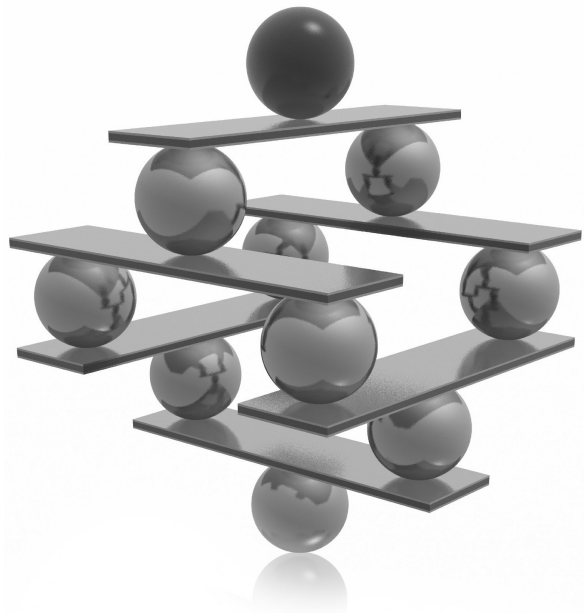# Chapter 2

Planning the Installation and Installing SQL Server

In This Chapter

▶ **SQL Server Editions**

▶ **Planning Phase**

▶ **Installing SQL Server**

This chapter begins by introducing the various SQL Server editions, so that you can identify which edition is appropriate for your environment. Before you proceed to the actual installation of this database system, you need to develop an installation plan. Therefore, the second part of this chapter is dedicated to the planning phase. It first provides some general recommendations, and then leads you through the planning steps provided by SQL Server Installation Center, a component of the SQL Server software. The final part of the chapter describes the actual installation of the SQL Server database server. Again, the same component, SQL Server Installation Center, is used to install the system on your computer.

NOTE

This chapter covers the basic installation of SQL Server.

SQL Server Editions

As you plan your installation, you need to know which SQL Server editions exist so that you can choose the most appropriate edition. Microsoft supports the following editions of SQL Server 2012:

▶ **Express Edition** The lightweight version of SQL Server, designed for use by application developers. For this reason, the product includes the basic Express Manager (XM) program and supports Common Language Runtime (CLR) integration and native XML. Also, you can download SQL Server Management Express for SQL Server Express to easily manage a database. SQL Server Express is available as a free download at http://msdn.microsoft.com/express.

▶ **Workgroup Edition** Designed for small businesses and for use at the department level. This edition provides relational database support without the business intelligence (BI) and high-availability capabilities. It supports up to two processors and a maximum of 2GB of RAM.

▶ **Standard Edition** Designed for small and medium-sized businesses. It supports up to four processors as well as 2TB of RAM and includes the full range of BI functionality, including Analysis Services, Reporting Services, and Integration Services. This edition does not include many enterprise-based features from Enterprise Edition (such as failover clustering, for instance).

▶ **Web Edition** Designed for web-hosting providers. In addition to the Database Engine, this edition includes Reporting Services. It provides support for up to four processors and 2TB of RAM.

▶ **Enterprise Edition**   The special form of the SQL Server system that is intended for time-critical applications with a huge number of users. In contrast to Standard Edition, this edition contains additional features that can be useful for very high-end installations with symmetrical multiprocessors or clusters. The most important additional features of Enterprise Edition are data partitioning, database snapshots, and online database maintenance.

▶ **Developer Edition**   Allows developers to build and test any type of application with SQL Server on 32- and 64-bit platforms. It includes all the functionality of Enterprise Edition, but is licensed only for use in development, testing, and demonstration. Each license of Developer Edition entitles one developer to use the software on as many systems as necessary; additional developers can use the software by purchasing additional licenses. For rapid deployment into production, the database system of Developer Edition can easily be upgraded to Enterprise Edition.

▶ **Datacenter Edition**   A new edition as of SQL Server 2008 R2 that is designed to support the highest level of scalability. It doesn't have any memory limitations, and you can create up to 25 instances. It also supports a maximum of 256 logical processors.

▶ **Parallel Data Warehouse Edition**   Dedicated to data warehousing and supports data warehouse databases from 10TB to 1PB (petabyte). To manage such huge databases, it uses MPP (massively parallel processing) architecture, introduced by Microsoft with its High Performance Computing (HPC) Windows operating systems.

Planning Phase

The description of the planning phase is divided into two parts. The first part gives some general recommendations, while the second part discusses how to use SQL Server Installation Center to plan the system installation.

General Recommendations

During the installation process, you have to make many choices. As a general guideline, it is best to familiarize yourself with their effects before installing your system. At the beginning, you should answer the following questions:

▶ Which SQL Server components should be installed?

▶ Where will the root directory be stored?

► Should multiple instances of the Database Engine be used?

► Which authentication mode for the Database Engine should be used?

The following subsections discuss these topics.

Which SQL Server Components Should Be Installed?

Before you start the installation process, you should know exactly which SQL Server components you want to install. Figure 2-1 shows a partial list of all the components. You will see this Feature Selection page again when you install SQL Server later in this chapter, but knowing ahead of time which components you want to select means you don't have to interrupt the installation process to do research. There are two groups of components on the Feature Selection page: main features and shared features.
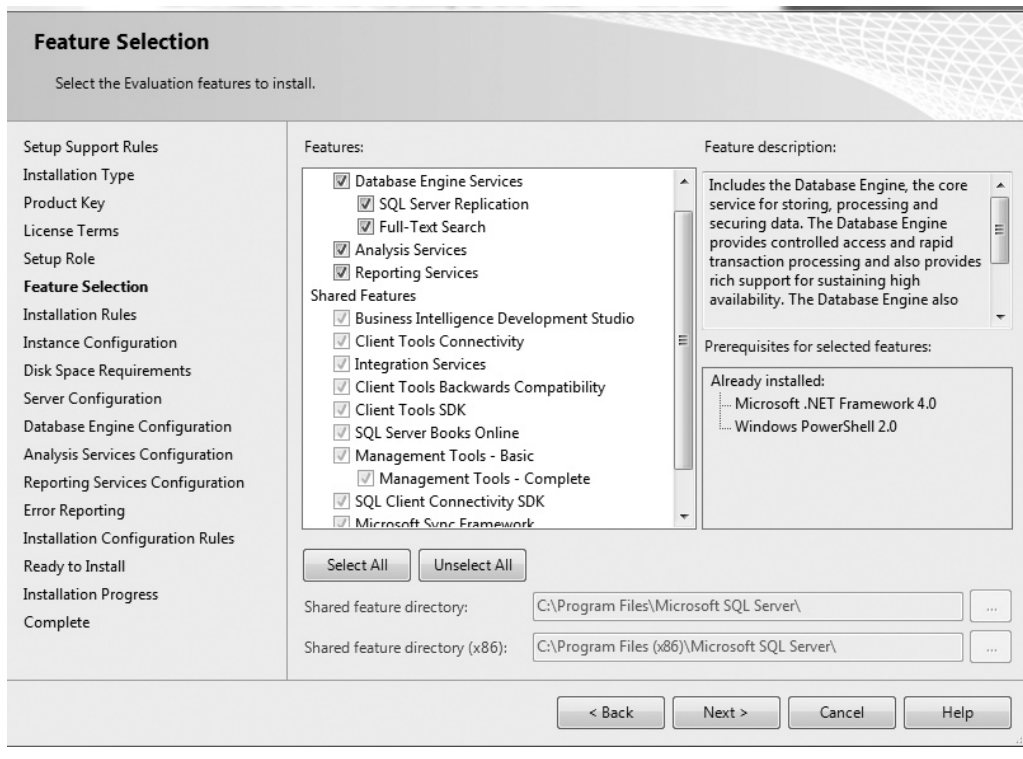

Figure 2-1 *A preview of the Feature Selection page*

This section introduces only the main components. For a description of the shared components, refer to SQL Server Books Online.

The first item in the list of the main features is Database Engine Services. The Database Engine is the relational database system of SQL Server. Parts II and III of this book describe different aspects of the Database Engine. The first of the two features under Database Engine Services, SQL Server Replication, allows you to replicate data from one system to another. In other words, using data replication, you can achieve a distributed data environment. Detailed information on data replication can be found in Chapter 18.

The second feature under Database Engine Services is Full-Text Search. The Database Engine allows you to store structured data in columns of relational tables. By contrast, the unstructured data is primarily stored as text in file systems. For this reason, you will need different methods to retrieve information from unstructured data. Full-Text Search is a component of SQL Server that allows you to store and query unstructured data. Chapter 28 is dedicated to Full-Text Search.

Besides the Database Engine, SQL Server comprises Analysis Services and Reporting Services, which are components related to business intelligence (BI). Analysis Services is a group of services that is used to manage and query data that is stored in a data warehouse. (A data warehouse is a database that includes all corporate data that can be uniformly accessed by users.) Part IV of this book describes SQL Server and business intelligence in general, while Chapter 22 discusses Analysis Services in particular.

Reporting Services allows you to create and manage reports. This component of SQL Server is described in detail in Chapter 24.

Where Will the Root Directory Be Stored?

The root directory is where the Setup program stores all program files and those files that do not change as you use the SQL Server system. By default, the installation process stores all program files in the subdirectory Microsoft SQL Server, although you can change this setting during the installation process. Using the default name is recommended because it uniquely determines the version of the system.

Should Multiple Instances of the Database Engine Be Used?

With the Database Engine, you can install and use several different instances. An *instance* is a database server that does not share its system and user databases with other instances (servers) running on the same computer.

There are two instance types:

▶   Default
▶   Named

The *default instance* operates the same way as the database servers in earlier versions of SQL Server, where only one database server without instance support existed. The computer name on which the instance is running specifies solely the name of the default instance. Any instance of the database server other than the default instance is called a *named instance*. To identify a named instance, you have to specify its name as well as the name of the computer on which the instance is running: for example, NTB11901\ INSTANCE1. On one computer, there can be several named instances (in addition to the default instance). Additionally, you can configure named instances on a computer that does not have the default instance.

Although all instances running on a computer do not share most system resources (SQL Server and SQL Server Agent services, system and user databases, and registry keys), there are some components that are shared among them:

▶   SQL Server program group
▶   Analysis Services server
▶   Development libraries

The existence of only one SQL Server program group on a computer also means that only one copy of each utility exists, which is represented by an icon in the program group. (This includes SQL Server Books Online, too.) Therefore, each utility works with all instances configured on a computer.

You should consider using multiple instances if both of the following are true:

▶   You have different types of databases on your computer.
▶   Your computer is powerful enough to manage multiple instances.

The main purpose of multiple instances is to divide databases that exist in your organization into different groups. For instance, if the system manages databases that are used by different users (production databases, test databases, and sample databases), you should divide them to run under different instances. That way you can encapsulate your production databases from databases that are used by casual or inexperienced users. A single-processor machine will not be the right hardware platform to run multiple

instances of the Database Engine, because of limited resources. For this reason, you should consider the use of multiple instances only with multiprocessor computers.

Which Authentication Mode for the Database Engine Should Be Used?

In relation to the Database Engine, there are two different authentication modes:

▶ **Windows mode**   Specifies security exclusively at the operating system level—that is, it specifies the way in which users connect to the Windows operating system using their user accounts and group memberships.

▶ **Mixed mode**   Allows users to connect to the Database Engine using Windows authentication or SQL Server authentication. This means that some user accounts can be set up to use the Windows security subsystem, while others can use the SQL Server security subsystem in addition to the Windows security subsystem.

Microsoft recommends the use of Windows mode. (For details, see Chapter 12.)

Planning the Installation

SQL Server contains a tool called Installation Center (see Figure 2-2), which appears when you start the installation of the software. This tool supports you during the planning, installation, and maintenance phases of your database system.

To begin the planning phase, insert the SQL Server DVD into your DVD drive. (This software product can also be distributed as an ISO image file.) The Install Shield wizard opens and prompts you to specify the location in which to save the extracted files. When you click Next, the Install Shield wizard extracts all necessary files from the DVD and completes its task.

The first phase of Installation Center leads you through the process of planning the installation. As shown in Figure 2-2, when you click Planning, the following tasks, among others, can be executed:

▶ Hardware and Software Requirements

▶ Security Documentation

▶ Online Release Notes

▶ Setup Documentation

▶ System Configuration Checker
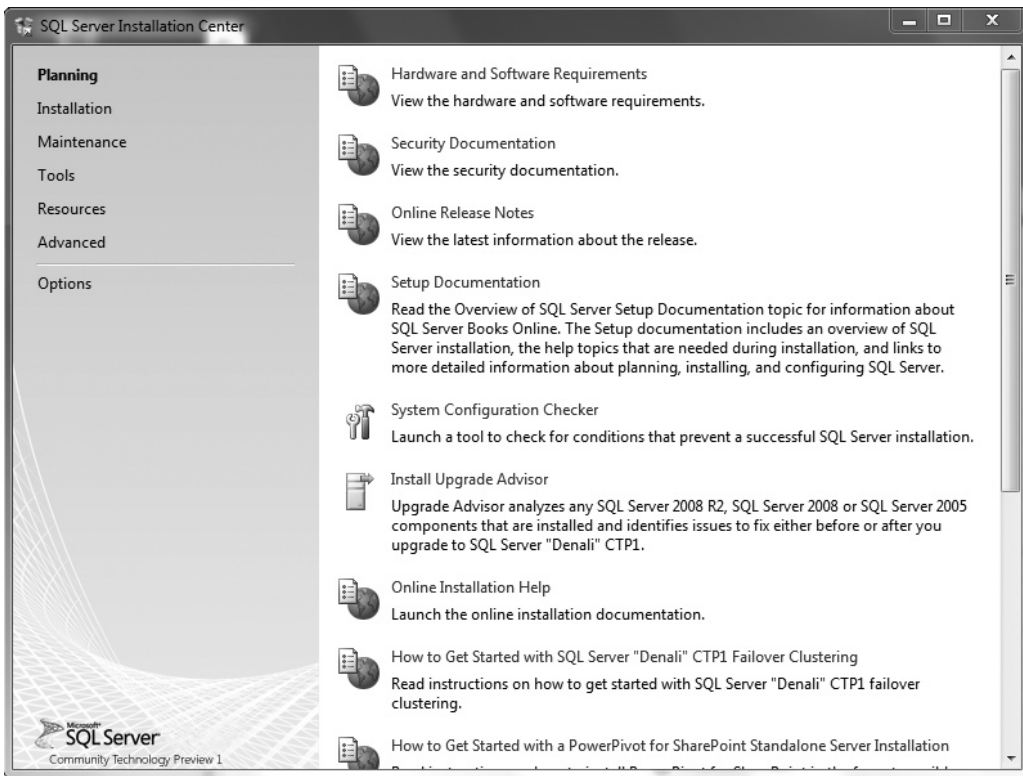
▶ Install Upgrade Advisor

Figure 2-2   *SQL Server Installation Center*

Upgrade Advisor analyzes all components of previous releases that are installed and identifies issues to fix before you upgrade to SQL Server 2012. The supported previous releases are SQL Server 2005 and 2008 (together with Release 2).

The following subsections describe the first five tasks.

Hardware and Software Requirements

The fact that the SQL Server system runs only on Microsoft operating systems simplifies decisions concerning hardware and software requirements. The system administrator has to be concerned only about the hardware and network requirements.

Hardware Requirements   Windows operating systems are supported on the Intel and AMD (Opteron and Athlon 64) hardware platforms. Processor speed should be 1.4 GHz at a minimum.

NOTE

Generally, two SQL Server edition groups exist: 32-bit and 64-bit. The requirements for these two groups differ. Therefore, the values listed in this section are general values.

Officially, the minimum requirement for main memory is 512MB. However, almost everybody recognizes that such a minimal configuration will not perform very well, and as a general guideline, main memory of your computer should be at least 2GB or more.

Hard disk space requirements depend on your system configuration and the applications you choose to install. The more SQL Server components you want to install, the more disk space you will need.

Network Requirements   To connect to any SQL Server components, you must have a network protocol enabled. The SQL Server system can serve requests on several protocols at once. Clients connect to the system using a single protocol. If the client program does not know which protocol the system is listening on, configure the client to sequentially attempt multiple protocols.

As a client/server system, SQL Server allows clients to use different network protocols to communicate with the server, and vice versa. During connectivity installation, the system administrator must decide which network protocols (as libraries) should be available to give clients access to the system. The following network protocols can be selected on the server side:

▶   **Shared memory**   Used by connections to the system from a client running on the same computer. Shared memory has no configurable properties, and this protocol is always tried first.

▶   **Named Pipes**   An alternative network protocol on the Windows platforms. After the installation process, you can drop the support for Named Pipes and use another network protocol for communication between the server and clients.

▶   **Transmission Control Protocol/Internet Protocol (TCP/IP)**   Allows the system to communicate using standard Windows Sockets as the Internet protocol communication (IPC) method across the TCP/IP protocol.

▶   **Virtual Interface Adapter (VIA) protocol**   Works with VIA hardware. For information about how to use VIA, contact your hardware vendor. (The VIA protocol is deprecated and will be removed in a future version of SQL Server.)

NOTE

Shared memory is not supported on failover clusters (see Chapter 16).

Security Documentation

When you click Security Documentation, the system takes you to the Microsoft page that discusses general considerations concerning security. One of the most important security measures is to isolate services from each other. To isolate services, run separate SQL Server services under separate Windows accounts. (Chapter 12 discusses Windows accounts and other security aspects.) Information about all other security aspects can be found in Books Online.

Online Release Notes

There are two main sources to get information concerning all the features of the SQL Server system: Books Online and Online Release Notes. Books Online is the online documentation that is delivered with all SQL Server components, whereas Online Release Notes contain only the newest information, which is not necessarily provided in the Books Online documentation. (The reason is that bugs and specific behavior issues affecting the system sometimes are detected after Books Online is written and published.) It is strongly recommended that you read the Online Release Notes carefully to get a picture of features that were modified shortly before the delivery of the final release.

Setup Documentation

The Setup documentation includes an overview of SQL Server installation; all help topics that are relevant during installation; and links to information about planning, installing, and configuring SQL Server. During the installation process, if you encounter an issue that isn't addressed in this chapter, look for coverage of the issue in the help topics.

System Configuration Checker

One of the most important planning tasks is to check whether all conditions are fulfilled for a successful installation of the database system. When you click System Configuration Checker, the component called Setup Support Rules is automatically started. (The same tool is launched at the beginning of the installation phase, described next.) Setup Support Rules identifies problems that might occur when you install SQL Server support files. After finishing this task, the system shows you how many operations were checked and how many of them failed. All failures have to be corrected before the installation can continue.

Installing SQL Server

If you have done an installation of a complex software product before, you probably recognize that feeling of uncertainty that accompanies starting the installation for the first time. This feeling comes from the complexity of the product to be installed and the diversity of questions to be answered during the installation process. Because you may not completely understand the product, you (or the person who installs the software) may be less than confident that you can give accurate answers for all the questions that the Setup program asks to complete its tasks. This section will help you to find your way through the installation by giving you answers to most of the questions that you are likely to encounter.

As its name suggests, besides planning, Installation Center supports the installation of the software, too. Installation Center shows you several options related to the installation of the database system and its components. After clicking Installation, choose New SQL Server Stand-Alone Installation or Add Features To An Existing Installation, which launches a wizard to install SQL Server 2012.

The first page of the wizard, Setup Support Rules (see Figure 2-3), identifies problems that might occur when you install SQL Server Setup support files. (Again, it is the same tool that is launched when you click System Configuration Checker during the planning phase.) Failures must be corrected before Setup can continue. If no problems are reported, click Next.

On the Installation Type page, choose one of the two radio buttons:

▶   Perform a new installation of SQL Server

▶   Add features to an existing instance of SQL Server

If you select the latter option, use the drop-down list to select the instance of SQL Server to update. After you have chosen an option, click Next.

On the next page of the wizard, Product Key, enter the 25-character key from the product packaging. (The alternative is to specify a free edition of the software, SQL Server Express, for instance.) Click Next to continue. On the License Terms page, click I Accept the License Terms.

The next page, Setup Role, allows you to choose between installing only the main components of SQL Server 2012 (Database Engine Services, Analysis Services, and Reporting Services) and installing additional auxiliary components, such as Power Pivot for SharePoint. Choose SQL Server Feature Installation and click Next.

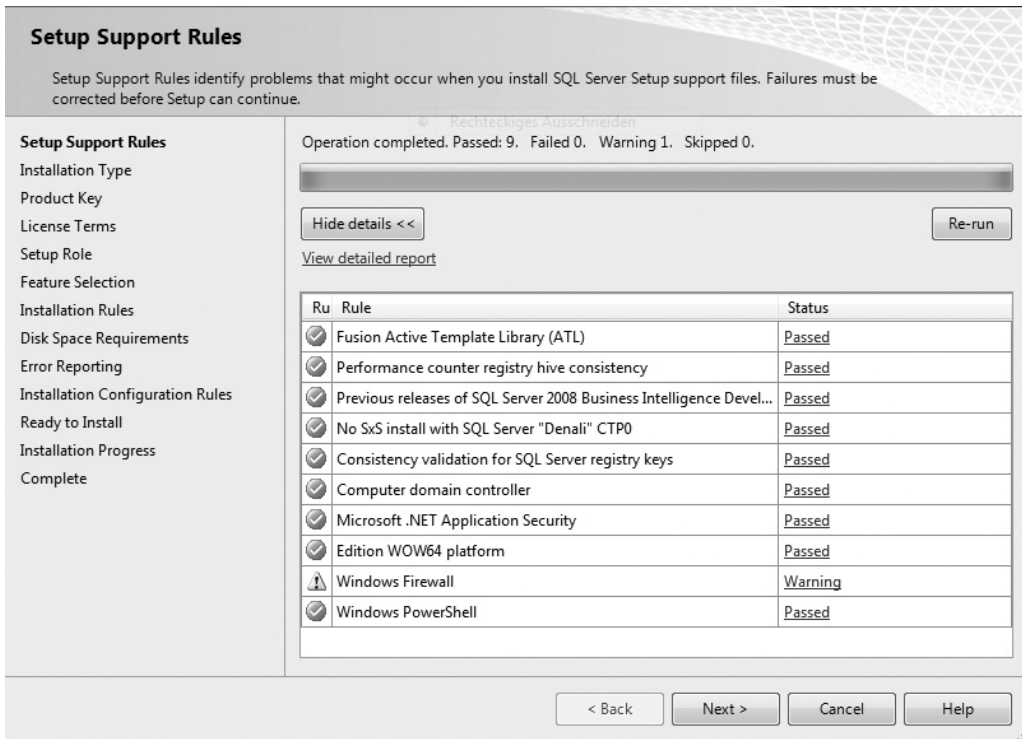**Setup Support Rules**

Setup Support Rules identify problems that might occur when you install SQL Server Setup support files. Failures must be corrected before Setup can continue.

Setup Support Rules		
Installation Type	Operation completed. Passed: 9. Failed 0. Warning 1. Skipped 0.	
Product Key		
License Terms	Hide details <<	Re-run
Setup Role	View detailed report	
Feature Selection		
Installation Rules		
Disk Space Requirements		

Ru	Rule	Status
✔	Fusion Active Template Library (ATL)	Passed
✔	Performance counter registry hive consistency	Passed
✔	Previous releases of SQL Server 2008 Business Intelligence Devel...	Passed
✔	No SxS install with SQL Server "Denali" CTP0	Passed
✔	Consistency validation for SQL Server registry keys	Passed
✔	Computer domain controller	Passed
✔	Microsoft .NET Application Security	Passed
✔	Edition WOW64 platform	Passed
⚠	Windows Firewall	Warning
✔	Windows PowerShell	Passed

< Back   Next >   Cancel   Help

Figure 2-3 *Summary of Setup Support Rules page*

On the Feature Selection page (see Figure 2-4), select the components to install by checking the corresponding check boxes. Also, toward the bottom of the page, you can specify the directory in which to store the shared components. After that, click Next to continue.

NOTE

All the shared features in Figure 2-4 are grayed out, which means that these features are not selected. For your own installation, you should decide which of these features should be installed and check their corresponding check boxes.
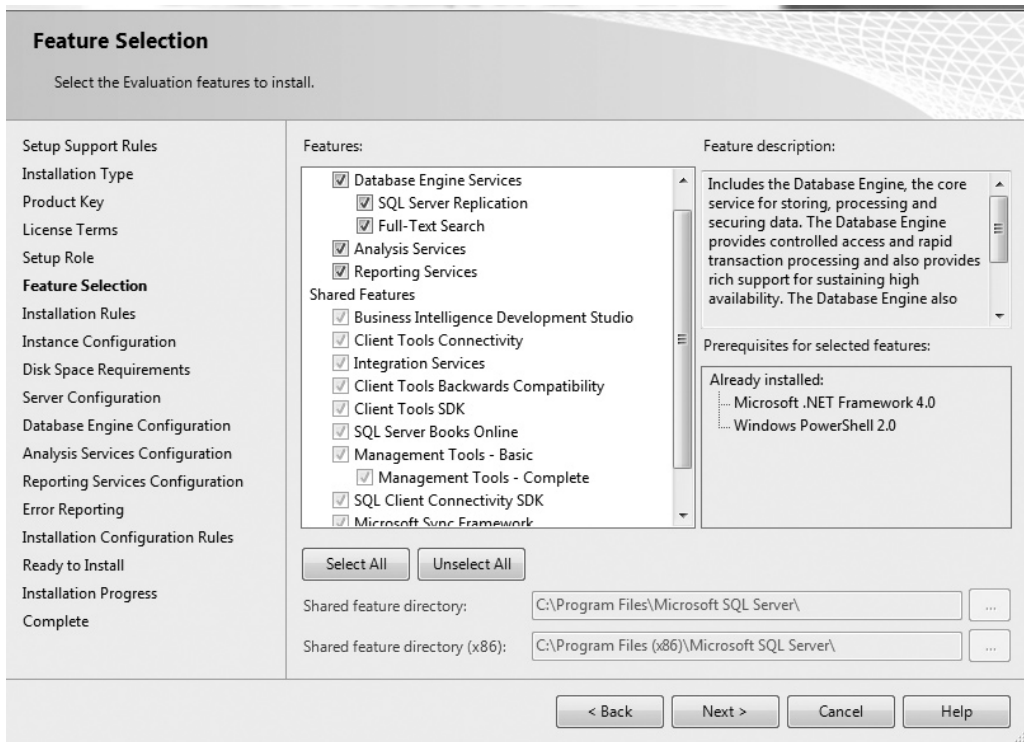
Figure 2-4 *Feature Selection page*

NOTE

Components of SQL Server that are selected will be installed one after the other in the order in which they are listed on the Feature Selection page. The installation process starts with the installation of the Database Engine, followed by the installation of Analysis Services, and so on. Only the selected components will be installed.

On the next page, Installation Rules, the setup runs rules to determine if the installation process will be blocked. If all checks are passed (or marked "Not applicable"), click Next to continue.

On the Instance Configuration page (see Figure 2-5), you can choose between the installation of a default or named instance. (A detailed discussion of these type of instances can be found in the section "Should Multiple Instances of the Database Engine Be Used?" earlier in this chapter.) To install the default instance, click Default Instance. If a default instance is already installed and you select Default Instance, the Setup program upgrades it and gives you the option to install additional components. Therefore, you have another opportunity to install components that you skipped in the previous installation processes.

To install a new named instance, click Named Instance and type a new name in the given text box. In the lower part of the page, you can see the list of instances already installed on your system. As you can see from Figure 2-5, the computer on which I installed the instance already contains an installed instance. (MSSQLSERVER is the name of the default instance for the Database Engine.) Click Next to continue.

Figure 2-5 *Instance Configuration page*

The Disk Space Requirements page shows whether the space available on your disk is sufficient for the installation of the database system. If so, click Next to continue.

The next page, Server Configuration (see Figure 2-6), allows you to specify usernames and corresponding passwords for services of all components that will be installed during the installation process. (You can apply one account for all services, but this is not recommended, for security reasons.)

To choose the collation of your instance, click the Collation tab of the same page. (Collation defines the sorting behavior for your instance.) You can either choose the default collations for the components that will be installed, or click Customize to select some other collations that are supported by the system. Click Next to continue.

On the Database Engine Configuration page (see Figure 2-7), you choose the authentication mode for your Database Engine system. As you already know, the
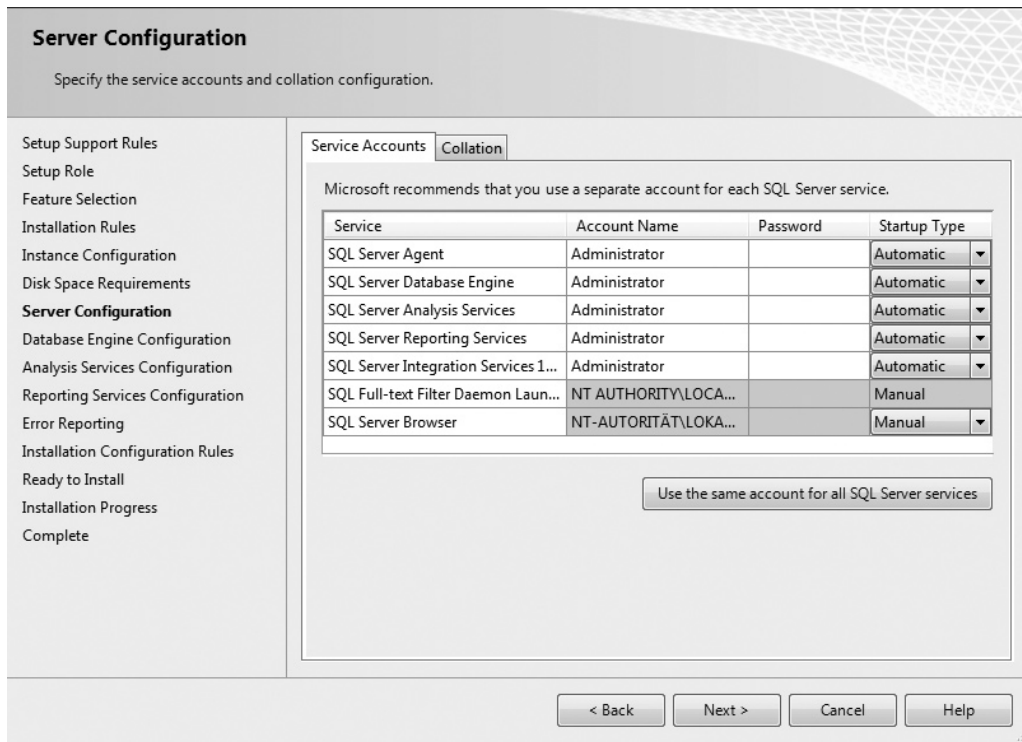

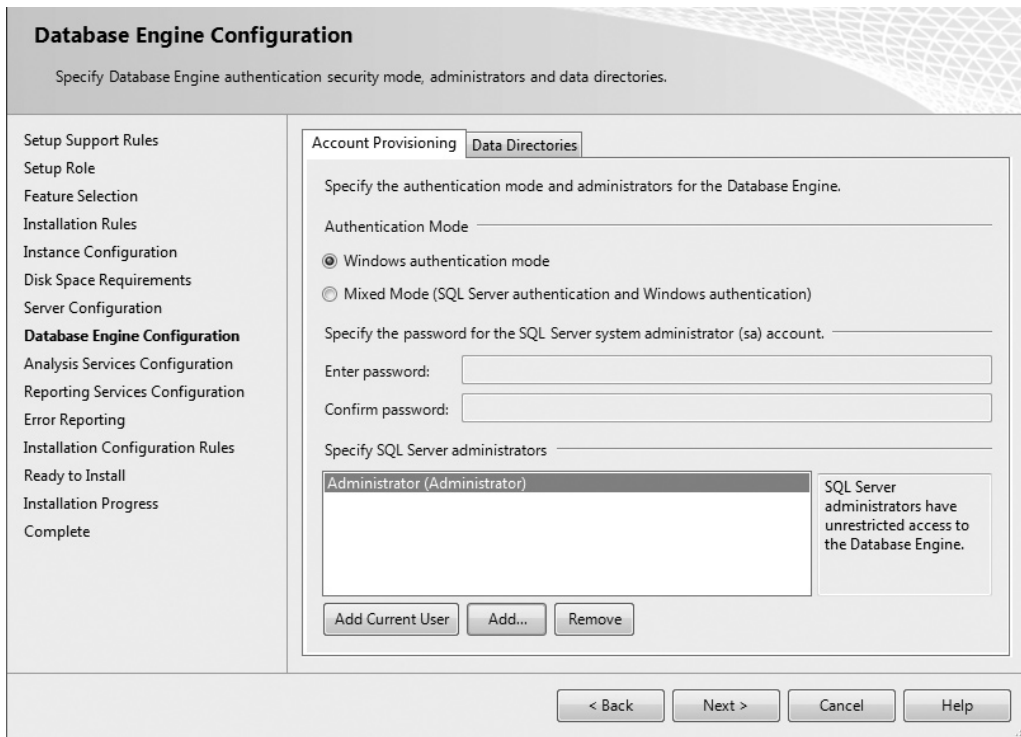**Figure 2-6**   *Server Configuration (Service Accounts tab)*

Figure 2-7 *Database Engine Configuration (Account Provisioning tab)*

Database Engine supports Windows authentication mode and Mixed mode. If you select the Windows Authentication Mode radio button, the Setup process creates the **sa** (system administrator) login, which is disabled by default. (For the discussion of logins, see Chapter 12.) If you choose the Mixed Mode radio button, you must enter and confirm the system administrator login. Click Add Current User if you want to add one or more users that will have unrestricted access to the instance of the Database Engine.

NOTE

You can change the information concerning account provisioning after installation. In that case, you have to restart the Database Engine service called MSSQLSERVER.

The other tab of the Database Engine Configuration page, Data Directories (see Figure 2-8), allows you to specify the locations for all the directories in which Database Engine–related files are stored. After that, click Next to continue.

What appears for the next step depends on whether or not you chose to install Analysis Services. (A Configuration page appears for each SQL Server component that you chose to install.) If you did choose to install it, a page similar to Figure 2-7 will appear for Analysis Services. Specify users that will have access to Analysis Services and click Next to continue.

Similarly, what appears for the next step depends on whether or not you decided to install Reporting Services. If you indicated that Reporting Services should be installed, the Reporting Services Configuration page (see Figure 2-9) appears. On this page, you
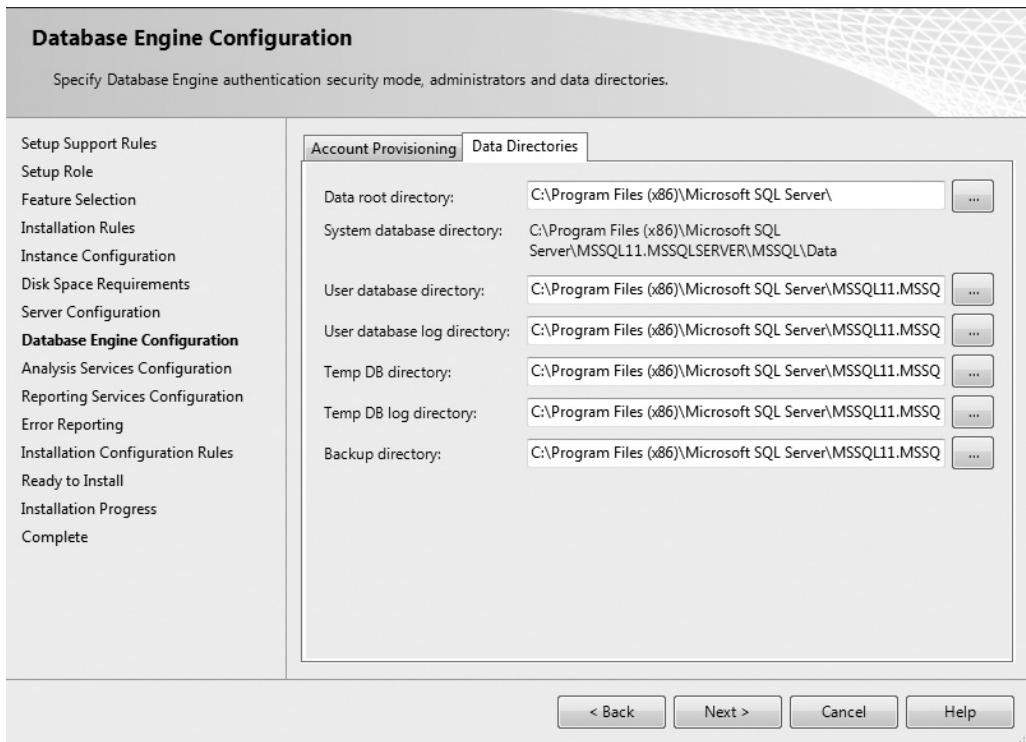

Figure 2-8   *Database Engine Configuration (Data Directories tab)*

Figure 2-9   *Reporting Services Configuration page*

can decide just to install the report server (without its configuration) or to install and configure it. The third alternative is to integrate the report server with Microsoft Office SharePoint Server (a server program that can be used to facilitate collaboration, provide content management features, and implement business processes). After that, click Next to continue.

On the Error Reporting page, specify the information, if any, that you would like to send to Microsoft automatically. Clear the check box if you do not want to take part in this automatic reporting. Click Next.

The next page, Installation Configuration Rules, is similar to the earlier page called Installation Rules. At the end of this step, the summary of all configuration rules will be displayed.

The last page, before the installation process actually starts, is the Ready to Install page. This page allows you to review the summary of all SQL Server components that will be installed. To start the installation process, click Install. Setup shows you the progress of your installation process. If the installation process succeeds, click Next.

At the end, the Complete page (see Figure 2-10) appears, with the location of the file in which the summary log is stored. Click Close to complete the installation process. After that, you can use all components that you installed during the installation process.
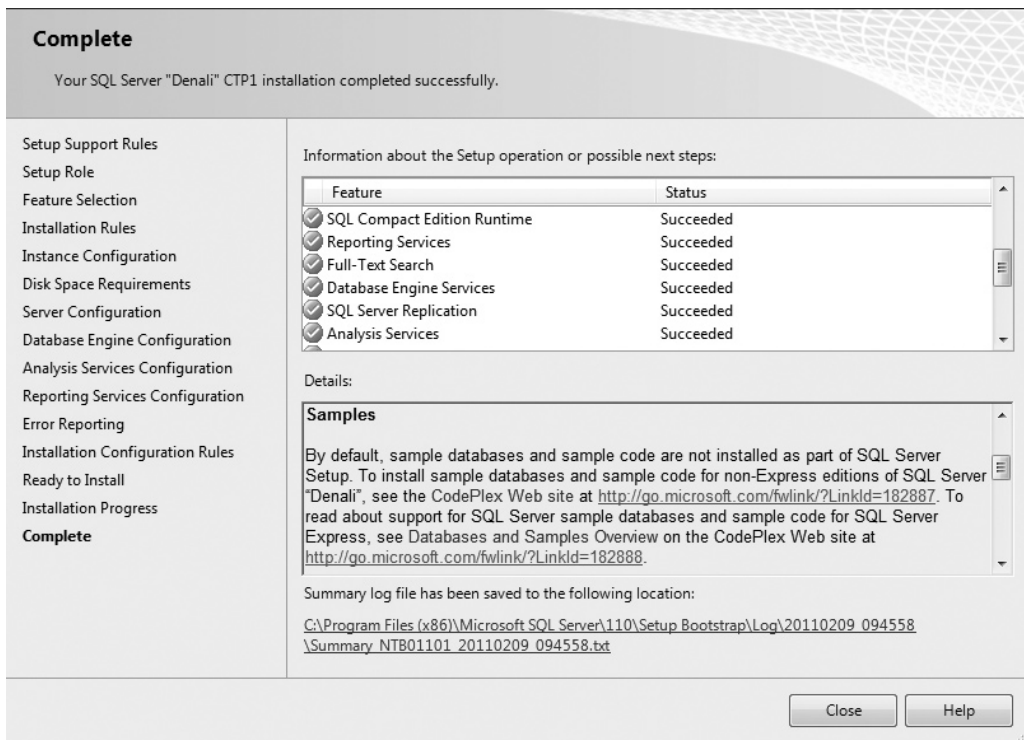

Figure 2-10   *Complete page*

Summary

The SQL Server Installation Center component can be used both to plan the installation and to accomplish it. The most important step in the planning phase is the invocation of System Configuration Checker. This component identifies problems that might occur when you install SQL Server files.

The installation of SQL Server is straightforward. The most important decision that you have to make during this phase is which components to install, a decision you prepared for during the planning phase.

The next chapter describes SQL Server Management Studio. This component of SQL Server is used by database administrators as well as users to interact with the system.