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SharperSkills® SQL Training

Microsoft® SQL Server® 2012

HANDS-ON TRAINING

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Sharper Software

SharperSoftware

SharperSkills® SQL Training

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TRAINING AT A GLANCE

Module 1 – *Introduction*

This module is the introductory module to the course. Here's what we'll discuss during this module:

- Course audience
- Housekeeping rules
- Your instructor
- Our Case Study Company: Contoso Clinic
- Document Conventions

Module 2 – *Understanding the Virtual Server Environment*

In this module you'll learn about:

- System requirements to run the Virtual Environment
- How to install the Virtual Environment
- How to run the Virtual Environment
- What's included in the Virtual Environment
- The Managed Service Accounts needed to install and configure SQL Server 2012.
- Check your knowledge

Module 3 – *Installing SQL Server 2012 in a single-server virtual environment*

In this module you'll learn:

- Step-by-step guide to installing and configuring SQL Server 2012 in a Single Server environment
- Checking what has been installed.
- Check your knowledge

Module 4 – *The SQL Server 2012 Management Studio*

In this module, you'll learn:

- What are the uses of SQL Server 2012 Management Studio
- SQL Server Management Studio features and capabilities
- Creating your first database
- Importing data into your new database
- Managing Security
- Check your knowledge

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Module 5 – *Creating the Contoso Clinic Database*

In this module, you'll learn:

- How to create a new database from scratch
- Working with Schemas
- How to import/export data from/to the Contoso Clinic Database
- How to create Primary Keys, Foreign Keys and relationships between tables
- How to work with Views, Stored Procedures and User-Defined Functions
- Check your knowledge

Module 6 – *Maintaining the Contoso Clinic Database*

- How to manage storage properly
- Using Transparent Encryption to protect the database
- Managing Backups
- Using Maintenance Plans
- Check your knowledge

Module 7 – *Turning Data to useful information*

- Advanced data import using Integration Services.
- Creating pre-defined reports using Reporting Services.
- Business User Interactivity with reports.
- Building a Statistical Analysis Model using Analysis Services.
- Self-service analytics using PowerPivot and PowerView.
- Check your knowledge

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MODULE 1 – INTRODUCTION

Welcome to this SharperSkills® Course. This course was prepared by Sharper Software for training professionals like yourself on how to make the most out of your investment in SQL Server.

Course Audience

Who is this course for?
This course is for improving the skills of the following IT Professionals:

- Database Administrators – who manage all aspects of a database server
- Database Developers – who develop solutions that rely on SQL Server as its backed database
- Database Operators – who maintain the database health and ensure smooth operations
- Data Warehouse Developers – who develop Business Intelligence solutions on top of SQL Server
- Extract, Transform & Load (ETL) developers – who develop data transformation solutions for the data warehouse

Who is this course NOT for?
This course is not aimed to serve the following audiences, as most of the content is rather technical:

- Business Decision Makers
- Information Workers
- IT Decision Makers – as the course is about utilization, not features and capabilities.

Housekeeping rules

- Please put all mobiles on silent. If you have an important call, please take it outside the training lab.
- Follow the instructor step-by-step. Don't fall behind or you'll lose important knowledge. The instructor will go as slow as possible, so please make sure you keep up.

Your instructor

Hovsep Karaguezian is currently the Co-Founder and Chief Software Architect at Sharper Software. Hovsep has 20+ years of experience in IT in general and in data platforms in particular. Hovsep worked for large organizations in Kuwait including Al-Ghanim Industries, Zain Telecommunications and Microsoft. He's bringing his expertise to your team so you can make the most out of your investment in SQL Server.

For a detailed profile about Hovsep's career, please visit his Linked-In profile at: http://kw.linkedin.com/pub/hovsep-karaguezian/3/1a3/b90.

You can also follow Hovsep on twitter **@HovsepK** and/or Sharper Software **@SharperSoft**.

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Our Case Study Company: Contoso Clinic

Introduction

Contoso Clinic is a fictitious, medium-sized clinic operating in Kuwait. It consists of 3 doctors operating in 3 sub-clinics, 2 technicians, 3 nurses and 2 receptionists. Contoso Clinic has more than 4500 patients who live in various areas in Kuwait and are from various nationalities. These patients have had more than 37,000 encounters with the clinic. The Clinic works with 7 different Insurance Companies, each provides a different coverage rate. Contoso Clinic currently has a database which tracks most of its operations.

Business Challenges

As with many of the other clinics, Contoso Clinic suffers from many business challenges. Here is a list of the most prevalent challenges:

- The clinic has challenges in keeping track of its employees, payroll and training.
- Clinic's Management does not know whether it is making or losing money. The current database only holds encounter details and the payments made by patients. Expenses are maintained separately.
- Running an efficient Billing process. Keeping track of amounts due by patients and by insurance companies and making sure due payments are collected in timely manner.
- Identifying additional revenue opportunity. Should the clinic also open a Laboratory? Or should the clinic open a Radiology operation?
- Patient records are private information. Yet, any DBA has full access to these records and can take copies of the database elsewhere.
- Management Reporting questions that need to be answered:
  - Which doctor or practice is making the most of the money?
  - Which doctor or practice is overloaded?
  - Which disease is the most widely spread?
  - The Clinic's capacity is reaching its maximum. Management is planning to expand its operations into another region, but are not sure to which area in Kuwait should the Clinic expand to.

Document Conventions

Text Formatting

The following text formatting conventions are used in this document:

- *Italic* – For clickable items that appear on the screen.
- **Bold** – For actions that you need to perform, like clicking on a button or link.
- | (Vertical bar) – for sub-item selections, such as sub-menu or sub-folders.

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SQL Server Compatibility Indicator

We use a compatibility indicator at each step of the training. A sample indicator is shown below. Here's the explanation of each of these indicators.

Sample SQL Server Compatibility Indicator	Explanation
[SQL Server Version]	This step is not compatible with this version of SQL Server, or this feature may not be available in this specific version
[SQL Server Version]	This step is partially compatible with this version of SQL Server. The latest edition may have additional functionality.
[SQL Server Version]	This step is fully compatible with this version of SQL Server.

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MODULE 2 – OUR TRAINING VIRTUAL SERVER

This SharperSkills® Training includes a Hyper-V image that students will use to learn the material during the hands-on labs. Please refer to the Student Welcome Kit for instructions about where to find this image.

System Requirements

In order to run this Hyper-V image you need the following minimal specifications:

- CPU: At least 2x 2.1 GHz processor cores dedicated for this Hyper-V image.
- Host system should be capable of handling virtual loads.
- RAM: Host system should have at least 8 GB RAM, at least 4GB of the RAM is dedicated for this Hyper-V image.
- Hard Drive Space: At least 50GB of free hard disk space is necessary for running this Hyper-V image.

Installing the Virtual Environment using the collateral DVD

Using Hyper-V on Windows Server 2008 R2 or later

Follow these steps to install the contents of the collateral DVD onto a server.

NOTE: Student machines in the Training Lab are already configured to use this image.

1. Insert the DVD into your DVD Drive. Wait for the Open DVD window.
2. In the Open DVD window click on Open DVD to view its contents.
3. Double-Click on **SharperSQLInstaller.exe** to run it. If prompted to elevate privileges, click **Yes** to continue.

<Rest of module cut as this is only a preview>

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MODULE 3 – INSTALLING SQL SERVER IN A SINGLE-SERVER VIRTUAL ENVIRONMENT

Compatibility Indicator
SQL Server 2005
SQL Server 2008
SQL Server 2008 R2
SQL Server 2012

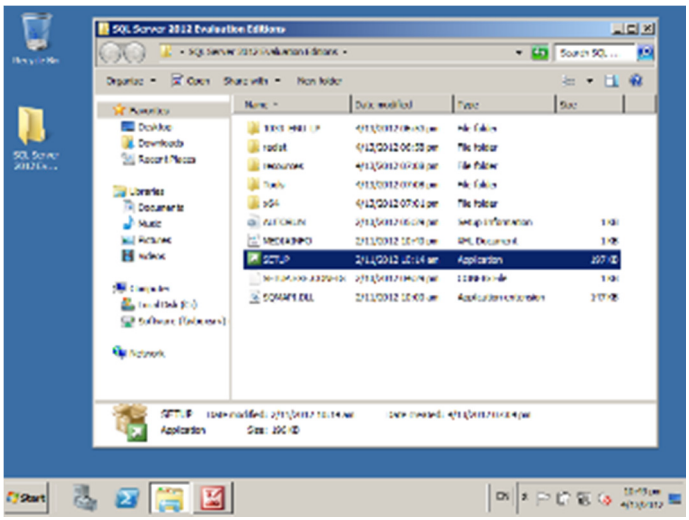
Please follow your instructor's lead and perform the steps outlined in the table below:

Explanation

Let's begin the installation of SQL Server 2012 Evaluation Edition on this environment.

Steps to follow

1. Start the Virtual Environment and double-click on the **SQL Server 2012 Trial** shortcut on the Desktop.
2. Double-click on **Setup.exe** to begin installation.
3. Wait for Setup to make the necessary checks.

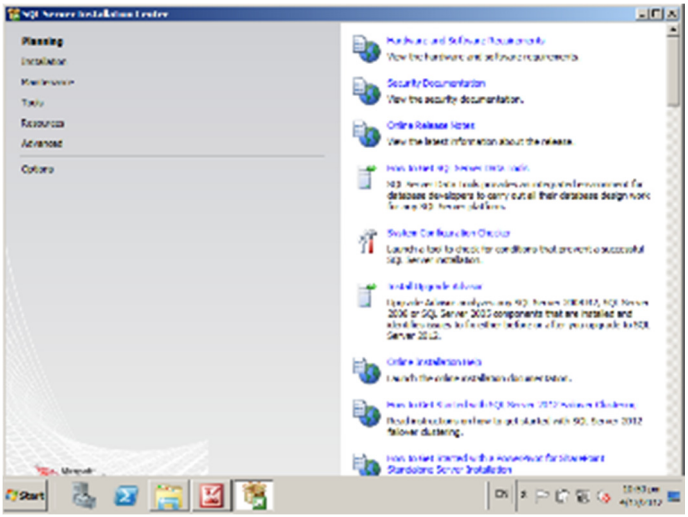


Explanation

SQL Server Setup opens and the Planning Page is displayed. Please listen to your instructor as s/he explains what are these options and how to use them

Steps to follow

Follow your instructor.

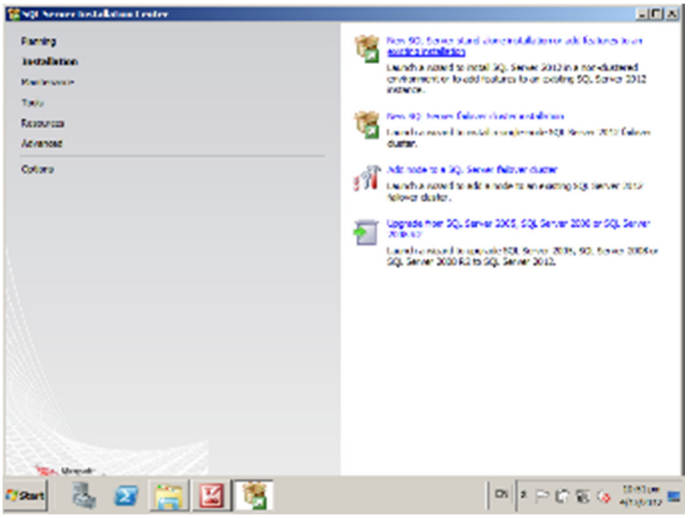


Explanation

Let's commence on the installation. We are planning to install SQL Server as a standalone installation, not clustered.

Steps to follow

Click on the **Installation** link on the left. The following page will be displayed.



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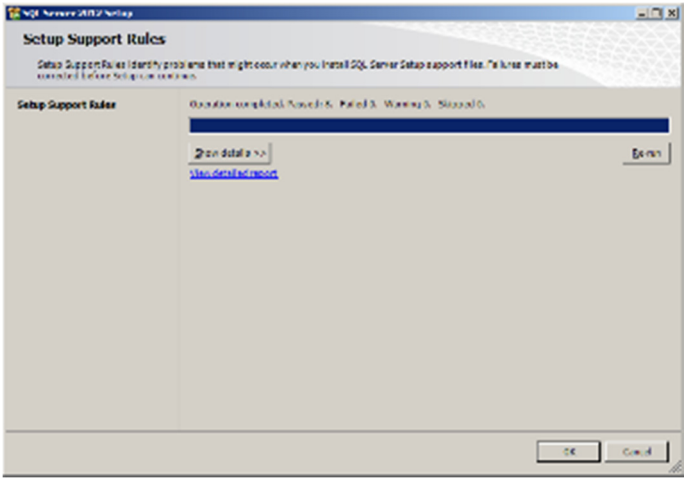
Explanation

Before Setup continues, SQL Server needs to check the prerequisites. This step will fail in case any of the prerequisites are missing.

Steps to follow

1. Click **New SQL Server stand-alone installation or add features to an existing installation**.
2. Wait until the *Setup Support Rules* window completes operation.
3. Click **OK** to continue.

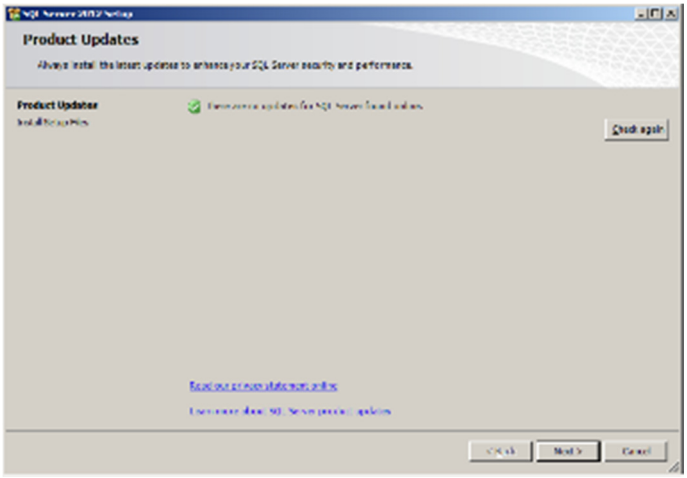


Explanation

SQL Server will now check for any updates. There should be none.

Steps to follow

1. Make sure there are no necessary updates.
2. Click **Next** to continue.

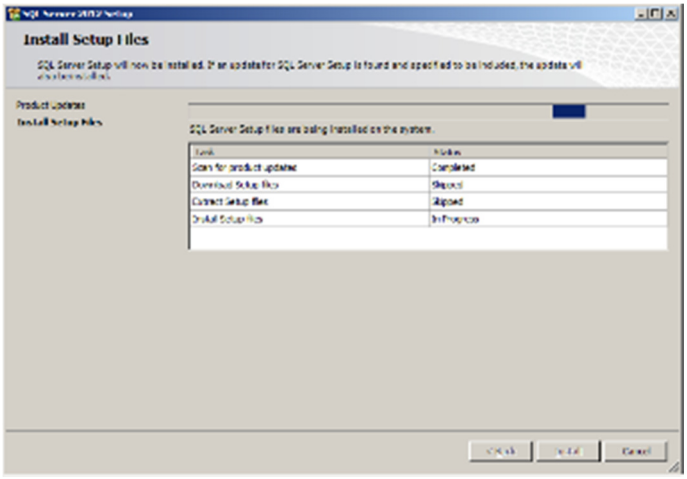


Explanation

SQL Server will now copy the files from the source DVD or folder into the destination computer.

Steps to follow

1. Click **Install** to continue.
2. Please wait until Setup extracts and copies the necessary files.



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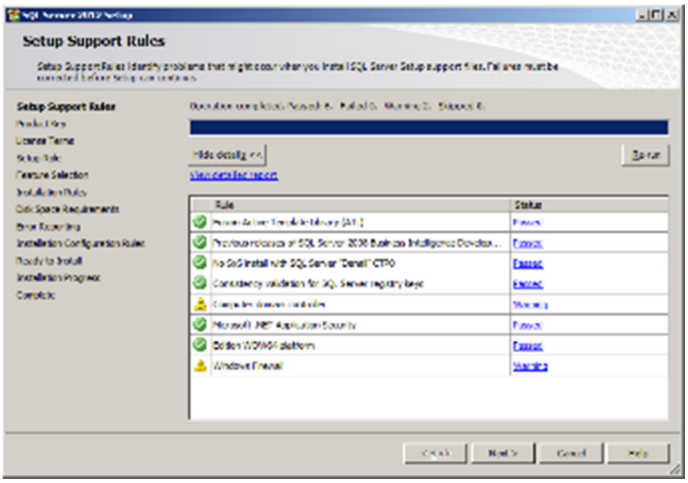
Explanation

SQL Server checks the validity of the rules and gives us a report. Notice the warning about our Computer being a Domain controller. In production environments, it is not recommended to install SQL Server on a computer that is also a Domain Controller. The other warning is for Windows Firewall. Windows Firewall blocks SQL Server traffic to your machine by default. If you need to allow other machines to connect to your SQL Server (e.g. in the production environment), then you need to follow the instructions at http://go.microsoft.com/fwlink/?LinkId=94001 to enable SQL Server traffic through Windows Firewall. For our training, this is not a necessary step.

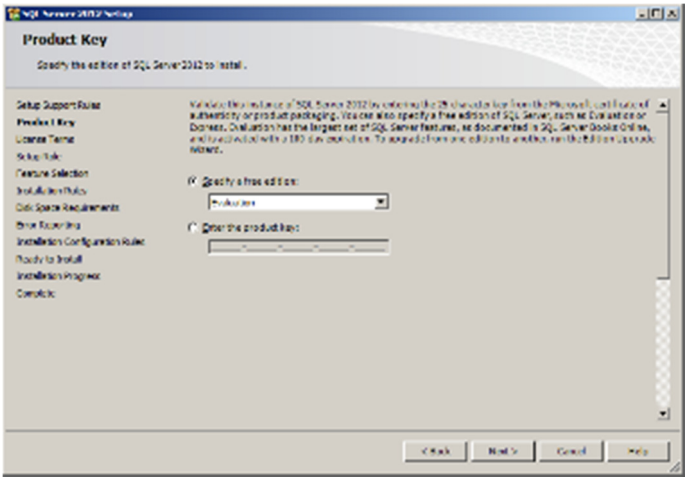


Steps to follow

1. Notice the warning message about Domain Controller and Windows Firewall and act only if necessary.
2. Click **Next** to continue.

Explanation

Here we will select to install an Evaluation Edition of SQL Server 2012, as we don't need to install a fully-functional edition. In case you have a product key and would like to install a fully-functional edition, please type the product key in this window.

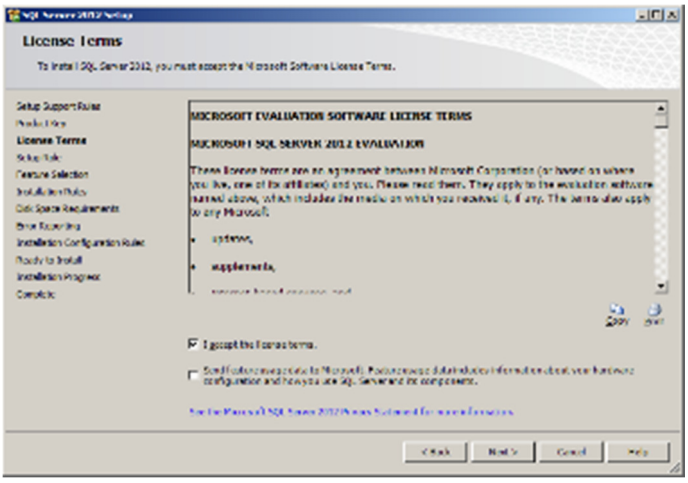


Steps to follow

1. Make sure that **Specify a free edition** is the selected option.
2. From the dropdown, select **Evaluation**.
3. Click **Next** to continue.

Explanation

We are presented with the Microsoft Software License Agreement Terms page. Kindly read and accept these terms to continue.



Steps to follow

1. Read the License Agreement.
2. **Check** the box next to *I accept the license terms*.
3. Click **Next** to continue.

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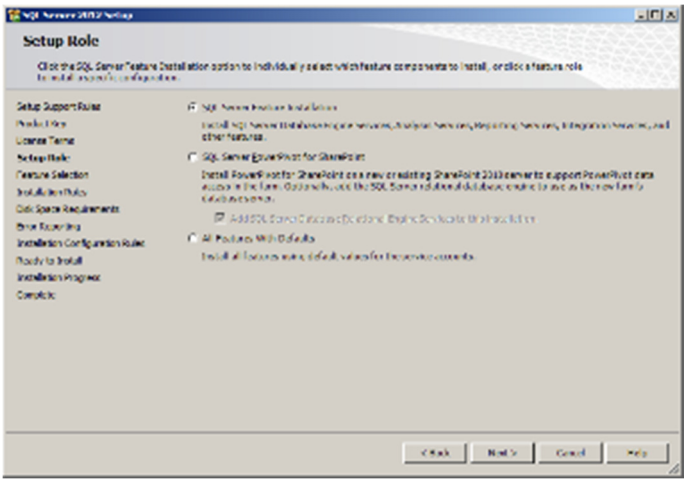
Explanation

Now it's time to select a role for our server. This server will include the necessary services and features of SQL Server. Hence, we'll keep the selected option.



Steps to follow

1. Make sure *SQL Server Feature Installation* is the selected option.
2. Click **Next** to continue.

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MODULE 4 – THE SQL SERVER MANAGEMENT STUDIO

Compatibility Indicator
SQL Server 2005
SQL Server 2008
SQL Server 2008 R2
SQL Server 2012

Copying the sample database

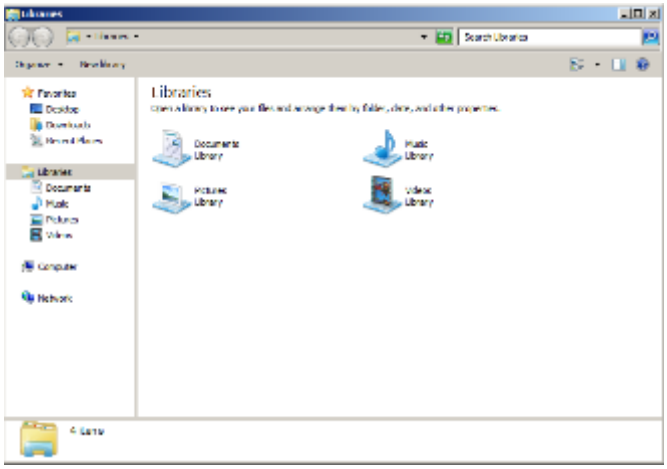
We will use the AdventureWorks 2012 Sample Database for the purposes of our training. This sample is available as a free download from CodePlex. Follow these simple steps to copy the sample database to the specific folder.

Explanation

The Sample database AvdventureWorks2012 is available on our hard drive. Let's find the source files.

Steps to follow

1. Make sure the Virtual Environment is running.
2. Start a Windows Explorer (e.g. by clicking on the shortcut on the taskbar, or Win-E)

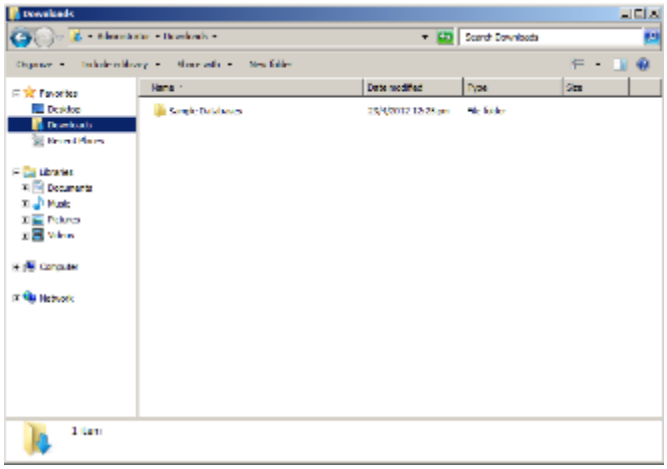


Explanation

The files are in the Downloads folder.

Steps to follow

In Windows Explorer, click on the **Downloads** link.

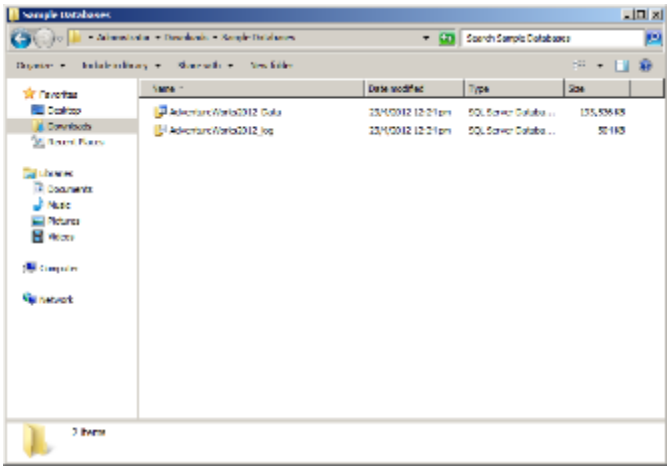


Explanation

The files are in the Sample Database folder.

Steps to follow

Open the **Sample Database** folder. Here are the files.



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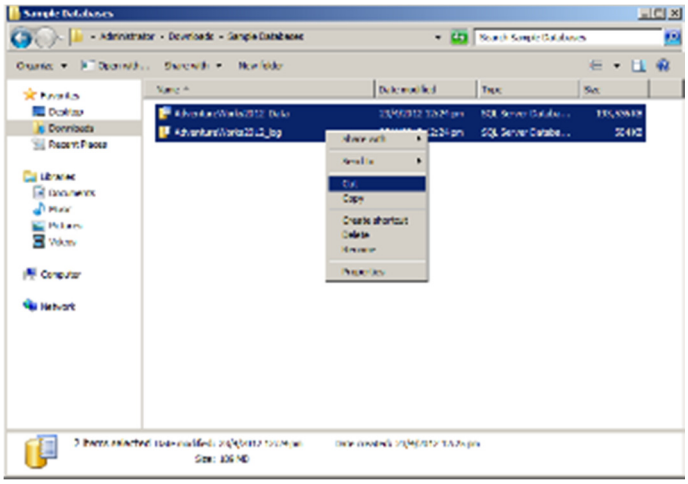
Explanation

Let's move these files to the default SQL Server Data folder.

Steps to follow

1. Select all files (**CTRL-A** or via the menu).
2. Right-click and select **Cut** (Or CTRL-X).

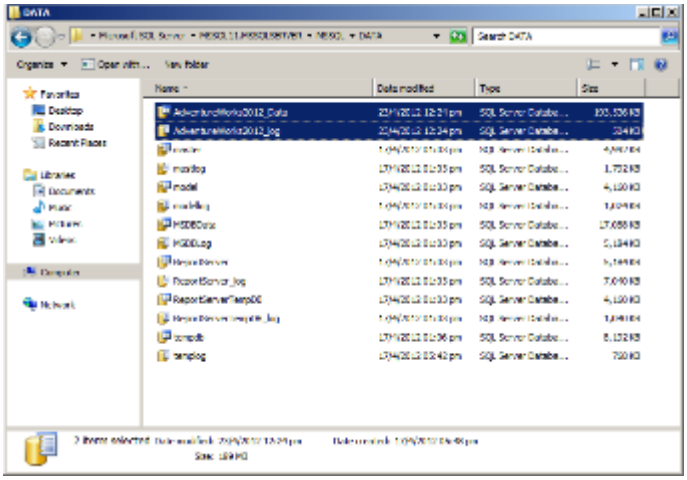


Explanation

Now let's browse to the default SQL Server Data folder and paste these files there. Once moving files is complete, we can proceed with the next step.

Steps to follow

1. Browse to the default SQL Server folder: `C:\Program Files\Microsoft SQL Server\MSSQL11.MSSQLSERVER\MSSQL\DATA`
2. Right-click and select **Paste** (Or CTRL-V). Wait until files are moved to this folder.



Using the SQL Server Management Studio

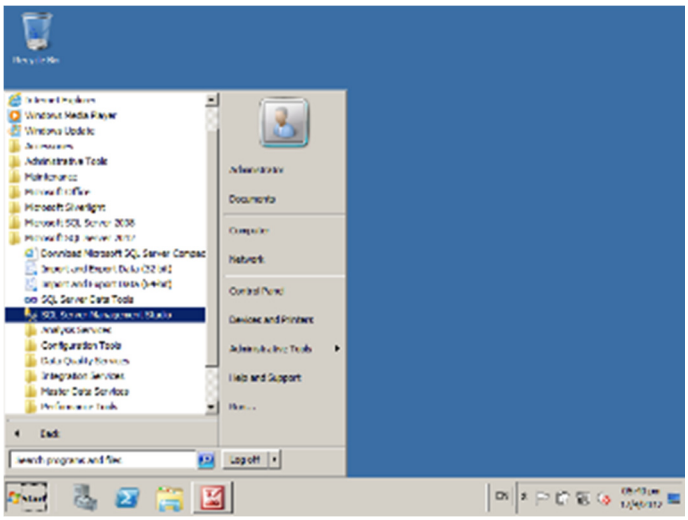
In this section we will learn how to use the SQL Server Management Studio.

Explanation

Let's begin using the SQL Server 2012 Management Studio Edition on this environment.

Steps to follow

1. Make sure the Virtual Environment is running.
2. Click **Start** | **All Programs** | **Microsoft SQL Server 2012** | **SQL Server Management Studio**



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Explanation

SQL Server Management Studio is now running. See what's available to us.

Steps to follow

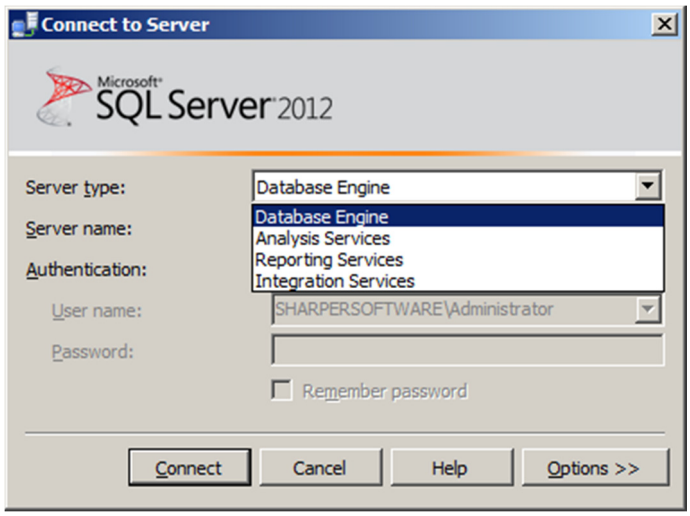
Follow your instructor to understand the contents of the logon dialog box.

Explanation

We can connect to the Database Engine, Analysis Services, Reporting Services or Integration Services.

Steps to follow

1. From the *Server type* dropdown, select **Database Engine**.
2. Make sure the *Server name* is **SHARPERSQL**
3. Select **Windows Authentication** for *Authentication*.
4. Click **Connect** to continue.

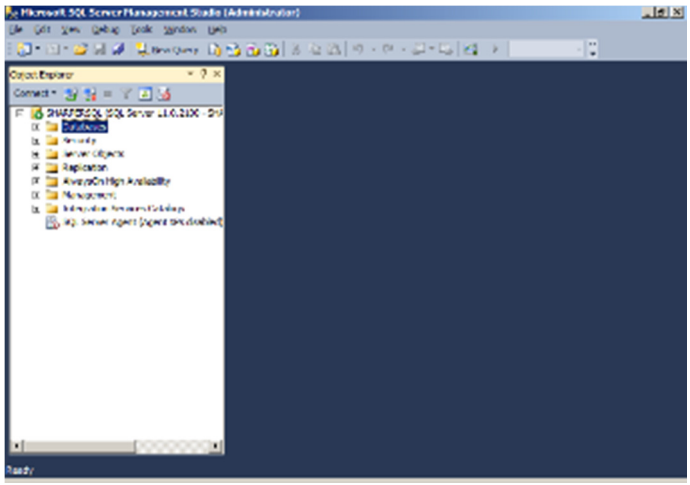


Explanation

We have just connected to the SQL Server Management Studio.

Steps to follow

Follow your instructor to understand the contents of SQL Server Management Studio.



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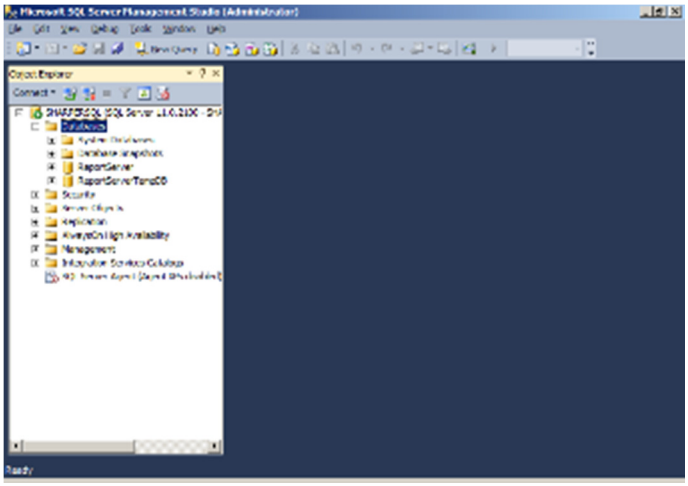
Explanation

Let's see what databases are available to us. Obviously there are no user-defined databases yet. We can see the System Databases and Reporting Services Databases only.

Steps to follow

Expand the *Databases* node and see its contents.

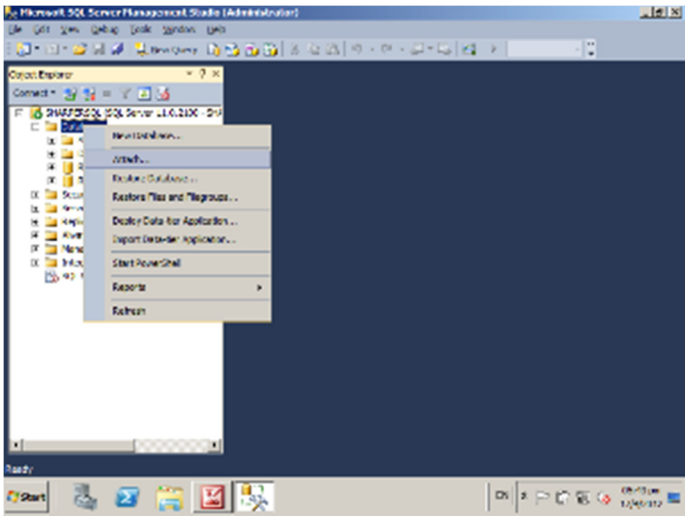


Explanation

Let's add the AdventureWorks 2012 sample database so we can learn how to use the SQL Server Management Studio.

Steps to follow

1. Right-click on the *Databases* node.
2. Click on **Attach**.

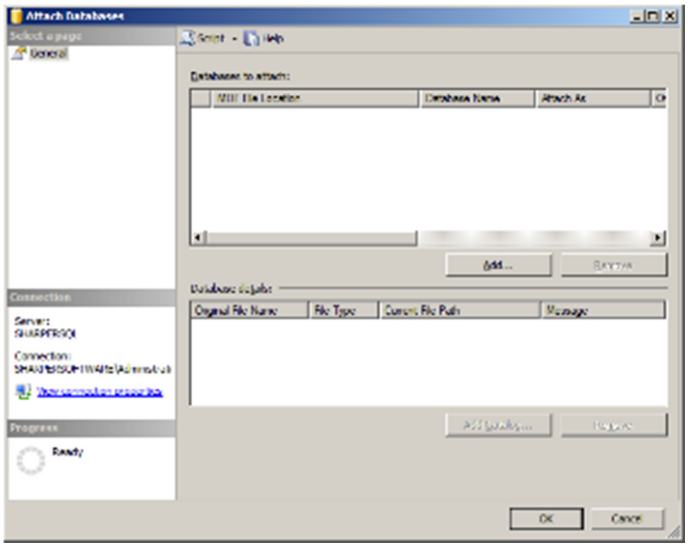


Explanation

This window allows us to specify the data files where our sample database is stored.

Steps to follow

Click on **Add**…



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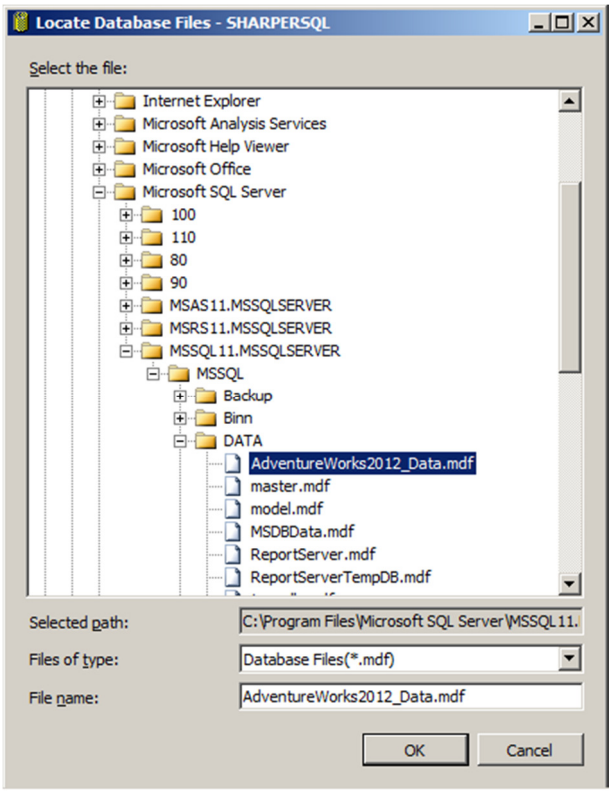
Explanation

Let's add the AdventureWorks 2012 sample database.

Steps to follow

1. Select **AdventureWorks2012_Data.mdf**
2. Click **OK**.

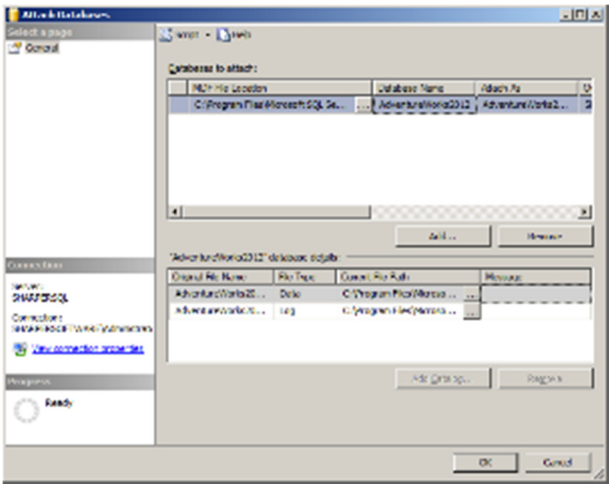


Explanation

Now SQL Server knows where to find the sample database. Let's make sure SQL Server can open it.

Steps to follow

1. Follow your instructor to understand this dialog box.
2. Click **OK** to continue.



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MODULE 5 – CREATING THE CONTOSO CLINIC DATABASE

Contoso Clinic's current data files

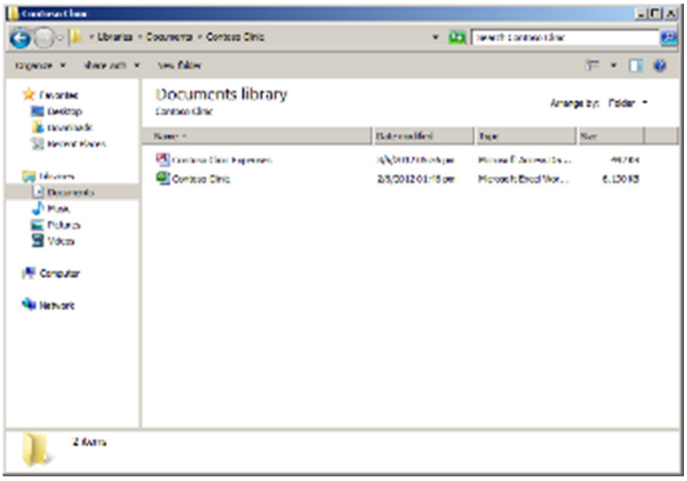
Contoso Clinic is maintaining its patient information, encounter details, payments, etc. in a single Excel file. Expenses, however, are maintained in a separate Access Database. Let's get to know the contents of these files.

Explanation

Let's open the folder where Contoso Clinic's data files are stored.

Steps to follow

1. Make sure the Virtual Environment is running.
2. Start a Windows Explorer.
3. Browse to **Documents** | **Contoso Clinic**

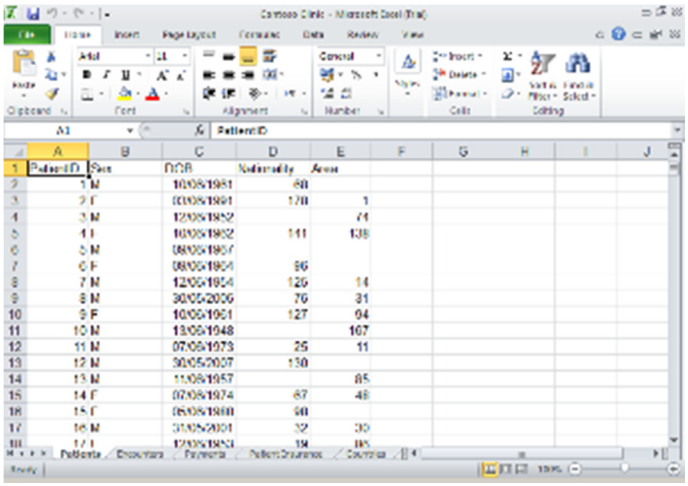


Explanation

Let's open the large Excel file first. As you can see, this file has a large number of sheets. Let's take a look at the Patients sheet. This sheet is maintaining data about each patient, Sex, Date of Birth, Nationality (code) and Residence Area (code). Notice the blank sells.

Steps to follow

1. **Double-click** on *Contoso Clinic.xlsx* excel file to open it.
2. Click on the **Patients** sheet.
3. Follow your instructor to understand this sheet.

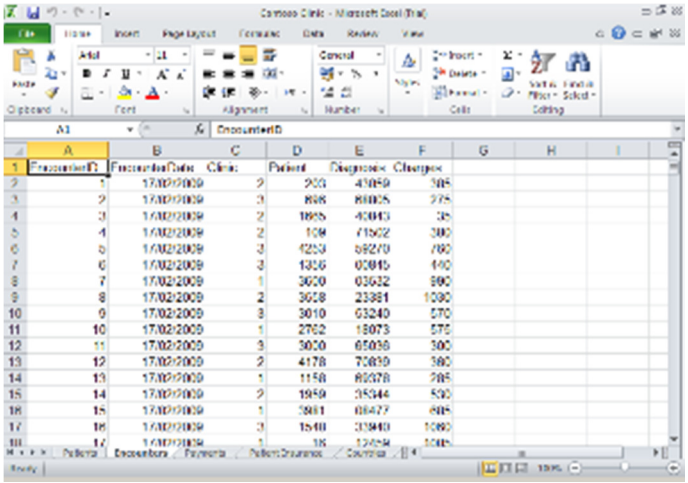


Explanation

Let's look at the Encounters sheet. This sheet is storing the details of every patient encounter, its Date, Clinic number (code), Patient File No, Diagnosis (code) and charges in Kuwaiti Dinars.

Steps to follow

1. Click on the **Encounters** sheet.
2. Follow your instructor.



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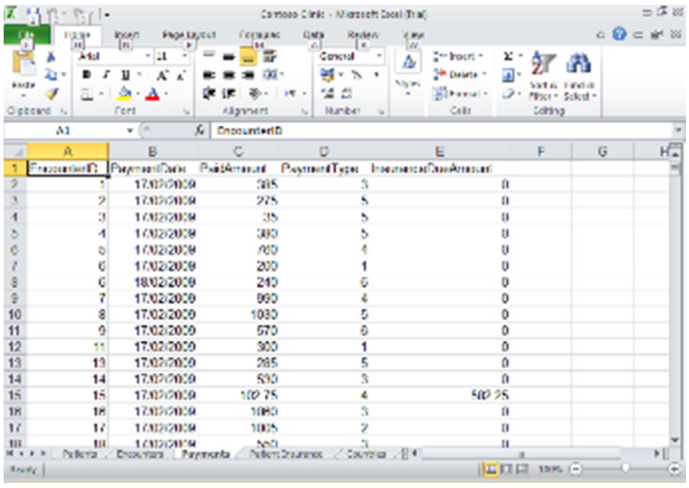
Explanation

Take a look at the other sheets.

Steps to follow

Follow your instructor to take a look at all other sheets.



Compatibility Indicator
✓ SQL Server 2005
✓ SQL Server 2008
✓ SQL Server 2008 R2
✓ SQL Server 2012

Creating the Contoso Clinic Database

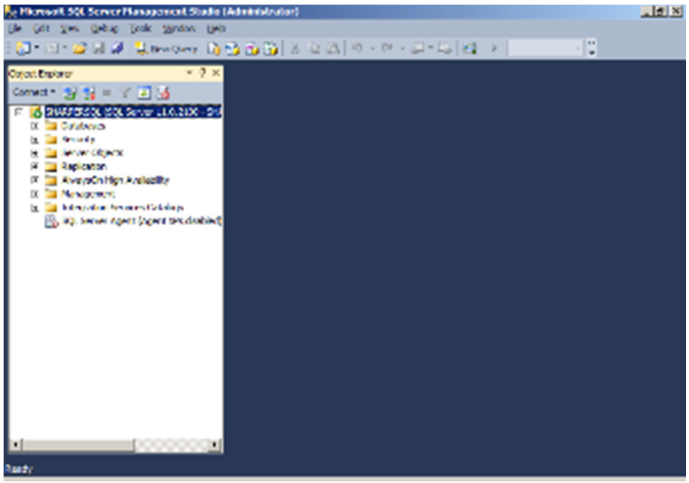
Follow these steps to create the Contoso Clinic Database.

Explanation

We will use the SQL Server Management Studio to create the database.

Steps to follow

1. Make sure the Virtual Environment is running.
2. Start the **SQL Server Management Studio**.
3. **Logon** to the *Database Engine* on the local machine.



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MODULE 6 – MAINTAINING THE CONTOSO CLINIC DATABASE

Now that the installation of ContosoClinic database is complete, it is imperative to maintain it in a way that would ensure maximum availability & integrity.

Compatibility Indicator
✓ SQL Server 2005
✓ SQL Server 2008
✓ SQL Server 2008 R2
✓ SQL Server 2012

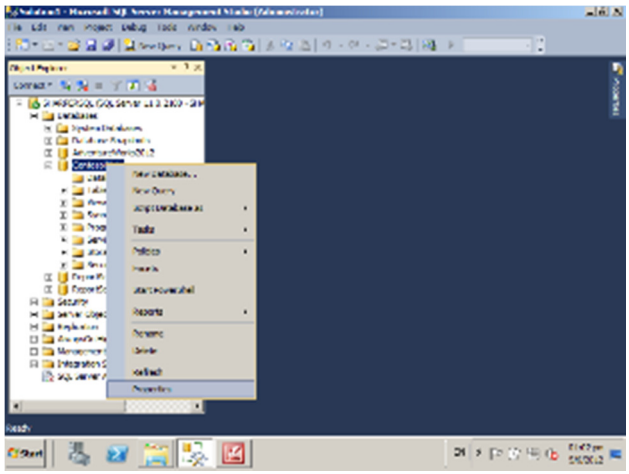
Current status of ContosoClinic database

Explanation

Let's first of all check the status of our database. The numbers shown may vary from what you see on your screen.

Steps to follow

1. **Collapse** all items.
2. **Right-click** on the *ContosoClinic* database and select **Properties**

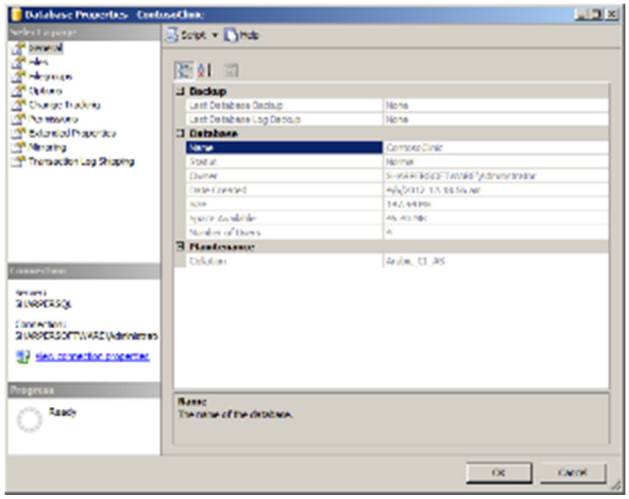


Explanation

SQL Server usually does not return the used storage to the Operating System by default (for performance reasons). In the screenshot, the database has 45MB of free space in it.

Steps to follow

1. Check the *Size* of the database (numbers may vary) and the *Space Available*.
2. Click on the **Files** page.

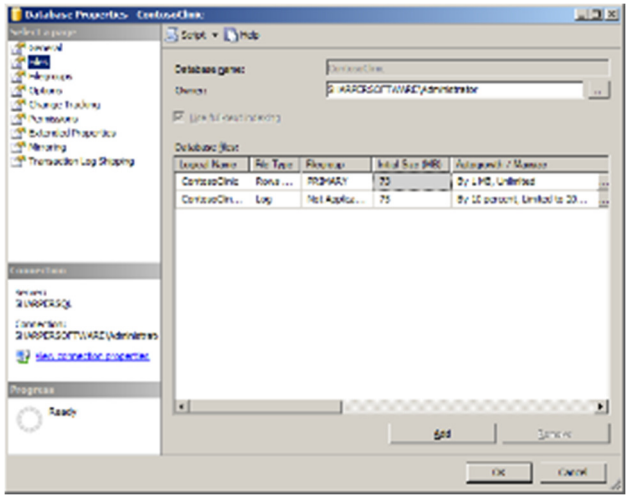


Explanation

Check the size of the Log file. If it's really large, then there were lots of changes made to the database.

Steps to follow

1. **Review** the items on this page.
2. Follow your instructor to view the other pages.
3. Click **Cancel**.



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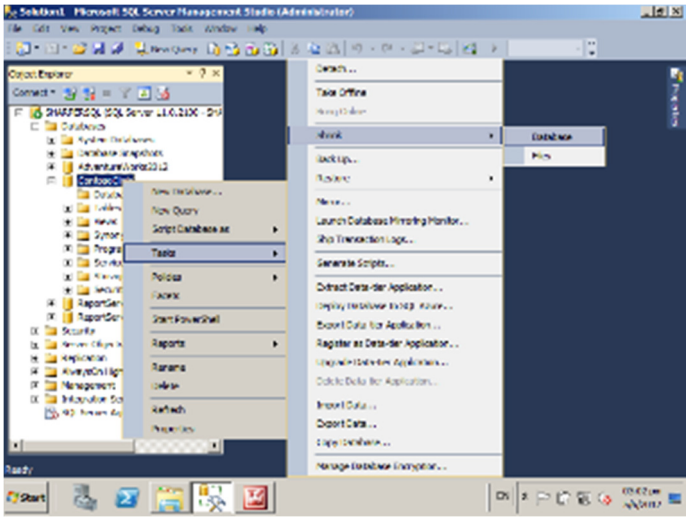
Explanation

Our database needs to release some of the unnecessary storage. Let's shrink the free space and return it to the Operating System.

Steps to follow

Right-click on *ContosoClinic* and select **Tasks** | **Shrink** | **Database**

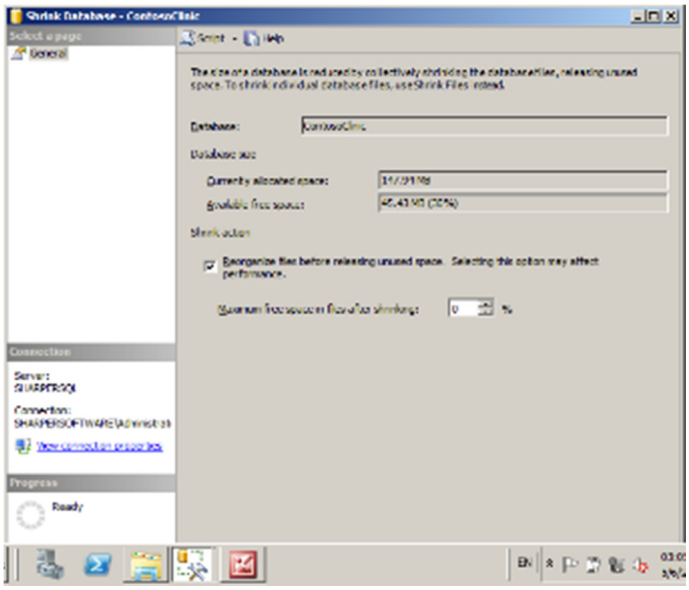


Explanation

This step will shrink the database.

Steps to follow

1. **Check** the *Reorganize files before releasing unused space* option.
2. Click **OK** to continue.
3. Open the *Properties* of the database once again and check its size. While preparing this document, the new size of the database was shrunk down to about 29MB.
4. Note that the *Transaction Log* is down to its minimum 1MB initial size.



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MODULE 7 – TURNING DATA TO USEFUL INFORMATION

Compatibility Indicator
✓ SQL Server 2005
✓ SQL Server 2008
✓ SQL Server 2008 R2
✓ SQL Server 2012

Advanced data import using Integration Services

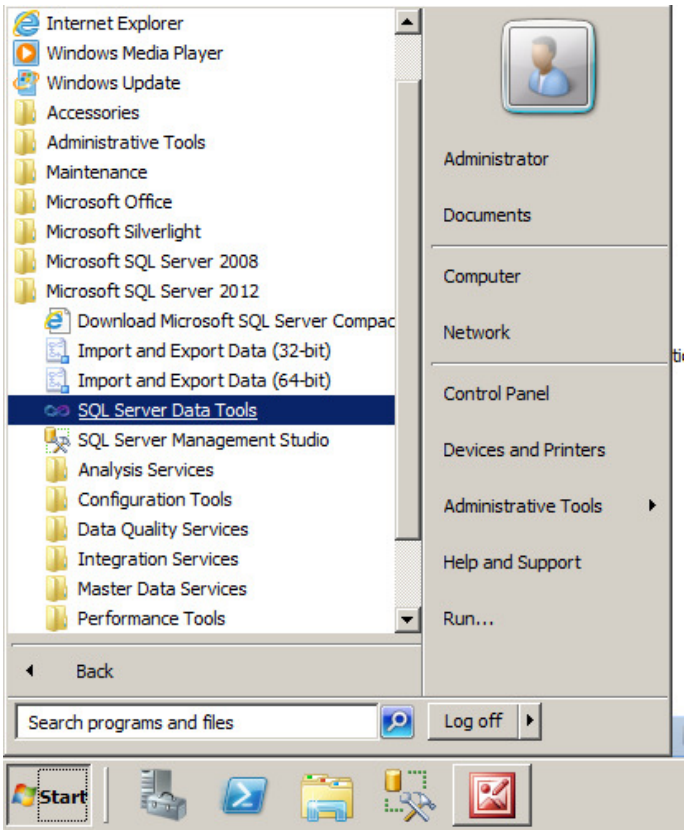
Contoso Clinic hired an advertising agency to track its patients and update the area these patients have moved into. The agency updates the addresses once every 2 months and sends the updates in a tab-delimited text file.

Explanation

SQL Server provides tools that allow us to develop database solutions. These tools are based on the Visual Studio 2010 IDE. Let's start these tools.

Steps to follow

1. Click **Start** | **All Programs** | **SQL Server 2012** | **SQL Server Data Tools**
2. In the dialog box, select **Business Intelligence Settings** and then click **Start Visual Studio**.
3. Wait for Visual Studio to run for the first time.

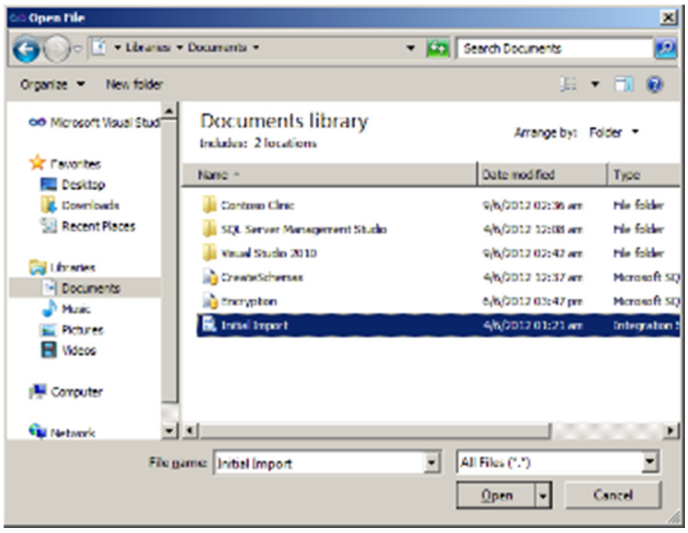


Explanation

Let's review the package we created earlier when we imported data from Excel.

Steps to follow

1. In the *Data Tools*, click **File** | **Open** | **File…** (Shortcut: CTRL-O).
2. **Browse** to the *Documents* folder and open the *Initial Import.dtsx* file we created earlier.



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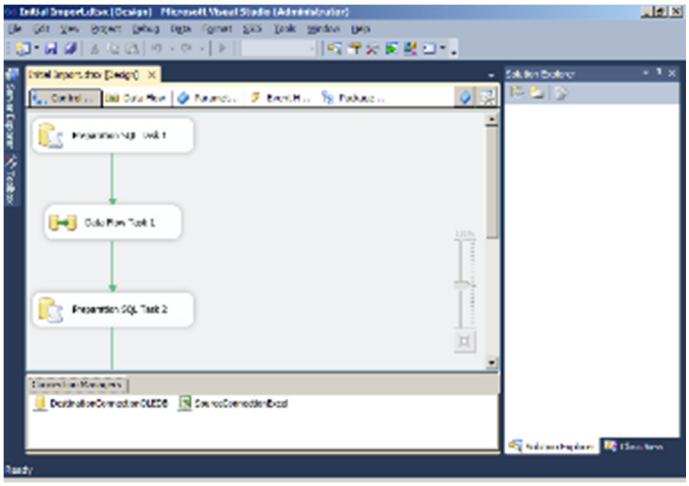
Explanation

This window is the Integration Services Package Designer. Let's look at it in more details.

Steps to follow

1. Follow your instructor to understand the contents of this window.
2. **Double-click** on the topmost box named *Preparation SQL Task 1* to open its editor.

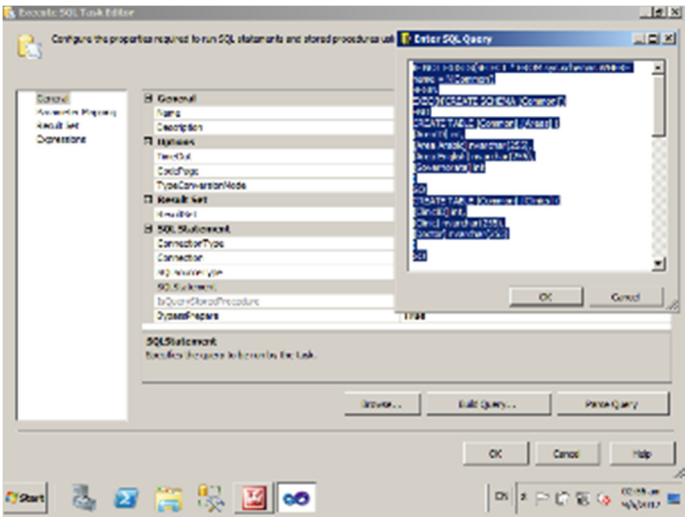


Explanation

This dialog box shows details about the first step in the Integration Services Package. Let's see what it does.

Steps to follow

1. Click the ellipses **(…)** next to *SQL Statement*.
2. Read the T-SQL Statements. They create the schemas (only if we missed creating them), tables and other objects necessary for storing the data imported from the source
3. Click **Cancel** to continue. Then **Cancel** again to close the first step.

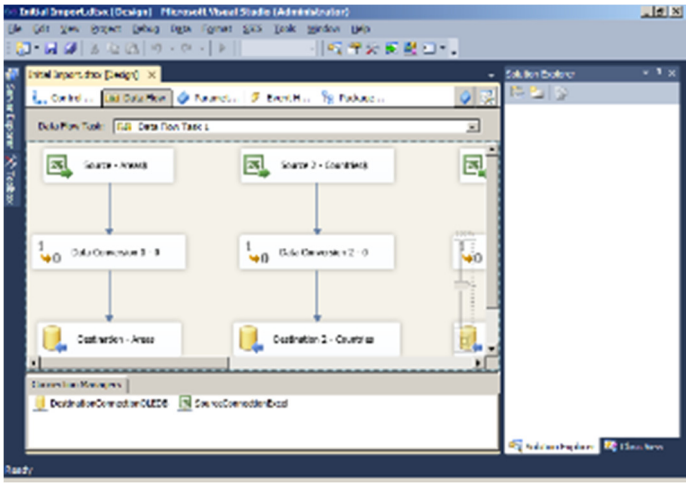


Explanation

Let's now look at how does the actual import work.

Steps to follow

1. **Double-click** on the second step in the package called *Data Flow Task 1* to open its editor. Notice that the designer has switched to the second tab.
2. Notice that the import operations are designed to run in parallel.
3. **Double-click** on the top-left Excel task named *Source – Areas$* to open its editor.



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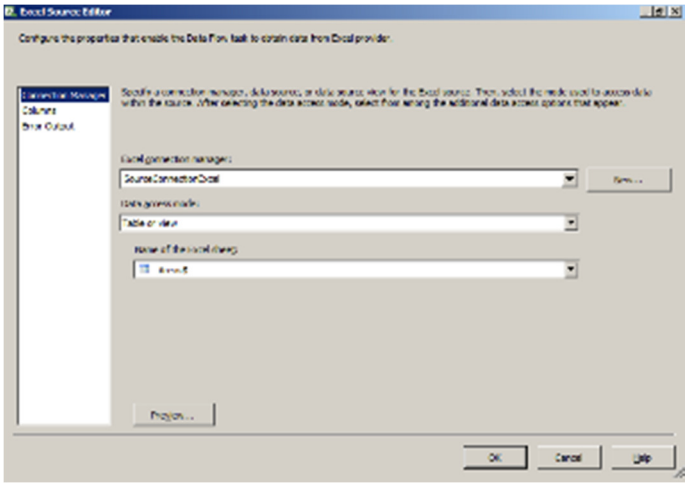
Explanation

This is the Excel Source Editor window where we define the source of data and columns to import.



Steps to follow

1. Follow your instructor to understand the contents of this editor.
2. Switch to the *Columns* page and understand its functions.
3. Switch to the *Error Output* page and understand its functions.
4. Click **Cancel** to continue.

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APPENDIX A – TABLE DESIGN FOR CONTOSO CLINIC DATABASE

Schema.Table	Column Name	Data Type	Allow Nulls
Common.Areas	AreaID	int	No
	[Area Arabic]	nvarchar(50)	No
	[Area English]	nvarchar(50)	No
	Governorate	int	No
Common.Clinics	ClinicID	int	No
	Clinic	nvarchar(25)	No
	Doctor	nvarchar(25)	No
Common.Countries	CountryID	int	No
	CountryEng	nvarchar(50)	No
	NationalityEng	nvarchar(50)	No
	CountryAra	nvarchar(50)	No
	NationalityAra	nvarchar(50)	No
	ISO2DigCode	nvarchar(2)	No
	ISO3DigCode	nvarchar(3)	No
	OfficialCurrencyEng	nvarchar(50)	Yes
	OfficialCurrencyCodeA	nvarchar(3)	Yes
	OfficialCurrencyCodeN	nvarchar(3)	Yes
	UNM49Code	int	Yes

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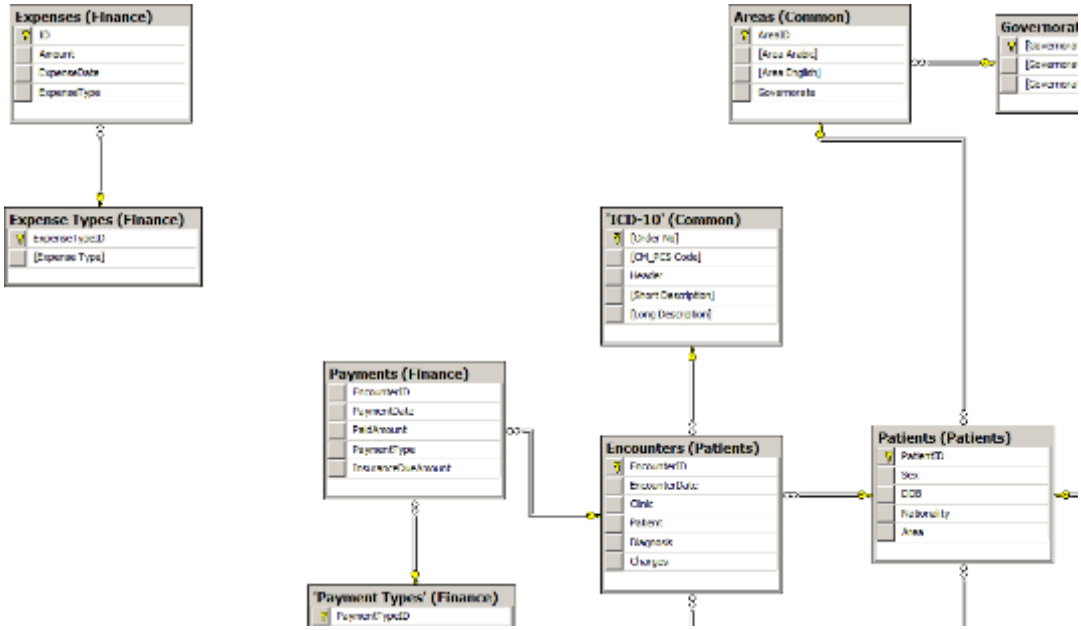
APPENDIX B – ERD FOR CONTOSO CLINIC DATABASE



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RESOURCES AND FURTHER READING

- Developer Resources:
  - SQL Server 2012 Developer Training Kit Web Installer http://www.microsoft.com/en-us/download/details.aspx?id=27721
  - SQL Server Developer Resources: http://msdn.microsoft.com/en-US/sqlserver
  - SQL Server 2012 Virtual Labs: http://msdn.microsoft.com/en-us/hh859579
  - SQL Server 2008 Virtual Labs: http://msdn.microsoft.com/en-US/cc138238

- IT Professional Resources:
  - SQL Server IT Professional Resources: http://technet.microsoft.com/en-US/sqlserver
  - SQL Server 2012 Virtual Labs: http://technet.microsoft.com/en-us/virtuallabs/hh859575
  - SQL Server 2008 Virtual Labs: http://technet.microsoft.com/en-us/virtuallabs/cc164207

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