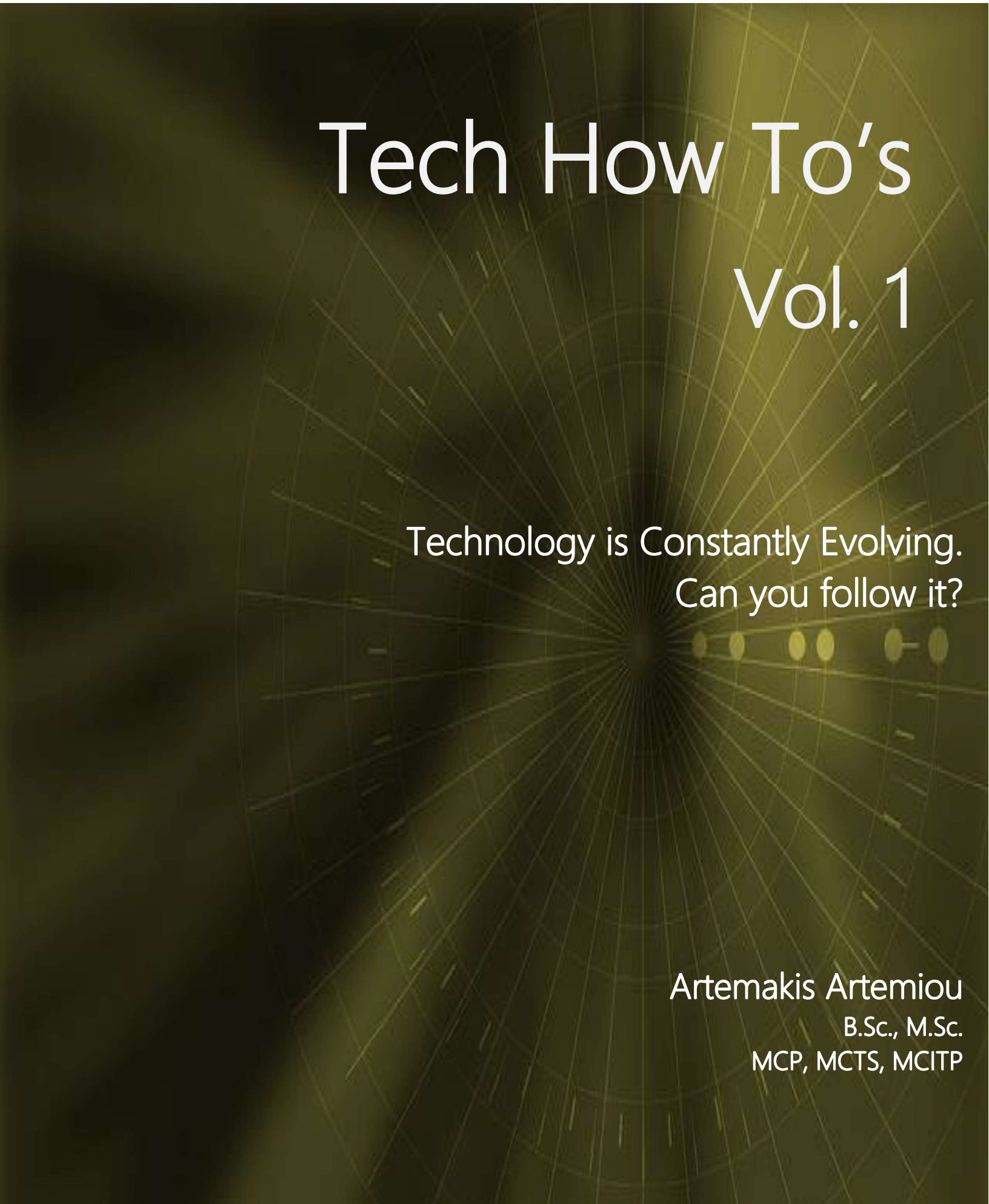

Tech How To's
Vol. 1

Technology is Constantly Evolving.
Can you follow it?

Artemakis Artemiou
B.Sc., M.Sc.
MCP, MCTS, MCITP

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Tech How To’s

Vol. 1

ARTEMAKIS ARTEMIOU

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To every person in this world,
who chases their dreams every single day,
who gets educated and works towards their goals,
but doesn't lose respect for their fellow human beings during this process.
-A.A.

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Introduction

I have been a technologist all my life. In the age of 10 I started learning programming by myself. Yes, I am one of those who started learning programming by experimenting with MS-DOS 5.0 and QBasic Gorillas game. Since then, I worked with several programming languages and developed hundreds of thousands of source code. Then, at a point, almost 15 years ago, I entered the world of Databases and mostly SQL Server, along with .NET of course. Since then it has been quite a journey! Each release came - and still comes - with exciting new features enabling us to do more and more! Every time waiting for that new built, in order to start testing it, exploring it, learning it, as soon as it becomes available. The possibilities are endless! The only limit is your creativity!

The massive interaction with the SQL Server community started at about seven years ago. Blogging, organizing user group events, speaking in user group meetings, conferences and other events, open-source projects related to SQL Server, guest articles, discussions on message boards/forums, and much more!

The love for technical writing and knowledge sharing urged me for adding another activity to my interaction with the community that is ***book authoring***. In order to be able to write, you first need to acquire and comprehend the specific technical knowledge. You need to explore, to experiment, to test. You need to test the limits of each new technology or feature, in order to be able to fully understand its nature and capabilities. Since then, I have published several eBooks on SQL Server. This eBook however is different. Some might consider it "light" but I can say for sure that it is as significant as my other eBooks.

Not everyone is a programmer, a database engineer, a SEO expert, etc. However, many people embrace technology and want to learn more. They want to just get started with different technology topics and then learn even more. This eBook is for all of those people and that is why I am publishing it under my initiative TechHowTos.com.

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Who Should Read This Book?

This book is for everyone who loves technology and wants to learn about different technology topics such as: Databases, Programming, Search Engine Optimization, Software and Database Security, Trending Technologies and more.

How Is This Book Organized?

This book is organized as follows. Chapter 1 discusses about Databases and mostly about SQL Server. Chapter 2 discusses about programming and provides some really cool how-to's in order to get you started with some simple programming tasks. Chapter 3 talks about Search Engine Optimization (SEO)

which nowadays is a very hot topic. Chapter 4 discusses about security and Chapter 5 about certain Windows-related tasks. Finally, Chapter 6 talks about trending technologies such as FinTech, Machine Learning, Internet of Things and Software Integration.

Feedback

Feedback is always welcome and appreciated. It is with other people's feedback that we become better in what we do. Please feel free to visit the following link and provide your feedback:

http://www.techhowtos.com/feedback/

The survey is short. It will only take 2 minutes of your valuable time.

Acknowledgments

Writing a book is not an easy thing. It doesn't really matter the length of the book. Even if you just write a few pages, it takes a considerable amount of time and energy. In the case where you are not a professional technical writer but just a technical community guy like me, this amount of time is valuable "free" time after work, time from your family and beloved ones. You may use this time because you are just passionate in what you do. However, this is not enough, at least to me. Without the support of your family it just doesn't feel right. During this process I had all the support I needed. I am very grateful for all the support my beautiful wife and daughters give me when writing books and articles and for all their support and love in everything I do. Without their support and encouragement none of this would have been possible. This book is dedicated to them with all my love.

- Artemakis

Stay in Touch

Feel free to connect! You can find me on the following online channels:

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- The SQL Server and .NET TV
- Twitter
- Cyprus .NET User Group

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CHAPTER 1

Databases

IN THIS CHAPTER:

- What is a Database?
- How to Get Started with SQL Server
- What is SQL Server Management Studio?
- How To Get Basic SQL Server Instance Info
- In Which Context Does SQL Server Access Network Resources?
- What are SQL Server Always On Availability Groups?
- Rebuild All Database Indexes Online With a Single T-SQL Statement
- Can I Restore a Database from SQL Server 2005 SP4 to SQL Server 2005 SP3?
- How Can I Check the Isolation Level for a Specific SQL Server Database?
- How to Enable PowerPivot in Excel 2016

Databases are data structures that hold information and are stored on a computer. This information is easily retrievable and manageable. A dominant form of databases are relational databases. A relational database contains many other objects that are used for organizing the stored information. For example, relational databases contain schemas, tables, functions, stored procedures, and many other database-objects.

The majority of systems used some form a database. They use databases in order to store, organize and retrieve their data. Databases are major area of Technology.

This chapter talks about databases and introduces one of the world's leading Relational Database Management Systems and data platforms that is Microsoft SQL Server. In this chapter, you will learn how you can get started with SQL Server, as well as how you can perform several tasks.

Moreover, you will learn how you can enable PowerPivot in Microsoft Excel.

What is a Database?

A database is a data structure which holds information and it is stored on a computer. This information is organized in such a manner, which is easily manageable and retrievable.

A relational database contains many other objects that are used for organizing the stored information. For example, relational databases contain schemas, tables, functions, stored procedures, and many other database-objects. All these, help databases keeping information as structured as possible, in order to be easily retrieved and managed.

Databases are organized in Database Management Systems (DBMSs). Database Management Systems allow the interaction of users and applications with databases. Relational Database Management Systems (RDBMSs) are used for hosting Relational Databases.

How to Get Started with SQL Server

SQL Server is one of the most powerful data platforms in the world. It is Relational Database Management System (RDBMS) in which you can store, organize and process your data.

SQL Server provides a wide range of technologies which can help you organize your data (structured, semi-structure or even unstructured) and transform them from raw data into valuable knowledge.

To get started with SQL Server you just need two things:

- SQL Server Database Engine
- SQL Server Management Studio (SSMS – client tool)

For installing SQL Server Database Engine, you can just download and install the latest version of **SQL Server Express edition** which is free.

After installing SQL Server Express Edition, you will need a way to connect to the database engine in order to work. For doing that, you just need to download and install SQL Server Management Studio (SSMS), which is also free.

With SQL Server Management Studio, you can do just about anything. You can create databases, tables, functions, views, stored procedures and other database objects using the GUI or with T-SQL code.

Here's a screenshot of SQL Server Management studio where I'm in the process of creating a new database named "**TestDB**":

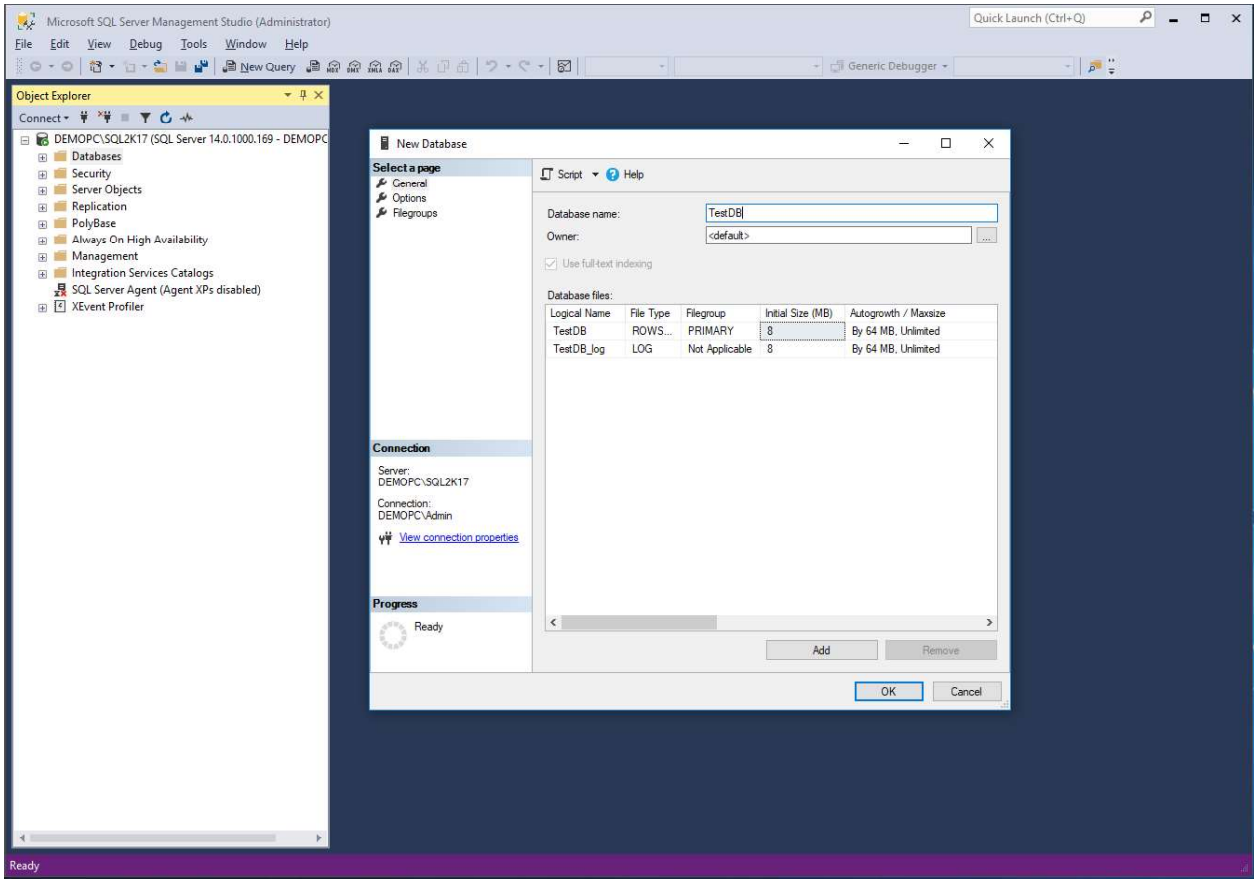
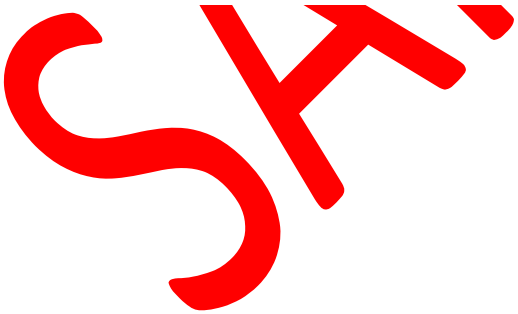


Figure 1.1: Creating a new database in SSMS.

And here's a screenshot where I'm creating a new table in the "TestDB" database:



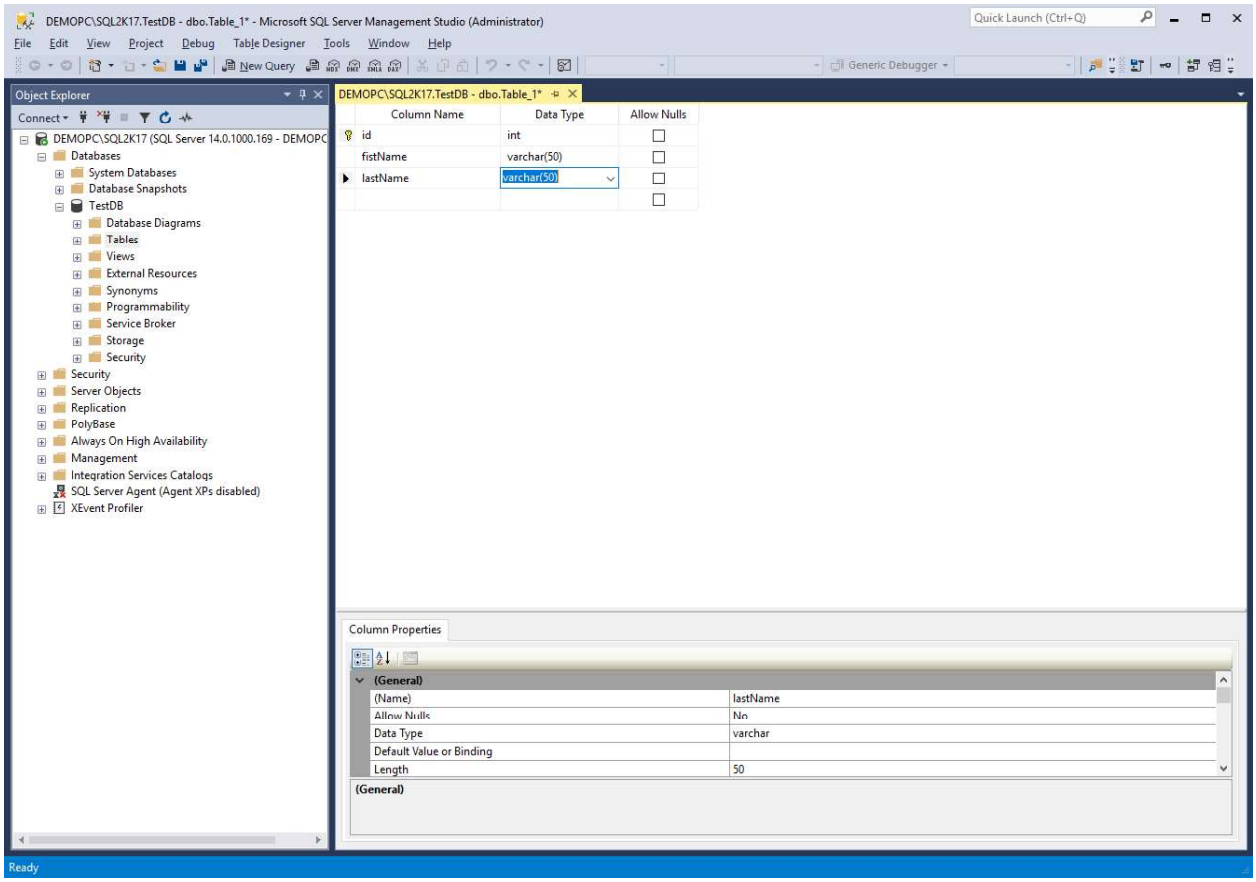


Figure 1.2: Creating a new database table database in SSMS.

The above should get you started!

▪ What is SQL Server Management Studio?

SQL Server Management Studio is an Integrated Environment that allows the user to manage, configure, administer and develop in Microsoft SQL Server.

The latest SQL Server Management Studio (SSMS) is free and can be downloaded from this link. Note that this version of SSMS supports only 64-bit Windows Operating Systems. If you need to use SQL Server Management Studio on a 32-bit machine, then you can download the 32-bit version of SQL Server Management Studio Express Edition here.

The below screenshot shows the first screen of the latest version of SSMS at the time of the writing, which is SSMS 17.4.

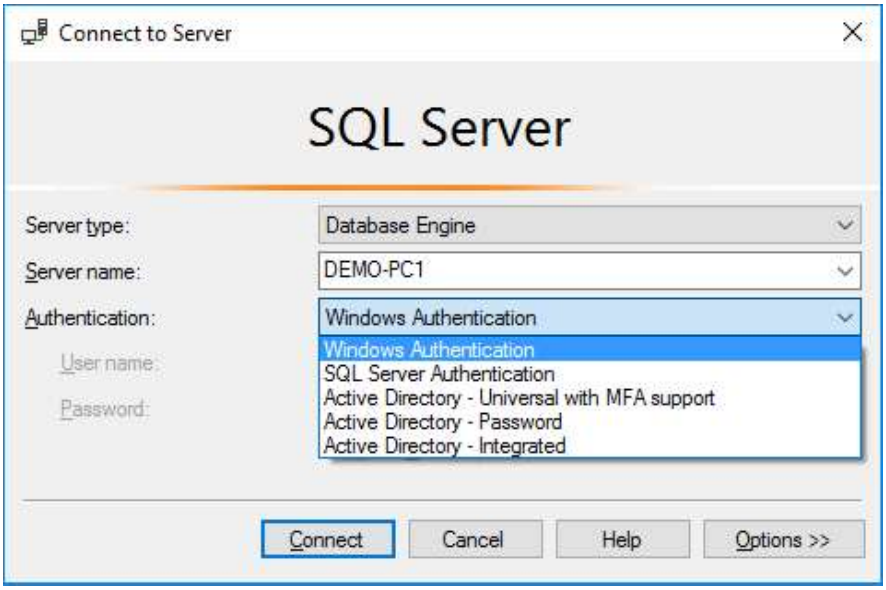


Figure 1.3: SSMS – "Connect to Server" Dialog.

As you can see, right after you start the application, you are presented with the login screen.

In the login screen, you need to specify at least two parameters (if you need, you can specify more options in the "Options" dialog), these are:

- Server Name
- Authentication

In the "Server Name" field, you can enter the name or IP of the SQL Server instance to which you want to connect to.

In "Authentication" you can specify one of 5 values:

- Windows Authentication
- SQL Server Authentication
- Active Directory Authentication with MFA Support
- Active Directory – Password
- Active Directory – Integrated

Active Directory – Password authentication, Active Directory – Integrated authentication and Active Directory Authentication with MFA Support are used only for connecting to Microsoft Azure SQL Database.

Normally, in the case of on-premises SQL Server instances, regarding authentication, you either select "Windows Authentication" or "SQL Server Authentication".

If you choose Windows Authentication, then SSMS will try to log on to the target SQL Server instance within the context of the user that runs SSMS. Usually this is the Windows user you are

logged in to Windows, unless you launched SSMS within the context of another user (i.e. using the "Run as different user" option when launching SSMS).

If you choose SQL Server Authentication, then you will need to specify a username and password for connecting to the SQL Server instance. In both cases, you will need to be granted access by your Database Administrator (DBA) in order to be able to access the SQL Server instance and consequently the database.

The other three authentication types will be covered in future articles where we will be talking about Azure SQL Database.

Now that the authentication part is clear, let's login with Windows authentication and see a screenshot of SQL Server Management Studio for a sample SQL Server Instance:

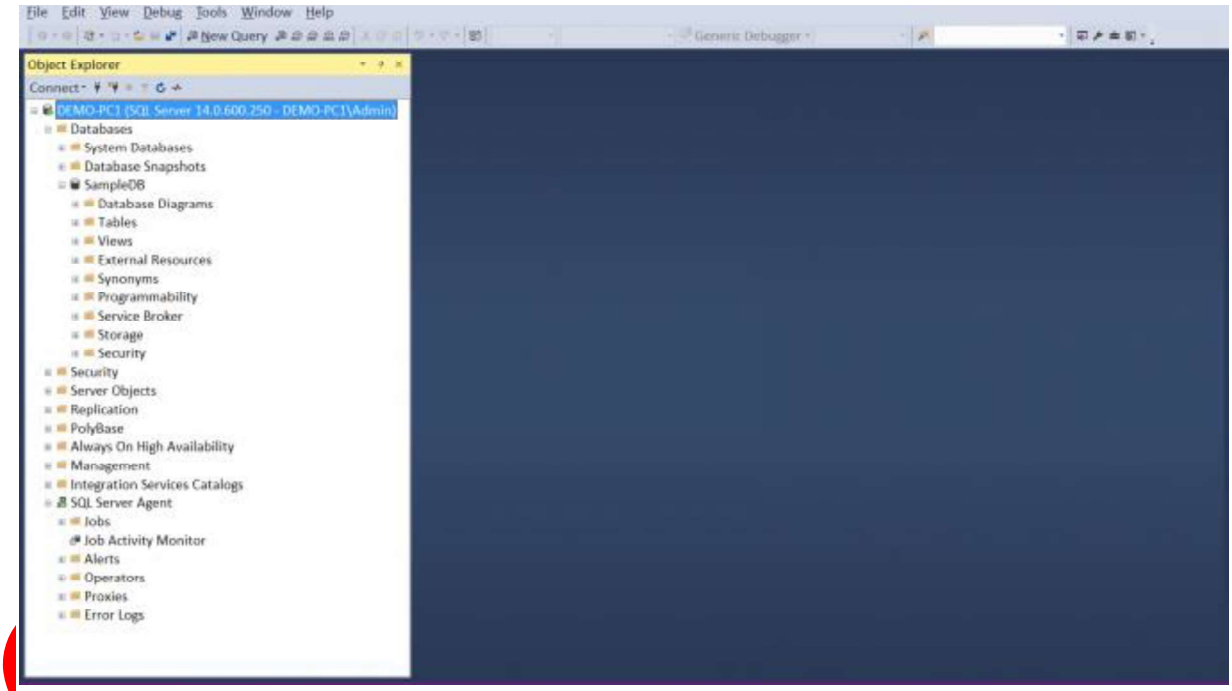


Figure 1.4: SSMS – Workspace.

As you can see in the above screenshot, right after you connect to a SQL Server instance via SSMS, in the left, there is a tree via which you can access just about anything. For example you can access, view and edit: databases, tables, views, stored procedures, functions, users, logins, etc. Also, you can access SQL Server Agent jobs. Moreover, you can create databases as well as configure different SQL Server components and features.

If you click on "New query", you will be presented with the below screen, where you can start working with T-SQL:

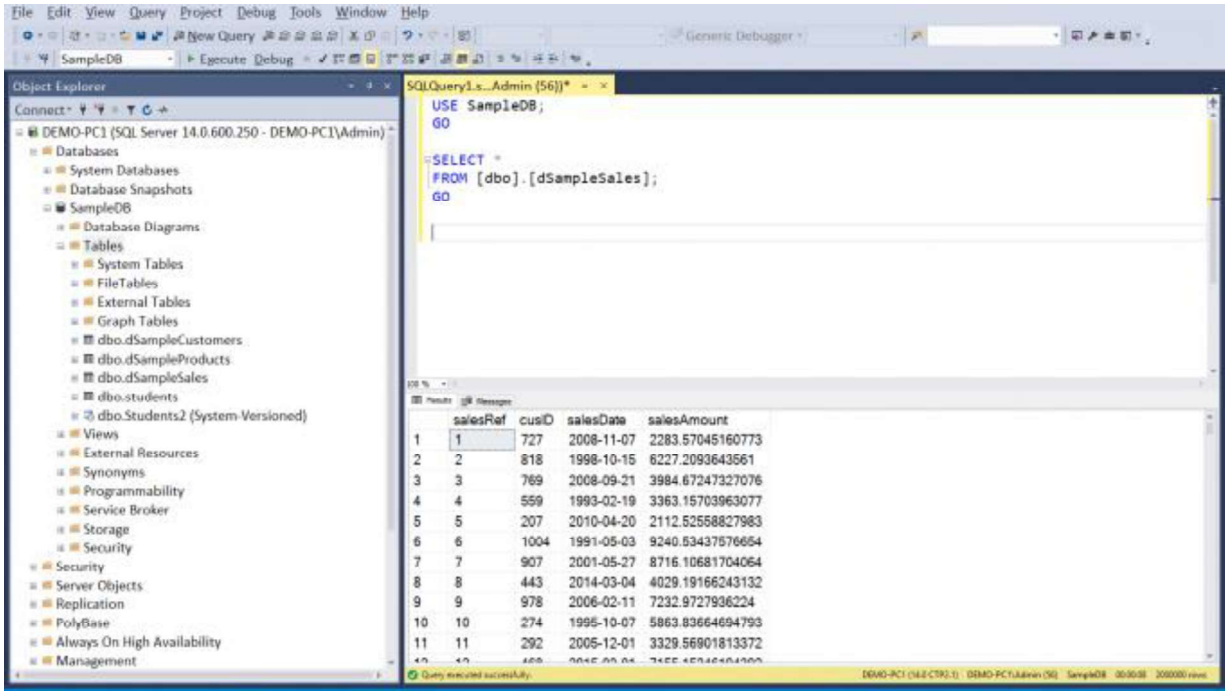


Figure 1.5: SSMS – Running a Query.

As you can see, in the above example, I'm querying a table called "dSampleSales" that exists in a database called "SampleDB". Right after I'm running the query, the results are displayed in Grid view.

How to Get Basic SQL Server Instance Info

With the below T-SQL script, you can get basic SQL Server instance info such as:

- Full instance name
- SQL Server version
- Edition
- Collation
- Number of databases
- Product level (i.e. SP-level)
- …and more

The script uses the built-in SQL Server function SERVERPROPERTY.

```
SELECT
SERVERPROPERTY('ServerName') AS FullInstanceName,
REPLACE(SUBSTRING(@@version,0,CHARINDEX('-',@@version)),'Microsoft ','') as
FullSQLVersion,
SERVERPROPERTY('ProductVersion') AS ProductVersion,
SERVERPROPERTY('ProductLevel') AS ProductLevel,
SERVERPROPERTY('ComputerNamePhysicalNetBIOS') AS ComputerNamePhysicalNetBIOS,
SERVERPROPERTY('MachineName') AS MachineName,
SERVERPROPERTY('InstanceName') as InstanceName,
SERVERPROPERTY('BuildClrVersion') AS BuildClrVersion,
SERVERPROPERTY('Collation') AS Collation,
SERVERPROPERTY ('edition') as InstanceEdition,
CASE WHEN SERVERPROPERTY('EngineEdition')=1 THEN 'Personal/Desktop'
   WHEN SERVERPROPERTY('EngineEdition')=2 THEN 'Standard'
   WHEN SERVERPROPERTY('EngineEdition')=3 THEN 'Enterprise'
   WHEN SERVERPROPERTY('EngineEdition')=4 THEN 'Express'
   WHEN SERVERPROPERTY('EngineEdition')=5 THEN 'SQL Database'
   WHEN SERVERPROPERTY('EngineEdition')=6 THEN 'SQL Data Warehouse'
END AS EngineEdition,
CASE WHEN SERVERPROPERTY('IsClustered')=1 THEN 'Clustered'
        WHEN SERVERPROPERTY('IsClustered')=0 THEN 'Not Clustered'
   ELSE 'N/A' END AS ClusteredStatus,
(SELECT COUNT(*) FROM sys.databases) AS TotalDatabases
```

Listing 1.1: Get Basic SQL Server Instance Info.

For more information about the built-in SQL Server function SERVERPROPERTY please visit this MSDN article.

In Which Context Does SQL Server Access Network Resources?

When you run adhoc queries (i.e. execute stored procedures, use OPENROWSET, etc.) targeting resources outside the scope of the SQL Server instance (i.e. a file on a network location), SQL Server accesses these resources under the context of the Database Engine's service account. When you access resources outside the scope of the SQL Server instance using SQL Server Agent jobs, then, unless a proxy account is used, the job accesses these resources under the context of SQL Server Agent's service account. If you use a proxy, the SQL Server Agent job accesses these resources within the context of the proxy's credentials.

What are SQL Server Always On Availability Groups?

SQL Server Always On Availability Groups is a technology that was initially released by Microsoft with SQL Server 2012.

The main concept is that you have groups of databases that have primary replicas and secondary replicas. These replicas are hosted on different servers and can be synchronized in two modes:

- Asynchronous-Commit Availability Mode