

# SUPPLEMENTAL BONUS TO *Ubuntu Unleashed 2016*

IN THIS SUPPLEMENT

## Updates, Installing, and Upgrading to Ubuntu 16.04

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### What's New in 16.04

Anyone reading this already knows that Ubuntu 15.10 is good. Still, readers willing to register a book online to receive an upgrade kit are the sort of persons who are unlikely to be content to sit still with what they know when something better may be just over the horizon. With that in mind, let's take a quick tour of the shiny new features in the new release, Ubuntu 16.04. Most of the new development was behind the scenes this time, so this year's update does not contain many screenshots or other graphics.

Ubuntu Software Replaces Ubuntu Software Centre

The Ubuntu Software Centre had not been heavily maintained for some time. At the same time, GNOME Software, which is a similar app, has matured nicely. A decision was made to use GNOME Software instead, but with some minor tweaks and rebranding to Ubuntu Software. For the most part, things function similarly with the exception that there is currently no way to purchase proprietary software through the new app, but it seems this is something that may be added in the future. In addition, Ubuntu Software supports apps packaged in the new snap format, described in the next section.

### Snappy Ubuntu Core and Snap Packages

Snappy Ubuntu Core is a new distribution model for Ubuntu on servers. It begins with a bare, minimal server image and libraries shared with the main Ubuntu. The difference is in how applications are provided. Instead of using the Ubuntu software repositories and `deb` packages, as is traditional for Ubuntu, Core uses a different package format called snap. Snaps are designed to be more secure, with better application isolation. These are the main ideas:

- ▶ Keep the operating system and application files completely separate, each as a set of distinct read-only images.
  - ▶ Snappy Ubuntu Core files are read-only, so they cannot be tampered with and, therefore, can be updated perfectly and predictably.
  - ▶ Keep the download sizes to the bare minimum.
  - ▶ Manage the changes in software upstream, and provide delta-based updates that include only the changes, rather than making users download the entire package, and do this in a way that can be rolled back quickly and easily.
- ▶ All packages will include signatures to ensure you are running exactly what the developer released.

This sounds a lot like the way savvy users would like to manage applications on devices like mobile phones, which could be a reason for creating a new format rather than sticking with the tried-and-true `deb` packages. There are not yet many application packages using snaps, but it is worth a look. Check the web page for Snappy Ubuntu Core at <https://developer.ubuntu.com/en/snappy/> and learn more about snaps on the desktop at <https://developer.ubuntu.com/en/desktop/get-started/>.

### ZFS

This is the first release to offer native support for the ZFS file system, which is commonly used in server and container environments. ZFS is only supported on 64-bit architectures and is only supported for data storage, not for the root file system. Learn more about ZFS on Ubuntu at <https://wiki.ubuntu.com/Kernel/Reference/ZFS> and in the official announcement at <http://blog.dustinkirkland.com/2016/02/zfs-is-fs-for-containers-in-ubuntu-1604.html>.

### LXD

LXD is a new network-aware container manager, designed primarily for cloud usage with containerized servers. Like a virtual machine system, LXD isolates the container system from the host system, but does so in a much faster way. This is cutting-edge cloud deployment stuff and may not interest most desktop users but is exciting for those involved in cloud computing. Read more at <http://www.ubuntu.com/cloud/lxd>.

## Package Changes

Each Ubuntu release receives updated packages for almost all the software in the software repositories. *Ubuntu Unleashed* readers will likely find the following few highlights of this release of greater interest:

- ▶ **Python 3:** Python 3 is now both the default and the only version of Python installed by default. Python 2 is still available in the software repositories and is likely to remain for some time, as there are still many Python 2 applications in use, but this is a good reason to start upgrading your applications, if you have written or are maintaining anything in Python 2.
  - ▶ **OpenStack:** The OpenStack Mitaka release is now available. Remember that updating an OpenStack deployment is a nontrivial process. So, if you decide to update, make sure that you read the official documentation, both from OpenStack and from Ubuntu.
  - ▶ **Apt:** Most of us have used apt-get and its related commands. Apt is a faster, newer command line package manager that has similar syntax and does the same thing, but with more features. At the same time, it has a simplified interface and is more interactive. It will not completely replace apt-get but will streamline many of your command line package management duties.
  - ▶ **Package updates:** Many server-focused packages have been updated, including Ceph, MAAS, Juju, MySQL, Apache, Nginx, and PHP. If you plan to upgrade your servers, do your homework first to see which packages you have installed that may be affected.
- ▶ **Linux kernel 4.4:** The new, updated kernel has received bug fixes, security improvements, additional hardware support, and improvements to performance. These are all behind-the-scenes improvements that you might not see directly but that make the inclusion of this kernel a plus.

## Full Release Notes

Full release notes for Ubuntu 16.04 are available online at <https://wiki.ubuntu.com/XenialXerus/ReleaseNotes>.

## Before You Begin the Installation

Ubuntu is one of the easiest distros to install. This bonus supplement covers how to get started with the install disc, including booting into an Ubuntu 16.04 live DVD to test your system. Then we cover the actual installation of Ubuntu 16.04, looking at the various options available. The whole process is pain free under Ubuntu, as you are about to learn. If you performed an installation using the DVD included with the book, you can skip down to the “Upgrading from Ubuntu 15.10” section.

### Download a Different Image for Mac

Some Mac hardware will not boot using the standard Ubuntu DVD. This is because of the changes happening in the hardware and software world. If you have a Mac and you have trouble using the regular install image, download the 32-bit version of Ubuntu from <http://releases.ubuntu.com/16.04/> and use it instead.

Installing a new operating system is a major event, so make sure that you have properly thought through what will occur. You first want to consider how the software that you propose to install may affect the hardware. Although Ubuntu runs well on an extremely wide variety of hardware, it is worthwhile checking your hardware components because there might be a banana skin waiting for you to slip on. The following sections cover some areas for you to investigate and think about, and may even save you hours of frustration when something goes wrong. You start by researching and documenting your hardware. This information could prove helpful later during the installation.

## Researching Your Hardware Specifications

At the absolute minimum, you need to know the basics of your system, such as how much RAM you have installed and what type of mouse, keyboard, and monitor you have. Knowing the storage capacity of your hard drive is also useful because it helps you plan how to divide up (for Ubuntu) the storage space it contains. Installation and hardware problems have become quite rare over the past few Ubuntu releases, but they do occasionally occur, especially with the newest hardware that might not yet have software drivers available. Most popular hardware older than a year or so is likely to work just fine, although there are no guarantees. The more information you have, the better prepared you will be should you encounter any problems.

## Installation Options

Ubuntu is most commonly installed by end users using the live DVD of the desktop edition. This is also a great way to test your computer’s hardware before you make any permanent changes to your system. If you can successfully boot your

computer from the Ubuntu CD or DVD, your system will run just as well, and quite a bit faster, when you choose to install Ubuntu to your hard drive.

## Planning Partition Strategies

Partitioning is a topic that often strikes fear into the hearts of novice Linux users. Coming from a Microsoft world, where you might just be used to having one hard drive, it can seem a bit strange to use an operating system that makes partitioning important. Depending on your requirements, you might opt to use the default setting, which is a single large partition to contain all your files, or you might prefer to segment your installation across several partitions to match your individual needs. One common partitioning scheme is to create a small partition called `/swap`, about 1.5 times the size of your RAM, a second partition of about 15GB called `/` for all the system files, and a third called `/home` that will use the rest of the hard drive's space and will house all your data files.

To plan the best partitioning scheme, research and know the answers to these questions:

- ▶ How much disk space does your system require?
  - ▶ Do you expect your disk space needs to grow significantly in the future?
  - ▶ Will the system boot just Ubuntu, or do you need a dual-boot system?
- ▶ How much data will require backup, and what backup system will work best?

## The Boot Loader

During installation, Ubuntu automatically installs GRUB2 (Grand Unified Boot Loader) to the Master Boot Record (MBR) of your hard drive. Handily enough, it also detects any other operating systems such as Windows and adds entries in GRUB2 as appropriate. If you have a specific requirement not to install GRUB2 to the MBR, you need to install using the Alternate disc, which allows you to specify the install location for GRUB2 and which you can download from [Ubuntu.com](http://Ubuntu.com).

## Installing from CD or DVD

Most PCs made after 1995 have BIOS support for booting directly from a CD or DVD drive and enable you to set a specific order of devices (such as floppy, hard drive, CD-ROM, or USB) to search for bootable software. Turn on your PC and set its BIOS if required to allow you to do this (usually accessed by pressing a Function or Del key after powering on); then insert your Ubuntu disc and boot to install Ubuntu.

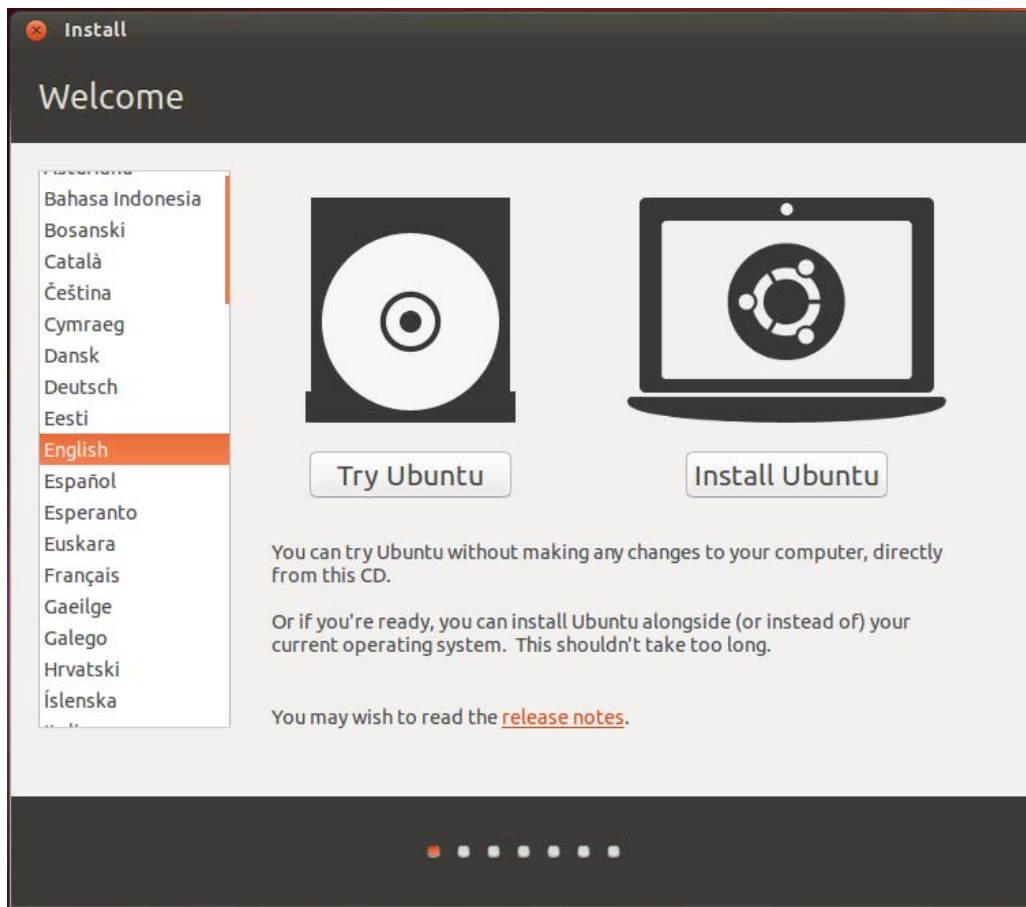
## Step-by-Step Installation

This section provides a basic step-by-step installation of Ubuntu from the install disc. The install process itself is fairly straightforward, and you should not encounter any significant problems.

Have your computer ready to connect to the Internet so that you can download updates as soon as you have finished the installation. Although the usual recommendation is to not have your computer connected up, Ubuntu's unique security configuration means that it effectively blocks all incoming network ports, so it is fairly secure until you start opening these ports.

## Starting the Install

To get started, insert the DVD into your drive and reboot your computer. After a minute or two, the initial screen appears and offers a variety of languages for you to use during installation, along with a couple of other options (see Figure 1).



**FIGURE 1** Choose a language in this opening screen.

From this screen, you may choose to Install Ubuntu or you may choose to Try Ubuntu without making any changes to your system. We suggest that you choose the **Try Ubuntu** option this first time to test your hardware.

Ubuntu starts the process by loading components from the DVD into memory. Then, after a few short seconds, you are presented with the GNOME desktop that you can use to start testing things. Bear in mind that Ubuntu loads some parts of itself from memory and other parts from the DVD, so it will not be a true representation of the real performance of Ubuntu and will run noticeably slower than when it is installed to a hard drive. Rather, it is designed to give you a taste of what to expect and allows you to test it with your hardware.

Thanks to the work that has gone into Ubuntu, the majority of your hardware should be fine, and you can proceed to install Ubuntu. You do this by double-clicking the **Install** icon helpfully located on your desktop.

#### NOTE

If you find that some things don't work, don't panic. In these cases, Google is definitely your friend, and you should do some research to see whether anyone else has had similar problems or whether they've managed to install on similar hardware.

After a couple of seconds, the Preparing to Install Ubuntu screen appears. On this screen, you confirm whether your hardware meets the minimum requirements (see Figure 2). Confirm, answer a few questions, and click **Continue**.

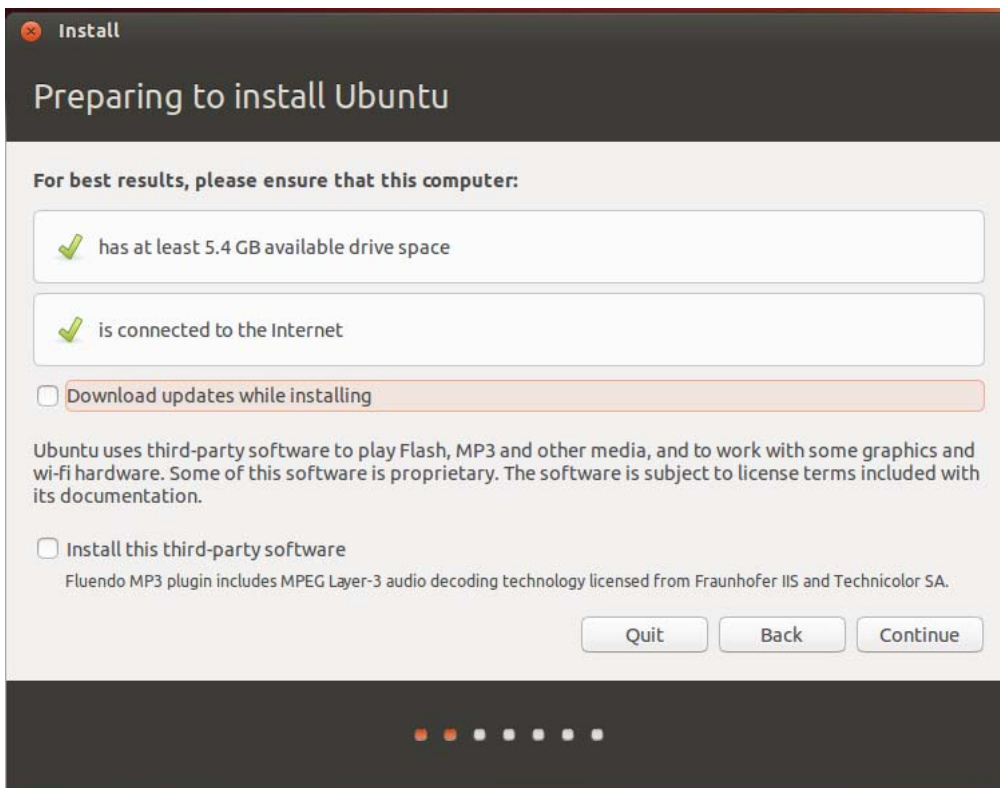


FIGURE 2 Preparing to install Ubuntu.

Partitioning under Linux used to be somewhat of a black art, but Ubuntu has made it easy. In Figure 3, I am installing on a blank hard drive. When installing over an earlier Ubuntu installation, the installer gives the option to install alongside or to erase and use the entire disk; the second option is the typical choice of most end users. Also available is the option to manually partition the hard drive, a welcome choice for more advanced users. The install process splits into two tracks here: Erase Disk and Install Ubuntu, or Something Else. Each has a short series of screens to walk you through the process. You also have the option to encrypt your installation, in which case you want to be absolutely certain you choose a key phrase you will remember because if you lose or forget it, you are sunk. Also, you can set up the Logical Volume Manager (LVM).

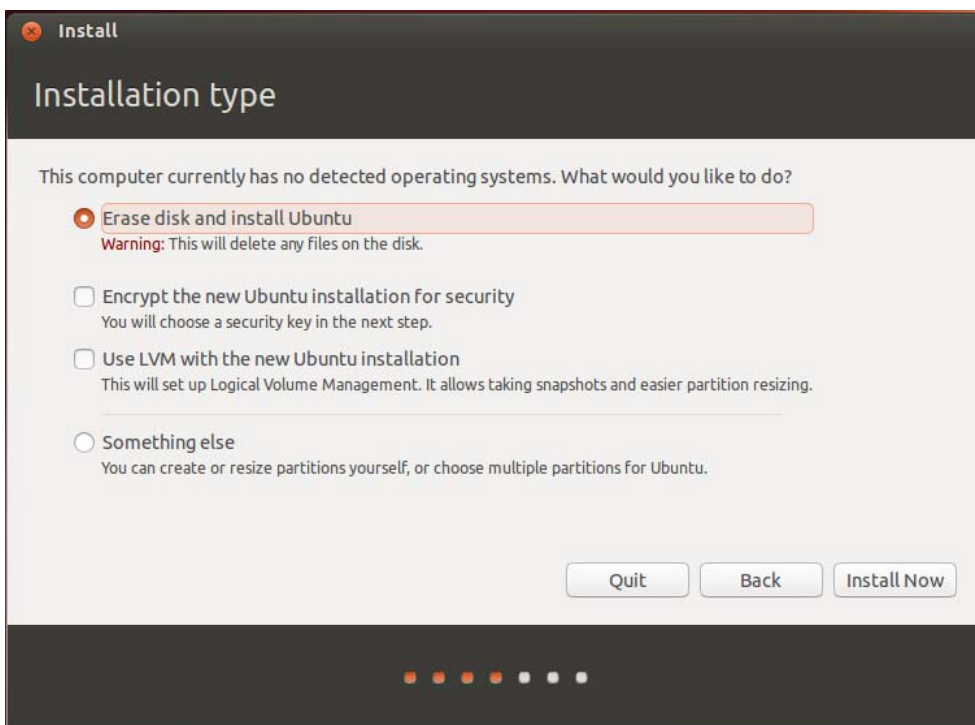


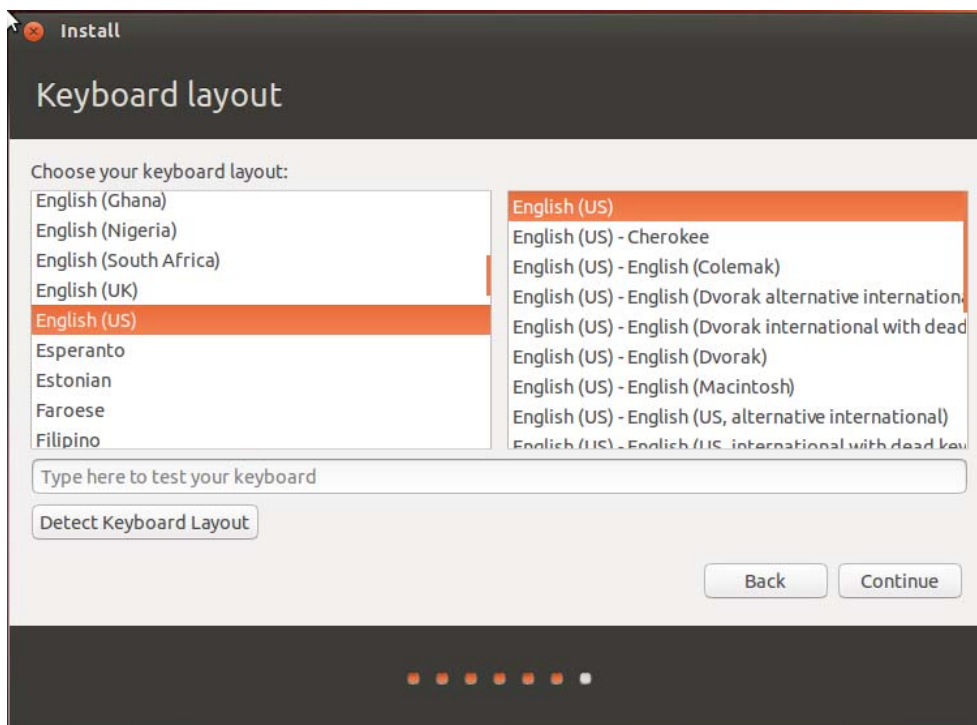
FIGURE 3 Allocating drive space.

After you have allocated drive space, the next screen asks you to specify your location in the world. This information impacts time and region options. Find the city closest to you on the map and select it. Figure 4 shows that we have selected Chicago; you want to choose the city closest to you. Ubuntu automatically chooses the time zone and detects the offset from Greenwich mean time (GMT) for you. Click **Continue** to advance to the next screen.



**FIGURE 4** Where are you?

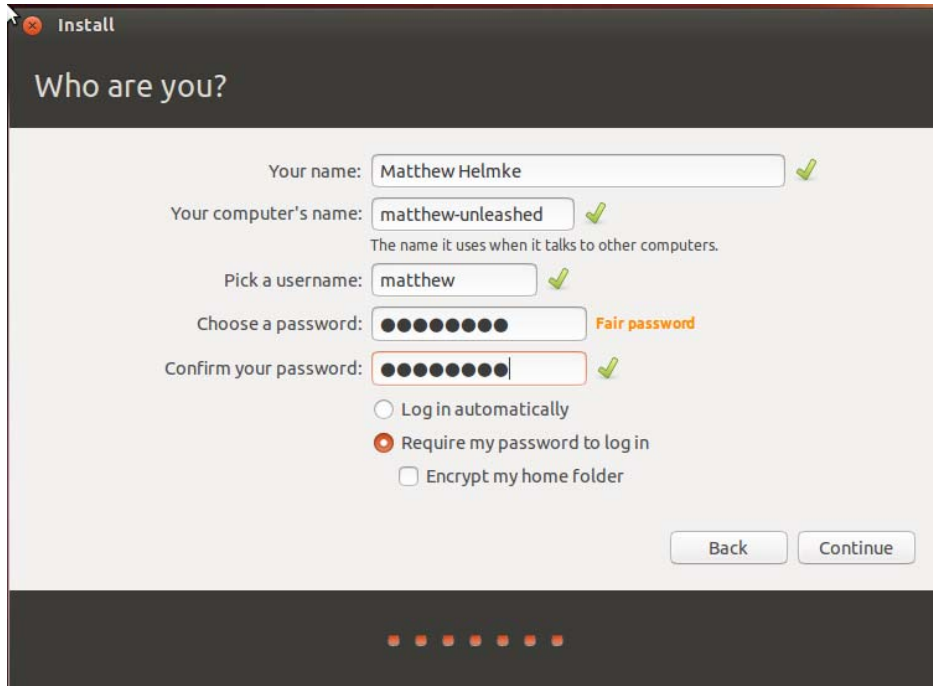
Following the Time and Region screen is the Keyboard Layout screen. Ubuntu makes a good guess at what type of keyboard you have connected to your computer, but it enables you to change it in case Ubuntu is wrong. Make sure to find the correct layout for your keyboard (see Figure 5). If in doubt, use the text box provided to try out all the keys. Then click **Continue**.





**FIGURE 5** Keyboard layout.

Now you need to identify yourself so that Ubuntu can create its first user. Enter your full name, your desired username and password, and the name of the computer on which you are installing Ubuntu (see Figure 6). Here you can choose to encrypt your Home folder, which differs from encrypting your whole disk earlier. Either one or both may be chosen. Encrypting the whole disk affects everything on the storage device, whereas encrypting the Home folder affects only personal files. Then click **Continue**.



**FIGURE 6** Who are you?

If you are installing alongside another operating system, a Migration Assistant appears and offers to help you by finding some of your settings on the other operating system and bringing them over to Ubuntu, such as browser bookmarks and more. Most users will not see this because the installer skips this step when it is not needed.

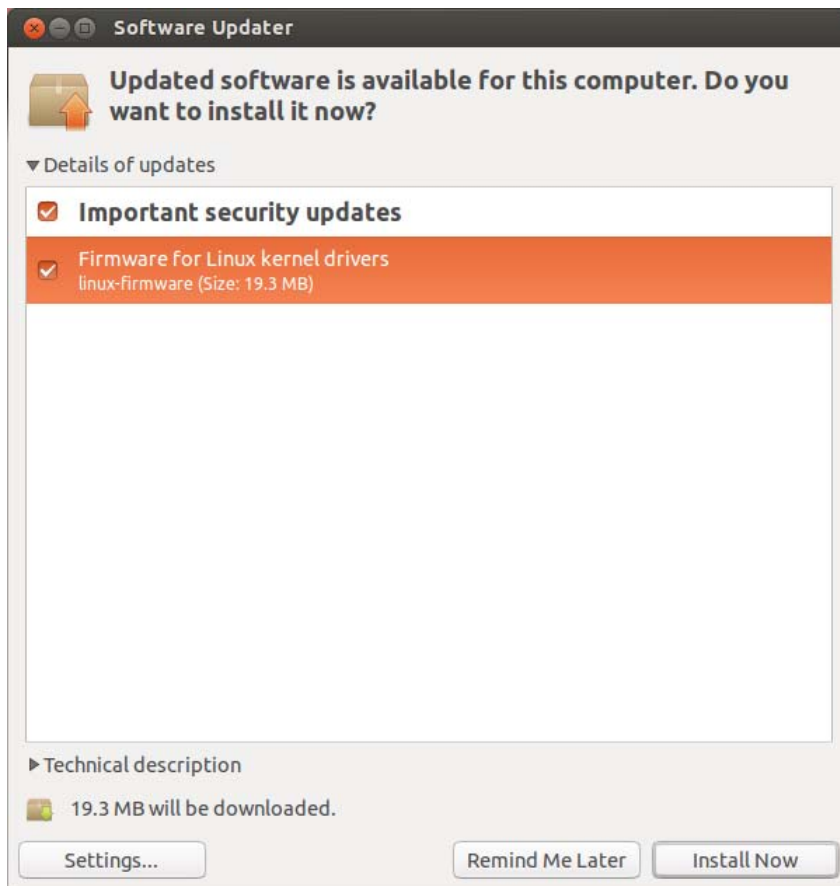
The final screen summarizes what you have chosen to do. Go over the settings list and ensure that it contains no surprises. If all is well, now ensure that your computer is connected to the Internet so that it can download some updates and access Internet servers to assist with configuration as it installs. This connection is not required, but it is quite convenient and recommended. Click the **Install** button to begin the installation, and you will be treated to a nice-looking slide show that outlines some of the features of Ubuntu while the installation occurs.

When the installation completes, you are prompted to reboot. You can then log in to Ubuntu at the welcome page and ultimately arrive at the Ubuntu desktop.

## First Update

The first thing that you might need to do with your new system is update it to the latest package versions. You do this mainly to ensure that you have the latest security updates available.

You can do this in a couple of ways in Ubuntu, but the easiest way to do it is to click the **Software Updater** icon in the Launcher. Your screen will darken, and you will be asked for a password. This password is the same as the one you used to log in to your system and is used in this case to authorize Ubuntu to make a systemwide change (install software, in this case). Figure 7 shows the Software Updater in action.



**FIGURE 7** Software Updater.

The application is easy to use because it automatically retrieves information about all the possible updates available to you. Just click **Install Updates** to start downloading and installing the necessary package updates.

If you want more information, click the **Show Details** arrow; if you want Ubuntu to check again, click the **Check** button to force Ubuntu to refresh the updates.

## Upgrading from Ubuntu 15.10

You can easily upgrade from Ubuntu 15.10 by inserting an Ubuntu 16.04 disc into the drive while 15.10 is running. A pop-up window appears and asks whether you want to upgrade. Just follow the simple onscreen directions.

Another option is to do an online upgrade without a disc using Software Updater by clicking the **Upgrade** button when it appears. Again, just follow the onscreen instructions while you are connected to the Internet, and you will be all set.

But what if you don't want to wait for the notification? Or what if you accidentally clicked Don't Upgrade when notified? Not to worry. You can choose to upgrade any time.

To upgrade from Ubuntu 15.10 on a desktop system, follow these steps:

1. Press **Alt+F2** and type **update-manager** into the command box.  
Update Manager should open up and tell you, "New distribution release '16.04' is available."
2. Click **Upgrade** and follow the onscreen instructions.

To upgrade from Ubuntu 15.10 on a server system, follow these steps:

1. Install the update-manager-core package if it is not already installed.
2. Launch the upgrade tool with the command `sudo do-release-upgrade`.



3. Follow the onscreen instructions.

Note that the server upgrade will use the GNU screen and automatically reattach in case of dropped-connection problems.

## Troubleshooting

Most people will encounter no problems while installing Ubuntu, but that is not a guarantee. No operating system can support every piece of hardware out there, and sometimes an uncommon piece of equipment, old or new, may not be supported. Other times, the fault may lie with the install media. You can check the following quick and easy things if you run into problems installing Ubuntu 16.04.

If your system fails to boot from the CD or DVD:

- ▶ Check your BIOS settings to make sure that they are set to boot from the proper drive.
  - ▶ Check your install CD or DVD to see whether there is a problem with it. Can another machine read it?
- ▶ Check your equipment to make sure that it is working. Especially if it is old, there is also a chance that it might not have drivers available or work properly with Ubuntu.