

Alison Balter

Sams **Teach Yourself**

# T-SQL

in **One Hour** a Day



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in **One Hour a Day**

**SAMS**

800 East 96th Street, Indianapolis, Indiana 46240 USA

## **Sams Teach Yourself T-SQL in One Hour a Day**

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## About the Author

**Alison Balter** is the president of InfoTech Services Group, Inc., a computer consulting firm based in Venice Beach, California. Alison is a highly experienced independent trainer and consultant specializing in Windows applications training and development. During her 30 years in the computer industry, she has trained and consulted with many corporations and government agencies. Since Alison founded InfoTech Services Group, Inc. (formerly InfoTechnology Partners) in 1990, its client base has expanded to include major corporations and government agencies such as Cisco, Shell Oil, Accenture, AIG Insurance, Northrop, the Drug Enforcement Administration, Prudential Insurance, Transamerica Insurance, Fox Broadcasting, the United States Navy, the United States Marines, the University of Southern California (USC), Massachusetts Institute of Technology (MIT), and others.

Alison is the author of more than 300 internationally marketed computer training videos, including 18 Access 2000 videos, 35 Access 2002 videos, 15 Access 2003 videos, a complete series of both user and developer videos on Access 2007, and Access 2010 and Access 2013 user videos. Alison travels throughout North America giving training seminars in Microsoft Access and Microsoft SQL Server.

Alison is also author of 14 books published by Sams Publishing including: *Alison Balter's Mastering Access 95 Development*, *Alison Balter's Mastering Access 97 Development*, *Alison Balter's Mastering Access 2000 Development*, *Alison Balter's Mastering Access 2002 Desktop Development*, *Alison Balter's Mastering Access 2002 Enterprise Development*, *Alison Balter's Mastering Microsoft Access Office 2003*, *Teach Yourself Microsoft Office Access 2003 in 24 Hours*, *Access Office 2003 in a Snap*, *Alison Balter's Mastering Access 2007 Development*, a power user book on Microsoft Access 2007, *Using Access 2010*, *Access 2013 Absolute Beginner's Guide*, and *Teach Yourself SQL Express 2005 in 24 Hours*.

An active participant in many user groups and other organizations, Alison is a past president of the Independent Computer Consultants Association

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## **Dedication**

*Many people are important in my life, but there is no one as special as my husband Dan. I dedicate this book to Dan. Thank you for your ongoing support, for your dedication to me, for your unconditional love, and for your patience. Without you, I'm not sure how I would make it through life. Thank you for sticking with me through the good times and the bad! There's nobody I'd rather spend forever with than you.*

*I also want to thank God for giving me the gift of gab, a wonderful career, an incredible husband, two beautiful children, a spectacular area to live in, a very special home, and an awesome life. Through your grace, I am truly blessed.*

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# Introduction

Many excellent books about T-SQL are available, so how is this one different? In talking to the many people I meet in my travels around the country, I have heard one common complaint. Instead of the host of wonderful books available to expert database administrators (DBAs), most SQL Server readers yearn for a book targeted toward the beginning-to-intermediate DBA or developer. They want a book that starts at the beginning, ensures that they have no gaps in their knowledge, and takes them through some of the more advanced aspects of SQL Server. Along the way, they want to acquire volumes of practical knowledge that they can easily port into their own applications. I wrote *Sams Teach Yourself T-SQL in One Hour a Day* with those requests in mind.

This book begins by providing you with some database basics. In Lesson 1, “Database Basics,” you get a summary of all the components that are covered through the remainder of the book.

Lesson 2, “SQL Server Basics,” teaches you the basics of working with SQL Server Management Studio. You learn about the versions of SQL Server available. You then find out how to connect with a database server and install the sample files.

In Lesson 3, “Creating a SQL Server Database,” you see how to create a new SQL Server database. The SQL Server database is a container within which you will place all the other objects you learn about throughout the book.

Lessons 4 through 18 cover tables, relationships, the T-SQL language, views, stored procedures, functions, and triggers. These objects are at the heart of every SQL Server database. Lesson 4, “Working with SQL Server Tables,” explains how to work with tables. Then you move on to Lesson 5, “Working with Table Relationships,” which covers how to work with table relationships.

Knowledge of the T-SQL language is an important aspect of SQL Server. Probably the most used keyword used in T-SQL is `SELECT`. Lesson 6,



“Getting to Know the `SELECT` Statement,” delves into the `SELECT` statement in quite a bit of detail. Lesson 7, “Taking the `SELECT` Statement to the Next Level,” expands on Lesson 6 by covering some more sophisticated T-SQL techniques. You then move on to Lesson 8, “Building SQL Statements Based on Multiple Tables,” where you find out how you can build T-SQL statements based on data from multiple tables. Lesson 9, “Powerful Join Techniques,” builds on Lesson 8 to provide you with different techniques you can use to join tables. Not only can you use T-SQL to retrieve data, but you can also use it to modify data. Lesson 10, “Modifying Data with Action Queries,” shows you how to modify data with action queries. Lesson 11, “Getting to Know the T-SQL Functions,” introduces you to many of the built-in T-SQL functions, such as `DataAdd`, `DateDiff`, and `Upper`. These built-in functions prove invaluable for building database applications.

Another important SQL Server object is the view. Lesson 12, “Working with SQL Server Views,” shows you how to build and work with views. Lesson 13, “Using T-SQL to Design SQL Server Stored Procedures,” begins the in-depth coverage of stored procedures. Lessons 14, 15, and 16 continue to build on each other, each providing more sophisticated coverage of stored procedures and their uses.

Lesson 17, “Building and Working with User-Defined Functions,” provides you with an alternative to stored procedures: user-defined functions. Lesson 18, “Creating and Working with Triggers,” shows you how you can use triggers to respond to inserts, updates, and deletes.

The last six lessons cover security and administration. You learn about SQL Server authentication and permissions validation and how you can take advantage of both to properly secure your databases. The lessons in Part III also show you how to configure, maintain, and tune the SQL Servers that you manage. Without proper care, even the fastest hardware could run a database that is abysmally slow!

Finally, this book uses the sample database called `AdventureWorks2014`. Lesson 2 covers the process of installing the sample database. Also, all the sample code created in this book are available in a script file that you can open and execute from a SQL Server Management Studio query.

SQL Server, and the T-SQL language, are powerful and exciting. With the keys to deliver all that it offers, you can produce applications that provide much satisfaction as well as many financial rewards. After poring over this hands-on guide and keeping it nearby for handy reference, you too can become masterful at working with SQL Server and T-SQL. This book is dedicated to demonstrating how you can fulfill the promise of making SQL Server perform up to its lofty capabilities. As you will see, you have the ability to really make SQL Server shine in the everyday world!

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## LESSON 3

# Creating a SQL Server Database

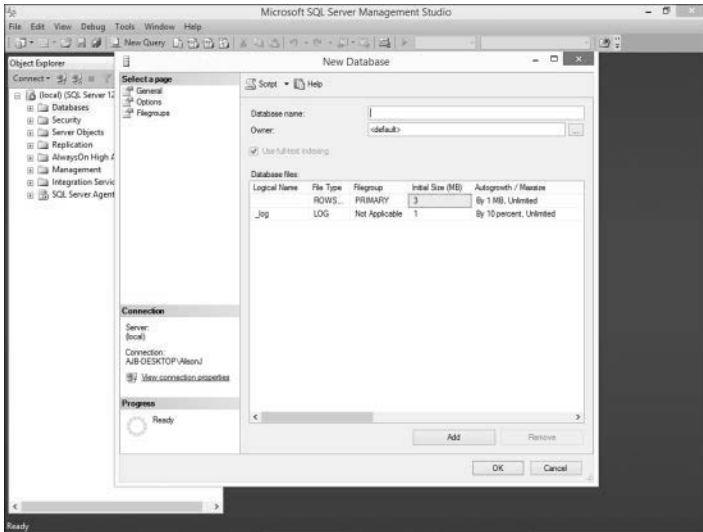
Databases are at the heart of every SQL Server system. They contain the tables, database diagrams, views, stored procedures, functions, and triggers that comprise the system. This lesson covers:

- ▶ How to create a SQL Server database
- ▶ How to set database options
- ▶ How to work with the Transaction Log
- ▶ How to attach to an existing database

## Creating the Database

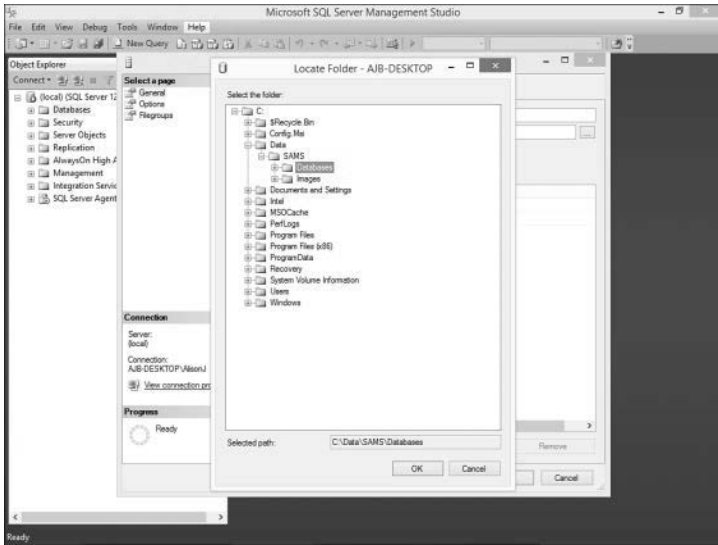
Before you can build tables, views, stored procedures, triggers, functions, and other objects, you must create the database in which they will reside. A database is a collection of objects that relate to one another. An example would be all the tables and other objects necessary to build a sales order system. To create a SQL Server database, follow these steps:

1. Right-click the Databases node and select New Database. The New Database dialog box appears (see Figure 3.1).
2. Enter a name for the database.
3. Scroll to the right to view the path for the database.

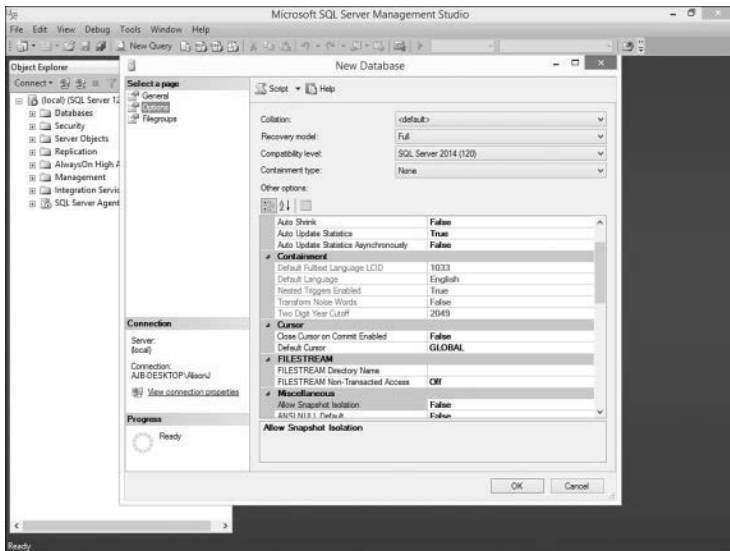


**FIGURE 3.1** The New Database dialog box enables you to create a new database.

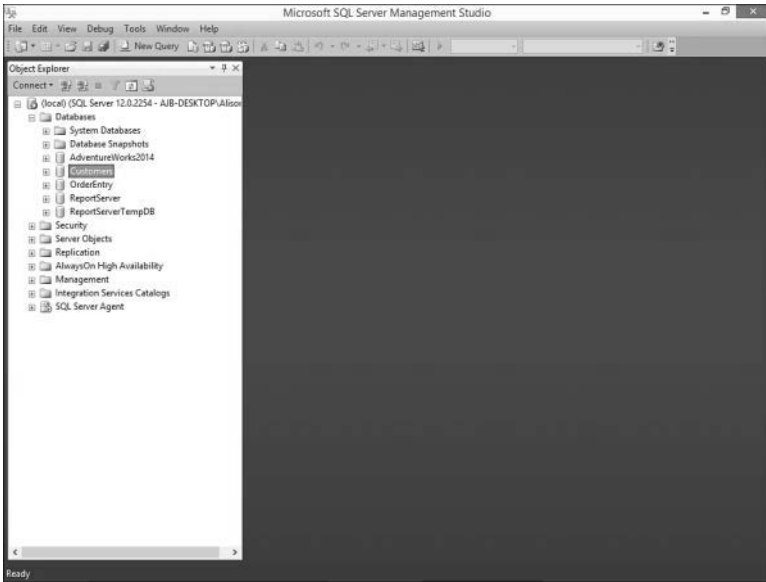
4. Click the Ellipsis button. The Locate Folder dialog box appears.
5. Select a path for the database (see Figure 3.2).
6. Click OK to close the Locate Folder dialog box.
7. Click to select the Options page and change any options as desired (see Figure 3.3).
8. Click OK to close the New Database dialog box and save the new database. The database now appears under the list of databases (see Figure 3.4) under the Databases node of SQL Server Management Studio. If the database does not appear, right-click the Databases node and select Refresh.



**FIGURE 3.2** You can opt to accept the default path, or you can designate a path for the database.



**FIGURE 3.3** The Options page of the New Database dialog box enables you to set custom options for the database.



**FIGURE 3.4** The new database appears under the list of databases in the Databases node.

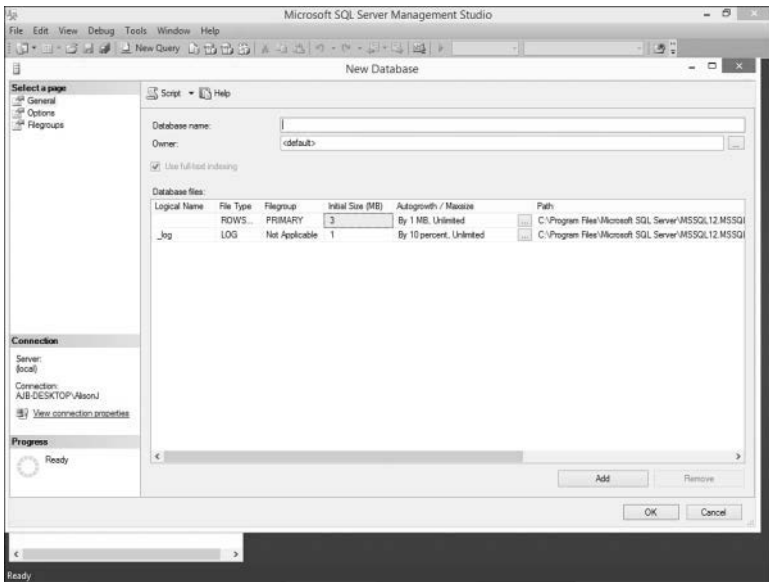
## Defining Database Options

In the previous section, you created a new SQL Server database. You accepted all the default options available on the General page of the New Database dialog box. Many important options are available on the General page. They include the Logical Name, File Type, Filegroup, Initial Size, Autogrowth, Path, and File Name (see Figure 3.5).

The logical name is the name that SQL Server will use to refer to the database. It is also the name you will use to refer to the database when writing programming code that accesses it.

The File Type is Data or Log. As its name implies, SQL Server stores data in data files. The file type of Log indicates that the file is a transaction log file.

The initial size is *very* important. You use it to designate the amount of space you will allocate initially to the database.



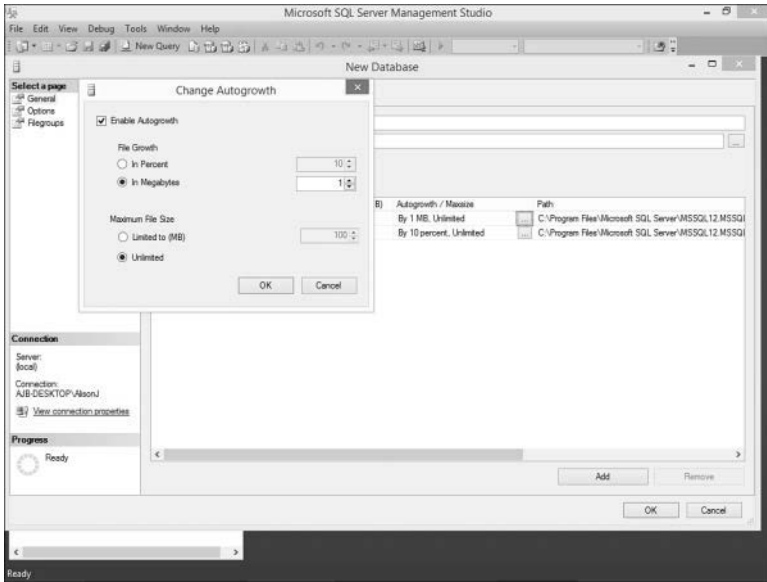
**FIGURE 3.5** Several important features are available on the General page of the New Database dialog box.

**NOTE:** I like to set this number to the largest size that I ever expect the data database and log file to reach. Whereas disk space is very cheap, performance is affected every time that SQL Server needs to resize the database.

Related to the initial size is the Autogrowth option. When you click the build button (ellipsis) to the right of the currently selected Autogrowth option, the Change Autogrowth dialog box appears (see Figure 3.6).

The first question is whether you want to support autogrowth at all. Some database designers initially make their databases larger than they ever think they should be and then set autogrowth to false. They want an error to occur so that they will be notified when the database exceeds the allocated size. The idea is that they want to check things out to make sure everything is okay before allowing the database to grow to a larger size.





**FIGURE 3.6** The Change Autogrowth dialog box enables you to designate options that affect how the database file grows.

The second question is whether you want to grow the file in percentage or in megabytes. For example, you can opt to grow the file 10% at a time. This means that if the database reaches the limit of 5,000 megabytes, then 10% growth would grow the file by 500 megabytes. If instead the file growth were fixed at 1,000 megabytes, the file would grow by that amount regardless of the original size of the file.

The final question is whether you want to restrict the amount of growth that occurs. If you opt to restrict file growth, you designate the restriction in megabytes. Like the Support Autogrowth feature, when you restrict the file size, you essentially assert that you want to be notified if the file exceeds that size. With unrestricted file size, the only limit to file size is the amount of available disk space on the server.

## File Groups

One great feature of SQL Server is that you can span a database's objects over several files, all located on separate devices. We refer to this as a file group. By creating a file group, you improve the performance of the database because multiple hardware devices can access the data simultaneously.

## The Transaction Log

SQL Server uses the transaction log to record *every* change that is made to the database. In the case of a system crash, you use the transaction log, along with the most recent backup file, to restore the system to the most recent data available. The transaction log supports the recovery of individual transactions, the recovery of all incomplete transactions when SQL Server is once again started, and the rolling back of a restored database, file, filegroup, or page forward to the point of failure. Specifying information about the transaction log is similar to doing so for a database. Follow these steps:

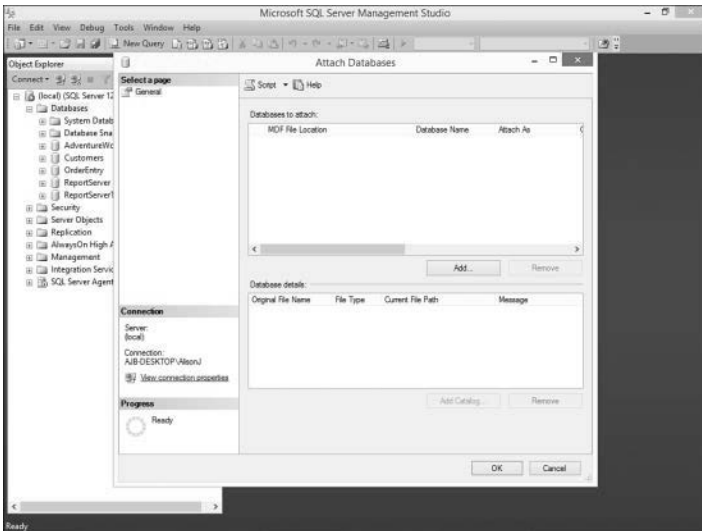
1. While creating a new database, you can also enter information about the log file. To begin, enter a logical name for the database. I recommend you use the logical name of the database along with the suffix `_log`.
2. Specify the initial size of the log file.
3. Indicate how you want the log file to grow.
4. Designate the path within which you want to store the database.
5. Continue the process of creating the database file.

**WARNING:** Do not move or delete the transaction log unless you are fully aware of all the possible ramifications of doing so.

## Attaching to an Existing Database

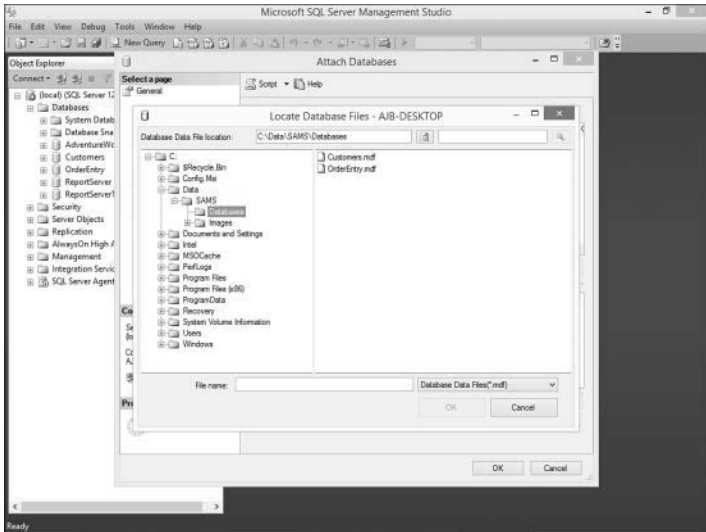
There are times when someone will provide you with a database that you want to work with on your own server. To work with an existing database, all you have to do is attach to it. Here's the process:

1. Right-click the Databases node and select Attach. The Attach Databases dialog box appears (see Figure 3.7).



**FIGURE 3.7** The Attach Databases dialog box enables you to attach to existing .mdf database files.

2. Click Add. The Locate Database Files dialog box appears (see Figure 3.8).
3. Locate and select the .mdf to which you want to attach.



**FIGURE 3.8** The Locate Database Files dialog box enables you to select the database to which you want to attach.

4. Click OK to close the Locate Database Files dialog box.
5. Click OK to close the Attach Databases dialog box. The database appears in the list of user databases under the Databases node of SQL Server Management Studio.

## Summary

The ability to create a database is fundamental to working with SQL Server. The process of creating a database involves understanding what a log file is and how to configure it. After you have created both the database and the log file, you are ready to create and work with the other database objects.

## Q&A

- Q. What objects does a SQL Server database contain?**
- A.** A SQL Server database contains the tables, database diagrams, views, stored procedures, functions, and other objects required to support the database's operations.
- Q. Explain what a log file is and why it is important.**
- A.** The log file keeps track of all transactions that occur as the database is used. It is necessary when restoring system information.
- Q. Explain why you would want to attach to an existing database.**
- A.** The ability to attach to an existing database allows you to easily utilize a database from another server.

## Workshop

### Quiz

1. What is autogrowth?
2. The autogrowth feature improves the performance of a database (true/false).
3. You attach to a backup file (true/false).
4. It is always okay to delete a log file (true/false).
5. What are the two options for growing a database?

### Quiz Answers

1. Autogrowth provides the ability for a database or log file to grow automatically as necessary.
2. False. The autogrowth feature degrades performance. It is best to set the sizes of the database and log files to values larger than you expect you will need.
3. False. You attach to a database file (.mdf).

4. False.
5. By percentage or in megabytes.

## Activities

Create a new SQL Server database. Designate sizes for both the database and the log file, indicating you do not want to allow autogrowth. View the database in the Object Explorer. Notice that the database does not yet contain any user objects.

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