Practical Sql

Microsoft Sql Server T-SQL for Beginners

By

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Contents

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Version: 1.0

Software and Sample Data

The examples in this book used Sql Server 2012 Express which is as of writing this book a free version of sql server available for download from Microsoft.

Sample data and examples for use with this book can be downloaded from the download page at:

http://practical-sql.com

If you have any problems downloading the samples please email info@practical-sql.com for help or use the contact page http://practical-sql.com/Contact.aspx.

There should be no problem with running these exercises on later versions of Sql Server but we cannot give a 100% guarantee. Most examples will run on previous versions of Microsoft Sql Server but some functions might differ or not exist on previous versions such as the format function.

Overview

A brief overview of the different sections contained within this book :

Section 1. Sql Server Install and Tour

This Section takes the reader from downloading and installing sql server to creating a sql table and performing basic queries on the data within the table.

Chapter 1

This chapter introduces the book , how to use the book and where to get downloads.

Chapter 2

Here we cover how to get a free copy of sql server express and the installation of the software.

Chapter 3

Once sql server has been installed this chapter will take you on a brief tour of the software and how to login to the sql server for the first time.

Section 2. Starting Sql Development

Section 2 introduces the basics of sql development namely how to create databases, tables and fields and the fundamental statements that perform the basic operations on your data.

Chapter 1

This chapter will show you how to create your first sql server database and the various properties of sql server databases.

Chapter 2

Once you have created your database this chapter will explain and give examples of creating sql server tables to store your data.

Chapter 3

In the final chapter of this section with introduce the basic sql statements to insert, query, update and delete data from a sql table.

Section 3. Advanced Queries

Section 3 goes into sql development in more detail cover ways of grouping data, creating conditional statements and joining tables of data together.

Chapter 1

This chapter covers how to perform calculations on groups of data such as how to sum all the numbers in a field or count the number of rows in a table.

Chapter 2

Next we cover various functions that allow us to manipulate string fields in various ways.

Chapter 3

Conditional statements allow us to return different values depending on the value of another of another expression. For example you might want to return a different value depending on the time of day or the month it ways when the query was executed.

Chapter 4

When developing sql databases more often than not the data you need to return will be in more than one table. This chapter covers the various ways you can combine the data in 2 or more tables.

Section 4. Sql Beyond the Basics

Now that the basics of sql development have been covered Section 4 carries on by introducing more development techniques such as using Stored Procedures, Functions and Views, Triggers, database design rules and much more.

Chapter 1

The sql developer can add rules to the check that the data being added to the table is valid, this chapter will show you ways to create various constraints.

Chapter 2

Templates are a useful sql server feature. We will show you how to use Templates to speed up your sql development to save you time and create consistency and also how to create your own sql server templates.

Chapter 3

When you start to develop more complex queries you can add them to stored procedures so that they can be saved in the database and executed with a single 1 line statement at a later date.

We will cover to create stored procedures and pass parameters to the stored procedures.

Chapter 4

Views allow you to hide complex SELECT statements so you only need to run a simple select statements. Using View can save you copying and pasting large chunks of code and make it easier to read the sql that you have developed.

Chapter 5

Next we will cover different types of functions that can be created and how they compare to stored procedures.

Chapter 6

Synonyms are aliases for tables and are especially useful when you start to develop code that uses references to multiple databases.

We will show you how to create and manage synonyms within your database.

Chapter 7

Triggers allow you to execute some tsql when an action is taken on the database or table. We will cover how to create various triggers and use them for various purposes such as auditing and preventing users from creating tables.

Chapter 8

When you start to develop sql for large amounts of data the design of the database will be increasingly more important. We will cover the fundamental rules of database design called normal forms.

Chapter 9

As a sql developer you can be expected to predict every possible problem that might occur while your code is running. Sql Exceptions allow the developer to define a course of action to take when an unexpected error occurs.

Chapter 10

Finally we cover Transactions. Transactions are the 'all or nothing' in the sql world. You might have a number of changes to tables within your stored procedure but want all the changes to be saved as long as there has been no errors executing any of the statements, transactions will allow to do this.

Section 1. Sql Server Install and Tour

1. Introduction

"Knowledge isn't power until it is applied." – Dale Carnegie

The purpose of this book is to teach the user sql database development. More precisely you will learn sql development on Microsoft Sql Server using the version of Sql from Microsoft called T-SQL (T-SQL stands for Transact SQL).

When starting to learn anything new there often appears to be an overwhelming amount to learn.

With the Practical Series of books and 'Practical Sql' in this case you will be guided from the basics to more advanced techniques.

The instructions are kept concise with the focus being on useful examples. The aim here is that you will be more likely to remember what is said about a topic and can always refer back to the examples at a later date if required.

Practical Sql

'Practical Sql' will cover the tsql development language used on the Microsoft Sql Server Database system.

Sql Server Development is a topic that many IT Professionals avoid but there really is no need as the basics and even more advanced techniques can be acquired easily.

In other words Sql development is not a skill that will be of use to just DBA's and developers.

There are many applications that rely on sql server databases so some knowledge of databases it becoming a common requirement.

2. Sql Server Installation

The installation of Sql Server Express is straightforward, should not cause any problems and free.

You can download the current version of Sql Server Express from the following location

http://www.microsoft.com/en-gb/download/details.aspx?id=29062

Select your language and please be aware that the examples in this book were developed on Microsoft® SQL Server® 2012 Express and although they will probably still work on a later version of Sql Server Express we can give no guarantee.

System Requirements for Microsoft® SQL Server® 2012 Express

Supported Operating System

Windows 7, Windows Server 2008 R2, Windows Server 2008 Service Pack 2, Windows Vista Service Pack 2.

32-bit systems

Computer with Intel or compatible 1GHz or faster processor (2 GHz or faster is recommended.)

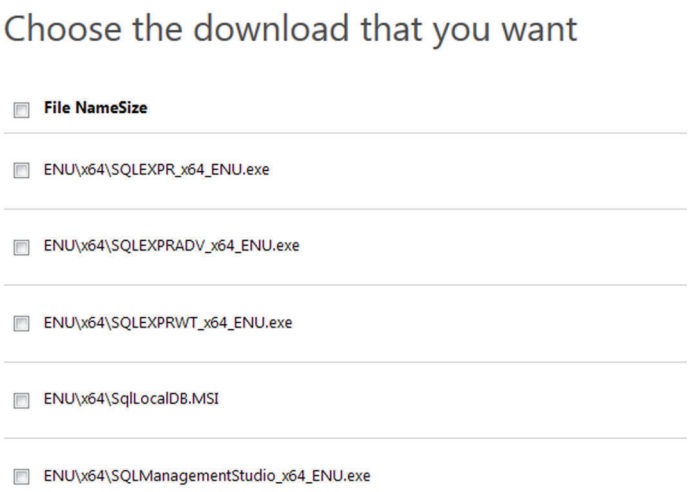
64-bit systems

1.4 GHz or faster processor

Minimum of 512 MB of RAM (2 GB or more is recommended.)

2.2 GB of available hard disk space

1. Click the checkbox to download the version of SQLEXPRADV_x64_ENU.exe for your language and either the 32bit (x84) or 64bit (x64) version, the version that was used for this book was: ENU\x64\SQLEXPRWT_x64_ENU.exe

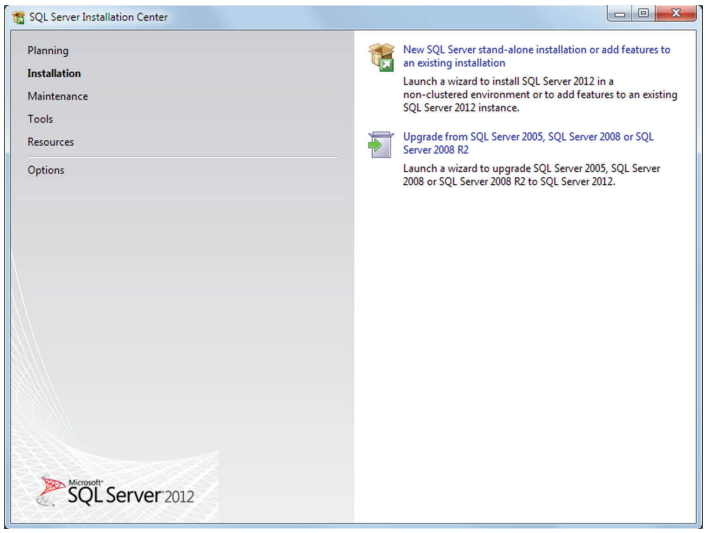


2. Once the download has completed double click on the file to start the installation.

SQL Server Installation Center

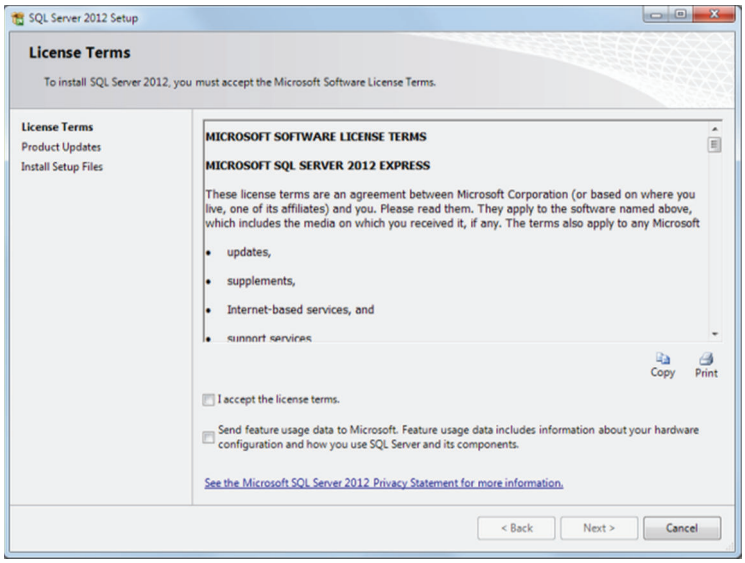
3. Click the Installation menu option on the left hand side of the screen and then select

   'New SQL Server stand-alone installation or add features to an existing installation'.



SQL Server 2012 Setup
License Terms

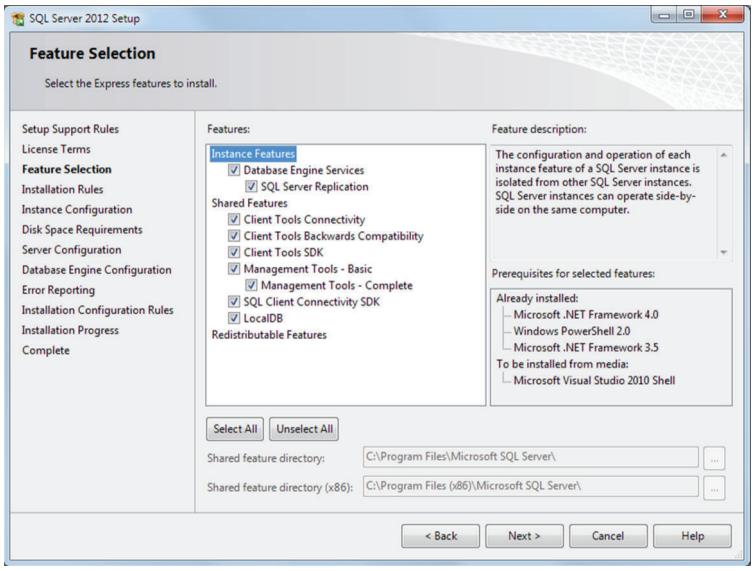
4. Eventually the license terms of the software should be displayed.



5. Tick the box 'I accept the license terms' and click next.
   It is up to the user whether or not they wish to tick the 'Send feature usage data to Microsoft' option.

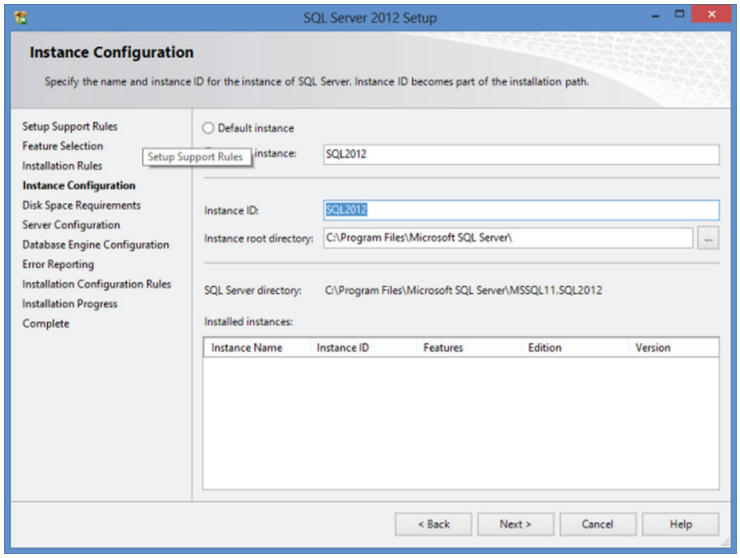
Feature Selection

6. Keep the default options and click next.

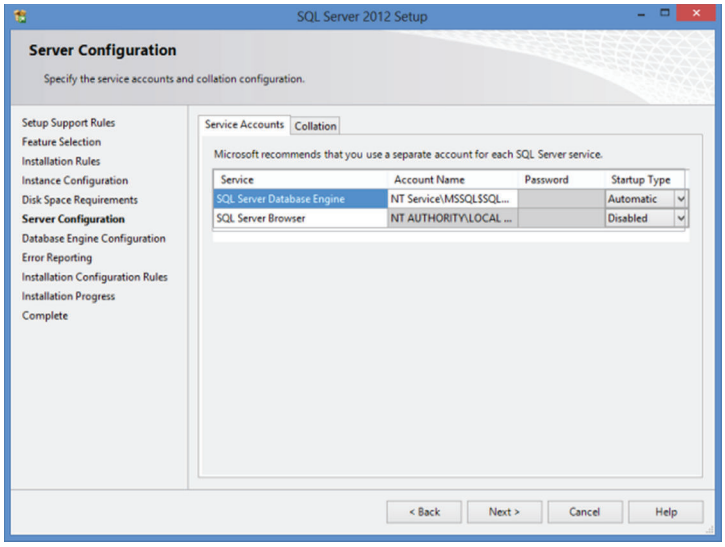


Instance Configuration

7. In this example we called the server SQL2012.



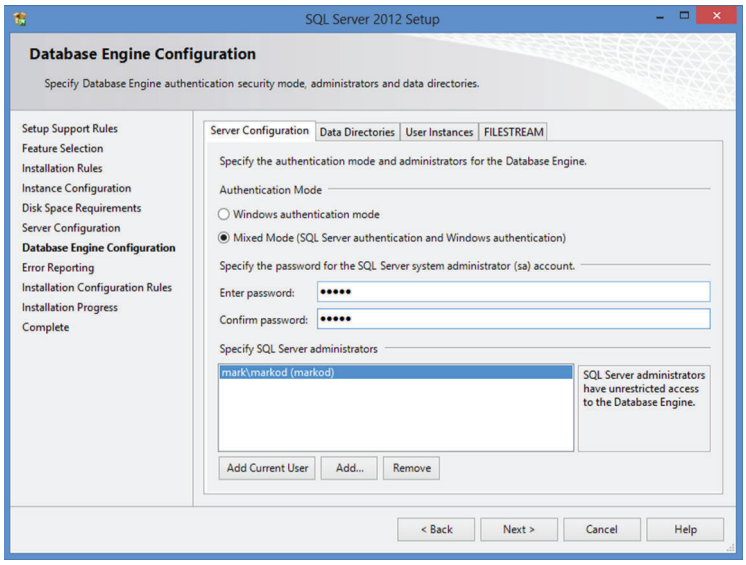
Server Configuration



8. Keep the default options and click next.

Database Engine Configuration - Server Configuration

9. Click on the option Mixed Mode and enter a password for sa.
10. The current user should already be in 'Specify SQL Administrators' list.

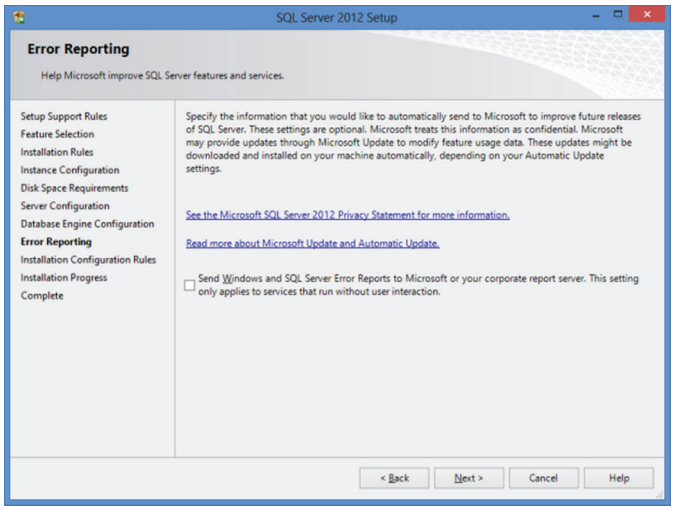


Data Directories

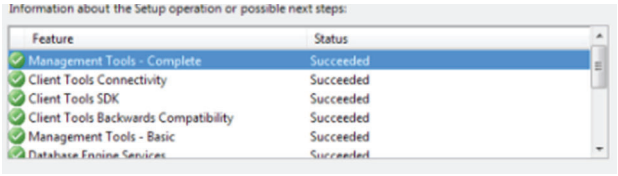
11. This tab shows the default locations for database, backup and log files. This should not need to be changed unless you have very limited space on your hard disk.
12. User Instance\FILESTREAM - This tabs will not require any changes for this installation.

Error Reporting

13. Click next to being the installation.



14. Once the installation of sql server has completed the results will show if there have been any errors during the installation of certain features, as shown below:



15. There will also be a link to the installation log file so you can find out more information on any errors that occurred during the installation.

16. Click Close

17. Close the 'SQL Server Installation Center' window and restart your computer.

3. Sql Server Tour

Before we get started learning sql server development we will give a brief tour of the sql server environment itself.

This chapter will not turn you into a sql server database administrator but the aim (especially if you are completely new to sql server) is to familiarise yourself with some of the features, services and basic configuration of sql server.

The main sql server tool that your will be using for the configuration and development tasks is called the 'Sql Server Management Studio' from now on this will be referred to as **SSMS**.

SQL Server Services

Services are basically programs that run in the background of your computer.

The sql server runs using services, you can view these services in several ways for example if you go to:

All Programs - SQL Server 2012 - Configuration Tools - SQL Server Configuration Manager

Click on the Sql Server Services option and you will see the services that are running

Sql Server (SQL2012)

The main service for sql server. You will not be able to access sql server if this service is not running.

Sql Server Agent (SQL2012)

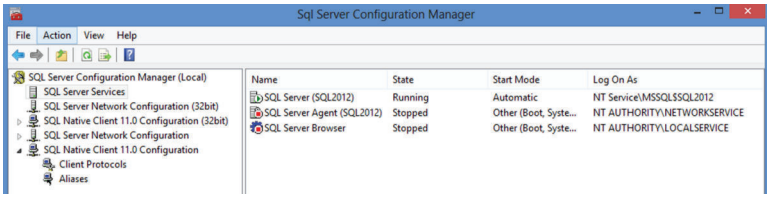
This service allows you to perform various tasks including the scheduling of jobs for example to backup your sql server databases or execute tsql at a particular time.

Sql Server Browser

The sql server browser provides information that is required when connecting to a sql server on a server which has multiple installations of sql server and viewing a list of available sql servers when logging onto a sql server.

To follow the examples in this book you should not need to start this service.

From the sql server configuration manager you can configure each of these services, for example if the start automatically and the account that is used to run the service.



The default account for the Sql Server Service is NT Service\MSSQL$SQL2012

The account that is used to run services is important when the sql server needs to access the filesystem for example when doing backup and restore tasks.

SQL Server Network Configuration

Within the Sql Server Network Configuration you can configure which protocols can access your sql server.

The protocols are just different ways in which in which messages are sent to and from your sql server installation.

The 3 protocols which we will cover next are Shared Memory, Named Pipes and TCP/IP.

Shared Memory - default enabled

This protocol allows users running on the same computer to connect to the sql server.

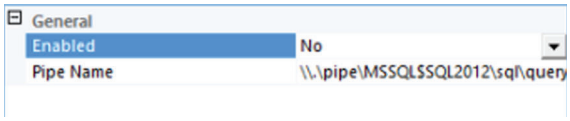
Named Pipes - default disabled

Named pipes are often used to allow applications and systems that do not use TCP/IP to connect to the sql server

default named pipe:\\.\pipe\MSSQL$SQL2012\sql\query

To test connecting to the sql server using named pipes:

1. Right click on the 'Named Pipes' protocol and select Properties.



2. Change the pipe to:

   \\.\pipe\mytest

3. Go to Sql Server Services , right click on the SQL Server and select restart.
4. Open SSMS and select Connect - Database Engine.

   Instead of the server name enter the pipe :

   \\.\pipe\mytest

The reason for using named pipes is so that systems that do not use TCP/IP can connect to your database.

TCP/IP - default disabled

This is the protocol that you will need to configure to allow your sql server to be accessd from other machines on your network.

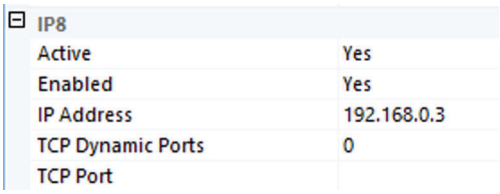
Protocol tab

Enabled - set this to Yes to enable the protocol.
Keep Alive (milliseconds) - This is how often the connection to the sql server check - leave this at the default 30000 (30 seconds).
Listen All - IPAll settings used for all ip addresses (default setting).

IP Addresses tab

Used to configure the ports and individual ip addresses.

For example if you need your sql server to be accessed by another machine, you would need to add the ip address and make sure it was set to active and enabled, for example:



The default port for sql server is 1433, sql server express uses dynamic ports by default

TCP Dynamic Ports - leave blank to use static ports.

When using dynamic ports the port that the sql server uses changes when sql server restarts.

TCP Port - if you wish to set a port that doesn't change you can enter the port in the TCP Port field. No change is required here to follow the examples in this book.

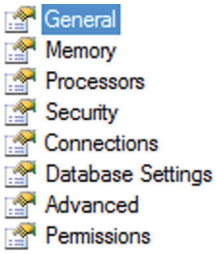
Sql Server Properties

There are various properties of the sql server that can be set using the SSMS.

As this is a beginners guide to sql server development we will cover a few of the useful properties you may wish to change here.

To view the properties for your sql server installation right click on the Sql server icon in the object explorer as shown:

On the left hand side of the 'Server Properties' dialog that is displayed you will see that the properties are divided into the following pages:



General

The general settings display various read-only properties such as the version of the sql server and the version of the windows operating system.

Name	MARK\SQL2012
Product	Microsoft SQL Server Express (64-bit)
Operating System	Microsoft Windows NT 6.2 (9200)
Platform	NT x64
Version	11.0.3128.0
Language	English (United States)
Memory	8071 (MB)
Processors	4
Root Directory	c:\Program Files\Microsoft SQL Server\MSSQL11.
Server Collation	Latin1_General_CI_AS
Is Clustered	False
Is HADR Enabled	False

You can also display the properties such tsql commands such as the following:

```
SELECT

CONVERT(sysname, SERVERPROPERTY('servername')),

SERVERPROPERTY('ProductVersion') AS ProductVersion,

SERVERPROPERTY('ProductLevel') AS ProductLevel,
```

SERVERPROPERTY('Edition') AS Edition,

SERVERPROPERTY('EngineEdition') AS EngineEdition,

SERVERPROPERTY('Collation') AS Collation;

The result from this query should look similar to the following screenshot:

	(No column name)	ProductVersion	ProductLevel	Edition	EngineEdition	Collation
1	MARK\SQL2012	11.0.3128.0	SP1	Express Edition (64-bit)	4	Latin1_General_CI_AS

Memory

This page shows the sql server memory options, such as the minimum and maximum amount of memory allowed to be used by the sql server.

Security

This page allows you to set whether Sql Authentication is allowed to be used to login to the sql server. Windows authentication mode is the default setting.

Connections

The 'Allow remote connections to this server' is the most important option on this page, especially if you have an application running on another server that need to access your sql server database.

Database Settings

Here is where you set the default locations for the data (the sql server database files), Log (sql server logs) and backups:

Data

C:\Program Files\Microsoft SQL Server\MSSQL11.SQL2012\MSSQL\DATA\

Log
C:\Program Files\Microsoft SQL Server\MSSQL11.SQL2012\MSSQL\DATA\

Backup

C:\Program Files\Microsoft SQL Server\MSSQL11.SQL2012\MSSQL\Backup

Advanced

There are many options on this page. The most important to note at the moment are:

Default language - make sure this correct for your country and be aware of the differences between English (US) and British English. The default language setting is used when creating new logins.

Permissions

The permissions page shows the commands various logins can execute on the server.

For now if you select the login that you used to connect to the sql server, then select the 'Effective' tab at the bottom of the page you will see a list of permissions which are basically a list of things that this login can do while connected to the sql server, for example:

CREATE ANY DATABASE

Means that the login can create a sql server database.

If you select the login 'NT AUTHORITY\SYSTEM' you will see that the list of effective permissions is more restricted that your login.

When allowing applications to connect to your sql server it is better to have logins that are as restrictive as possible and only give the permissions they actually require.

System databases

When you first install sql server there are 4 databases already created.

To view these 4 system databases expand the Databases folder in the Object explorer, and then expand the 'System Databases' folder.