Microsoft SQL Server Installation Guide

Version 5.0

For SQL Server 2016 Developer

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With contributions from Beth Haines

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Introduction

These instructions are used by students enrolled in the Master of Science in Computer Information Systems and other Computer Science Department programs in both on-campus and online programs. In some places these instructions say that you should contact your instructor. Online students should normally contact their facilitator first.

The document begins with discussion SQL Server editions and how they are utilized in our courses, downloading SQL Server from BU MSDNAA and installing SQL Server itself. We continually update this document; please let us know of problems you encounter or questions not answered.

The examples in the main document are for the Microsoft Windows family, including Windows Server 2012, Windows 7 & Windows 10.

These setup instructions are for SQL Server 2016 Developer Edition, but can be used in installing other versions from 2008 and 2012 families.

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 Editions

SQL Server is released in several editions. To simplify your selection, we will focus on the Developer and the Express editions. For both CS 669 and CS 779 we recommend that you use the Developer Edition. The Developer Edition has the same full feature set as the Enterprise Edition with the exception of the license. Production environments cannot be implemented using the Developer Edition. Please refer to the SQL Server 2016 Licensing Quick Reference Guide for additional information. https://www.microsoft.com/en-us/cloud-platform/sql-server-editions

The Developer Edition is especially useful for those students who plan investigate advanced SQL Server topics as part of their CS 779 term project. You can download the Developer Edition from the MET BU MSDNAA. Our installation instructions explain which features you may find useful for either course.

If you have difficulty downloading and installing the Developer Edition, the Express Edition can be used for all of the CS 669 and some of CS 779 assignments. The Express Edition is a free version of SQL Server which is a smaller version that places limits on the size of the database, computing capacity and feature set. For some of the MET courses, we have found that the Express Edition is suitable on the most part, and has advantages of a much smaller load on the computer and simpler installation.

For additional details on the features supported by both the Developer (Enterprise), Express as well as other editions please refer to the Features Supported by the Editions of SQL Server 2016 which can be found here: <u>http://msdn.microsoft.com/en-us/library/cc645993.aspx</u>

SQL Server Express Edition

This guide covers installation of the Developer edition of SQL Server which is suitable for all classes. For installing the Express edition follow the instructions in the *SQL Server Express Installation Guide* instead of the instructions in this document.

Downloading SQL Server Installer

MSDN Academic Alliance

MET College is a member of the MSDN Academic Alliance, which allows faculty, graduate and undergraduate students currently enrolled in MET courses to obtain certain Microsoft products free of charge. You can obtain SQL Server Developer free of charge from the Microsoft Developer Network Academic Alliance (MSDNAA) Program.

By the first day of class your instructor will submit your BU email address to Microsoft to enroll you in the program for the current semester. You will receive an email from the MSDNAA E-Academy License Management System (ELMS) from the address: <u>@e-academy.com</u>. The email will provide you with a username and password, and direct you to the MSDNAA site.

FAQ and basic information are at: <u>http://www.bu.edu/metit/hw-and-sw/msdn-academic-alliance-software-center/</u>

If you do not receive your email by the end of the first week, first check your junk email folder and then please follow the instructions at <u>http://www.bu.edu/metit/hw-and-sw/msdn-academic-alliance-software-center</u>

Directions to Download SQL Server Developer Edition from MSDNAA

- 1. You will receive an email from MSDNAA with your username and password as well as the link for the MSDNAA.
- 2. Sign into Microsoft DeamSpark with your MSDNAA user name and password.
- 3. Search for SQL Server 2016.
- 4. Scroll down to *Microsoft SQL Server 2016 Developer* ... expand it and click on Add to Cart. and click *Add to Cart*
- 5. Once your order is processed, click on the Download link Download.



Note that it is several gigabytes in size and be sure to note the download destination under the download progress bar.

6. Once the download is complete go to the destination folder (i.e. *downloads* folder on your computer). The installation file is an ISO image file. If you are using Windows 10 double click on the ISO file to run setup. Otherwise can burn the image to a DVD or follow the following links to install a disk burning program or virtual mounting software, directions are listed on the BU MSDN site under ISO images section: http://www.bu.edu/metit/hw-and-sw/msdn-academic-alliance-software-center/

Installing SQL Server 2016 Developer Edition

- 1. Run *Setup.Exe* to start the setup of SQL Server 2016 Developer install, if prompted, click Yes to allow this app to make changes to your device.
- 2. Once the SQL Server Installation Center launches choose Installation tab (second from the right).
- 3. In most cases you will want to run a **New SQL Server New SQL Server stand-alone installation**, but other options are available, for example if you have SQL Server 2014 installed, you have an option to update.



(CS779Note) If you are configuring the installation for CS779 and you might want to explore failover clustering. Note that you can go back and install this component at a later time.

6

| SQL Server 2016 Setup Product Key Specify the edition of SQL Server | - C × | |
|--|--|--|
| Product Key License Terms Global Rules Microsoft Update Product Updates Install Stup Files Install Rules Feature Selection Feature Rules Feature Configuration Rules Ready to Install Installation Progress Complete | Validate this instance of SQL Server 2016 by entering the 25-character key from the Microsoft certificate of authenticity or product packaging. You can also specify a free edition of SQL Server Eavleboper, Evaluation, or Express. Evaluation has the largest set of SQL Server fautures, as documented in SQL Server Books Online, and is activated with a 180-day expiration. Developer edition does not have an expiration, has the same set of features found in Evaluation, but is licensed for non-production database application development only. To upgrade from one installed edition to another, run the Edition Upgrade Wizard. © Specify a free edition: Developer C Enter the product key: | |
| | < Back Next > Cancel | |

- 5. On the Product Key page make sure that the selected Edition is "Developer" click Next.
- 6. On the License Terms page, check the box next to "I accept the license terms" and click Next.
- 7. On the Microsoft Update page, we recommend that you check the "Use Microsoft to check for updates" so that you have the most up-to date version and click next.
- 8. Setup will check if needed install Setup Support Files. Click Next when complete.

Feature installation:

9. Select the components of SQL server to install on your computer.

Minimum Required Features List for CS 669

- You will need to choose Database Engine Services in order to use SQL Server for CS669.
- Please that you will also need to install Management Tools- Basic & Complete. Please see section on *Install SQl Server Management Tools* in this guide.

| 🐮 SQL Server 2016 Setup – 🗆 | | | | | | \times |
|---|------------|--|---|---|---|----------|
| Feature Selection | | | | | | |
| Select the Developer features to | o install. | | | | | |
| Product Key License Terms Global Rules Microsoft Update Product Updates Install Setup Files Install Rules Feature Selection Feature Rules Instance Configuration Server Configuration Database Engine Configuration Feature Configuration Rules Ready to Install Installation Progress Complete | Features: | n se) ic Extractions for Sea ce for External Data ve ePoint n for SharePoint Proc v > C:\Program Files\Mic C:\Program Files\Mic C:\Program Files\Mic | Feature description: The configuration an instance feature of a isolated from other S Server instances can Prerequisites for selec Already installed: Windows PowerS Microsoft .NFT Fi C Disk Space Requireme Drive C: 1058 MB req rosoft SQL Server/ rosoft SQL Server/ VMicrosoft SQL Server/ | nd operation of 6 SQL Server instar Operate side-by ted features: Shell 3.0 or highe ramework 4.6 ents uired, 29200 MB | ach ince is inces. SQL -side on er available | |
| | | | < Back | Next > | Cancel | |

- For CS779 in addition to what is listed above please review these descriptions to see which features you might be interested in for advanced topics for the term project.
- Instance root Directory and Shared Features Directory: Note the paths where SQL server will install the components (default is Program Files folder within C drive.)

• Detailed Explanations:

- a. Instance Features:
 - Database Engine Services: This installs SQL Server engine (the core service for storing, processing and security data) on your system. <u>This is required for both</u> <u>CS669 and CS779.</u>
 - SQL Server Replication: Allows for having synchronized copies of the data in two different locations. For example, this can be used in data distribution, synchronization, load balancing and disaster recovery.
 - a. (CS669) Not needed for this course
 - b. (CS779) This is a worthy subject for a term project, and can be installed at a later time. Note that you may need two separate systems.
 - R-Services: Advanced Analytics Extensions and integration with R., an open source statistical environment.
 - a. (CS669) Not needed for this course
 - b. (CS779) This is a worthy subject for a term project, and can be installed at a later time. Make sure to select R Server (Standalone) in Shared Features.
 - Full Text and Semantic Extractions for Search: In some database implementations where there are a lot of text data that needs to be searched, full text search allows for additional indexing for faster data retrieval.
 - a. (CS669) Not needed for this course
 - b. (CS779) This is a worthy subject for a term project, and can be installed at a later time.
 - Data Quality Services: Enables you to discover, build, and manage knowledge about your data. You can then use that knowledge to perform data cleansing, matching, and profiling.
 - a. (CS669) Not needed for this course
 - b. (CS779) This is a worthy subject for a term project, and can be installed at a later time. Make sure to select Data Quality Client under Shared features.
 - PolyBase Query Service for External Data: Enables integrated querying access Hadoop non-relational unstructured and semi-structured data and SQL Server relational data.
 - a. (CS669) Not needed for this course
 - b. (CS779) This is a worthy subject for a term project, and can be installed at a later time.
 - Analysis Services: Provides support for analytical processing (OLTP) and data mining, such as when you set up a data warehouse and want to perform some ad hoc queries against cubes.
 - (CS669) Not needed for this course.
 - (CS779) If you plan to do a Data Warehouse project or data mining you will need this.

- Reporting Services Native: Allows for creation of Reports based on data in Online Transaction Processing (most common databases) and Data Warehouses. The reports can be in the form of tables, charts, and other formats.
 - (CS669) Not needed for this course
 - (CS779) This is a worthy component to explore as part of a term project.
- b. Shared Features:
 - R Server (standalone): R Server installation for Windows which provides big data analysis, transformation, modeling and model deployment capabilities.
 - Reporting Services SharePoint: Allows for creation of Reports based on data in Online Transaction Processing (most common databases) and Data Warehouses. The reports can be in the form of tables, charts, and other formats.
 - (CS669) Not needed for this course.
 - (CS779) This is a worthy component to explore as part of a term project.
 - Data Quality Client: Not needed unless you are planning to try Data Quality Services for CS779
 - Client Tools Connectivity: components to communicate between clients and servers.
 - (CS669) Not needed for this course
 - (CS779) Might be needed for some advanced components, check if needed for what you are planning to do for the term project, can be added later.
 - Integration Services: This is needed for data warehouse Extraction Transformation Loading Processes when data needs to be transformed and loaded into the database.
 - (CS669) Not needed for this course.
 - (CS779) If you plan to do a DW project or data mining you will need this component.
 - Client Tools Backwards Compatibility: This is not needed for the courses in this program, but in production environments if you connect to older versions of SQL Server from management tools this option is needed.
 - Client Tools SDK: Additional Software Development Kit with recourses for developers.
 - (CS669) Not needed for this course
 - (CS779) You might want to do some research to see if there might be anything here of interest for a term project, especially if you enjoy programming in Object Oriented languages.
 - Documentation Components: This is the documentation for SQL Server. Note that this information is also available online.
 - Distributed Replay Controller and Client. An advanced topic component. Works similar to SQL Server Profiler to capture traces against upgraded environments.
 - (CS669) Not needed for this course
 - (CS779) You might want to do some research to see if there might be anything here of interest for a term project.

- SQL Client Connectivity SDK: Additional Software Development Kit with recourses for developers.
 - (CS669) Not needed for this course
 - (CS779) You might want to do some research to see if there might be anything here of interest for a term project.
- Master Data Services: A platform for integrating data from disparate systems across an organization into a single source of master data for accuracy and auditing purposes.
 - (CS669) Not needed for this course
 - (CS779) You might want to do some research to see if there might be anything here of interest for a term project.

Instance Configuration

10. Generally, you can leave the Default Instance. The Named instances would be used if you want to create multiple instances of SQL Server on the same machine. If you are installing SQL Server for CS779 this might be a worthy topic to explore for the term project. Click Next when complete.

| Product Kev | Default instance | | | | | | |
|---|---|----------|--------------------------|--|---------------------|------------------------|-------|
| License Terms Global Rules | O Named instance: | | MSSQLSERV | ER | | | |
| Microsoft Update Product Updates Install Setup Files | Instance ID: | | MSSQLSERV | ER | | | |
| Install Rules Feature Selection Feature Rules | SQL Server directory: Analysis Services dire | ctory: | C:\Program C:\Program | Files\Microsoft SQ Files\Microsoft SQ | L Server\MSSQL13.MS | SSQLSERVE SQLSERVER | R |
| Instance Configuration Server Configuration | Reporting Services di | rectory: | C:\Program | Files\Microsoft SQ | L Server\MSRS13.MSS | QLSERVER | |
| Database Engine Configuration Analysis Services Configuration Reporting Services Configuration Feature Configuration Rules | Instance Name | Instar | nce ID | Features | Edition | Ve | rsion |
| | | | | | | | |

Server Configuration

11. Set both SQL Server Agent, Analysis, Reporting, Integration Services (if installed) These are services that run components of SQL Server.

You can set SQL Server Database Engine to Manual if you don't want it to run all the time with your system startup. This may use a lot of system recourses when you are not using the Sql Server.



- Please note the following:
 - a. **SQL Server Agent** is used for running scheduled jobs, such as backups, scheduled sql scripts and db maintenance. If this was a production environment you would want this service set to automatic.
 - b. You will need **SQL Server Database Engine** to run SQL Server. Since DBMS uses a lot of system recourses, we would recommend running it manually when you need it.
 - c. If you installed other components for SQL Server for advanced topics, you should also set them to manual so that they don't run on system startup.
 - d. SQL Server Browser can be left disabled.
 - e. You do not need to select Grant Perform Volume Maintenance Task privilege to SQL Server for the course, however if performing installs in production environments this is recommended for data confidentiality. Note the link on the page for additional details.
 - f. If you are installing **SQL Server Analysis Services** this runs the back-end data mining components. You will need to set this particular service to use **NT**

AUTHORITY\LOCAL SERVICE account name (all other services can use the default Account Name).

- You may get the following error message after setting the Analysis services to use the local service account name "The Local Service account is not permitted for the SQL Server service. Specify another account for the service login." In that case, use the default Account Name that the installer suggested. In that case, please see section "Review that SQL Server Analysis Services is using the local account." on how to make this change after the install.
- g. Check the collation tab at the top. For our purposes this can be left at default SQL_Latin1_General_CP1_CI_AS which is Latin1-General case insensitive. This drives how SQL server recognizes commands, for example you can choose a different language or set it to be case sensitive. Some applications require for you to choose a specific collation. You can click *Customize* to change it. Click *Next* when done.

| 📸 SQL Server 2016 Setup | - | - 🗆 | \times |
|--|---|------------|----------|
| Server Configuration Specify the service accounts and | collation configuration. | | |
| Product Key License Terms Global Rules Microsoft Update Product Updates Install Setup Files Install Rules Feature Selection Feature Rules Instance Configuration Server Configuration Database Engine Configuration Analysis Services Configuration Reporting Services Configuration Feature Configuration Rules Ready to Install Installation Progress Complete | Service Accounts Collation Database Engine: SQL_Latin1_General_CP1_CL_AS Latin1-General, case-insensitive, accent-sensitive, kanatype-insensitive, width-insensitive for Unicode Data, SQL Server Sort Order 52 on Code Page 1252 for non-Unicode Data Analysis Services: Latin1_General_CL_AS Latin1_General_CL_AS Latin1-General, case-insensitive, accent-sensitive, kanatype-insensitive, width-insensitive Warning: The Database Engine and Analysis Services collations are not the same. | Customize. | |
| | < Back Next > | Cancel | |

Database Engine Configuration

Account Provisioning:

- Choose the authentication mode for the system. Windows authentication will use your windows account privileges to connect to SQL Server. <u>We highly</u> <u>recommend using Mixed Mode</u> so that there is an additional built in SA account with a separate user name and password as well as your built in windows account.
- <u>Make sure to add users (such as your account) to SQL Server</u> <u>Administrators (click on Add Current User) if it is not already there</u>.
- These accounts will allow you to log into SQL Server.

• Note that the server itself does not need these accounts and runs as a service which you specified in previous step.

| 髋 SQL Server 2016 Setup | | - | | \times |
|---|---|--|--|-----------|
| Database Engine Confi Specify Database Engine auther | guration ntication security mode, administrators, data directories and TempDB settings. | | | |
| Product Key License Terms Global Rules Microsoft Update Product Updates Install Setup Files Install Rules Feature Selection Feature Rules Instance Configuration Server Configuration Database Engine Configuration Analysis Services Configuration Reporting Services Configuration Feature Configuration Rules Ready to Install Installation Progress Complete | Server Configuration Data Directories TempDB FILESTREAM Specify the authentication mode and administrators for the Database Engine. Authentication Mode O 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 Specify SQL Server administrators SQLSERVER-PCUack Polnar (Jack Polnar) Solution Add Current User Add Remove | QL Server ac ave unrestri) the Databa | dministrato cted acces ase Engine. | 0175 5 |
| | < Back N | lext > | Cance | ł |

- a. You can leave Data Directories to defaults. Data Directories can be changed if you have a multiple disk environment and for performance want to separate out where different parts of the DBMS go. For example, in production environments the LOG components should go on a separate disk array, which will improve performance of the system.
- b. For additional tuning you can explore the TempDB settings. TempDB system database used by SQL Server. For additional details please review the following link: <u>https://msdn.microsoft.com/en-us/library/ms190768.aspx</u> As an example, this page allows you to customize autogrowth settings for the TempDB. For the courses leaving the defaults is fine.

c. If you are installing SQL Server for CS779 you might want to enable FILESTREAM if you plan to explore large file types such as Binary language objects (BLOB). We suggest that this feature is enabled for CS799.

| Database Engine Config Specify Database Engine auther | guration | rs and data directories | | | |
|--|----------------------------------|---|---------|--------|------|
| Product Key License Terms Global Rules Product Updates Install Setup Files Install Rules Setup Role Feature Selection Feature Rules Instance Configuration Server Configuration Database Engine Configuration Analysis Services Configuration Reporting Services Configuration Feature Configuration Rules Ready to Install Installation Progress Complete | Server Configuration Data Direct | tories FILESTREAM act-SQL access e I/O access MSSQLSERVER ats access to FILESTREA | .M data | | |
| | | < Back | Next > | Cancel | Help |

Analysis Services Configuration

If you have selected Analysis Services component (i.e. for CS779) you will be presented with the following screen.

- Select the Multidimensional and Data Mining Mode
- Click Add Current User
- Click Next

| Product Key License Terms Global Rules Microsoft Update | Server Configuration Server Mode: Multidimensional Tabular Mode | Data Directories al and Data Mining Mode | | | |
|---|--|---|---------------------|--|--|
| Product Updates Install Setup Files Install Rules | O PowerPivot Moo Specify which users | de have administrative permissions fo | or Analysis Service | ·S. | |
| Feature Selection Feature Rules Instance Configuration Server Configuration Database Engine Configuration Analysis Services Configuration | SQLSERVER-PC\Jac | k Polnar (Jack Polnar) | | Analysis Sen administrato unrestricted Analysis Sen | rices irs have access to rices. |
| Reporting Services Configuration Feature Configuration Rules Ready to Install Installation Progress Complete | Add Current User | Add Remove | | | |

Error Reporting, Installation Configuration Rules, & Ready to Install

• Review selected features and click *Install*, Installation will begin, this will take some time.

| 髋 SQL Server 2016 Setup | - □ > | < |
|---|---|---|
| Ready to Install | | |
| Verify the SQL Server 2016 feat | ures to be installed. | |
| Product Key License Terms Global Rules Microsoft Update Product Updates Install Setup Files Install Rules Feature Selection Feature Rules Instance Configuration Server Configuration Database Engine Configuration Analysis Services Configuration Reporting Services Configuration | Ready to install SQL Server 2016: Summary - Edition: Developer - Action: Install (Product Update) - Prerequisites - Already installed: - Windows PowerShell 3.0 or higher - Microsoft .NET Framework 4.6 - To be installed from media: - Microsoft Visual Studio 2010 Redistributables - Microsoft Visual Studio 2010 Shell - General Configuration - Features - Database Engine Services - Analysis Services - Reporting Services - Native | |
| Feature Configuration Rules Ready to Install Installation Progress Complete | Configuration file path: C:\Program Files\Microsoft SQL Server\130\Setup Bootstrap\Log\20160821_143400\ConfigurationFile.ini | |
| | < Back Install Cancel | |

• This will take some time



• Once the installation is complete Congratulations SQL Server Install is complete, click close.

SQL Server Management Tools

You will need SQL Server Management Tools to work with SQL Server, this is the GUI interface that include components such as the GUI Query interface as well as components for advanced topics such as analysis and integration services as well as the database tuning advisor. 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.

It is required that you install the Management Tools Complete for all courses.



Download SQL Server Management Studio (SSMS)

You will be brought to a web page to download the latest release of SQL Server Management Studio. Click on the link to download the latest release, and save the file to a location you can remember

Download SQL Server Management Studio (SSMS)

| Updated: August 15, 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. |
| |



Install SQL Server Management Studio (SSMS)

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.

| | RELEASE 16.3 Microsoft SQL Server Management Studio |
|-------------|--|
| Package P | Progress |
| Microsoft | Report Viewer for SQL Server 2016 |
| Overall Pro | ogress |
| | |
| | |
| | |
| | Cancel |

Let it progress through until completion, then you will see a screen indicating successful setup, click close. Congratulations! SSMS is now installed.

SQL Server Data Tools

SQL Server Data Tools: Formerly Business Intelligence Development studio - a component of Visual Studio with some DBMS components for Analysis services, and development tools, etc. You can find the link to the install instructions in the Tools Section of the SQL Server Installation Center:

- a. (CS669) Not required
- b. (CS779) This component may be needed for most advanced topics.

| 🕈 SQL Server Installation Center | × |
|---|--|
| Planning | New SQL Server stand-alone installation or add features to an existing installation |
| Installation | Launch a wizard to install SQL Server 2016 in a non-clustered environment or to add |
| Maintenance | |
| Tools | Install SQL Server Management Tools |
| Resources | **X* 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 and Database Tuning Advisor, An internet connection is |
| Advanced | required to install these tools. |
| Options | 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. |
| | New SOL Server failover cluster installation |
| | Launch a wizard to install a single-node SQL Server 2016 failover cluster. |
| | ുണ്ണ Add node to a SQL Server failover cluster |
| | Launch a wizard to add a node to an existing SQL Server 2016 failover cluster. |
| | Upgrade from a previous version of SQL Server |
| | Launch a wizard to upgrade a previous version of SQL Server to SQL Server 2016. |
| | New R Server (Standalone) installation |
| | Launch a wizard to install R Server (Standalone) on a Windows machine. This is typically used by data scientists as a standalone analysis server or as a SQL Server R Services client. |
| Microsoft [®] SQL Server [®] 2016 | |

Working with and connecting to SQL Server

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.

Starting & Stopping SQL Server (optional)

If during setup you selected for SQL Server to start manually then you will need to go to the Windows Control Panel->Administrative Tools->Services

• Services for SQL Server Developer.

| ma or i mouncation service | | | cocor ocranee |
|--------------------------------------|--------------|----------|---------------|
| 🖏 SQL Server (MSSQLSERVER) | Provides sto | Manual | NT Service |
| 🔍 SQL Server Agent (MSSQLSERVER) | Executes jo | Manual | NT Service |
| 🔍 SQL Server Browser | Provides SQ | Disabled | Local Service |
| SQL Server Integration Services 11.0 | Provides m | Manual | NT Service |

• Start the following service: SQL Server (Instance Name)



- If using SQL Server Analysis Services check that this is using the local account.
 - 1. Double click on SQL Server Analysis Services.
 - 2. Go to the Log On Tab and choose Local System Account. Click Ok, service will restart if needed.

| QL Server Analysis Services (MSSQLSERVER) Properties (Local C | | | | |
|---|---------------------------|--|--|--|
| General Log On Reco | very Dependencies | | | |
| Log on as: | | | | |
| Local System account Allow service to in | it teract with desktop | | | |
| This account: | Browse | | | |
| Password | | | | |
| Confirm password: | | | | |
| Help me configure user a | account log on options, | | | |
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| L | OK Canal Arabi | | | |

- Note that when you are no longer using SQL Server you can shut the service down to save on system resources.
- You can also change the startup type to be automatic while the course is running to save you the step of turning this on and off.
- You may want to put the services shortcut to your desktop for quick access

Logging into SQL Server using SQL Server Management Studio

- To work with SQL Server you will use the SQL Server Management Studio. You will find it under Microsoft SQL Server 2016 program group.
- You may want to put the SQL Server Management Studio shortcut to your desktop or pin it to the Windows Task bar for quicker access.



- In the Connect to Server dialog box:
 - Server Type: Database Engine (default)
 - Server Name: This is your system name (default).
 - Authentication: Use
 - Windows Authentication (default) and your account OR
 - The SQL Server Authentication with Login: SA and password which you created during the install and click *Connect*.

| 🗐 Connect to Serve | er | × | Connect to Server | | × |
|--|--|-------------|--|---|-------------|
| | SQL Server | | | SQL Server | |
| Server type: Server name: Authentication: User name: Password: | Database Engine SGLSERVER-PC Windows Authentication SQLSERVER-PC-Vack Polnar Remember password | ~ ~ ~ | Server type: Server name: Authentication: Login: Password: | Database Engine SQLSERVER-PC SQL Server Authentication sa essee Remember password | × × × |
| | Connect Cancel Help Or | ptions >> | | Connect Cancel Help | Options >> |

Tip: If you forget your system name Click the down arrow icon, \checkmark , 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 and click Ok.

| Connect to Server × | | | | |
|---------------------|--|--------|--|--|
| Server type: | Database Engine | \sim | | |
| Server name: | <browse for="" more=""></browse> | | | |
| Authentication: | Windows Authentication | \sim | | |
| Password | Browse for Servers Local Servers Network Servers | × | | |
| | Select the server to connect to: | | | |
| | OK Cancel Help | | | |

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

Using SQL Server Management Studio

Overview of SQL Server Management Studio

Once you connect to SQL Server Instance you can begin to create a database, write quires, or explore the database. Below is a very quick overview of the SQL Server Management Studio Interface to get you started.



select * from STUDENT

Query window where you can type in your SQL query commands.



SQL Query results. Note how the execution time and number of rows are at the bottom.

Creating a Database

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.

| 🔒 New Database | | | | | | | - | | \times |
|----------------------------|------------------|-------------------|-------|---------------------|------------------------|---------------------|----------------------|---------------|----------|
| Select a page | Script 🝷 📑 | Help | | | | | | | |
| Prilogroups | Database name: | | | CS669 | | | | | |
| | Owner: | | [| <default></default> | | | | | |
| | Use full-text in | idexing | | | | | | | |
| | Database files: | | _ | | | | | | |
| | CS669 | File Type ROWS | Fileg | roup MARY | Initial Size (MB) 8 | Autogrov By 64 M | vth / Ma B, Unlim | xsize ited | |
| | CS669_log | LOG | Not | Applicable | 8 | By 64 M | B, Unlim | ited | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| Connection | | | | | | | | | |
| Server: \SQLEXPRESS | | | | | | | | | |
| Connection: | | | | | | | | | |
| View connection properties | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| Progress | | | | _ | | | | | |
| Ready | < | | | | | | | - | > |
| | | | | | Add | | | remove | |
| | | | | | | 0 | К | Car | ncel |

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 query window appears, where commands can be typed, saved, and executed. The window is illustrated next.



All of your assignment's commands can be typed and executed in this type of query window! 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!

Uninstall SQL Server or Change Features

If you no longer need to use SQL Server, or would like to re-install it or change feature, you can use these steps to uninstall SQL Server from your system.

Uninstalling SQL Server

- 1. Go to Windows Control Panel->Programs and Features
- 2. Sort program list by name.
- 3. Look for Microsoft SQL Server 2016 (64-bit) and double click on it.
- 4. Choose *Remove*
- 5. SQL Server will gather information that it needs to perform the uninstall. This will take some time.
- 6. When prompted to **Select Features**, *Select All* and click *Next*.



- 7. Removal Rules will process, click Next.
- 8. **Ready to Remove** will give you a summary, click *Remove*.
- 9. Once finished SQL Server is removed. You may want to review Windows Control Panel->Programs and Features to make sure no components have been left behind, but be careful not to remove any Windows SQL Server components such as Windows Compact Edition. If you are not sure, you can leave these as is.

Change SQL Server Features and Components

- 1. Go to Windows Control Panel->Programs and Features
- 2. Sort program list by name.
- 3. Look for Microsoft SQL Server 20146 (64-bit) and double click on it.
- 4. Choose Add.
- You may be prompted to select the SQL Server media location. (i.e. your DVD drive)
- SQL Server will gather information that it needs to modify components and check Install Setup files. This will take some time. Click *Ok* or *Next* when prompted.
- 7. When prompted to **Select Installation Type**, choose *Add features to an existing instance of SQL Server 2016* and click *Next*

Installation Type

| nstall Rules | Perform a new insta | allation of SQL Server 2 | 016 | | |
|----------------------------|--|-------------------------------|---|----------------------|---|
| nstallation Type | Select this option if | f you want to install a | new instance of SQL | Server or want to in | stall shared |
| Product Key | components. | | | | |
| License Terms | Add features to an existing instance of SQL Server 2016 MSSQLSERVER | | | | |
| eature Selection | | | | | |
| eature Rules | Select this option it | f vou want to add feat | ures to an existing in | stance of SOL Serve | er. For example, vo |
| eature Configuration Rules | want to add the Ar | alysis Services feature | s to the instance that | t contains the Data | base Engine. Featu |
| Ready to Install | within an instance | must be the same editi | on. | | |
| nstallation Progress | | | | | |
| Complete | Installed instances: | | | | |
| | | | | | |
| | Instance Name | Instance ID | Features | Edition | Version |
| | Instance Name MSSQLSERVER | Instance ID MSSQL13.MSSQLS | Features SQLEngine,AS,RS | Edition Developer | Version 13.0.1601.5 |
| | Instance Name MSSQLSERVER <shared compone<="" td=""><td>Instance ID MSSQL13.MSSQLS</td><td>Features SQLEngine,AS,RS SSMS, Adv_SSMS</td><td>Edition Developer</td><td>Version 13.0.1601.5 13.0.15700.20</td></shared> | Instance ID MSSQL13.MSSQLS | Features SQLEngine,AS,RS SSMS, Adv_SSMS | Edition Developer | Version 13.0.1601.5 13.0.15700.20 |
| | Instance Name MSSQLSERVER «Shared Compone | Instance ID MSSQL13.MSSQLS | Features SQLEngine, AS, RS SSMS, Adv_SSMS | Edition Developer | Version 13.0.1601.5 13.0.15700.20 |

- 8. When prompted for **Feature Selection**, review and update features, review Feature list in the installation instructions in previous sections, and click *Next*.
- 9. You will be prompted to verify Installation Rules, Disk Space Requirements, Error Reporting, and Installation Configuration Rules, click *Next*.
- 10. Ready to Install will give you a summary, click Install.

Appendix: 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 therequirements 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.