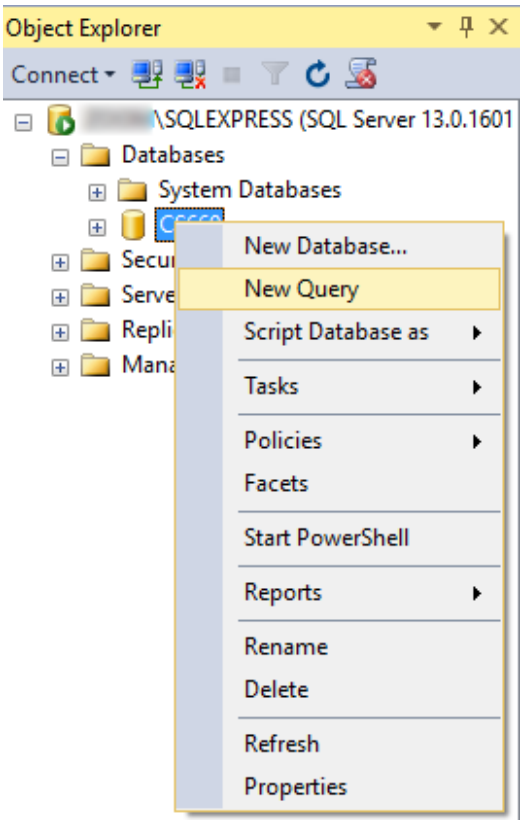
When the New Database window appears, enter a database name, and leave everything else defaulted. In the screenshot below, we use “CS669” as the database name, though you can use something different if you’d like.



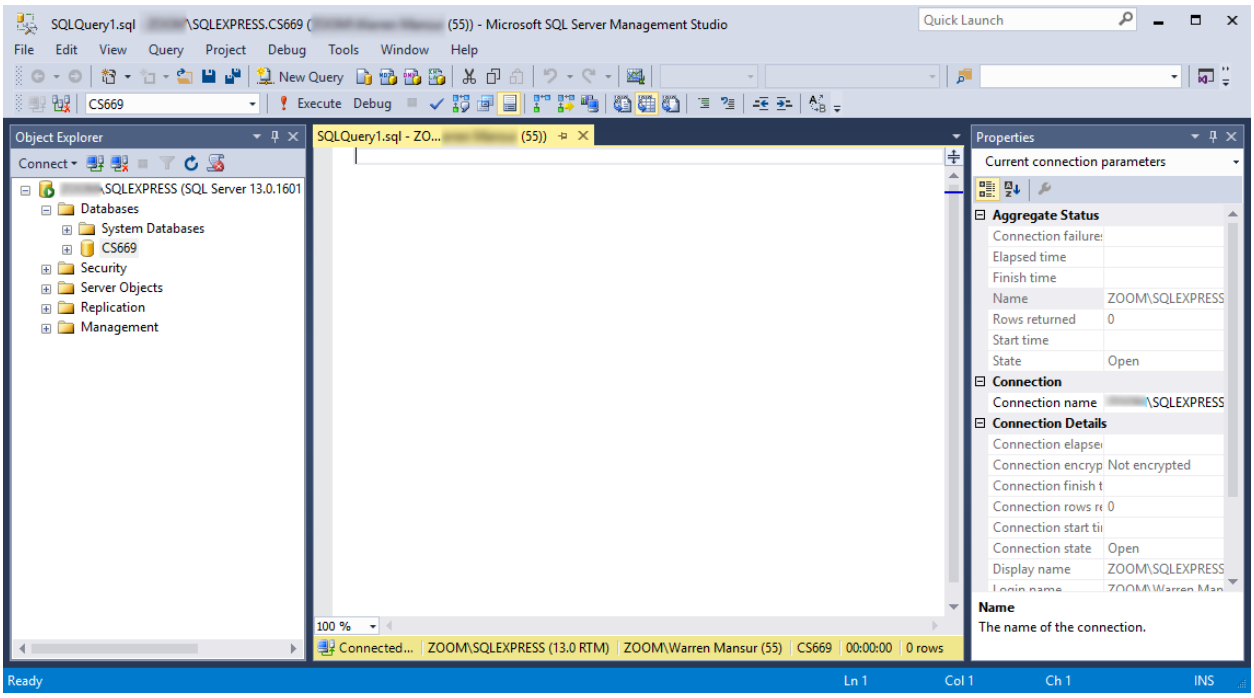
Then click the OK button to create the database. The window will process for a moment, then disappear. Next, in the Object Explorer, expand “Databases” and locate your new database. This is illustrated below.



Right-click on CS669 and select “New Query”, as illustrated.



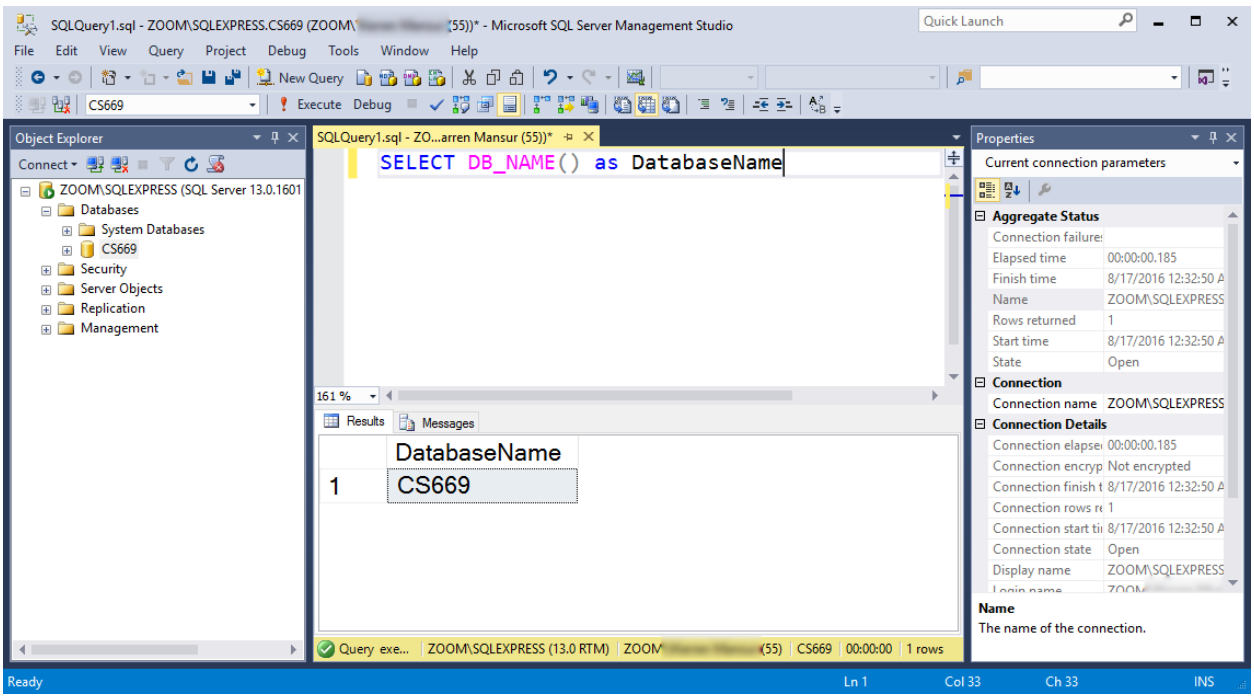
A new buffer appears, and in this buffer SQL commands can be typed, saved, and executed. The window is illustrated below.



All of your assignment's commands can be typed and executed in this type of buffer! Let's execute a single SQL command to verify that the database is running. In the buffer, type

```
SELECT DB_NAME() as DatabaseName
```

and then click the "Execute" button just above. You may alternatively hit the F5 key to execute the command. You should see the results something like this:



Notice that the results listed out our database name, CS669. There are of course many more commands that you will use in your course, but this gets us started. When you complete your assignments, you will use a buffer just like this, type in your commands, and execute them to get your results.

Congratulations! You have installed SQL Server and its client, connected to your database, and executed a command. You are now ready to complete assignments for your course!

Appendix A: How to Install SQL Server on a Mac

SQL Server can be installed and used on a Mac, but this requires some setup work. Many consider Mac computers to be the most user friendly computers available, and there are many devoted Mac users today. Although Mac computers may be user friendly, the Mac platform is not supported by the major, modern DBMS vendors, including Oracle and SQL Server. If you find yourself in the situation where your home computer is a Mac, and you do not have a readily available Windows machine available for DBMS installation, there are two ways to run Windows on your Mac – dual booting and using a virtual machine.

Dual Booting

The first solution, dual booting, is available to you if you have a modern Mac that runs on an Intel-based processor. All new Macs run on Intel-based processors, but older ones do not. Dual booting is a fairly simple concept. Normally when you power on your computer, your operating system starts booting immediately, and this happens seamlessly so that it appears your operating system is just a natural part of the computer. In actuality, when your computer is first powered on, it first loads a boot loader program, and that boot loader tells the operating system to start. If there is only one operating system, you may not even notice the work of the boot loader, because it always starts the same operating system. However, there is no reason why one cannot install two operating systems on their computer. In such a case, each time your computer is powered on, the boot loader asks you which operating system you would like to start, and also usually defaults to the first one if you do not select an option, after a timeout period.

All new Macs come with what Apple terms “Boot Camp”, which is a built-in utility that supports dual booting Mac OS X and Windows. To install Oracle in Windows on your Mac, you will need to:

1. Review the prerequisites needed to run Boot Camp and to install Windows as a second operating system on your Mac computer. The prerequisites are listed at http://support.apple.com/kb/HT1461. Ensure that your computer meets the requirements before continuing.

2. Obtain a licensed copy of Windows. If you do not have a licensed copy of Windows, you will need to download one from the MSDNAA site. BU students are entitled to free, licensed copies of the latest versions of Windows through the MSDNAA site, and details on how to access this site are available in your course’s syllabus.

3. Burn the copy of Windows onto a CD, or copy the ISO image onto a USB stick. Boot Camp supports installing Windows from either a CD or a USB stick.

4. Follow the steps recommended by Apple to install Windows using Boot Camp. Instructions are included with the utility, and you can also start here as well: http://support.apple.com/kb/HT1461

5. After Windows is installed, reboot your computer then boot into Windows. Proceed with the SQL Server install instructions, starting from the beginning of this install guide. When you need to run SQL Server, boot into Windows. When you need to use your Mac applications, boot into OS X.

Using a Virtual Machine

A virtual machine mostly behaves as any other application, but has some differences. The virtual machine has an application window that can be minimized and closed, the same as any other application. What makes a virtual machine different from an ordinary application is that an entire operating system is installed and executes inside of the virtual machine. The operating system running inside of the virtual machine, termed a "guest" operating system, runs as if it were to be on its own physical machine. This means we can install and use applications native to the guest operating system. Thus, once we are running a virtual machine, we are effectively running two operating systems at the same time – our machine's operating system (termed the "host" operating system), and the guest operating system – and are using applications native to both operating systems at the same time.

In our case, we are interested in running Windows as a guest operating system on our Mac. There are many virtual machines available for Macs; however, perhaps the two most popular are VirtualBox and Parallels. VirtualBox, available at http://virtualbox.org, is free to download and use. Parallels, available at http://parallels.com, costs money, but offers more features. Students have successfully used both to run both Windows and SQL Server on a Mac in our BU program.

Follow the steps below to install and use SQL Server on your Mac:

1. Download and install your virtual machine of choice.
2. If you do not have a licensed copy of Windows, you will need to download one from the MSDNAA site. BU students are entitled to free, licensed copies of the latest versions of Windows through the MSDNAA site, and details on how to access this site are available in your course's syllabus.
3. Install Windows inside of the virtual machine.
4. Proceed with the SQL Server install instructions, starting from the beginning of this install guide, installing SQL Server into the guest operating system.

Dual Booting Versus Using a Virtual Machine

An obvious question is, which of these two options should you use? The answer depends upon your computer hardware, and your personal preferences. The following table summarizes the advantages of both options.

	Advantages	**Disadvantages**
Dual Booting	Because both operating systems run natively on the computer's hardware, there is no performance overhead. Because both operating systems directly access the computer's hardware, there are not hardware compatibility issues. The setup is conceptually simpler. Simply boot the operating system you need upon startup.	You can only run one operating system and its applications at a time. To start the second operating system, you must reboot. There is no clipboard sharing between applications in both operating systems. If text is to be shared across applications, it must be saved in a file then loaded by applications in the other operating system.
Virtual Machine	The guest operating system and its applications run at the same time as the host operating system and its applications. There is clipboard sharing between applications in both operating systems. Text can be copied from an application in one operating system, and pasted into an application in the second operating system.	Because the guest operating system is running under the control of virtual machine software, the guest operating system and its applications will execute noticeably slower than if they were running natively on the computer. Because both operating systems run concurrently, the performance of the host operating system may degrade.

If your hardware is powerful enough to support running two operating systems simultaneously, and still perform reasonably well, you may want to use a virtual machine, so that you can run both your Mac applications and your Windows applications at the same time. If you are concerned about obtaining the best performance for both operating systems, you may want to dual boot.

A third advanced option, supported by the Parallels virtual machine, is to run the *same* Windows installation under a dual boot configuration *and* a virtual machine configuration. This is an advanced setup, and will require two Windows license registrations, as running the same installation both ways is the equivalent of running Windows on two different physical machines.