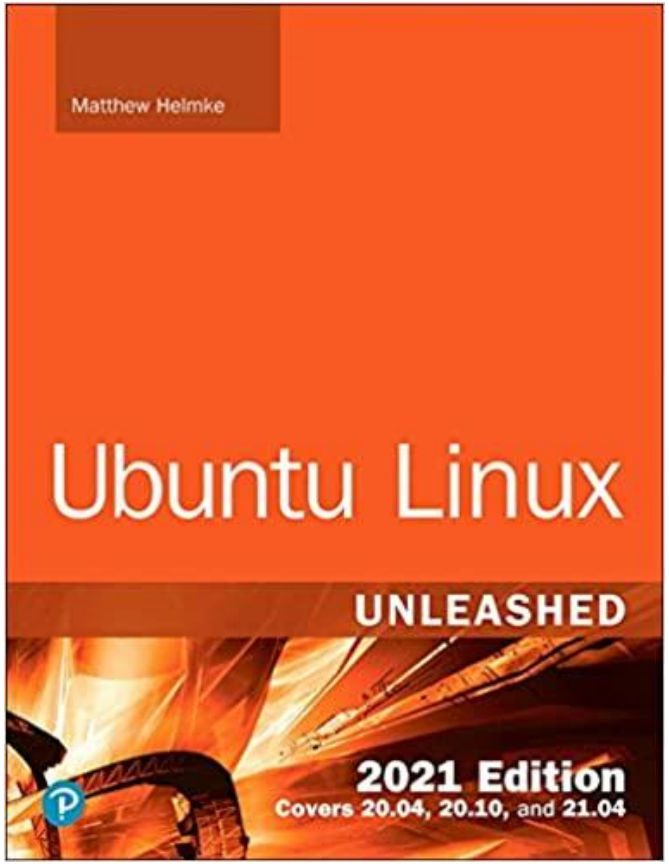
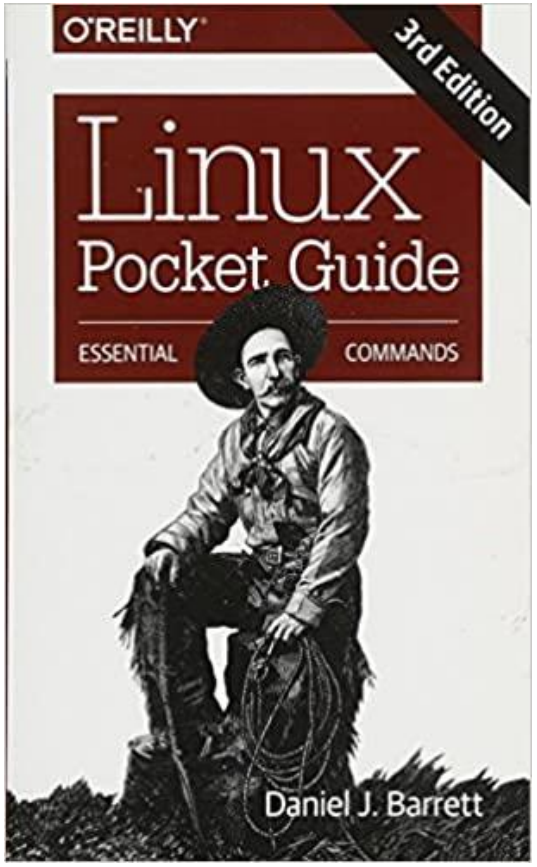
LINUX AND OPEN SOURCE SOFTWARE

CH1. LINUX INTRODUCTION

Syllabus & Text-books

1) Matthew Helmke, *Ubuntu Linux unleashed*, Pearson, 2021 Edition.
2) Daniel J. Barrett, *Linux pocket guide*, 3rd edition, O'Reilly, June 2016.





Main contents

- Installing Ubuntu and post-Instatallation Configuration
- Background Information and Resources
- Desktop Ubuntu

Installing Ubuntu and post-Instatallation Configuration

- Before you begin the installation:
  - Researching your hardware specifications
  - Installation options
  - 32-bit vs 64-bit Ubuntu
  - Planning partition strategies
  - The Boot Loader
  - Installing from DVD or USB Drive

Installing Ubuntu and post-Instatallation Configuration

- Before you begin the installation:
  - Researching your hardware specifications
    - CPU: 2GHz dual-core processor
    - Disk: 25 GB
    - RAM: 2GB
    - Monitor: 1024x768
    - DVD drive or USB stick

Installing Ubuntu and post-Instatallation Configuration

- Before you begin the installation:
  - Installation options
    - Desktop DVD, Server install DVD
    - ISO image
  - Ubuntu has serveral official variants: Ubuntu, Kubuntu, Lubuntu, Ubuntu Budgie, Ubuntu Kylin, Ubuntu Mate, Ubuntu Studio, Xubuntu.

Installing Ubuntu and post-Instatallation Configuration

- Before you begin the installation:
  - 32-bit vs 64-bit Ubuntu
    - 32-bit processor will be able to use a maximum of 4GB RAM
    - 64-bit processor will be abe to use up to 17 billion GB RAM
    - Ubuntu 20.04 LTS is only officially releasing a 64-bit version.
    - It is possible to run 32-bit programs on a 64-bit processor.
    - Software written for 64-bit processors is not backward compatible with 32-bit processors.

Installing Ubuntu and post-Instatallation Configuration

- Before you begin the installation:
  - Planning partition strategies
    - 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 only Ubuntu, or do you need a dual-boot system?
    - How much data requires backup, and what backup system will work best?

Installing Ubuntu and post-Instatallation Configuration

- Before you begin the installation:
  - The Boot Loader
    - If your system does not have a UEFI BIOS, Ubuntu automatically installs *GRUB2 (Grand Unified Boot Loader)* to the *Master Boot Record (MBR)* or to the *GPT (GUID Partition Table)* of your hard drive.
    - For systems that do not have a UEFI BIOS, and you want to create a dual-boot system using both Windows and Ubuntu, you should install Windows first.

Installing Ubuntu and post-Instatallation Configuration

- Before you begin the installation:
  - Installing from DVD or USB Drive
    - On most PCs, the BIOS supports booting directly from a CD, DVD, or USB drive and enables you to set a specific order of devices.
    - Turn on your PC and set its BIOS if required and then insert your Ubuntu install media and boot to install Ubuntu.

Installing Ubuntu and post-Instatallation Configuration

- Installing
  - To get started, insert the install DVD into your drive and reboot your computer.

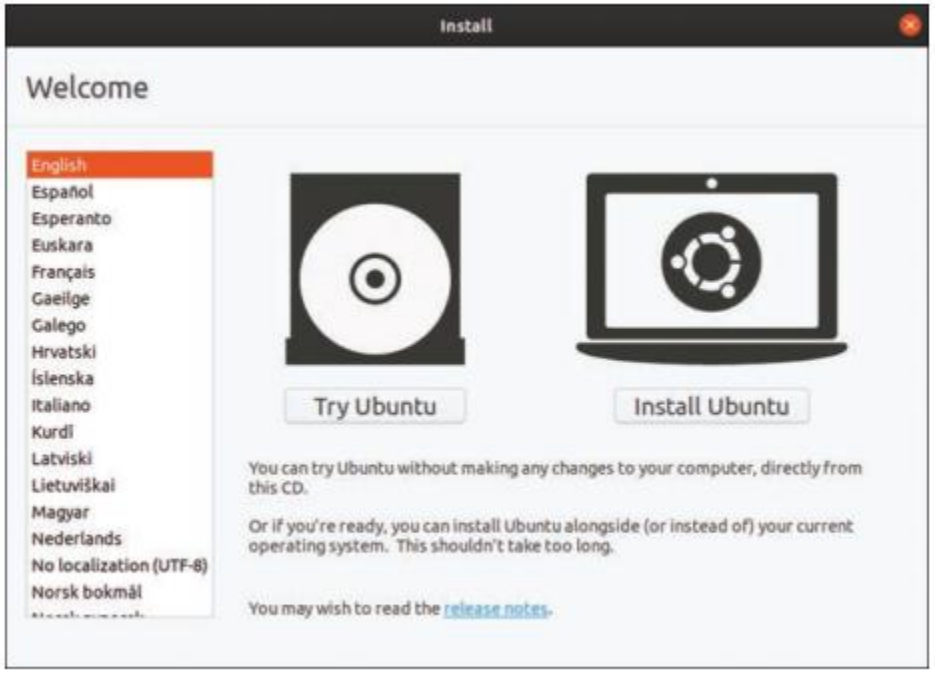


FIGURE 1.1 Choose a language for the installation in this opening screen.

Installing Ubuntu and post-Instatallation Configuration

- Installing

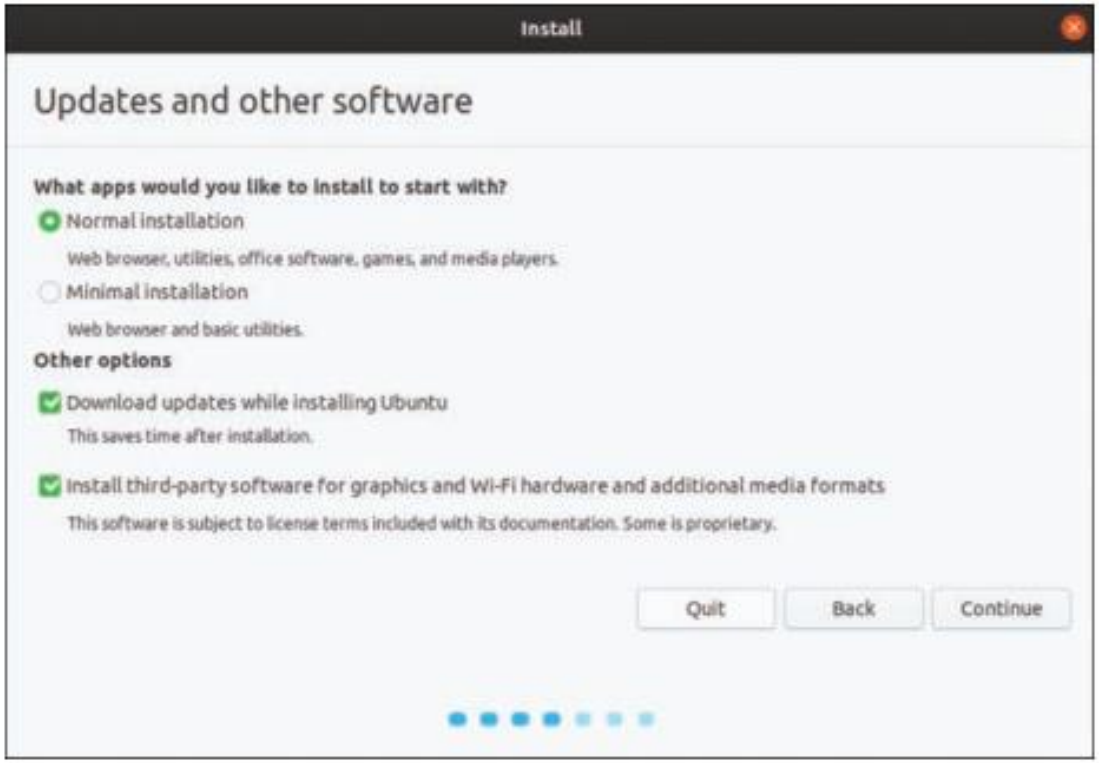


FIGURE 1.2 Before proceeding, decide whether you want to download updates during installation.

Installing Ubuntu and post-Instatallation Configuration

- Installing
  - You choose either to erase and use the entire hard disk for your installation or to specify partitions manually.

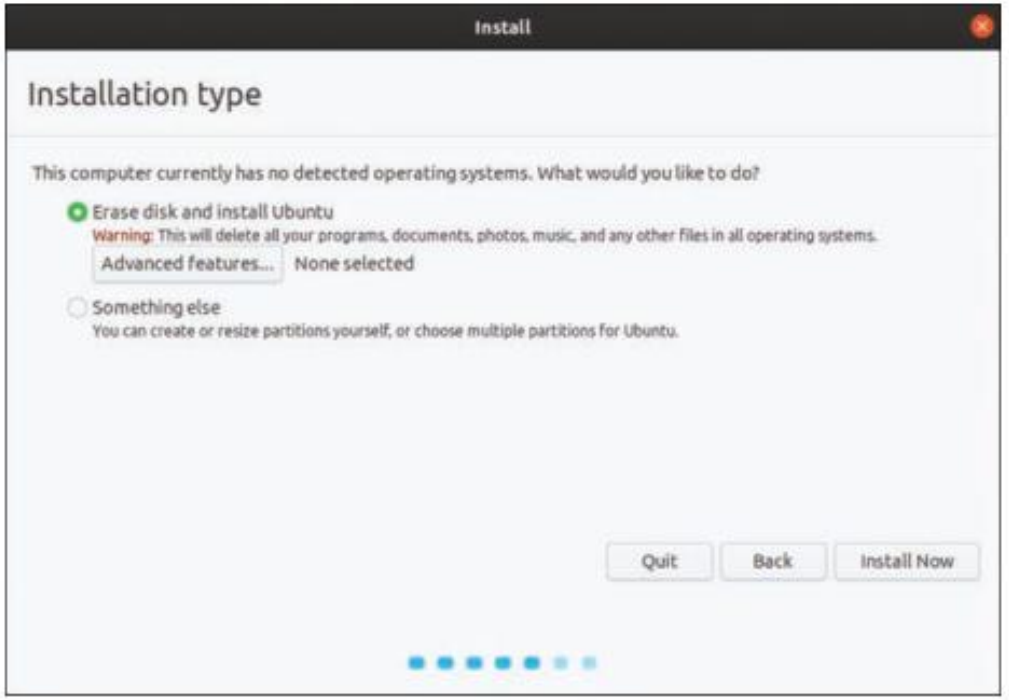
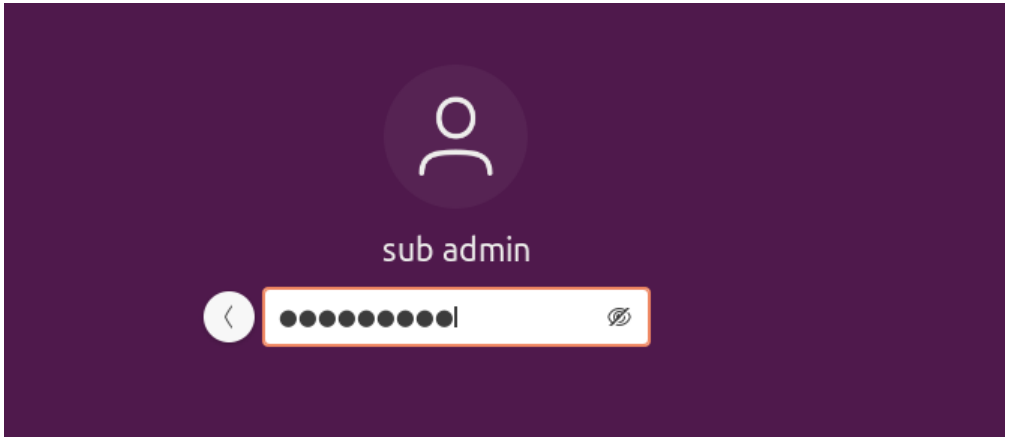


FIGURE 1.3 What do you want to do with your storage drive?

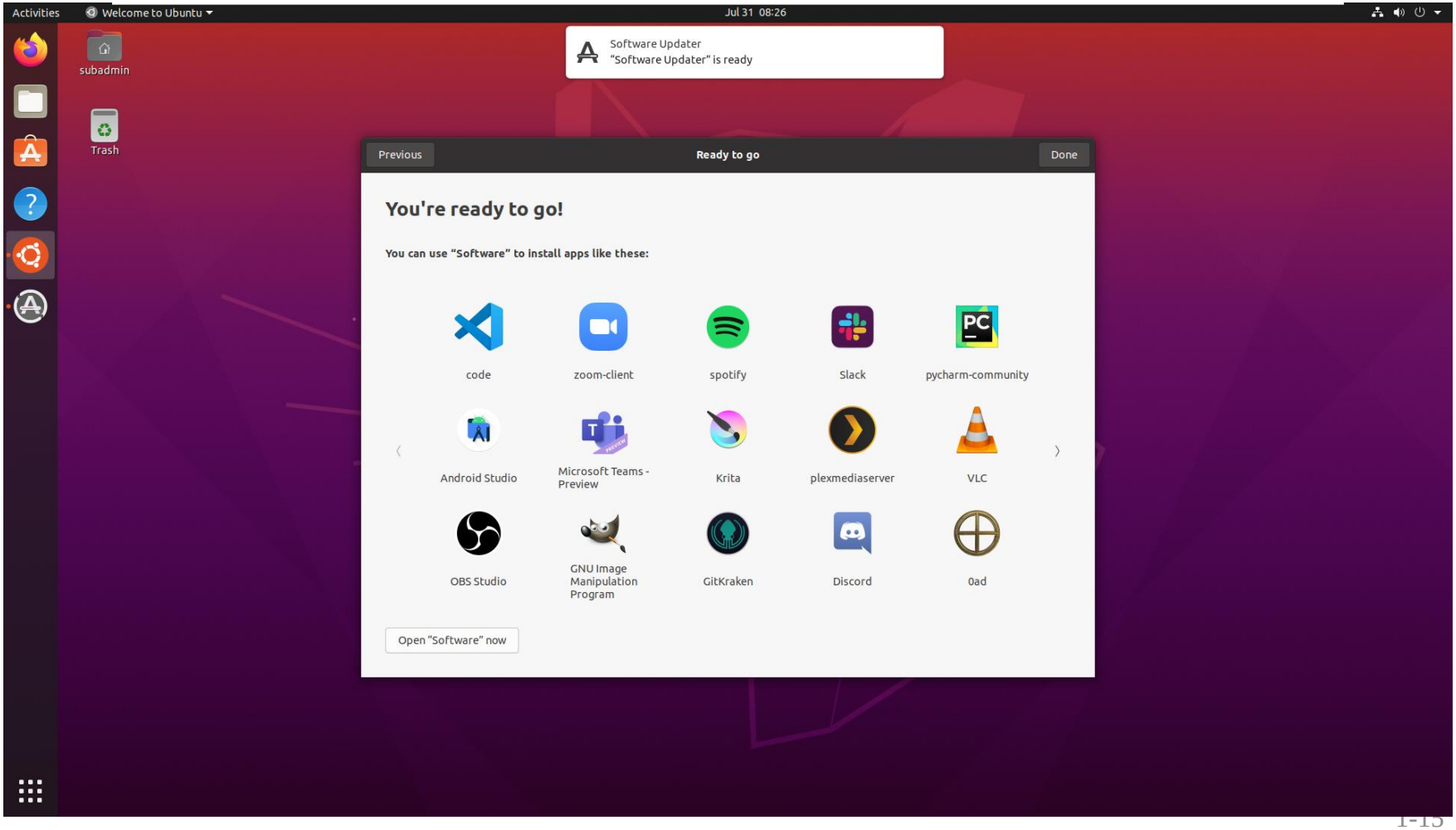
Installing Ubuntu and post-Instatallation Configuration

- Installing
  - After you have made your partitioning selections, installation continues by asking about: current location, keyboard layout, language, your name, username, password, etc.
  - While you are answering the questions asked by the installer, the Ubuntu install begins to copy files to your hard drive.
  - When the process is complete, you are prompted to restart the computer. Do so and remove the install media when it is ejected. Then log in when the reboot is complete.



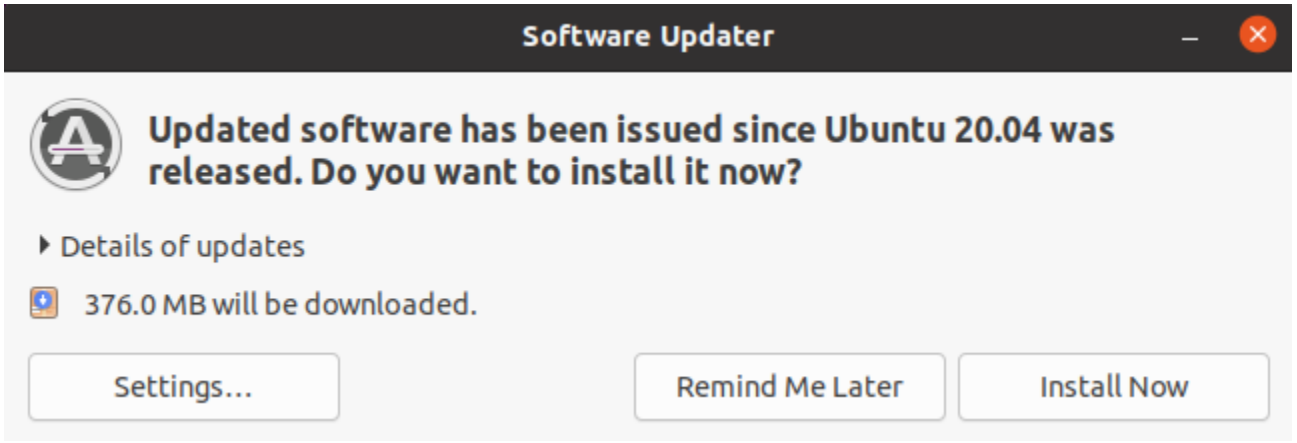
Installing Ubuntu and post-Instatallation Configuration

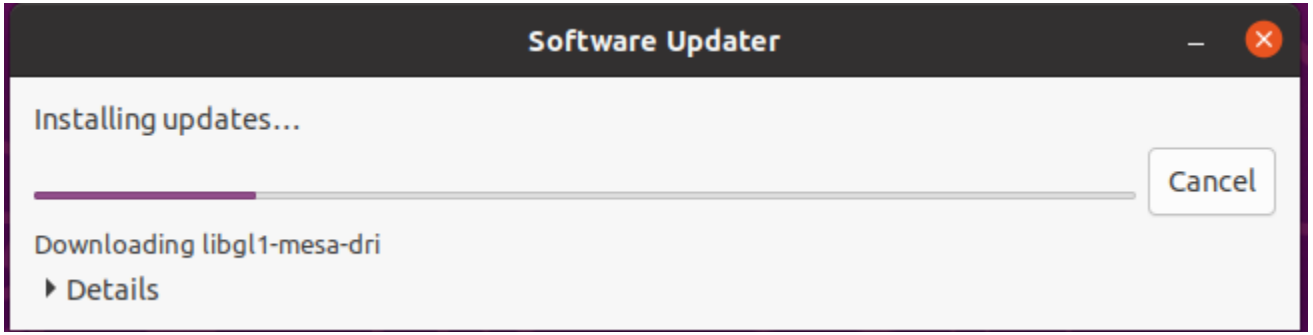
- Installing



Installing Ubuntu and post-Instatallation Configuration

- Update:
  - Click *Install Now* to update the system to the latest package versions.

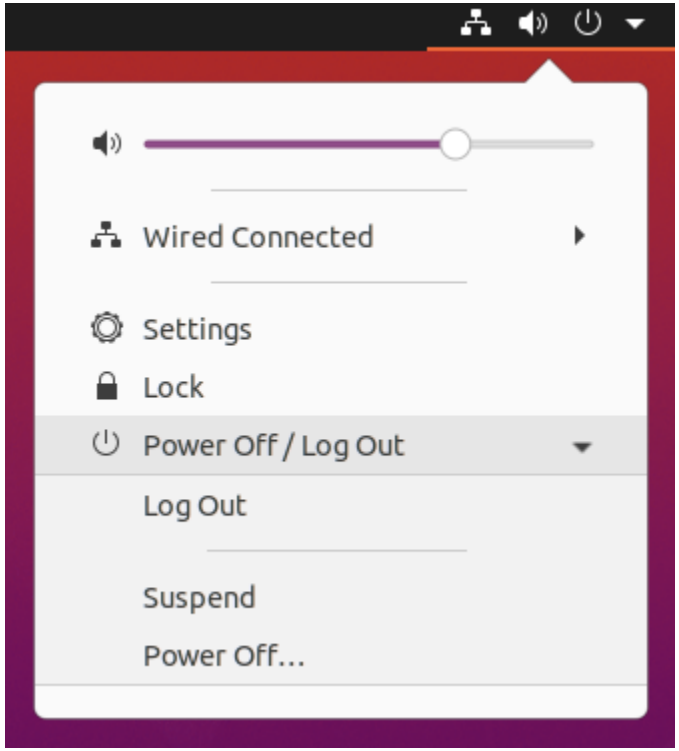




Installing Ubuntu and post-Instatallation Configuration

➢ Shutting Down

- You can use the power icon located in the upper-right corner of your screen to access the power menu.

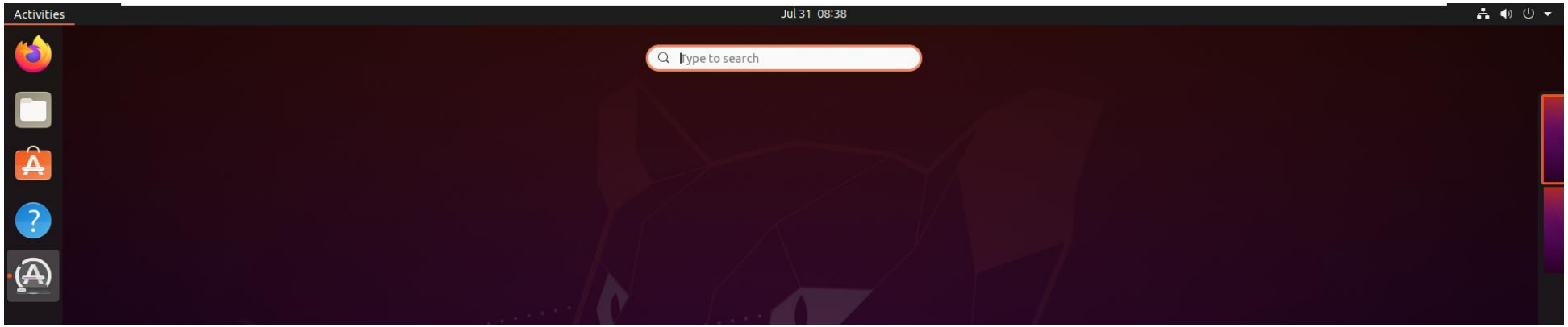


- Shutting Down
  - If you are working at the command line, you can immediately shut down or restart your system by using the *shutdown* command:
    - *$sudo shutdown –h now*
    - *$sudo shutdown –r now*

Installing Ubuntu and post-Instatallation Configuration

➢ Finding Programs and Files

- You access search by clicking Activities at the upper left of the screen, and then start typing in the search box to find specific programs or documents on your system.



Installing Ubuntu and post-Instatallation Configuration

➢ Software Updater

- The easiest way to check for updates is to use Software Updater.
- Open Software Updater from search by typing **software updater**.

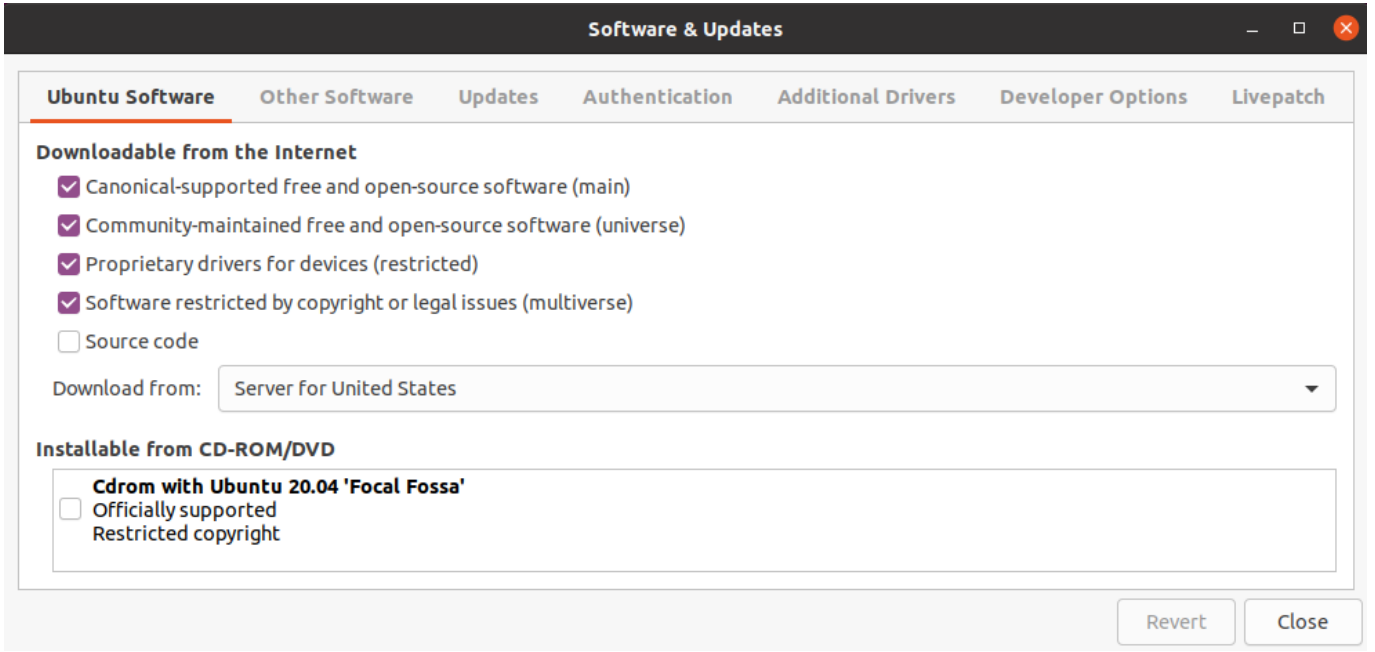
The *sudo* Command

- This command is used in front of other commands to tell Ubuntu that you want to run the specified command with super user powers.
- All you have to do is enter it like this:
  - $sudo *command commandoptions*
- For example:
  - $sudo vi /etc/X11/xorg.conf

Installing Ubuntu and post-Instatallation Configuration

➢ Configuring Software Repositories

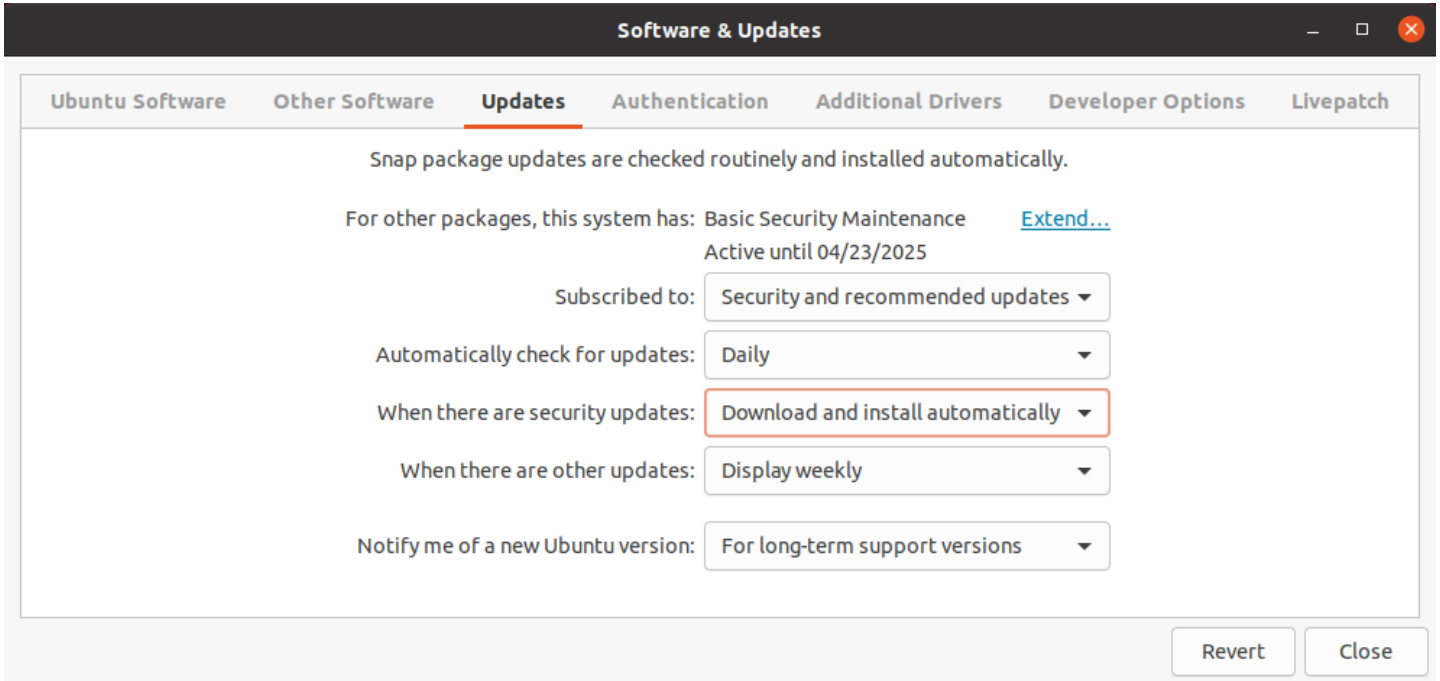
- Ubuntu uses software repositories to get information about available software that can be installed on your system.
- Open Software & Updates GUI tool



Installing Ubuntu and post-Instatallation Configuration

➢ Configuring Software Repositories

- Switch to the Updates tab to configure Ubuntu's behavior when updates are available.
- By default, both the important security updates and recommended updates are checked to ensure that you have the latest bug fixes and patches.

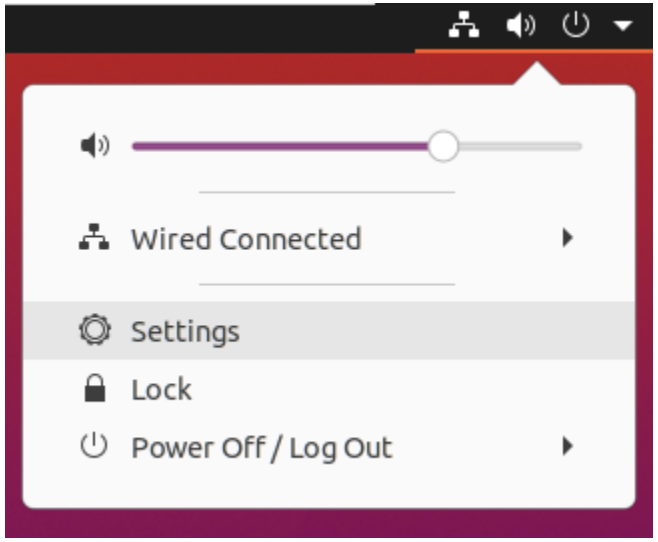


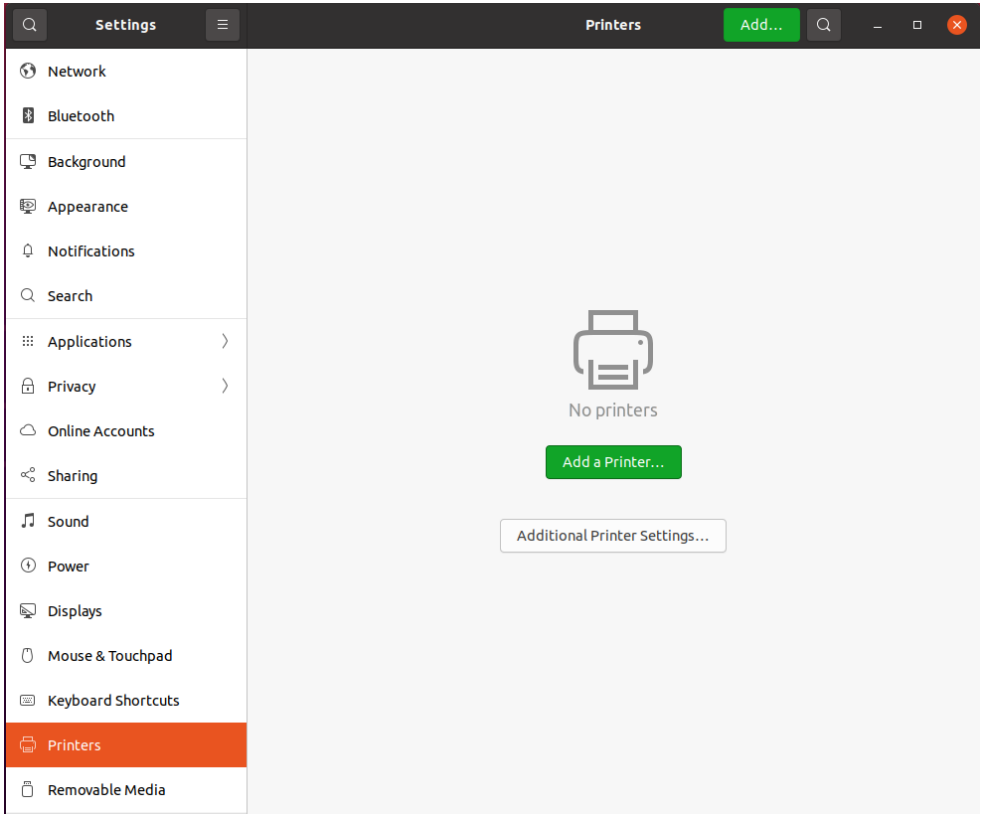
Installing Ubuntu and post-Instatallation Configuration

- System Settings:
  - Detecting and Configuring a Printer
  - Configuring Power Management in Ubuntu
  - Setting the Time and Date

Installing Ubuntu and post-Instatallation Configuration

- System Settings:
  - Detecting and Configuring a Printer



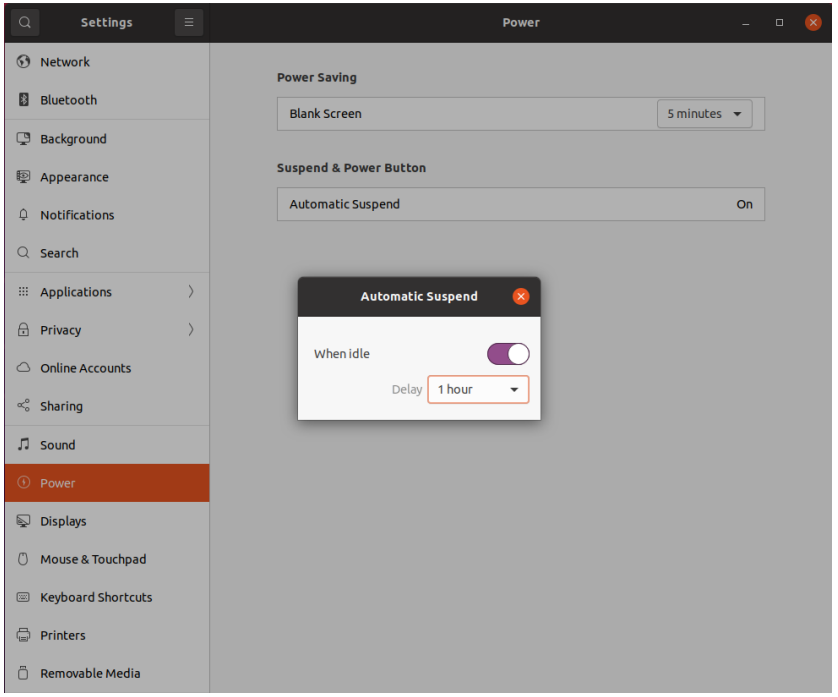


Installing Ubuntu and post-Instatallation Configuration

- System Settings:
  - Detecting and Configuring a Printer
    - Ubuntu includes drivers for many printers, and installing and using a printer in Ubuntu is usually easier than in other operating systems.
    - Open Printing database from the Linux Foundation at www.openprinting.org/printers.

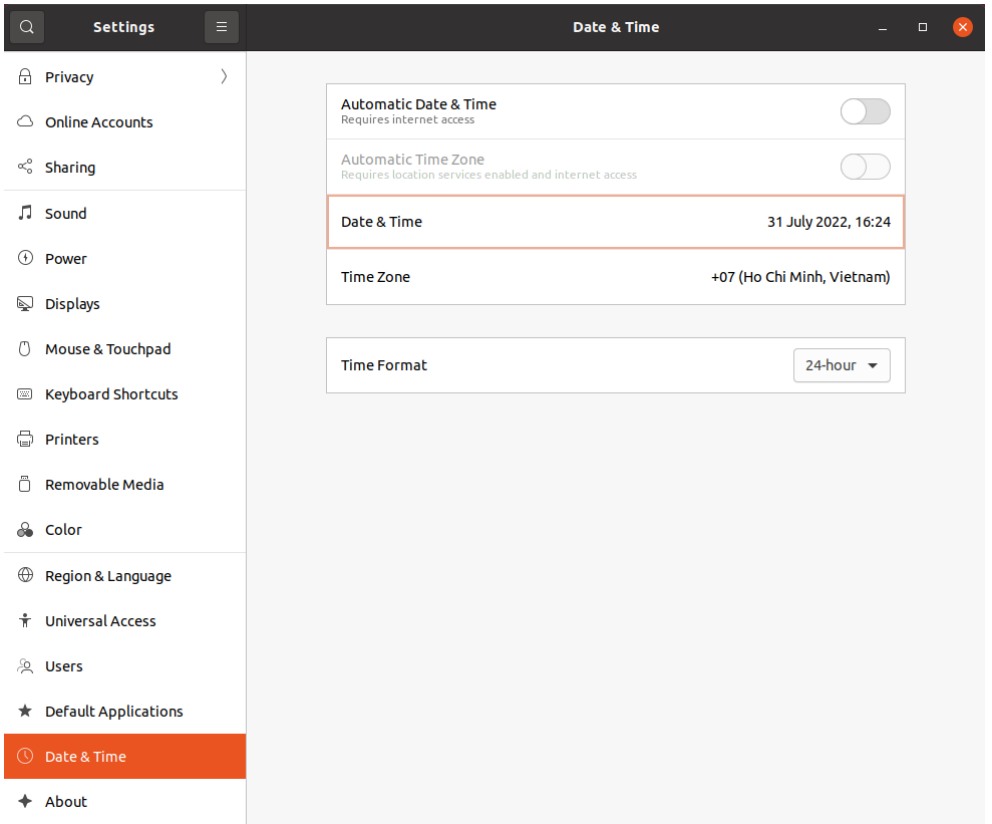
Installing Ubuntu and post-Instatallation Configuration

- System Settings:
  - Configuring Power Management in Ubuntu
    - Ubuntu provides good support for suspend, which means your computer writes its current state to memory and goes into a low-power mode.



Installing Ubuntu and post-Instatallation Configuration

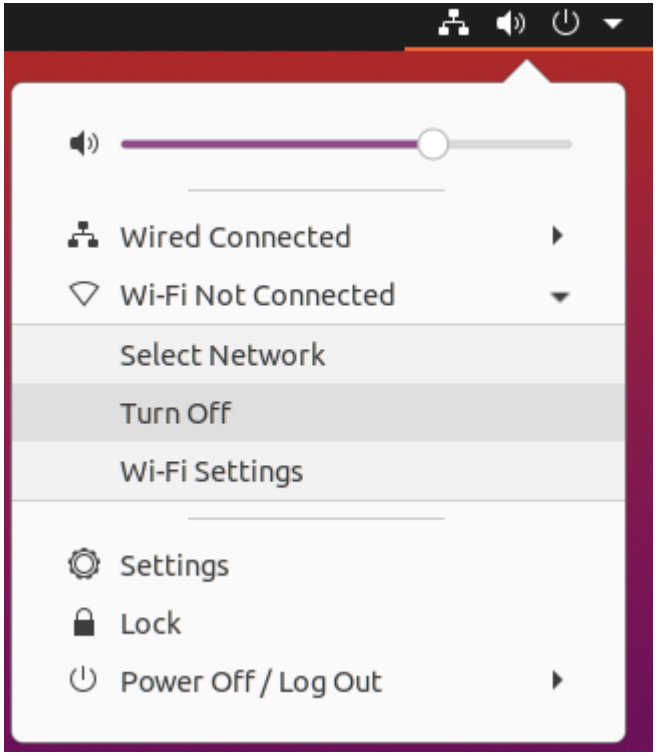
- System Settings:
  - Setting the Time and Date
    - Linux system time is based on the number of second elapsed since January 1, 1970.
    - Changing the Time and Date from Setting tool



Installing Ubuntu and post-Instatallation Configuration

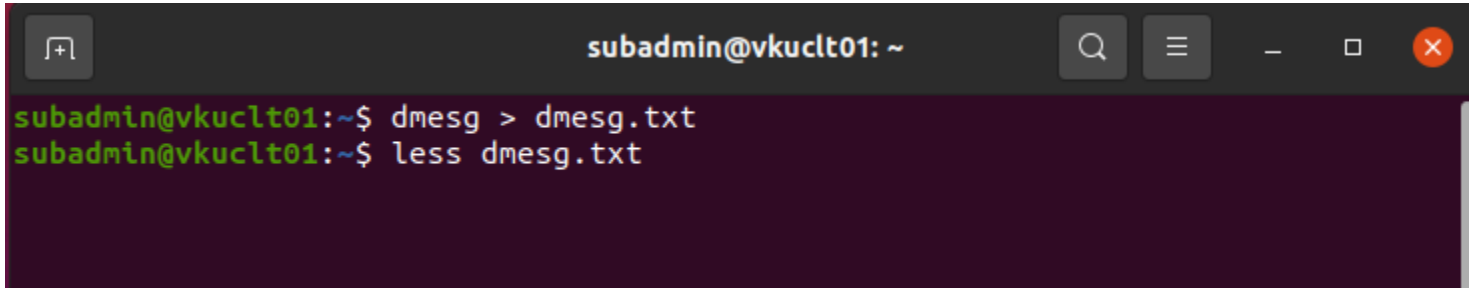
➢ Configuring Wireless Networks

- Click the networking icon in the toolbar to connect to a wireless network.

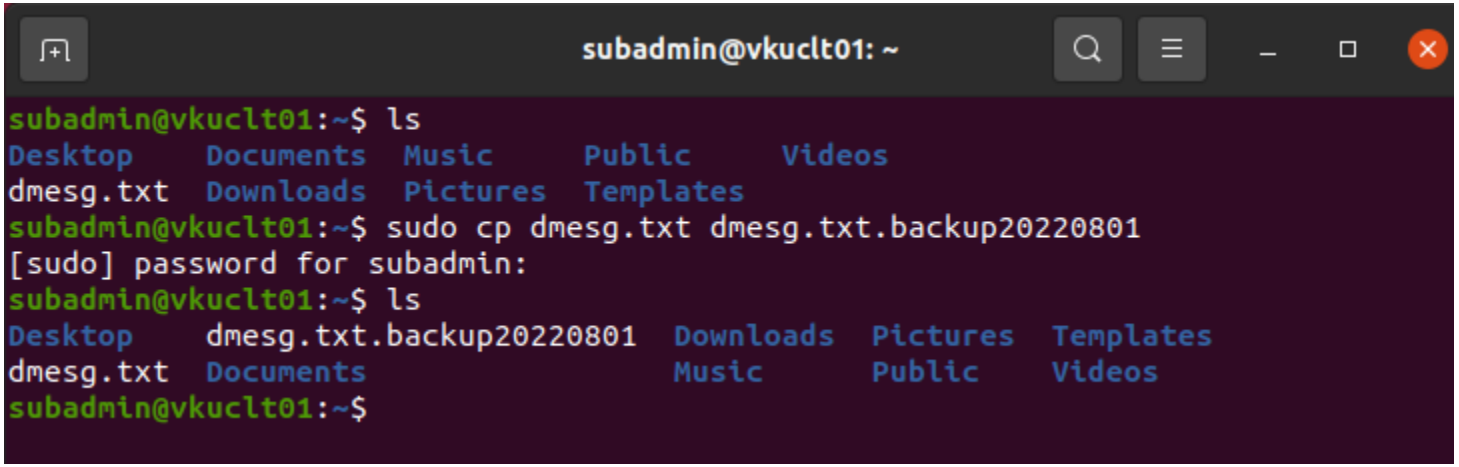


Installing Ubuntu and post-Instatallation Configuration

- Troubleshooting Post-Installation Configuration Problems
  - The *dmesg* command takes its output directly from the file */var/log/syslog*
  - You can choose to either run *dmesg* or read the file direcly by typing *$less /var/log/syslog*.



- Troubleshooting Post-Installation Configuration Problems
  - You should also get into the habit of making backup copies of all files that you modify, just in case you make a bad situation worse. For example:



Background Information and Resources

- What is Linux?
  - Linux is the core, or kernel, of a free operating system first developed and released to the world by Linus Benedict Torvalds in 1991.
  - Most of the Linux kernel version numbers are assigned by Linus Torvalds and his legion of kernel developers.
  - Combining the Linux kernel with GNU software tools (drivers, utilities, user interfaces, etc.) creates a Linux distribution.
  - Ubuntu is based on Debian Linux distribution.

Background Information and Resources

- Why use Linux?
  - Using Linux is a good idea for a number of reasons, including:
    - Linux provides an excellent return on investment (ROI).
    - Linux can be put to work on the desktop.
    - Linux can be put to work as a server platform.
    - Linux has a low entry-and-deployment cost barrier.
    - Linux appeals to a wide audience in the hardware and software industry.
    - Linux provides a royalty-free development platform for cross-platform development.
    - Big-player support in the computer hardware industry from such titans as IBM now lends credibility to Linux as a viable platform.

Background Information and Resources

- What is Ubuntu?
  - Ubuntu is an operating system based on the Linux kernel, created, improved, refined, and distributed by the Ubuntu Community at www.Ubuntu.com.
  - Ubuntu is spoinsored by Canonical Ltd (www.canonical.com)
  - Ubuntu released its first version in Oct 2004.
  - Releasing every six months, Ubuntu made rapid progress into the Linux community and is now one of the most popular Linux distros in the world.

Background Information and Resources

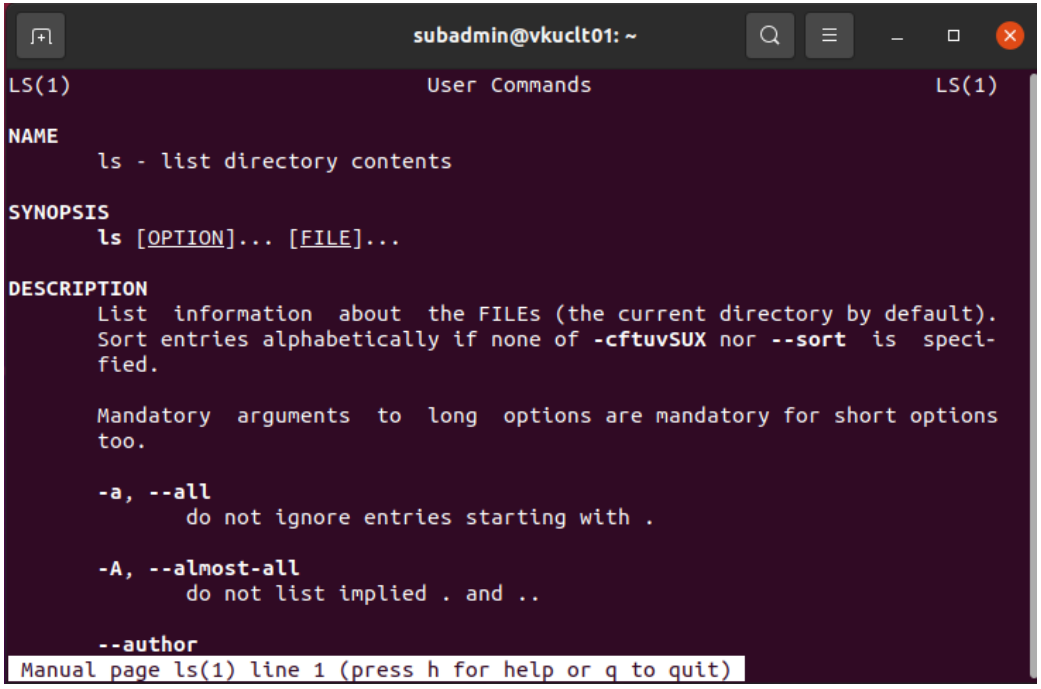
- Ubuntu for Business
  - Ubuntu is easy to install on a network and plays well with others such as Windows, macOS, Unix.
  - A business using Ubuntu not only avoids the need for licensing accounting and the threat of software audits but also has viable alternatives to many types of commercial productivity software, often for free.

Background Information and Resources

- Ubuntu in Your Home
  - Ubuntu installs a special set of preselected software packages onto your hard drive. These packages, which are suitable for small office/home office (SOHO) users.

Background Information and Resources

- Getting the Most from Linux and Ubuntu Documentation
  - Linux
    - Linux manual pages are compressed txt files that contain succinct information about how to use a program.



Background Information and Resources

- Getting the Most from Linux and Ubuntu Documentation
  - Ubuntu
    - The best place to start for Ubuntu-specific information is at Ubuntu-focused websites.
      - ✓ www.Ubuntu.com
      - ✓ https://help.Ubuntu.com
      - ✓ www.ubuntuforums.org
      - ✓ https://askubuntu.com
      - ✓ https://tutorials.Ubuntu.com
      - ✓ https://community.Ubuntu.com
      - ✓ https://answers.Launchpad.net/ubuntu

Desktop Ubuntu

- Foundations of the Linux GUI
- Ubuntu Desktop Options
- On the Internet
- Productivity Applications
- Multimedia Aplications
- Games

Foundations of the Linux GUI

- Foundations and the X server
  - Basic X Concepts
    - X windows system is known as just X, coming from the world-renowned Massachusetts Institute of Technology.
  - Using X
    - X.org (www.x.org) is the X server that is used with Ubuntu.
  - Elements of the *xorg.conf* file
    - ServerLayout: defines the display, defines one or more screen layouts, and names input devices.
    - Files: Defines the locations of colors, fonts, or port number of the font server.
    - Module: Tells the X server what graphics display support code modules to load.
    - InputDevice: Defines the input devices.
    - Monitor: Defines the capabilities of any attached display.
    - Device: Defines one or more graphics cards
    - Screen: Defines one or more resolutions, color depths.

Foundations of the Linux GUI

- Starting X
  - Using a Display Manager
  - Changing Windows Managers

Ubuntu Desktop Options

- Desktop Environment
- Using GNOME: A Primer
- KDE and Kubuntu
- Xfce and Xubuntu
- LXDE and Lubuntu
- MATE and Ubuntu MATE
- Ubuntu Budgie
- Ubuntu Kylin

Ubuntu Desktop Options

- Desktop Environment
  - When you install Ubuntu desktop, by default you use the GNONE.
  - Beside GNONE, there are some other desktop environments, such as KDE, Xfce, LXDE, MATE, etc.

Ubuntu Desktop Options

- Using GNOME: A Primer
  - GNOME is used by several other Linux distributions, such as Debian, Fedora, Red Hat Enterprise Linux, and Oracle Linux.

FIGURE 4.1 The GNOME Shell desktop.

Ubuntu Desktop Options

- Using GNOME: A Primer

FIGURE 4.2 The GNOME Dash, with the Activities link at the top.

Ubuntu Desktop Options

- Using GNOME: A Primer

FIGURE 4.3 Click the Show Applications icon to reveal an array of installed programs.

Ubuntu Desktop Options

- Using GNOME: A Primer

FIGURE 4.4 Adjust volume, account settings, and much more from the power menu.

Ubuntu Desktop Options

- KDE and Kubuntu
  - The KDE project began back in 1996.
  - The KDE project has always been focused on end users rather than creating a simple GUI for the system administrator.
  - You may also install Kubuntu in standard Ubuntu and alongside GNOME by installing the *kubuntu-desktop* package from the Ubuntu software repositories.

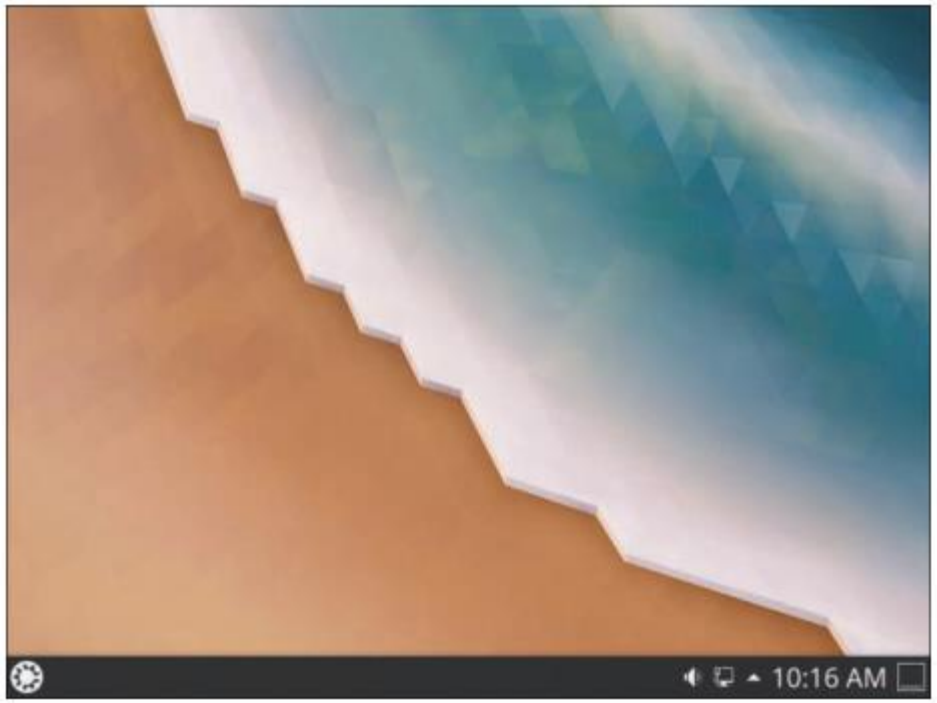


FIGURE 4.5 The Kubuntu desktop.

Ubuntu Desktop Options

- Xfce and Xubuntu
  - Xfce is a lighter desktop environment that requires less memory and processing power than either GNOME or KDE and is therefore often suggested for use on older machines.
  - To install Xubuntu with the Xfce desktop environment, install the *xubuntu-desktop* package.

FIGURE 4.6 The Xubuntu desktop.

Ubuntu Desktop Options

- LXDE and Lubuntu
  - Lubuntu is based on LXDE, an extremely fast desktop environment that uses less memory and fewer cycles than any of the others discussed.
  - Install *lubuntu-desktop* from the Ubuntu repositories to check it out.

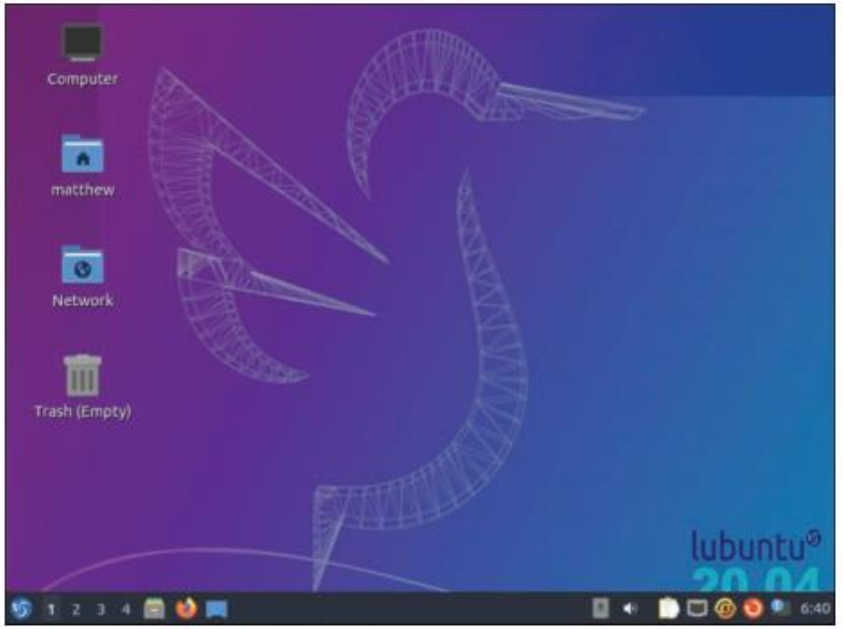


FIGURE 4.7 The Lubuntu desktop is quite attractive.

Ubuntu Desktop Options

- MATE and Ubuntu MATE
  - MATE is a continuation of GNOME 2, the older version of GNOME before GNOME 3.

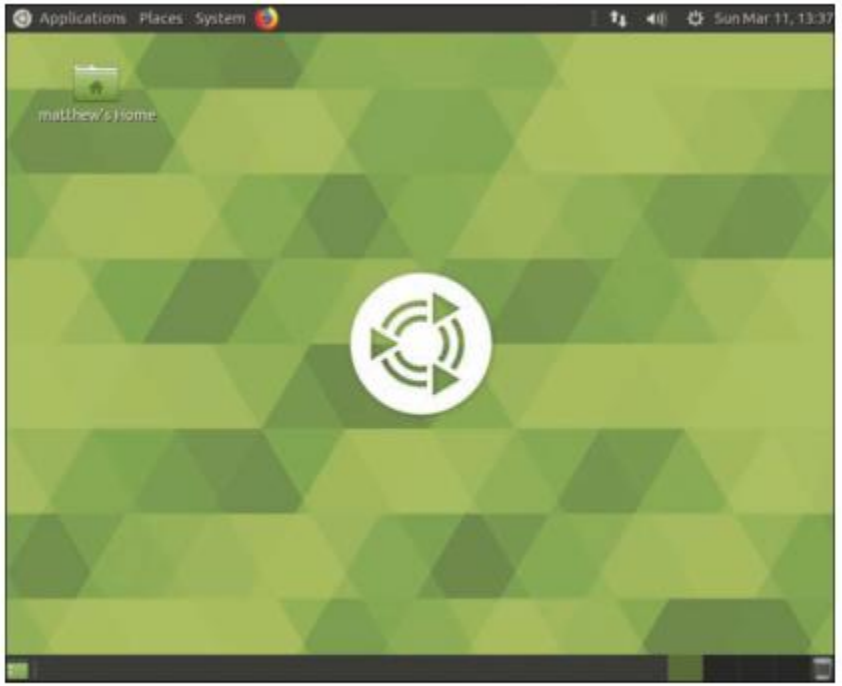


FIGURE 4.8 The MATE desktop.

Ubuntu Desktop Options

- Ubuntu Budgie
  - Ubuntu Budgie uses the Budgie desktop from https://budgie-desktop.org.

FIGURE 4.9 The Budgie desktop.

Ubuntu Desktop Options

- Ubuntu Kylin
  - Ubuntu Kylin is Ubuntu localized for China.
  - It starts out the same as standard Ubuntu and is modified with Chinese language.

On the Internet

- Getting Started with Firefox
- Checking Out Google Chrome and Chromium

On the Internet

- Getting Started with Firefox
  - Firefox is the default web browser in Ubuntu which is built on a solid code base that is derived from the Mozilla suite.

On the Internet

- Checking Out Google Chrome and Chromium
  - Google Chrome is the most popular browser today.
  - This browser is fast, secure, expandable with extensions.

Productivity Applications

- Introducing LibreOffice
- Other Useful Productivity Software
- Productivity Applications Written for Microsoft Windows

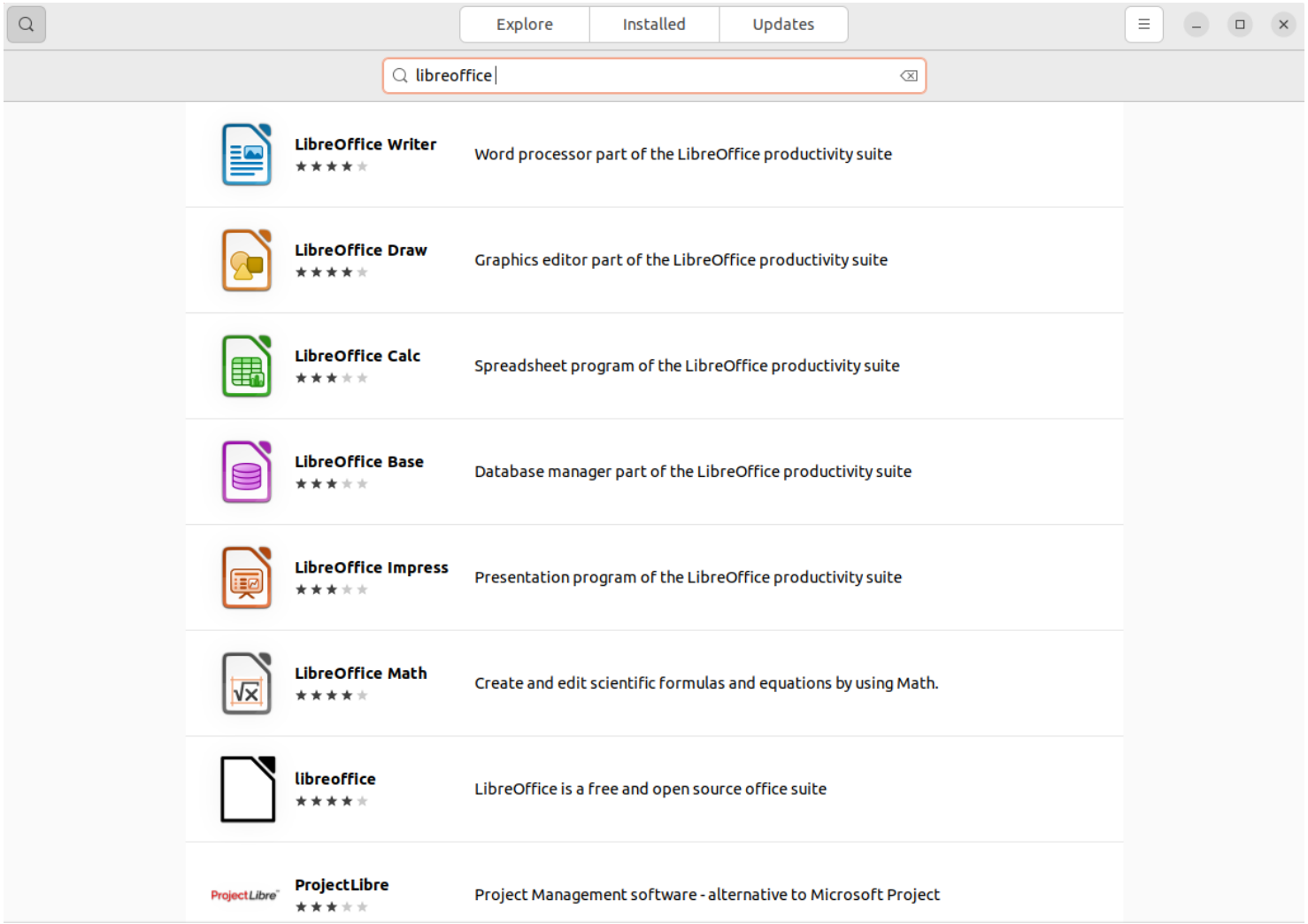
Productivity Applications

Introducing LibreOffice

- LibreOffice contains a number of productivity applications for use in creating text documents, preparing spreadheets, organizing presentations, managing projects, and so on.
  - Writer: enables you to compose, format, and organize text documents.
  - Calc: enables you to manipulate numbers in a spreadsheet format.
  - Impress: which is similar to Microsoft PowerPoint.
  - Math: enables you to write mathematical formulas with a number of math fonts and symbols
  - Base: database application.
  - Draw: graphics application.
  - Dia: similar to Microsoft Visio.
  - Planner: similar to Microsoft Project.

Productivity Applications

- Introducing LibreOffice



Productivity Applications

- Other Useful Productivity Software
  - Working with PDFs
    - Evince is used to open pdf file.
    - You can install Adobe Reader from the Ubuntu Software Center.
    - pdfedit is a program that just for editing PDF files.

Productivity Applications

- Other Useful Productivity Software
  - Writing Scripts
    - Celtx is a complex and powerful tool for serious writers and production managers.
    - The application comes with options to help you organize your scenes; annotate those scenes with notes; create index cards; maintain your list of characters, locations, and props; and far more.

Productivity Applications

- Other Useful Productivity Software
  - Working with XML and DocBook
    - XML is a markup language
    - DocBook is an open source standard form of XML.

LISTING 6.1 Sample XML Excerpt

```
<?xml version="1.0"?>
<xml-stylesheet type="text/css" href="book.css"?>
<book>
<title>Ubuntu Unleashed 2013</title>
<edition>8</edition>
<chapter>
       <number>1</number>
       <title>Installing Ubuntu</title>
       <text>
              <paragraph><dropcap>N</dropcap>ot that long ago,the mere mention...
              </paragraph>
       ...
       </text>
</chapter>
...
</book>
```

Productivity Applications

- Other Useful Productivity Software
  - Working with LaTeX
    - LaTeX was created for and is widely used in academia.
    - Texmaker is a program that is stable, has many useful features, and is rather popular in the TeX world.

Productivity Applications

- Other Useful Productivity Software
  - Creating Mind Maps
    - Mind map is the best way to help you gather your thoughts and ideas.
    - Heimer helps you do exactly that quickly and with an interface designed for simplicity and speed.
    - Install *heimer* from the Ubuntu Software Center.

Productivity Applications

- Productivity Applications Written for Microsoft Windows
  - Some Microsoft Windows applications could run on Linux by using an application named Wine.
  - Wine enables you to use Microsoft Windows and DOS programs on UNIX-based systems.

Multimedia Aplications

- Sound and Music
  - Sound Cards
    - ALSA supports a long list of sound cards.
    - PulseAudio is a sound server.
  - Sound Formats
    - Ubuntu supports all the most popular sound formats, including: raw, .mp3, .mp4, .wav, .ogg, .flac.
  - Listening to Music
    - Rhythmbox is a useful application that plays CDs and music files.
    - Banshee is another music application.

Multimedia Aplications

- Graphics Manipulation
  - The GNU Image Manipulation Program
    - GIMP is a free, GPL-licensed image editor with sophisticated capabilities that can import and export more than 30 different graphics formats.
  - Using Scanners in Ubuntu
    - To scan from GIMP, youshould install the *xsane* package.
  - Working withGraphics Formats
    - Ubuntu supports bmp, gif, jpg, pcx, png, svg and tif images.
  - Capturing Screen Images
    - *gnome-screenshot* (Alt + Print Screen) is used to take a screenshot of only the window that has focus on a desktop.
  - Other Graphics Manipulation Options
    - Some of graphics manipulation options: blender, cinePaint, darktable, digiKam, Hugin, Inkscape, Krita, Radiance, Xara Xtreme.

Multimedia Aplications

- Using Digital Cameras with Ubuntu
  - Handheld Digital Cameras
  - Using Shotwell Photo Manager

Multimedia Aplications

- Burning CDs and DVDs in Ubuntu
  - Creating CDs and DVDs with Brasero
  - Creating CDs from the Command Line
  - Creating DVDs from the Command line

Multimedia Aplications

- Viewing Video
  - Video Formats
    - Here is a list of the most common video formats and their associated file extensions: avi, flv, mpeg, mov, ogv, ogg, qt, webm.
  - Viewing Video in Linux
    - You could view video in Linux by installing *Ubuntu-restricted-extras* package from the Ubuntu software repositories.

Multimedia Aplications

- Recording and Editing Audio
  - Some audio recording and editing applications for Linux: Audacity, Ardour, Cecilia, LMMS, Mixxx, Rosegarden.
- Editing Video
  - These are the most respected video editing applications for Linux: Avidemux, Blender, Cinelerra, DaVinci Resolve, Kdenlive, Lightworks, OpenShot Video Editor, PiTiVi, Shotcut.

Games

- Ubuntu Gaming
  - A small number of games come installed by default with standard desktop Ubuntu such as *Solitaire* and *Mahjongg*.

Games

- Installing Proprietary Video Drivers

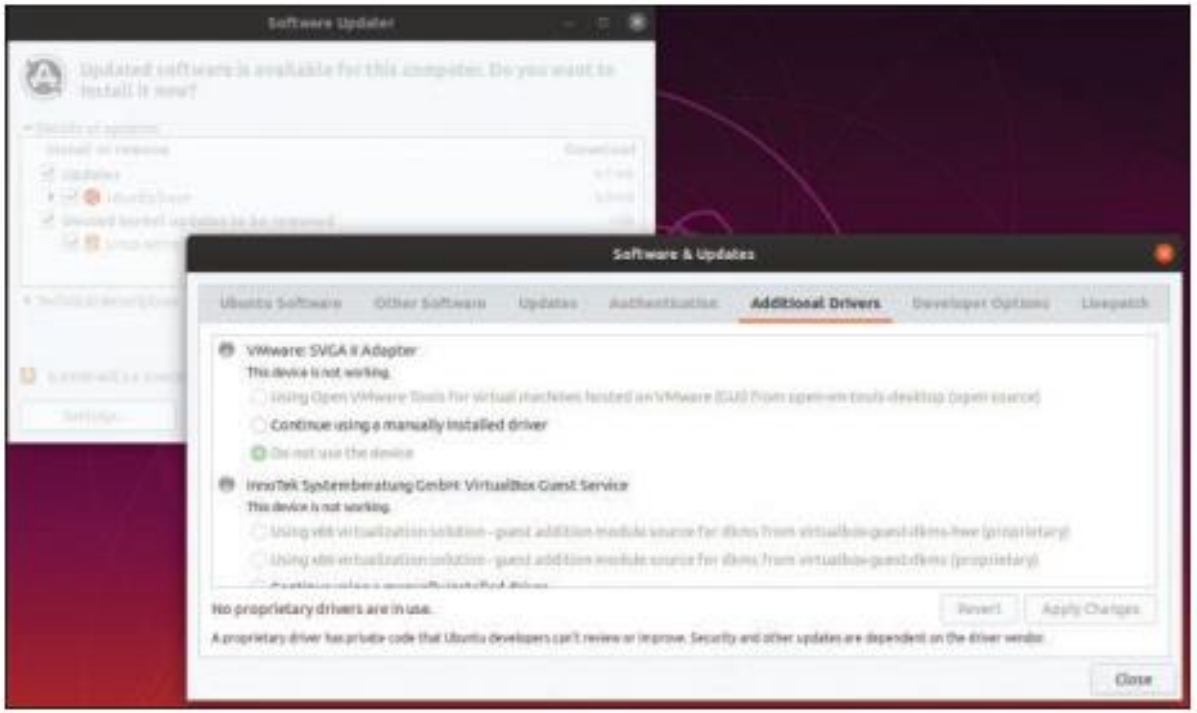


FIGURE 8.1 Use the Additional Drivers tab to activate or deactivate the appropriate proprietary graphics driver for your graphics card.

Games

- Online Game Sources
  - Steam
  - GOG.com
  - Humble
  - Itch.io
  - LGDB
  - Game Jolt

Games

- Installing Games from the Ubuntu Repositories
  - Warsow
  - Scorched 3D
  - Frozen Bubble
  - SuperTux
  - Battle for Wesnoth
  - Frets on Fire
  - FlightGear
  - Speed Dreams
  - Games for Kids
  - Commercial Games

Games

- Installing Games from the Ubuntu Repositories
  - Warsow

FIGURE 8.2 *Warsow* is one of the newest and fastest FPS games available.

Games

- Installing Games from the Ubuntu Repositories
  - Scorched 3D

FIGURE 8.3 *Scorched 3D* in action.

Games

- Installing Games from the Ubuntu Repositories
  - Frozen Bubble

FIGURE 8.4 Move left or right to aim and press up to fire.

Games

- Installing Games from the Ubuntu Repositories
  - SuperTux

FIGURE 8.5 Although the look and feel of *SuperTux* takes you back to the Mario era, it is far from dull or boring.

Games

- Installing Games from the Ubuntu Repositories
  - Battle for Wesnoth

FIGURE 8.6 Flex your strategic brain by playing *Battle for Wesnoth*, a rich and full land of fantasy of adventure.

Games

- Installing Games from the Ubuntu Repositories
  - Frets on Fire

FIGURE 8.7 *Frets on Fire* offers flashy graphics and familiar game play.

Games

- Installing Games from the Ubuntu Repositories
  - FlightGear

FIGURE 8.8 *FlightGear* features stunning landscapes and technically accurate control panels.

Games

- Installing Games from the Ubuntu Repositories
  - Speed Dreams

FIGURE 8.9 In *Speed Dreams*, many views of the race are available, including one from your car's hood.

QUESTION
&
ANSWER