Chapter 1

Installing SUSE

The most important part of getting Linux up and running is installing the system. Some aspects of the Linux installation process may seem unfamiliar and slightly alien when you see them for the first time. This chapter demystifies the process by helping you through the installation, explaining the general principles, pointing out any stumbling blocks that you may hit upon, and offering suggestions for resolving them.

The program used to install SUSE Linux is known as YaST, which stands for Yet another Setup Tool. (The "Yet another . . . " is common in Unix/Linux, and is intended to reflect humorously on the number of similar tools that different people and companies have developed to do specific tasks in their favorite, customized fashion.) YaST provides a framework that supports independent modules that perform a variety of administrative tasks, including modules for installation, all system administration and configuration tasks, and subsequent system updates. The YaST interface that you use for installation is therefore very similar to the interfaces that you will use for system configuration and administrative tasks when you have completed your SUSE Linux installation. Powerful and well designed, YaST will quickly become your friend.

NOTE **There are minor differences in detail in the installation process among the different versions of openSUSE, SLES, and SLED covered in this book, but the essentials are the same. The screenshots and procedure shown here are from an openSUSE 11.0 installation. For a description of the differences between openSUSE, SLES, and SLED, see the Introduction.**

IN THIS CHAPTER

Part I SUSE Linux Basics

Selecting Your Installation Method

You can install SUSE in numerous ways. Different installation methods are useful in different circumstances. The most common traditional installation method is to use physical media: a set of CDs or a DVD. A network installation is also possible, either across a local network or directly from the Internet. This book focuses first on installing a SUSE system from physical media: specifically the DVD provided with this book.

NOTE **The DVD included with this book provides openSUSE 11.0.**

You can install SUSE Linux in the following ways:

- **Compact disc:** The easiest and most common form of installation because almost every modern computer system includes a CD drive. This is the standard way to perform a fresh installation of SUSE Linux on a computer system. Starting with openSUSE 11.0, a single "live-CD" version is available for download that can also be used to start off an installation.
- **DVD:** A popular form of installation that saves you from having to swap out multiple CDs, but the computer system on which you are installing SUSE must contain a DVD drive. Because of the amount of storage available on a DVD, the SUSE Linux DVD also includes some packages that are not available on the CD installation set.
- **Manual installation:** Manual installation requires that you boot from a SUSE CD but provides more control over the source of the packages used when installing SUSE Linux. If you intend to install from a network installation source, you can boot from the first installation CD or use a special small CD to boot the computer and start the installation; the main package installation is then carried out across the network. For example, this installation method enables you to install SUSE from a centralized network repository where the SUSE Linux packages are located, using network protocols such as FTP (File Transfer Protocol), HTTP (Hypertext Transfer Protocol), NFS (Network File System), SMB (Server Message Block, the Windows file sharing protocol), and even TFTP (Trivial File Transfer Protocol). Network installation is particularly useful if you want to install SUSE on a large number of networked computer systems. Manual installation also enables you to install SUSE from an existing hard drive partition where the SUSE packages are already stored. You can also use Manual installation to install SUSE from a portable, external hard drive or USB stick.
- **AutoYaST:** AutoYaST is an advanced installation method that enables a system administrator to create a profile file that can be used to completely automate the installation of SUSE Linux on any number of identically configured systems.

As you can see, each installation method has its own advantages and disadvantages, and some are specifically targeted toward technically sophisticated users or system administrators who are installing SUSE into existing networked environments. The remainder of this chapter focuses on installing from CD or DVD, but also provides an overview of using SUSE's network-based installation.

Different Installation Sources

This chapter focuses on installing SUSE Linux from the DVD that was packaged with this book or from the installation discs you have purchased or downloaded and burned to disk. However, your installation discs and the installation DVD that is packaged with this book (like all SUSE installation media) also support a number of other installation sources. At the start of the installation, you can choose to install from a network installation source rather than the CD or DVD that you booted the installation from. The alternative installation source can be chosen by pressing the F4 key on the first screen of the installation. This enables you to select from a variety of different installation sources, including FTP installation, which enables you to install SUSE from a network source, including SUSE's up-to-date repositories. (Other network installation mechanisms include HTTP, NFS, and SMB/CIFS (Windows-style network share), although FTP is the most common.) An openSUSE ''mini-iso'' is available that starts an installation, but assumes then that the rest of the installation will be done across the network. As noted earlier, the DVD packaged with this book provides the most recent version of openSUSE available at the time that this book was written. To get the latest and greatest version of SUSE Linux and all of its patches, you can always install this version and then update it using the YaST Online Update module that is discussed in Chapter 9.

Starting Your Installation

Insert the first CD or the bootable DVD in your system's optical drive.

Next, check that your computer is set to boot from the optical (CD or DVD) disk drive so that you can boot from the installation disk to get the installation started. During the bootup routine, you may need to enter the BIOS and set the order in which your system will probe attached devices looking for bootable media. You can enter your system's BIOS setup routines by pressing a special key when booting the machine. Typically, this is the F2, Delete, or F1 key — check your system's boot screen for BIOS Setup instructions, which are usually displayed at the bottom of the screen. When you've entered the BIOS setup screens, different BIOS have different ways of configuring your system's boot sequence. You may find the options you are looking for under Startup Items, Boot Options, or under your Advanced settings. Make sure that your CD or DVD drive is probed before your floppy disk, hard drives, or network. Once set, save the new settings, and your machine will reboot. Some systems allow you to make a one-time choice of how to boot the system; if this is the case, you may see a message from the system such as "Press F12 for Boot Menu."

At this point, your system should boot from the first SUSE CD or the DVD, and you will see the Welcome screen (see Figure 1-1).

TIP **In the unlikely event that your system does not display a screen like the one in Figure 1-1, reboot and hold down the Shift key while your computer system boots. This will reboot your system into a text-mode installer that follows the same general sequence as the graphical boot process described in this chapter, but has fewer dependencies on the capabilities of the graphics card in your machine.**

FIGURE 1-1

The SUSE Welcome screen

Selecting Boot Options

When the boot splash screen has finished, you will be asked to select how you want to install SUSE, as well as some other helpful options for booting your system (see Figure 1-2).

The boot menu offers more than just installation options, although the most common selection is the standard Installation item. We discuss the other six options in detail because at some point in the life of a SUSE user you will likely need to use the others.

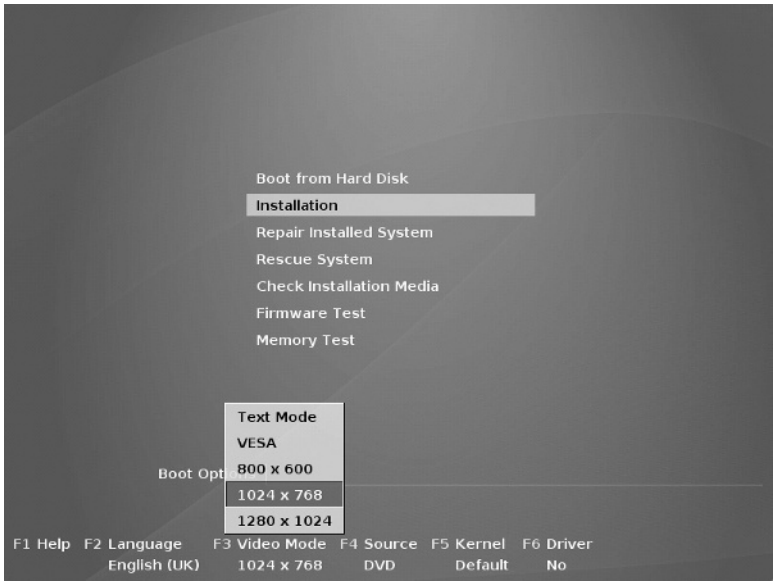
- **Boot from Hard Disk:** This is the default setting if you do not interact with the boot sequence. This option is automatically chosen after a few seconds if you do nothing; this prevents you from starting an installation accidentally and ensures that during the second stage of the installation (when the system reboots itself) it does not start installing from the beginning all over again.
- **Installation:** This is the standard option that most users should select. It will boot from the CD and start the install routine (YaST). We discuss the rest of the process in the remainder of this chapter.
- **Repair Installed System:** The YaST setup system includes a feature that can repair a broken system. So, if you have a system already installed that will not boot or has something else wrong with it, you can boot the installation CD and choose this option to try to repair it. The repair system is quite a sophisticated one, with a graphical interface and both automatic and manual options for fixing problems.
- **Rescue System:** The Rescue System boots a Linux system running in memory only. You can log in to this system as the root user without a password and carry out expert repairs

from the command line (checking filesystems, mounting filesystems, editing configuration files, and so on). The Rescue System is an expert tool, but one that can be very useful if a careless administrative change has stopped your system from booting properly.

- **Check Installation Media:** This option is particularly useful if you have downloaded a CD or DVD image yourself and burned it to disk. The media is checked to ensure that you have a perfect copy for installation.
- **Firmware Test:** Recent openSUSE versions include this option, which runs an Intel diagnostic tool that queries the BIOS, main board, and processor. Normally you will not need to use this, but it is useful for developers.
- **Memory Test:** SUSE has been very kind and integrated a memory test suite in the system boot menu. The memory test will run long and exhaustive tests on your system's memory and warn you of any anomalies that it encounters on the way. We have used this a few times with systems that don't quite seem to be running as we expect, and it has been able to tell us that a DIMM (Dual In-Line Memory Module) has indeed failed.

FIGURE 1-2

Boot options



At the foot of the initial installation screen are some other options that you can access through the keys F1, F2, and so on. These are:

- **Help (F1):** Pressing F1 brings up a screen displaying some help text about the various menus.
- **Language (F2):** Here you can select the language for the installation. You get another chance once the installation has started.

- **Video mode (F3):** Here you can select the video mode that you want to use for the installation. The selections include text mode and various possible screen resolutions. Usually the setting that is automatically chosen by default is acceptable. You can see this menu in Figure 1-2.
- **Installation source (F4):** If you have booted from the CD or DVD, this is the automatically chosen option. But you can choose a network installation here, via FTP, HTTP, or NFS. You can also choose to find an installation source by SLP (Service Location Protocol), which allows an installation server to announce itself on the network.
- **Kernel (F5):** Here, if necessary, you can choose to run the installation with certain special offers such as with ACPI disabled. In general, you only need to change the default here if you have tried to install already and run into serious problems.
- **Driver (F6):** It is possible to add an additional driver to the installation process if necessary through this option. Again this is needed only rarely, in the case where you have some very recent or special hardware on your system that prevents you from installing at all without using an external driver.

In this chapter, we select the standard Installation option in the boot menu.

NOTE **When the installation starts to boot, a graphical splash screen is displayed (see Figure 1-3). While this is fine for first-time users, it is something that will infuriate hard-core Linux users because it hides the system messages that are displayed during the boot process. SUSE is aware this may be a problem for some users, and pressing ESC or F2 while the system boots up will allow you to see the kernel and init messages.**

So far, the system has booted a minimal Linux kernel that is sufficient to run the installation process and execute the SUSE installer and the various utilities that it uses to probe and configure your system. SUSE's YaST installer now begins to collect information that it will use to configure your system to match your personal and hardware requirements.

TIP **The installer uses a very different boot process from that used by a standard SUSE Linux system. The standard Linux bootup sequence is discussed in more detail in Chapter 4.**

Configuring Language Settings

When the system has booted, you will be asked to configure your language settings (see Figure 1-4). SUSE (with help from the openSUSE community) has put a lot of effort into supporting as many languages as possible to accommodate a large audience. Each language choice is displayed in its own language and script. When your language has been selected, the installer will instantly change the system language and allow you to continue the installation process in that language.

FIGURE 1-3

Booting SUSE installation

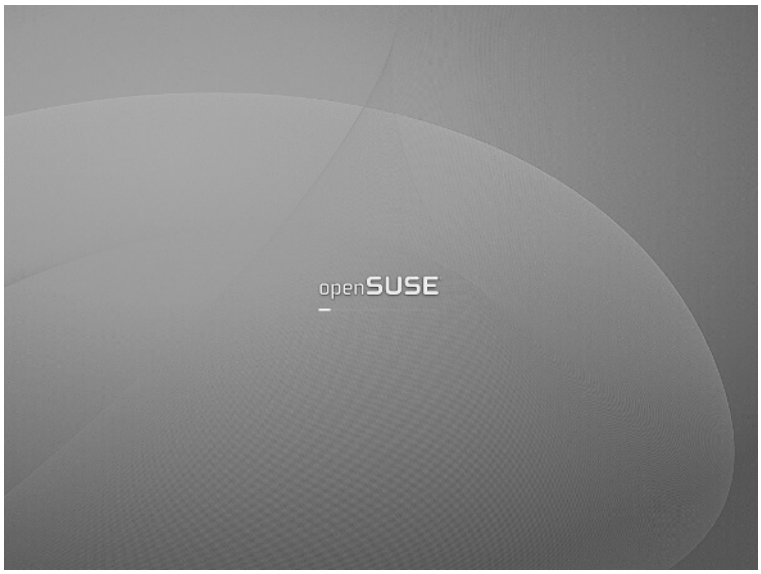
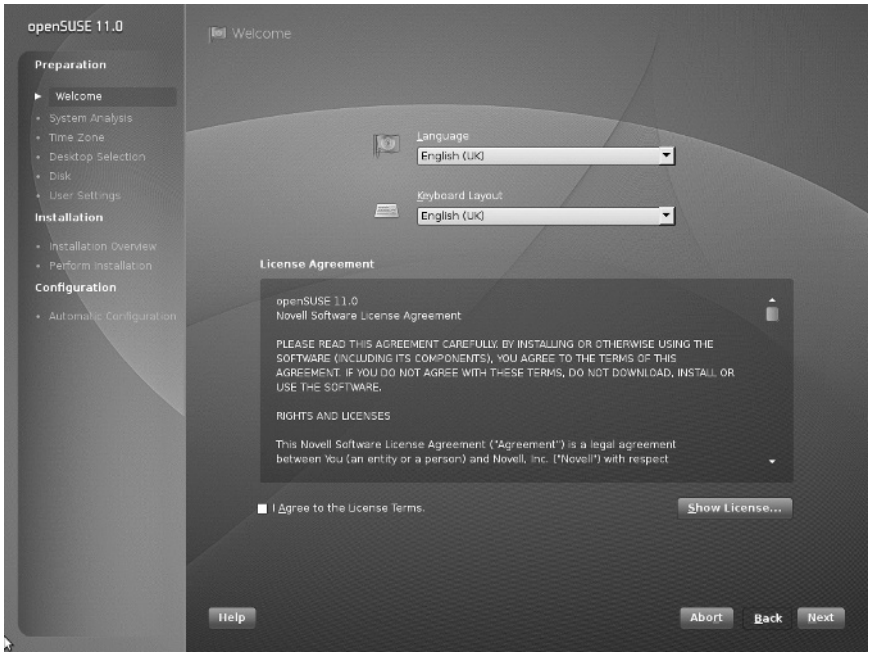


FIGURE 1-4

Selecting the system language



In this screen, you can choose your language and (if necessary) keyboard layout. As with most software products, you also have to agree to the SUSE license before using the system. Of course, most of the software you will be installing is free, but this is where you are informed of the terms and conditions on which it is supplied. Depending on the exact software selections you make, you may also have to agree to individual license terms for a few specific packages later in the installation (such as Sun Java, Adobe Acrobat reader, and a number of other packages).

During the installation routine, you can control the screen with your keyboard using *accelerators*. Any option on the screen can be selected by pressing the Alt key (Alt) and the accelerator code, signified by an underlined character in a button or a GUI element. For example, in Figure 1-4, pressing Alt+R will abort the installation while Alt+N will accept the setting you selected and you proceed to the next screen.

The installer then goes through an analysis of the system, probing the hardware and checking for a previously installed system (see Figure 1-5).

FIGURE 1-5

System probing

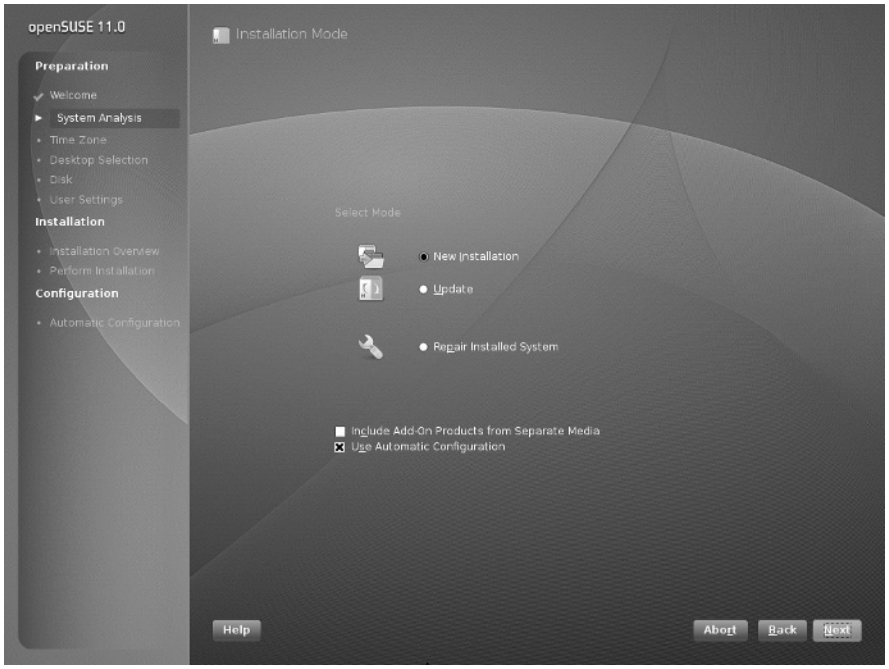
Installation Mode

You are now (see Figure 1-6) given a choice of installation modes: "New Installation," "Update" (which allows you to update a previous SUSE installation), and "Other Options." Choosing "Other Options" gives you the choice of "Repair Installed System," which is the same as the "Repair" option on the boot screen, and "Boot Installed System," which finds a previously installed system on the hard disk and boots that system.

TIP **Booting from the installation media and choosing "Repair Installed System" at this point can be a useful option if something has gone wrong that stops the system from booting normally (such as a damaged boot loader or incorrect initial ramdisk).**

FIGURE 1-6

Installation mode



You also have the option to set up network installation sources ("Include Add-On products from Separate Media") at this point; if you do, the installer also has to set up the network card so that it can acquire the necessary information from the package repositories across the network. Once the information about local and remote installation sources has been gathered (this can take a minute or two), the installation continues.

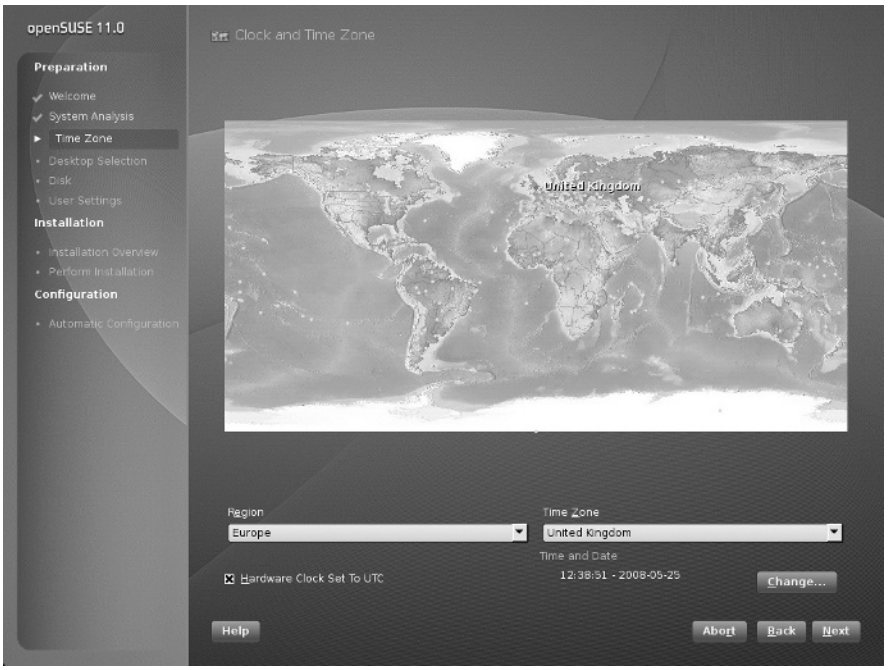
In this screen you are also given the option "Use Automatic Configuration." This will cause most of the network and hardware configuration to be done entirely automatically — a new feature in openSUSE 11.0 that helps make the installation run more quickly. Choosing automatic configuration will usually be fine; you can always make necessary changes after the installation has completed.

Customizing the Installation

For SUSE to operate correctly, the system time must be correct. (You may get quite confused when the system says something happened at 3 a.m. when in fact it happened at noon!) Before partitioning your disks and setting up your system, you will need to select your time zone, and check your date and time and also your location (see Figure 1-7). In openSUSE 11.0, a nice graphical world map allows you to click on your location: Clicking the map zooms in to a smaller region.

FIGURE 1-7

Time zone selection



You can choose whether to set the hardware clock to local time or to UTC (coordinated universal time, sometimes called GMT). In general, the best choice is UTC, but this can cause problems if Linux is sharing a dual-boot system with another operating system. After the installation is finished, you can set up an NTP (Network Time Protocol) source so that the clock in Linux is always precise.

Selecting Your Desktop Environment

The two most popular desktop systems for Linux are GNOME and KDE. Here you can choose between them (see Figure 1-8). If you are installing openSUSE 11.0, two forms of KDE are available: the tried and tested version 3.5 and the newly released version 4.0.

FIGURE 1-8

Selecting your desktop environment

Alternatively you can select "Other" and choose a minimal graphical environment or a text-mode-only installation. If you are installing a server system, one of these might be the best choice and can minimize the number of unnecessary packages to be installed.

If you want to install both GNOME and KDE (or both KDE versions) and switch between them at a later stage, that is also possible: Choose one of them here and later in the main package installation screen choose the other environment in full as well. Then when the system is fully installed, you will be able to choose between the different desktop environments when you log in.

The choice of GNOME versus KDE is a matter of personal preference. If you are unfamiliar with Linux desktops, you may want to install them both and decide which you prefer. As with many things in Linux where you have a choice, there are very vocal advocates on both sides of the discussion. One of the authors of this book is a KDE user, and one is a GNOME user.

Recent versions of GNOME have a very clean look and feel, while the KDE desktop can seem a little cluttered. First-time users are often put off by the fact that a single click is used to launch

an application from an icon in KDE unlike the double-click in Windows. At the time of this writing, KDE version 4 is still very new, and is not yet as mature as KDE 3.5.*x*, which is also available as an installation option.

Here I have chosen KDE 3.5 as the desktop selection.

Partitioning Your Disks

YaST initially chooses a partitioning scheme based on your disk layout. It is very likely that the installation default will be fine (see Figure 1-9) for a first-time user if there is no previous operating system on the disk that you want to preserve. For other users, YaST enables you to control the layout of partitions on the disk, the type of filesystems that are used on those partitions, and any options that will be used when mounting them.

FIGURE 1-9

Partitioning

The proposal that YaST offers you depends on whether it finds any partitions on the disk and what they are. If there is a Windows partition, YaST proposes a change in which the Windows partition is nondestructively resized to make space for Linux and offers to create a sensible layout for the new partitions you need. In that case you can usually safely go along with the proposal.

If there are pre-existing Linux partitions on the disk, YaST's proposal may involve removing one of them and replacing it with the new system. In such a case it is definitely your responsibility to know what the partitions on the disk contain and whether you want to keep or remove them.

But in any case, no changes will actually be made to the disk until you finally go ahead with the installation, so if you make mistakes at this stage, you can still abort the installation and leave the hard disk as it was.

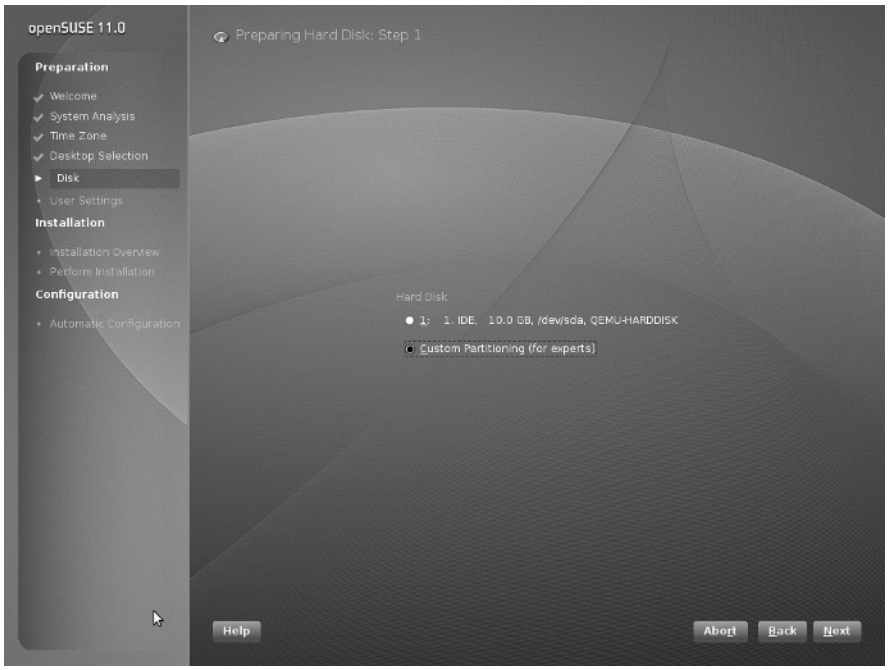
What you do next depends on your requirements.

If you want to accept the default partition layout selected by YaST, select Edit Partition Setup, click Next, and then if you do not wish to make changes to the proposal, skip ahead to the section of this chapter entitled "Selecting Software for Installation."

If you are an experienced Linux user, or you just want to specify your own customized partitioning scheme, select Create Partition Setup and click Next. Then, select the "Custom Partitioning (for experts)" option, and click Next (see Figure 1-10). This shows you any existing partitions and presents you with the option to create and delete partitions, as well as other advanced options such as software RAID, LVM (logical volume management), and cryptographic filesystems.

FIGURE 1-10

Selecting custom partitioning



If you are creating your own partitioning scheme and do not already have an operating system on your computer that you want to preserve, skip to the section "Primary and Extended Partitions."

Resizing Existing Operating System Partitions

Nowadays, it is quite common to have systems that can boot multiple operating systems. Such computer systems enable users to take advantage of the power and applications available in each operating system by selecting between available operating systems when you boot the system. These are typically referred to as dual-boot systems because most people install at most two operating systems on a single machine. However, because more than two operating systems can be installed on a single disk, the proper name is multiboot, which is the term used in this section. The number of operating systems that you can boot and run on a single computer is really limited only by the amount of disk space available on your computer system.

With SUSE Linux, the most common type of multiboot system is a system that can boot either SUSE Linux or some version of Microsoft Windows. Windows will be used as an example throughout the rest of this section, although the same general concepts are true when setting up multiboot systems that will run SUSE Linux and any other operating system.

Details about how to install Windows on an existing SUSE Linux system are not relevant to a discussion of installing SUSE Linux. However, the reverse is not true. Installing SUSE Linux on a system that already runs Windows, and on which you want to be able to continue to run Windows, is a common wish. This is quite easy to do and simply involves resizing your existing Windows partition(s) so that sufficient contiguous space is available for installing SUSE.

If you are running a new installation on a system that already contains an operating system such as Windows that you want to preserve, and if the disk or Windows partition in that system has sufficient free space to install SUSE Linux, YaST will propose a solution based on resizing your existing Windows partition and automatically creating appropriate swap and root partitions. If at all possible, you should accept this default selection.

If you do not have sufficient free space to install SUSE Linux and YaST cannot automatically resize your existing operating system partitions, your only alternative (besides adding another disk to your system) is to abort the SUSE install process, remove the installation media, and reboot into your other operating system. You must then free up sufficient disk space and clean up the organization of your operating system's partition(s) using a utility such as Windows' Disk Defragmenter. If there is sufficient unused space on your Windows partition, you should be able to restart the SUSE installation process and let YaST select appropriate partitioning and resizing values for you.

CROSS-REF For more on setting up dual-boot (multiboot) systems, see Chapter 4.

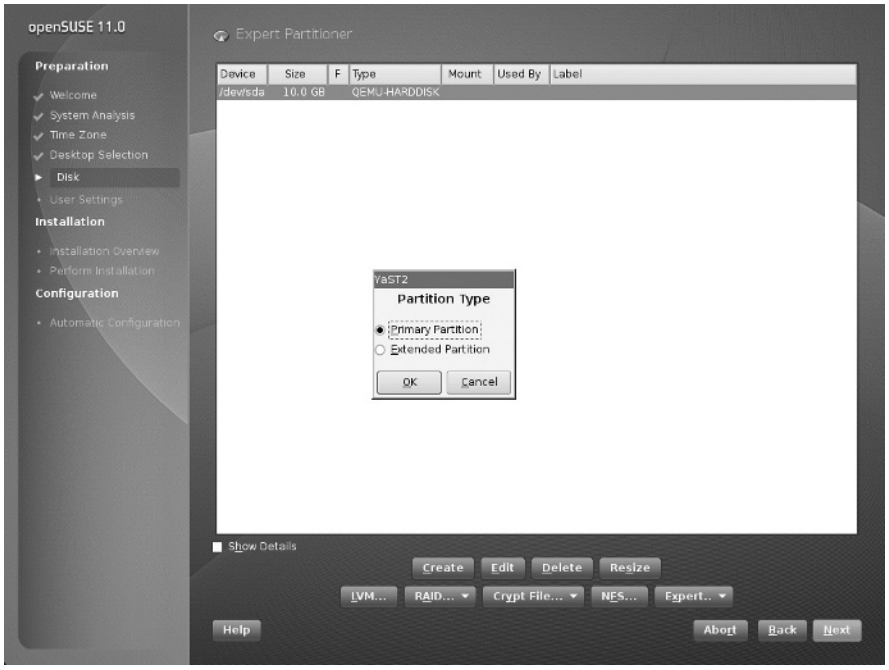
Primary and Extended Partitions

In this section, we start with a clean disk to create the partitions needed to install SUSE. If you want to remove the partitions on an existing installation of an operating system, select the partition and press Delete. You will be asked to confirm this, and the partition will be removed.

If you select Create, you are prompted for the type of partition you want to create (see Figure 1-11). In the PC world, the BIOS can access only four primary partitions. These can be thought of as four physical boundaries on the disk, with separate data and filesystems on each. With Linux, you need at least two partitions, and if you have Windows on another partition and a data or home disk on the other, you may quickly run out of ways to expand the way your disk is laid out. To combat this, logical and extended partitions were designed. An extended partition is a placeholder for further logical partitions. It is a good idea to create one extended partition (which takes up one of your primary partitions) and create logical partitions to accommodate partitioning schemes in the future.

FIGURE 1-11

Creating a partition



The most common way to partition disks for home Linux use is to have one primary partition for the Linux root partition, a second primary partition for the swap partition, and then an extended partition for any other (logical) partitions that may be needed. Using extended and

logical partitions grows the amount of total partitions you can have in a system to 16, which is usually more than enough.

Select the Primary partition option and click OK to proceed.

Defining Filesystems

After a primary partition has been created, you need to define the format in which a filesystem should be created on that partition, its size, and the mount point for that filesystem. Linux and Unix use the definition of mount points in the same way that Windows uses drive letters. The advantage with Linux is that the whole system is hierarchical in nature, and therefore access to data on disks, network drives, and partitions can be kept under one manageable tree structure.

Swap Partitions

The first partition you need to create is the swap partition. Most modern operating systems use swap partitions, also referred to as swap space, which provides the ability to free up memory when the memory is full by pushing processes out to the swap space on disk.

You should always create a swap partition on a Linux or Unix machine as the workload on any system can never be fully quantified beforehand and running out of physical memory without swap space causes processes to crash or be unable to execute in the first place.

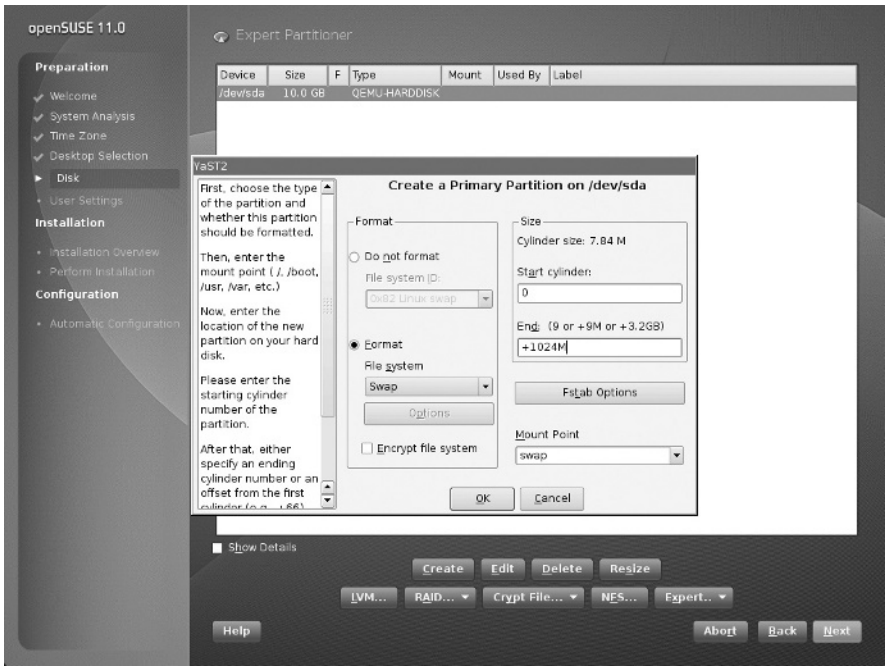
The window to create a filesystem/partition can be quite daunting for new users (see Figure 1-12). SUSE and the other distributions try to make the process as simple and usable as possible. Selecting the format of the filesystem is primarily a concern when creating data partitions or for advanced users, as discussed later in the chapter. When creating a swap partition, you must select Swap as its format. You will notice that the mount point will also change to be swap because the swap partition is not mounted like a data partition but is used internally by the Linux system.

CROSS-REF **Filesystems are discussed in more detail in Chapter 3.**

Start and end cylinders are often new concepts to new Linux users who are used to data sizes being defined in mega- and gigabytes. YaST enables you to enter the size of a partition in human readable form, such as MB and GB. The start cylinder, as this is the first partition on the disk, is 0 (the start of the usable space on the disk), and the end cylinder is what we need to change. It is usually customary to select a swap size that is 1.5 times the amount of physical RAM in the system, but this is subject to much conjecture. A reasonable swap size should be considered based on the workload of the machine you will be using, and as most modern PC systems have at least 512MB, it is safe to use the standard 1.5 times physical memory. To specify that you want the swap partition to be 750MB, enter +750M in the End cylinder entry box. The + signifies that you want to add space, the number is the unit of space needed, and the M specifies that the amount of data is expressed in megabytes. You can also specify G for gigabytes, which you will be using in the following example of creating a root partition.

FIGURE 1-12

Creating filesystems



After entering the size of your new swap partition, click OK to proceed.

TIP **At a bare minimum, the filesystems that need to be created are the swap space and a root (/) filesystem. However, for ease of use and manageability, the creation of a `/home` partition can help keep your personal data separate from the system partition and also enable you to keep your data if and when you do a total reinstall of Linux. See the section on "Data Partitions" later in this chapter for more information.**

In this example you are creating the bare minimum — the swap and root partitions.

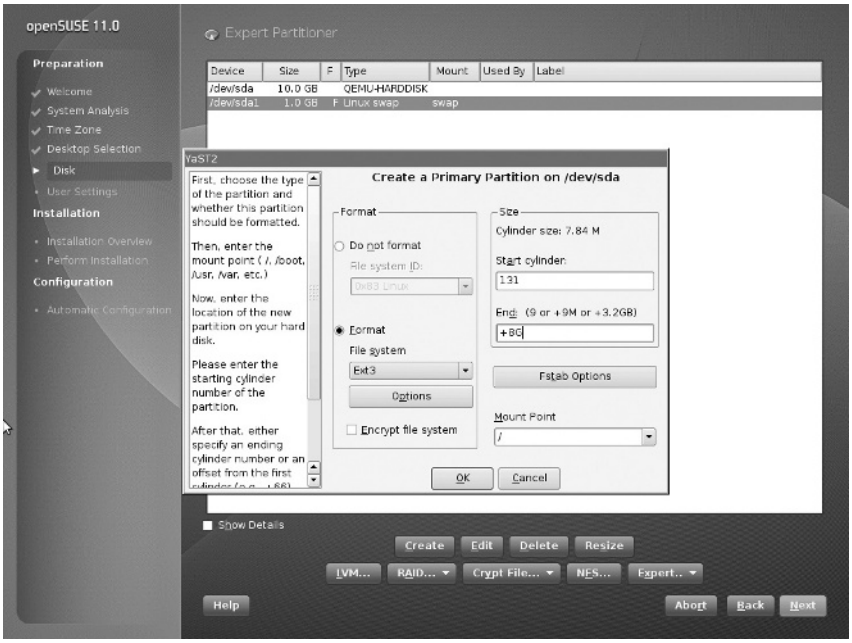
The Root Partition

After the swap space has been created, you need to configure the root (/) partition (see Figure 1-13). The root (/) partition is the most important data partition on any Linux or Unix system and is the only non-swap filesystem partition that is required in order to boot a Unix or Linux system. The root partition takes its name from the fact that it is the partition mounted at the root of the Unix/Linux filesystem, which is the directory known as /. A filesystem must be mounted on this directory to successfully boot a Linux system. The root filesystem contains core directories required to boot Linux, such as the directory through which devices are accessed (`/dev`); the directory containing system administration, configuration, and initialization

files (`/etc`); the directory in which critical system libraries, kernel modules, security, and internationalization information are located (`/lib`); and directories containing critical system binaries (`/sbin`, `/bin`, and so on).

FIGURE 1-13

Creating the root partition



By default, creating this partition will automatically use the remaining unallocated space on the hard drive, which is fine for our example. However, if you need to create another partition — `/home`, for example — you specify the size of the partition explicitly as you did with the swap space. See the next section "Data Partitions" for an overview of why you may want to create additional partitions.

When you create a partition, you can choose the type of filesystem that you want to put onto the partition. In the Windows world, there are the FAT and NTFS filesystems, and those filesystems can be accessed from Linux, too. But for your Linux system you will use one of the native Linux filesystems, and you are given the choice at this point.

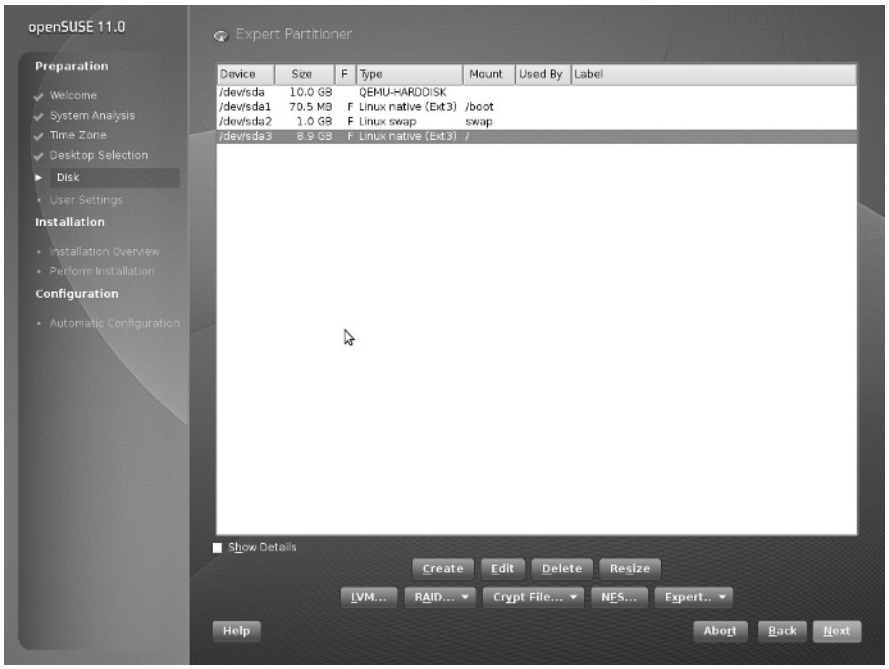
On newer versions of openSUSE (and for future versions of SLES), the default filesystem is EXT3, which is a journaling filesystem based on the original Linux EXT2 filesystem. SLES 10 and older versions of openSUSE use the Reiser filesystem as the default. The traditional EXT2 filesystem is also an option here (but in general not one you should choose because it lacks journaling capabilities), as is the advanced XFS filesystem (which is also a journaling filesystem).

A *journaling filesystem* dedicates a specific part of the filesystem for use as a cache of pending writes to the filesystem; this ensures that filesystem updates occur in a clean, atomic fashion and allow a fast recovery if the system is not cleanly shut down. Ordinarily, when a Linux system is shut down, it ensures that all pending writes to each filesystem have completed and then detaches the filesystems (known as unmounting them) to guarantee that all system data is consistent before the system is turned off. Using a journaling filesystem does not mean it is safe to just power off the machine as data loss can still occur when data is not completely written to the disk. But a journaling filesystem is much less likely to become corrupt in the event of sudden loss of power or some other disaster and takes less time to check for errors.

After the root partition has been created, you can review your changes (see Figure 1-14) and proceed further with the installation by clicking Next. If you want to create additional filesystems during the installation process, read the next section before clicking Next.

FIGURE 1-14

Reviewing changes to the partition scheme



Data Partitions

Data partitions is a generic term for partitions that are formatted as a filesystem and in which both the system and its users can store data. The partition designated as the root filesystem is a special case of a data partition because it is required in order to boot a Linux system.

The preceding sections explained how to create the swap and root partitions that must be present to successfully boot a Linux system. However, you can also create other data partitions, format them as filesystems, and specify their mount points during the installation process. On Linux systems, a mount point is simply a Linux directory through which a filesystem is made available to the system, known as *mounting* that filesystem. Using regular directories as mount points is a clever part of the design of Unix and Linux. If you run out of disk space on a given partition, you can add another disk to your system, create data partitions there, copy the data from existing directories to those partitions, and then mount the new partitions on the directory where the data was originally located, effectively increasing the amount of storage available to an existing system.

Today's larger disks make it attractive to create other data partitions. You have several reasons to consider creating multiple data partitions on today's disks:

- When you boot a Linux system, the system checks the consistency of each of its filesystems (as defined in the file `/etc/fstab` — more about this in Chapter 3). Checking the consistency of a single, huge, nonjournaled filesystem can take quite a bit of time.
- Filesystem corruption can occur as a result of a number of problems, such as a system crash, sudden power loss, or hardware problems. Whenever a filesystem is corrupted, repairing it (which is mandatory) can cause you to lose data. Creating multiple partitions reduces the extent to which filesystem corruption can affect a single data partition.
- Keeping data on multiple partitions limits the chance that you can lose data during a subsequent system upgrade. Some upgrades reformat the root partition or re-create its directory structure. If your user data is stored on other data partitions, they will not be affected by changes to the root filesystem.
- Some Linux backup software backs up data on a per-partition basis. Backing up a single huge partition can take quite a bit of time. Also, if your backups fail (such as when a tape is corrupted), you may not be able to use the backups to restore your system. Creating multiple partitions limits problems related to a backup failure to a single partition.

Chapter 3 provides more detail about creating multiple partitions and the types of filesystems supported by Linux, and provides additional reasons why you may want to create multiple partitions on your Linux system. Most types of Linux filesystems can be resized once they have been created, enabling you to customize your system's partitioning, even after the system has been installed and is running.

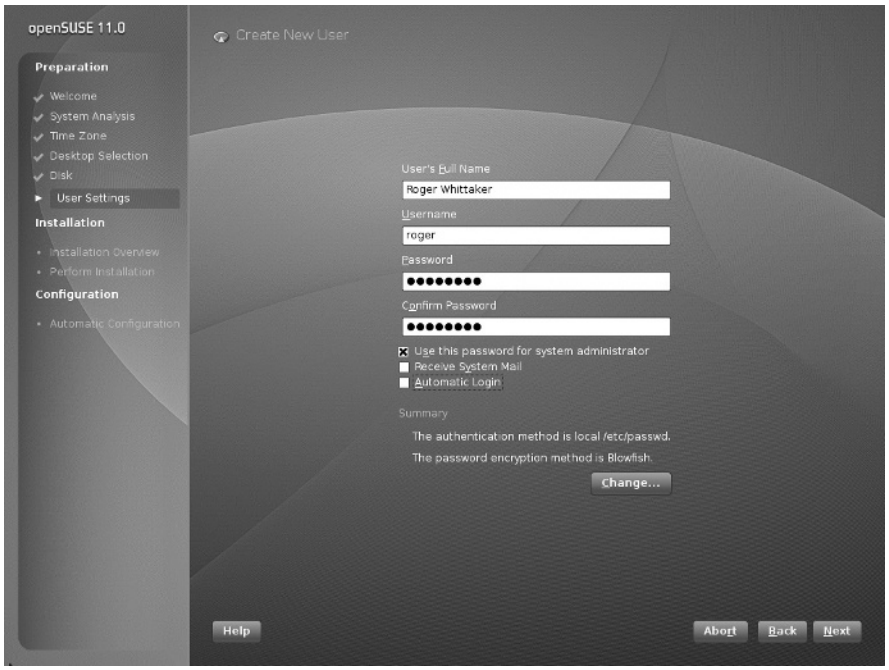
If you want to create multiple partitions during the installation process, you can do this by making sure that the root partition does not completely fill your disk and then creating additional partitions in the remaining space on your disk. Common parts of a Linux system that you might want to put onto separate data partitions are `/boot`, `/home`, `/opt`, `/tmp`, `/var`, `/usr`, and `/usr/local`. For more information on these partitions and the types of information stored there, see Chapter 3.

Creating a User

Before the installation proceeds, you are prompted to create a user and set a password (see Figure 1-15). You are asked for your full name. A system username will be suggested (your first name in lowercase letters), but you can change this to anything you wish. You are asked to provide a password, which you need to type twice.

FIGURE 1-15

Creating a user



In this screen, you can also choose whether or not to use the same password for the system administrator (the root user). For a home desktop machine, this is a sensible option. If you choose not to use the same password for the root user, you will be prompted to set it separately. You can also set "Automatic Login," which means that the user you create here will be automatically logged in when the system boots. For privacy reasons you will probably not want to do this unless the system is physically inaccessible to others.

TIP **One nice feature of the SUSE user creation process is that you can set yourself as the user who receives any e-mail destined for root by selecting the Receive System Mail option. Regardless of whether you set up this option, it is always a good idea to read the root user e-mail (if you are the owner of the root user account!) to see any automated e-mails that the system sends as well as e-mails from the mail subsystem. This includes bounced e-mails, system errors, and package updates that have been installed.**

Installation Settings

Now that most of the installation decisions have been made, YaST gives you a proposal ("Installation Settings") of what it is going to do (see Figure 1-16). If you are installing on a new system with no other operating system and you are happy to accept all the defaults, you can check the installation profile and click Install.

FIGURE 1-16

Installation overview

If you want to tweak the installation system, change the partition layout, or install other packages, continue reading.

Customizing Your Installation

Clicking any heading in the Installation Settings screen enables you to modify that aspect of your installation. Similarly, selecting the Change button displays a pop-up menu from which you can select any of the headings on this screen to change or examine the relevant aspects of the installation to guarantee that they meet your requirements.

- **Partitioning:** If you are unhappy about the partitioning scheme that is displayed here, you can go to the partitioning dialog (maybe for the second time) and make changes. If the disk contains partitions from a previous installation or another operating system that you want to keep, you should check carefully that the partition settings are what you want.
- **Booting:** YaST's proposal for the bootloader type and its location are displayed here. In most cases the proposal will work fine.
- **Software:** A listing of the software selections that have been chosen for you based on your earlier choice of a desktop environment. You can add additional software patterns or select individual packages by clicking on this heading.
- **Locale settings (Keyboard layout):** If you wish to change the language settings you selected earlier, you can do it here.
- **Time zone:** The time zone selection you made earlier is displayed here. Again, if you wish to change it, you have another chance now.
- **User settings:** Shows the name of the user that you set up earlier and notes that the root password has been set.
- **Default Runlevel:** The default for a system with a graphical desktop environment installed is "5: Full multiuser with network and display manager." If you change this to 2 or 3, the system will boot without starting the graphical environment, and only a text login will be available when the system starts up. Runlevels are discussed in Chapter 4.
- **System:** This is primarily for information only, displaying the hardware that YaST has discovered on your system. There is an option to save this information to a file. The System Settings button allows for some advanced kernel and driver choices.
- **Installation from Images:** The openSUSE 11.0 release pioneered the use of compressed system images on the installation media, corresponding to the main software patterns. This method speeds up the installation process considerably over the older method of installing each software package individually. There is no particular reason to disable this feature.

Throughout the remainder of the installation, we talk in more detail about what these settings do to your system and we also discuss the ways in which you can change these settings.

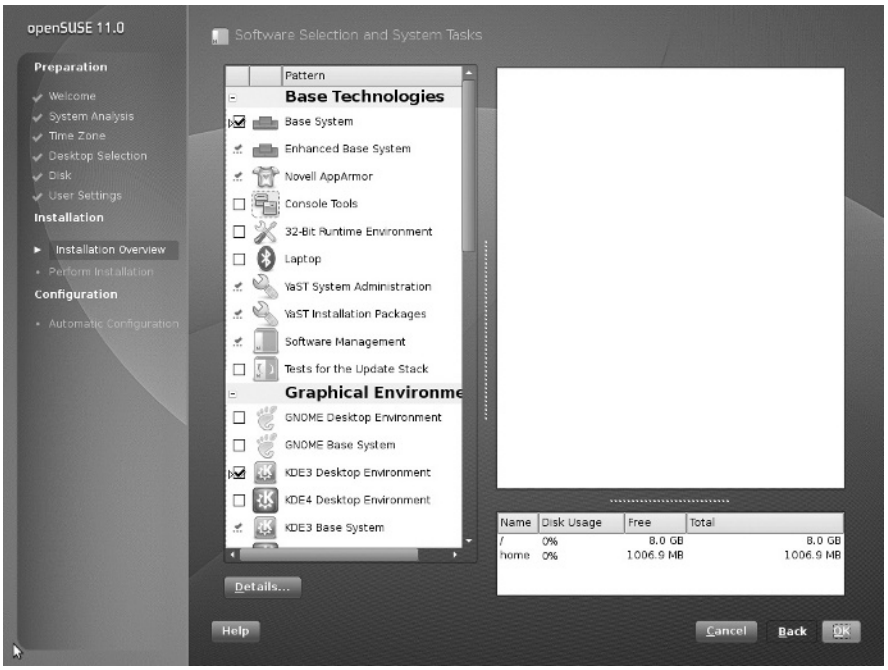
Selecting Software for Installation

The software that is automatically selected as part of a default SUSE installation provides you with nearly every type of tool required for day-to-day work. This section offers additional details about the other types of installations provided by the SUSE installer to provide a full and thorough SUSE learning experience.

To customize the software that is included as part of your SUSE installation, you must click the Software heading in YaST's Installation Settings panel, or click Change and select Software from the pop-up menu. Doing either of these displays the pane shown in Figure 1-17.

FIGURE 1-17

Using the YaST package manager

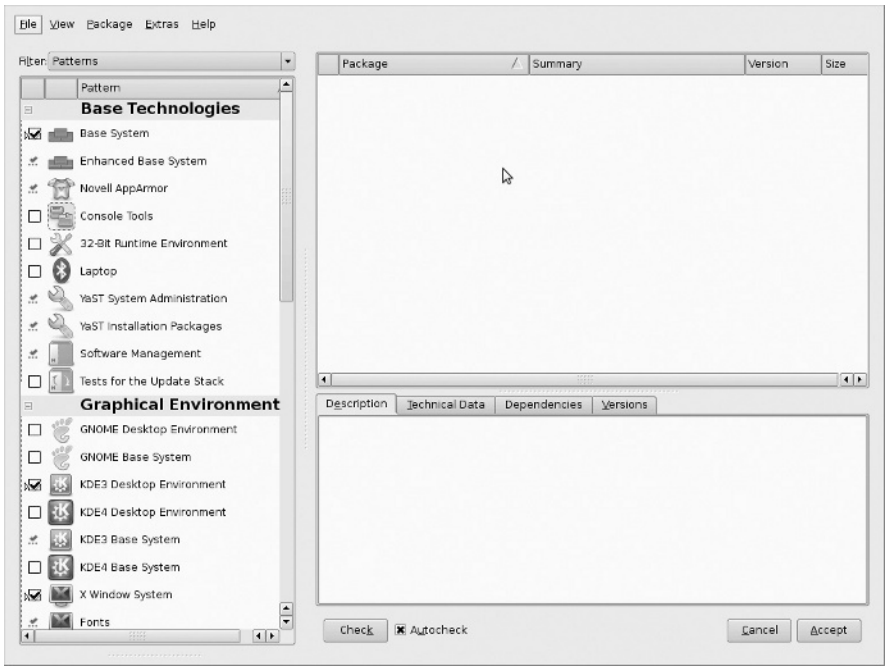


The main screen that you see here shows you the software patterns that are available to you; these are broad groups of software packages that you can select based on the general purposes for which you want to use the computer. So, for example, the categories "Office Software" and "Web and LAMP Server" are available here. To drill down to the level of individual packages, you can click the Details button, and you will see the view in Figure 1-18. Now you can choose to search for specific packages or add to the packages suggested in each of the main categories.

You are also given an indication of the total disk space that will be used by your package selections.

FIGURE 1-18

Package management (detailed view)



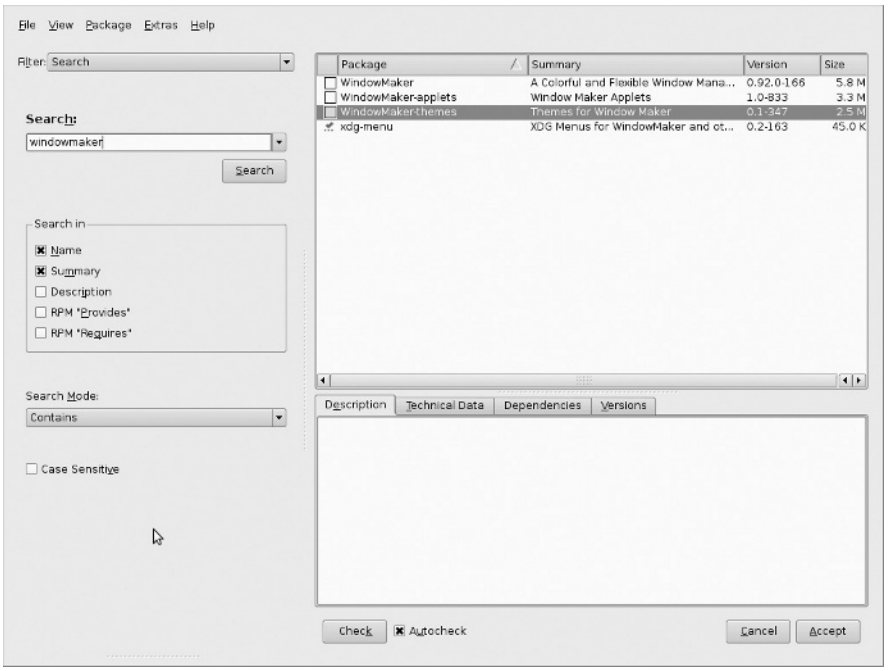
The Filter drop-down list box provides a powerful way to limit what packages you can select. Linux is all about choice: Linux users have differing opinions about the best desktop environment, the best text editor, and so on. Here you have complete control over what software you want to select.

As an example, we will keep the default package selection as chosen by SUSE and add a new package that is not installed by default.

Selecting Search from the drop-down list box enables you to enter search criteria for a package and returns all results based on the Search criteria selected. Figure 1-19 shows a search for the WindowMaker window manager. As you can see, YaST returned not only the package WindowMaker but also other packages that contain YaST in their summary definitions, which can be seen in the Description window.

FIGURE 1-19

Searching for individual packages



When a package is selected, your disk usage will be increased to reflect the size of the install domain.

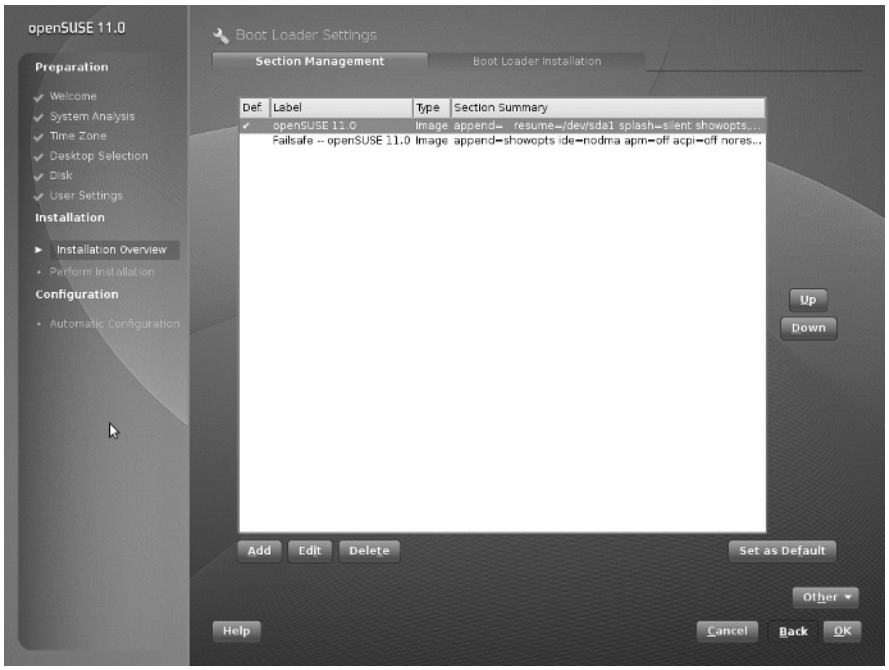
Select Accept to add those packages you select to the install list and take you back to the installation summary screen. The packages that you have selected might require certain other packages to be added as dependencies. If so, a list of these additional packages will be displayed. You should agree to the addition of these packages and continue.

Selecting a Boot Loader

The next item you can change is the configuration of the boot loader. A boot loader is central to the deployment of Linux as it controls the booting of operating systems on the PC. To customize the boot loader that is used by your SUSE installation, you must click the Booting heading in YaST's Expert Installation Settings panel, or click the Change button and select Booting from the pop-up menu. Doing either of these displays the pane shown in Figure 1-20, YaST's Boot Loader Settings screen.

FIGURE 1-20

Boot loader settings



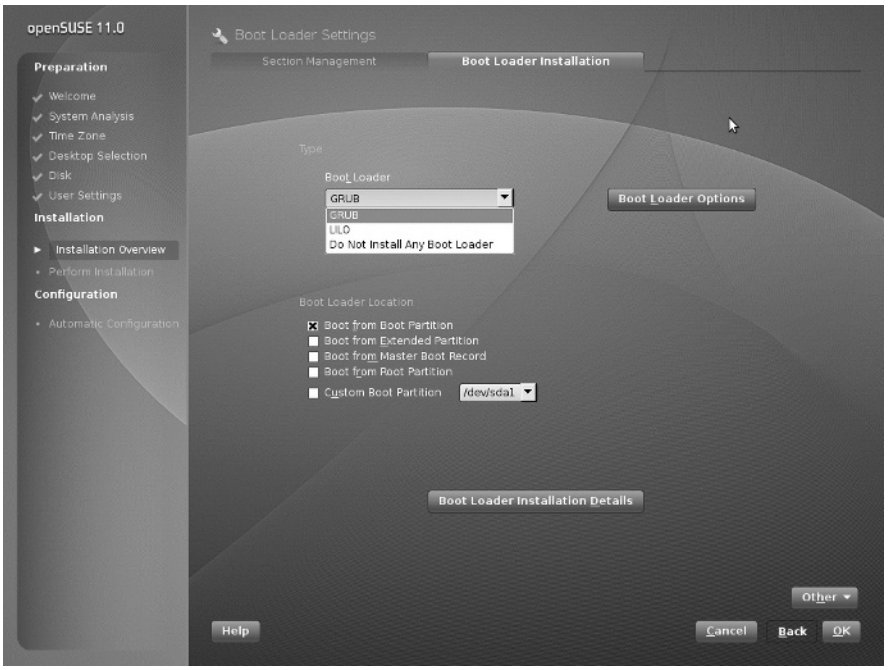
Linux systems typically use one of two boot loaders, LILO (Linux Loader) or GRUB (Grand Unified Boot Loader). Both are very powerful and flexible, and are controlled by easily edited configuration files (`/etc/lilo.conf` and `/boot/grub/menu.lst`, respectively). The key difference between the two boot loaders is how they interact with these configuration files. If you use LILO and update its configuration file, you must rerun the `lilo` command to update the system boot information that is stored on your disk. GRUB automatically rereads its configuration file whenever you boot your system and therefore does not require that you update any other system boot information. GRUB is the default boot loader on SUSE systems, and unless you have special reasons to do so, you will probably not want to change this.

YaST will already have configured your boot loader, depending on your system configuration. This includes any Windows installations that have been found: they will automatically be included in the boot menu.

Two types of configuration changes are possible here: the type of boot loader and its location (see Figure 1-21) and the details of each boot entry in the Section Management tab.

FIGURE 1-21

Boot loader configuration



Recent versions of openSUSE use generic boot code in the Master Boot Record and then install the boot loader by default to the boot record of the `/boot` partition. This requires the partition to be marked as bootable in the partition table. If you wish instead to install the boot loader to the MBR, you can select that option here.

In the Section Management tab you can edit the details of each boot entry. In particular, if you know that your hardware requires a special kernel parameter at boot time such as `acpi = off`, you can add it here.

In general, you should not change the location of the boot loader unless you are setting up a complex multiboot system, but it is possible that you might want to change details of the kernel line in the boot entry if you know what you are doing.

NOTE **Two common kernel parameters that we have come across in recent years are `noht` and `noacpi`. Both of these parameters are relevant to modern machines. The first, `noht`, will turn off Linux's support of the Intel processor's hyperthreading feature. In certain processor-bound workloads, it is better to turn off hyperthreading to improve performance. The second, `noacpi`, turns off Linux's ACPI infrastructure. ACPI is the Advanced Configuration and Power Interface and is a standardized way for an operating system to control machine power, BIOS settings, and so on. In some rare situations, ACPI actually stops Linux from booting on certain machines. Using the boot loader configuration to set these parameters enables you to control this before a system is installed.**

When you make any changes on the Boot Loader setup screen, click the Finish button to return to the standard YaST installer screen.

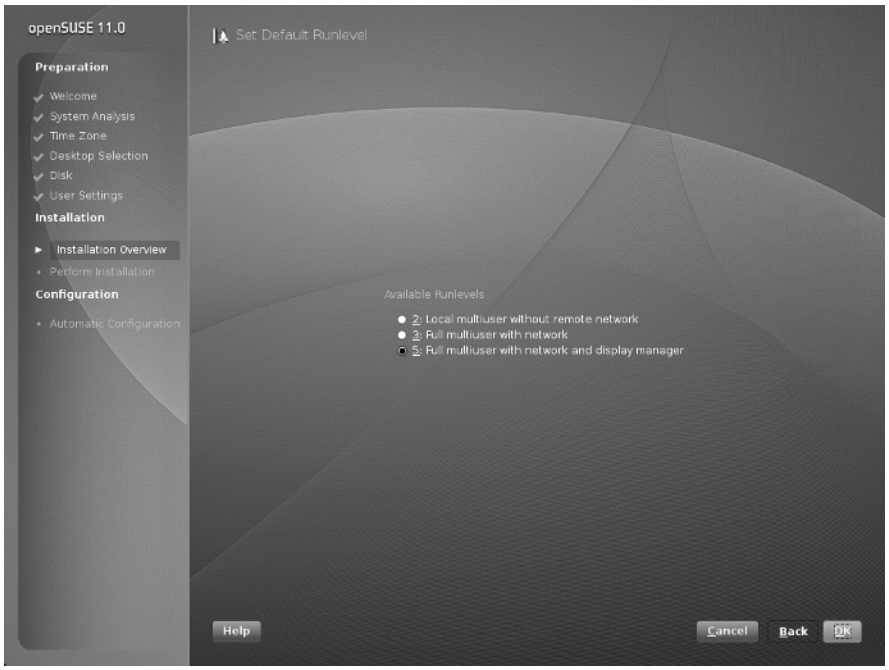
Changing the Default Runlevel

Runlevels are discussed in detail in Chapter 4. Basically, a system's *runlevel* determines the services that are automatically started when your system boots. The YaST Expert Installation Settings screen can be used to change the default runlevel of the system by clicking the Default Runlevel heading in YaST's Installation Settings panel or by clicking the Change button and selecting Default Runlevel from the pop-up menu.

As you can see in Figure 1-22, you can choose to boot your SUSE system in a variety of different ways: without networking functionality (runlevel 2), multiuser with network (runlevel 3), or multiuser with X Windows (runlevel 5). The default runlevel in a standard installation is runlevel 5, multiuser with the X Window system. That is what you need for a desktop system; for a server on which you do not intend to use a graphical interface, you can change this to runlevel 3.

FIGURE 1-22

Changing the default runlevel



When you make any changes that you want to your system's default runlevel, click Accept to set the selected runlevel as your system default. The Set Default Runlevel pop-up closes, and YaST's Installation Setting panel displays.

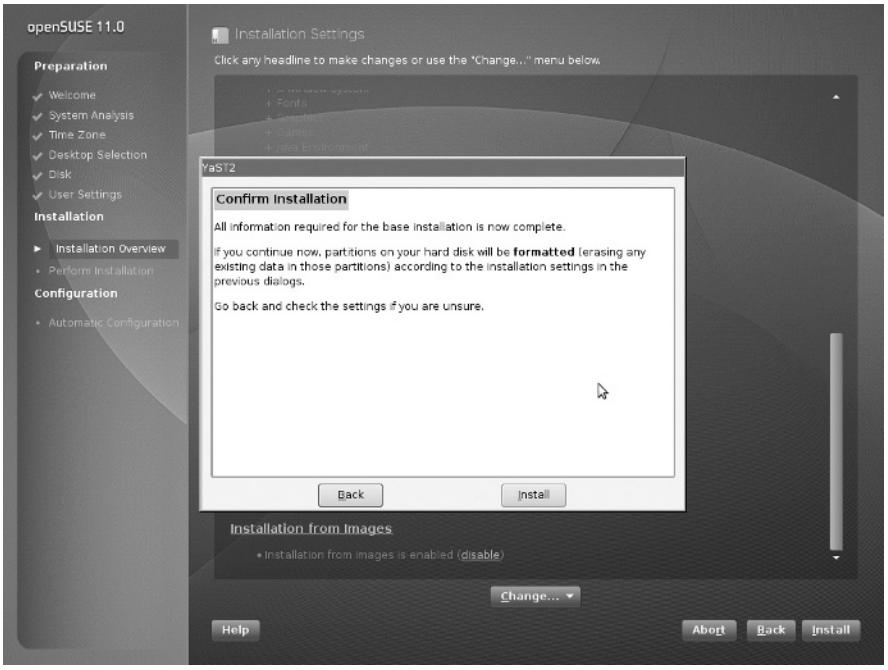
Running the Installation

When you've made any changes to the installation, select the Install button in the Installation Settings window, and the installation process begins. You will be asked if you definitely want to create the partitions you defined and the filesystems that sit above them (see Figure 1-23). Partitioning the disk is a destructive process and *will* remove any data that those partitions replace.

CAUTION **This is your last chance to abort your installation without making any changes to your disk. You should continue only if you are sure that the selected settings are correct. If you are installing SUSE for the first time on a new computer system, you have nothing to worry about. If you are installing SUSE on an existing computer system on which you need to preserve existing data, double-check your settings before proceeding. You can double-check that your partitioning scheme is, in fact, correct for your environment and make changes as necessary by selecting Partitioning from the Installation Settings screen. Then triple-check your selections before proceeding.**

FIGURE 1-23

Confirmation of installation



Selecting Install will create the partitions and filesystems (possibly destroying what was already on the disk), and install the packages you selected.

During package installation, you can view the progress, the CDs needed, and also an overview of the package use by selecting the Details button. To switch back to the slideshow, select the Slideshow button.

This may be a good time to get a coffee, as nothing interesting happens while packages are installed. If you are installing from DVD or a CD set, after the packages from the current disk are installed, the system will automatically reboot itself and run from hard disk in order to finalize the installation.

If you think back to the discussion of the install boot options at the beginning of the chapter, you will remember that the default is to boot off the hard drive first. This helps a lot if you leave the install media in the drive and are drinking your coffee in another room.

When the system has rebooted, YaST asks you for the remaining media to install the rest of the packages. In the case of a minimal installation, or when all packages are being installed, YaST proceeds automatically to the system configuration. If you chose "Use Automatic Configuration" earlier (refer to Figure 1-6), the system and package installation will now proceed, and everything else will be done for you. If you cleared the checkbox for that option, the items we discuss in the rest of the chapter will be configured after the software installation has concluded.

Configuring Your Network Access

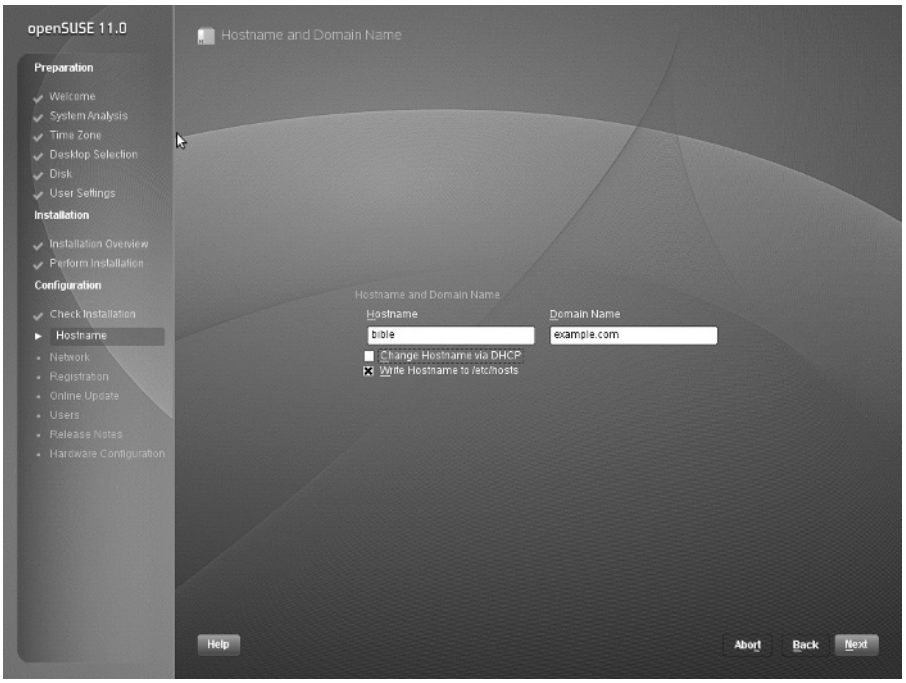
Assuming that you did not select Automatic Configuration, you are now asked to provide a host name and domain name (see Figure 1-24). YaST will have provided a random host name and the domain name "site."

The host name of your Linux machine can be anything you like, such as a person's name, a descriptive name, or something random. The only thing that you have to bear in mind is that the host name and domain name can contain only letters and numbers as well a hyphen or an underscore. The host name can be only one string of characters and cannot contain a space or a period. As the name suggests, the domain name dictates the network domain that this machine falls into. This domain may well be something in line with your company's policy or could be something you have set up yourself.

TIP **When integrating a new system into an existing networked environment, you should always follow the same naming conventions that are already being used, especially for the domain name. If you do not, other systems on the network may not be able to locate your system, and certain services on your system may not be able to interoperate with existing network services.**

FIGURE 1-24

Setting host name and domain name



If any network interface cards have been detected in the system, you will be asked to configure them for network access (see Figure 1-25). By default, YaST sets the first Ethernet card it finds as your system's primary Ethernet interface and sets it up to obtain an address automatically by the Dynamic Host Configuration Protocol (DHCP).

CROSS-REF **You can find discussions about DHCP servers in Chapter 20.**

For most people using SUSE in a business environment, a DHCP server may already be running, and an address, domain name system (DNS) server list, and router configuration will already

be available. Home users and users setting up a server system will find it necessary to configure these details manually. Home users with simple broadband or dial-up connections often automatically receive this information from their Internet service providers (ISPs) and therefore may not need to change these settings.

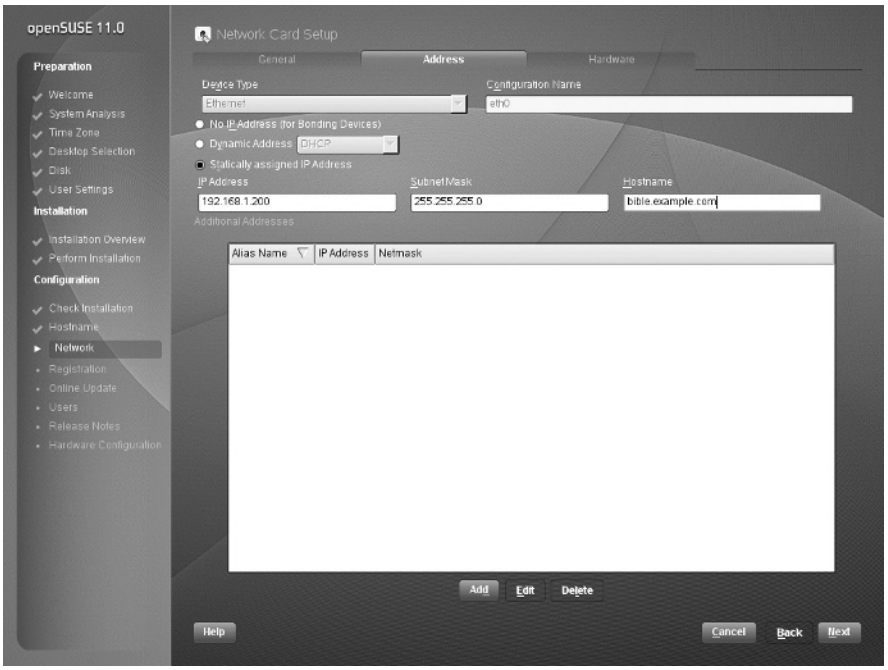
FIGURE 1-25

Configuring network cards

To change the configuration of the network card, click Network Interfaces and select the network card in question (if you have multiple network cards), and click the Configure button. A screen similar to the one shown in Figure 1-26 appears.

FIGURE 1-26

Configuration of network cards



In this example configuration, we set the IP address of the network card to 192.168.1.200 /255.255.255.0. We can set DNS servers (see Figure 1-27) in the next tab (Hostname/DNS) and also routing in a separate tab. If you are unfamiliar with these terms at this stage, see Chapter 6 for additional information. In general, if you are setting up a computer on an existing network that does not provide addresses by DHCP, you need to discuss these items with the network administrator.

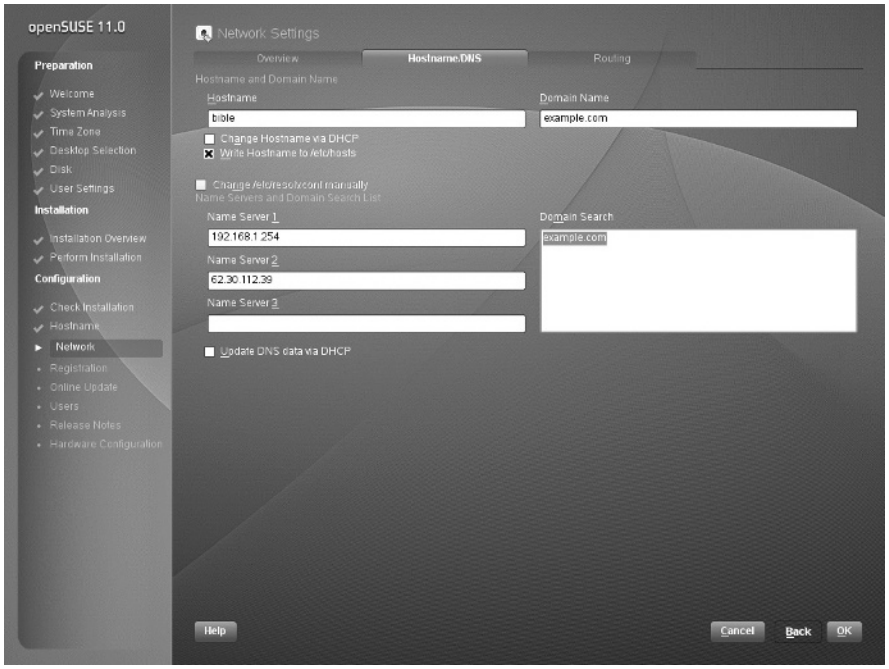
Enter the name server address into the Name Server 1 field. You can also enter up to two other separate DNS server entries. Your administrator or ISP should be able to give you this information.

The Domain Search entry is used to control how your machine looks up the address of other machines connected through TCP/IP. For example, if you use a Domain Search entry such as

example.com, you can communicate with any machine in the SUSE domain by just its host name. For example, with example.com as the Domain Search entry, you can communicate with the machine you are setting up in this example by just using the host name of bible. If you do have example.com as a Domain Search field, however, you have to specify the fully qualified domain name of the machine you want to communicate with (in the case of this example, that is bible.example.com).

FIGURE 1-27

Configuring DNS settings



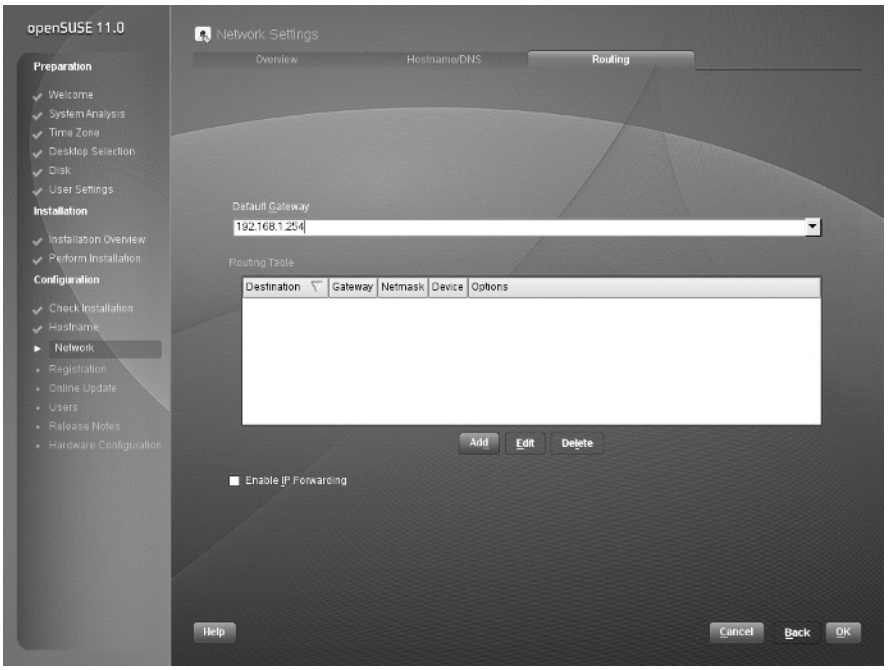
When you have set the DNS configuration for your system, press OK to save your changes.

Configuring the Default Gateway

Next, you will probably need to configure the router/gateway for your system. To do this, click the Routing button. You will see a screen similar to the one shown in Figure 1-28.

FIGURE 1-28

Configuring a default gateway



Your default gateway address is the IP address of the host to which TCP/IP packets that are not destined for your local network are sent for further processing. For example, your gateway address might be that of your asymmetric digital subscriber line (ADSL) router if that is how you connect to the Internet. In other cases, your network or system administrator will be able to provide you with this information.

When you have set the gateway address, click OK to proceed. You will then be returned to the Network Address Setup screen. If you are happy with the network card configuration, click Next.

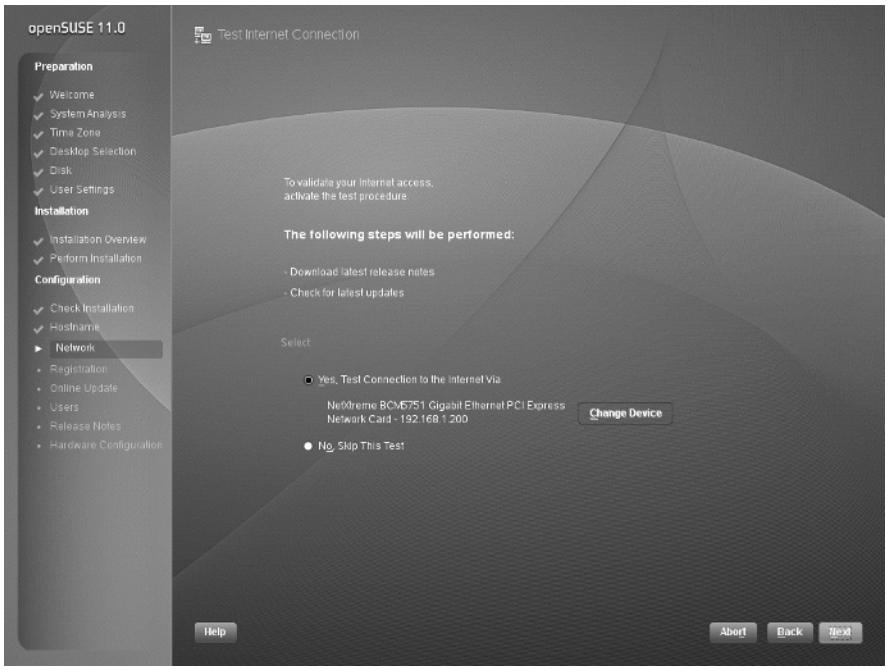
When you have finished configuring all of the network cards that you need to configure, click Next in the Network Configuration screen. This tells YaST to save the changes to your network configuration and restart the system networking.

Testing Your Connection and Online Updates

The SUSE installer now tests that it can connect to the Internet (see Figure 1-29) and, if it can, downloads the latest release notes. It also enables you to run a software update service as soon as the system has been installed. Online updates are discussed in more detail in Chapter 9.

FIGURE 1-29

Internet connection test



Configuring Your Modem

Modems are notorious for being something of a problem area for Linux because many of the internal PCI modems that are on sale are not true modems, but are what is known as *winmodems* or *soft modems*. The idea behind winmodems is that some of the functionality of the modem can be offloaded from hardware into software — the software in question being the Windows operating system. As these devices are designed to work only with Windows and in theory require a Microsoft operating system to work, it is not surprising that there are difficulties getting them to work on Linux. So there are three possibilities:

- **You have an old-fashioned external serial modem:** These will always work under Linux.
- **You have a winmodem:** This may or may not work with Linux.
- **You have an internal true hardware modem:** In almost all cases, this will work with Linux.

Winmodem support has improved considerably, and some previously unsupported modems now work with Linux. SUSE supports at least the SmartLink and Lucent ltmodem types. During

the installation, if YaST detects that you have a supported winmodem, it installs the necessary package to provide driver support.

Assuming that your modem is supported, YaST asks you for the necessary information to set up the modem and your dial-up connection. In the first screen of the setup you are asked for a dial prefix if necessary (a prefix you might need to get an outside line, for example) and to choose between tone dialing and pulse dialing (tone dialing will be the correct choice unless your telephone exchange is antiquated). You will almost certainly want to leave the other two choices here (Speaker on and Detect Dial tone) as they are (selected by default).

The next screen asks you for your country and offers a small selection of preconfigured providers (ISPs). This means that the access number is already known to the system for these providers. One or two have gone further and enable you to use a preconfigured username and password to sign up with them, or even to get full anonymous access with payment being collected through your phone charges.

If you already have an account with an ISP that is not listed, you need to press the New button and add the details of the provider's name, the access phone number, and your username and password.

When this is done, press Finish and the modem configuration should be complete. You will then be able to connect using the `kinternet` program, which you can access through the KDE menu (Internet ➪ Dialup). You can set `kinternet` to run whenever you log in to KDE; if you do this, you can log in by clicking its tiny icon, which will be resident in the system tray area of the KDE panel (by default in the bottom-right corner of the screen).

NOTE **More information about using winmodems under Linux can be obtained from `www.linmodems.org`. You may be able to obtain a driver for your modem from this site, even if it is not supported by SUSE. You can also download a tool called scanModem, which detects the exact type of modem that you have. When you know this, you can search the site for information about whether it is possible to get it working.**

ISDN and ADSL Connections

SUSE has very good support for internal Integrated Services Digital Network (ISDN) cards, which can also be set up at this point in the installation. In most cases, the card will be automatically set up, and you just have to provide the specific information given to you by your ISP.

Asymmetric digital subscriber line (ADSL) is now the normal way for home users to get a broadband connection over a telephone line. ADSL providers normally offer an Ethernet router that connects to the telephone socket. An Ethernet network cable is used to connect the computer to the router. This method will always work perfectly with Linux. The network card should be set up to use DHCP, and the ADSL router will do the rest.

If you have a "wires-only" ADSL service from your Internet service provider (ISP), you can buy an ADSL router and follow the ISP's instructions on how to set it up, and everything should work.

Universal Serial Bus (USB) devices are sometimes used to connect to an ADSL service. Such devices require drivers to work — there are a number of different types, not all of which work well with Linux. However, new ADSL connections almost always come with a router these days, and that is by far the best option.

Cable Modem Connections

If you use a cable modem connection to connect to the Internet, usually these devices also have Ethernet output. Again, all you need do is set up the network card to get an address by DHCP and follow the service provider's instructions.

Wireless Networking

A large proportion of wireless cards in laptop computers will work well with Linux. It is best to wait until the hardware is set up at the end of the installation and see if the card is recognized. If it is not, all is not lost; it is possible to set up a wireless card to work on Linux using a Windows driver, using a special kernel module called `ndiswrapper`. This can be done later, after the main installation is complete. More information is in Chapter 6.

CROSS-REF **See Chapter 6 for more information on `ndiswrapper`.**

User Management

By default, user information is stored locally in the traditional `/etc/passwd` and `/etc/shadow` files. However, there are different ways of managing users in a large network infrastructure. In an environment with Windows servers, the database of users may be held on an Active Directory server. Similarly, if there is a NetWare server infrastructure, user account information may be held in eDirectory. In a Unix environment, NIS or LDAP may be used. Linux can act as a client to all these systems. Kerberos authentication is also supported. But for a standalone machine, you will add local users. The user information and encrypted passwords will be held on the local hard disk. If, at the start of the installation, you did not choose Automatic Configuration, at this stage you can add further local users or configure one of the network authentication mechanisms.

CROSS-REF **See Chapter 25 for more information on the configuration of NIS and LDAP.**

Following the example of Mac OS X and Windows XP, SUSE enables you to set up an account to automatically log in to the system for you when the machine boots up. For home users, this provides a simpler way to use their system, but it is impractical and insecure in business environments. If you are the user who is automatically logged in on bootup, someone else can gain access to your files simply by turning the machine on.

When you have finished adding your user information, click Next to continue, and SuSEconfig will run.

SuSEconfig

The SUSE system configuration is controlled by SUSE-specific control files that the system application SuSEconfig uses to write application-specific configuration files. This enables the user to configure services and server processes without having to understand application-specific configuration files. When all packages have been installed, SuSEconfig picks up the default configuration files installed by SUSE and writes out specific application configurations.

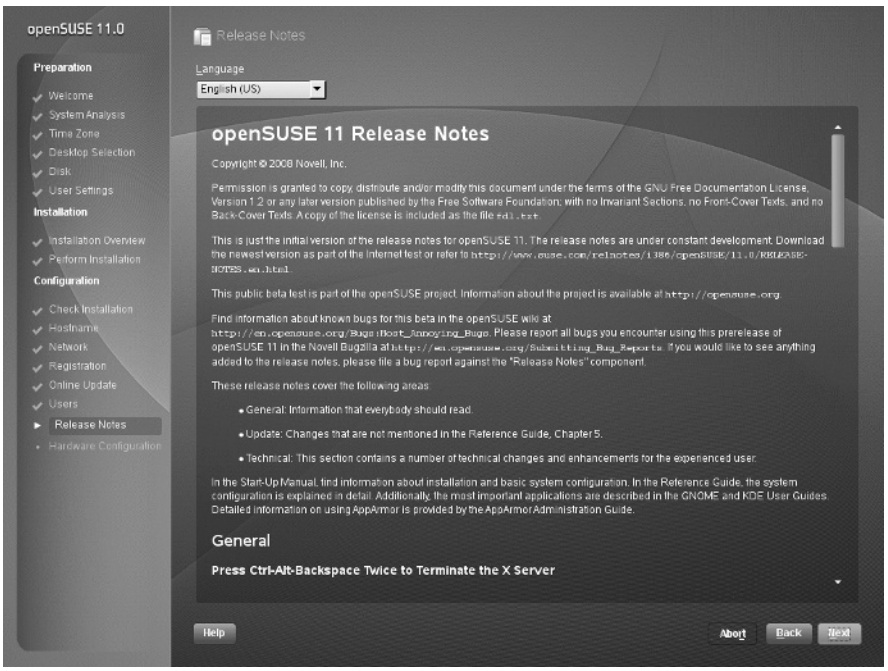
SuSEconfig is a core element of the SUSE system and allows YaST to maintain configuration files for services it can control. Any time you make changes to a service using YaST, SuSEconfig will be called to commit those changes.

Reviewing the Release Notes

When SuSEconfig has finished its initial installation, you will be shown the SUSE release notes (see Figure 1-30). These notes contain general information about changes from previous versions of SUSE Linux, as well as a technical overview of the previous version. This file also provides errata from the SUSE manual and is worth a read to get a general idea as to what has happened since the last release.

FIGURE 1-30

The release notes



Configuring Your Hardware

When you have read the release notes, click Next and you will be asked to configure your hardware (see Figure 1-31). The YaST installer and the YaST system configuration manager run the same modules to configure hardware.

FIGURE 1-31

Hardware configuration

Configuring the Graphics

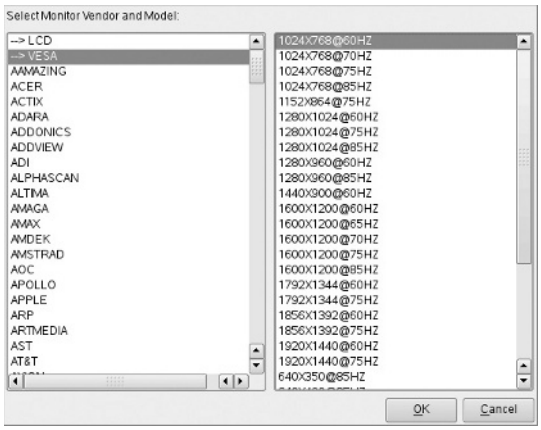
In almost all cases, YaST will set up the X Window system automatically in such a way that it is usable with a sensible resolution. This is a far cry from the situation in the early days of Linux when setting up your own combination of graphics card and monitor to work correctly was sometimes a significant challenge.

However, if you need to change the configuration, you can select both graphics cards and monitors under "Graphics Cards" and then select the screen resolution you want.

To change your monitor configuration from what YaST detected, click "Monitor" below "Graphics Cards." You are presented with a list of available monitors from which you can choose (see Figure 1-32).

FIGURE 1-32

Choosing your monitor model



If your specific monitor is listed in the vendor list, select it. If not, choose either LCD (for laptop or flatscreen monitors) or VESA (for CRT monitors). It is usually a safe bet that a resolution of 1024 × 768 will be supported by your monitor.

Every Linux book and piece of documentation on X Windows configuration has a disclaimer about configuring your graphics system. This book is no different because there are real dangers if you set up your monitor incorrectly. Because the graphics card drives the monitor, it is imperative that you either configure the graphics system with standard lower settings, or take a look in the documentation that came with *both* your monitor and your graphics card and figure out the correct settings for them. Sax2 comes with well-defined Video Electronics Standards Association (VESA) settings for general setup and also specific configurations from the major manufacturers of graphics systems. The remainder of this section discusses a low-specification graphics setup that should be safe for most people. However, you really should know how hard you can push your system so as not to damage your monitor by overdriving what your graphics card gives to it. Most of today's monitors have built-in settings to protect against hardware damage, but you should be especially careful when configuring the X Window system on an older monitor.

Configuring Your Sound Card

YaST will detect the sound card and will set it up automatically. During a standard installation, you are not required to intervene in this process; it just happens. In almost all cases, that is all

you need to know. The rest of this section concerns what you can do after installation if it turns out that sound was not configured correctly during the installation.

After the installation is complete, confirm that sound is working by attempting to play a music CD or music file (for example, an MP3 file using the `amarok` or `banshee` sound player programs). If you don't hear sound at this stage, first check the physical connection to the speakers. Then (if you are using KDE) check that the KDE volume control is at a sensible setting and not disabled or turned down to zero. In the unlikely event that sound still fails to work, you can rerun the YaST sound module in expert mode. The sound module is found in YaST's Hardware section. You will find three possible setup modes:

- **Quick automatic setup:** This is the default and is the one that is used during installation.
- **Normal setup:** This enables you to test the sound card. There is a volume control and a test button. When you have set the volume, a test sound is played when you press test.
- **More detailed installation of sound cards:** If you choose this option, you are taken to a screen where you can set any configurable options for the particular sound card that has been detected. Depending on the particular card, these may include settings to enable a joystick and MPU (midi processing unit) port settings.

If even experimentation with the detailed installation options fails, you can try the low-level `alsaconf` program. As root, type **alsaconf** to start the program. It is a text-based program that, in fact, provides the back end for YaST's sound configuration module. Running it standalone, however, gives you the opportunity to use its command-line options, including `alsaconf -l`, which writes a log file to `/tmp/alsaconf.log` that may give a clue as to the problem.

TIP **The ALSA (Advanced Linux Sound Architecture) home page can be found at `www.alsa-project.org`. This is the best place to start if you have any difficulties with configuration of sound on Linux.**

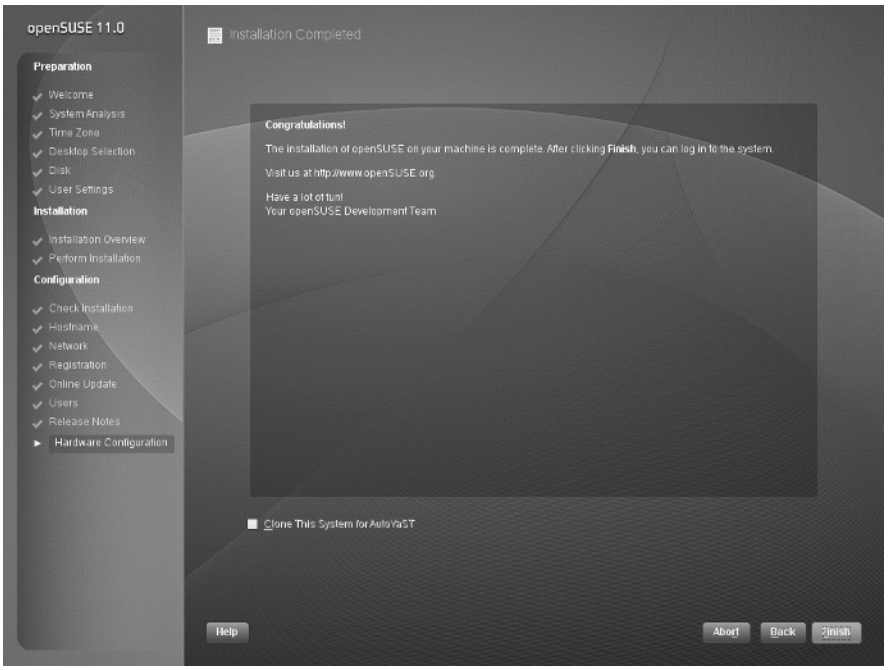
Completing Installation

Once you have finished with your hardware configuration, click Next.

It has been a long road, but you have successfully installed SUSE at this point (see Figure 1-33). Pat yourself on the back if you are new to the world of Linux. Although installing Linux is much easier now than it used to be, you have begun a journey in which you will learn a great deal and join a worldwide community of Linux users whose help and insights (thanks to the Internet) are never far away.

FIGURE 1-33

Installation completed



Note that this screen includes the option to "Clone this system for AutoYaST"; this means that if you want to save the settings that were applied in this installation for use in automatic installations using SUSE's AutoYaST tool, you can do so here.

If you are an experienced Linux user, you should be quite happy about how far SUSE has come from other distributions and how easy it has been to install it. Don't worry, however; as with everything Linux-related, you can make it as easy or as hard as you like, and you will see how in later chapters.

The system will now offer you a login screen; type your personal username and password, which you created during the installation, and log into the system. You will be presented with a brand new GNOME or KDE desktop according to the choice that you made earlier. Enjoy, play around with the system, and as the developers in Germany say: Have a lot of fun!