Xubuntu Documentation

The Xubuntu documentation team. Xubuntu and Canonical are registered trademarks of Canonical Ltd.

Xubuntu Documentation

Copyright © 2012–2022 The Xubuntu documentation team. Xubuntu and Canonical are registered trademarks of Canonical Ltd.

Credits and License

This documentation is maintained by the Xubuntu documentation team.

The contributors to this documentation are:

... Chris Crenshaw

... John T (JT252)

... Lefteris Pavlou

... Sean Davis (bluesabre)

... Stephen Michael Kellat (skellat)

... William Andrew Conna (williamconna)

... Yousuf Philips (jphilips)

... Zachariah Lorenzini (zachtex)

The contributors to this translation of the documentation are:

... Alex (misterzixy)

... Alex Katz (dumplingcloud)

... Andi Chandler (bing)

... Pasi Lallinaho (knome)

... Stephan Woidowski (swoidowski)

The contributors to previous versions of this documentation are:

... Cody A.W. Somerville (cody-somerville)

... David Pires (slickymaster)

... Elfy (elfy)

... Elizabeth Krumbach (lyz)

... Freddy Martinez (freddymartinez9)

... Jack Fromm (jjfrv8)

... Jan M. (fijam7)

... Jay van Cooten (skippersboss)

... Jim Campbell (jwcampbell)

... Kev Bowring (flocculant)

... Krytarik Raido (krytarik)

... Luzius Thöny (lucius-antonius)

... Pasi Lallinaho (knome)

... Steve Dodier-Lazaro (sidi)

... Unit 193 (unit193)

This document is made available under the Creative Commons Share Alike 4.0 International License (CC-BY-SA).

You are free to modify, extend, and improve the Xubuntu documentation under the terms of this license. All derivative works must be released under this license.

This documentation is distributed in the hope that it will be useful, but WITHOUT ANY WARRANTY; without even the implied warranty of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE AS DESCRIBED IN THE DISCLAIMER.

A copy of the license is available here: Creative Commons ShareAlike License.

All trademarks or registered trademarks are the property of the respective owners.

Welcome!

This documentation provides information on some of the most common topics on using Xubuntu. The complete set of topics is listed below.

If you require help with a topic or problem that is not addressed by the documentation, you can visit the Help & Support [http://xubuntu.org/help/] page of the Xubuntu website for a full list of additional help resources. Some of these resources include live chat on the #xubuntu [https://web.libera.chat/?nick=xu-help?w#xubuntu] (English) IRC channel or an Ubuntu localized [https://wiki.ubuntu.com/IRC/ChannelList#IRC.2FChannelList.2FLocal.Local_Ubuntu_channels] channel, live chat on the Xubuntu Support [https://t.me/XubuntuSupport] Telegram group, email support on our Xubuntu user [https://lists.ubuntu.com/mailman/listinfo/xubuntu-users] (English) mailing list or an Ubuntu localized [https://lists.ubuntu.com/#Localization+Lists] list, Xubuntu Reddit [https://www.reddit.com/r/xubuntu/], Xfce Forums [https://forum.xfce.org/] and Ubuntu Forums [https://ubuntuforums.org/forumdisplay.php?f=329&pp=20&prefixid=xubuntu&sort=lastpost&order=desc&daysprune=-1] as discussion platforms, and Ask Ubuntu [https://askubuntu.com/questions/tagged/xubuntu] for Q and A.

If you would like to contribute to Xubuntu, including this documentation, see the Get Involved [http://xubuntu.org/contribute/] section of the Xubuntu website. Xubuntu is a community-driven project that you can participate in. There are many areas of involvement, including artwork, bug reporting, bug triaging, testing, documentation, translation, programming, marketing, and more. To participate you can contact the team on the #xubuntu-devel [https://web.libera.chat/?nick=xu-contribute?w#xubuntu] IRC channel, the Xubuntu Development [https://t.me/XubuntuDevelopment] Telegram group, or the Xubuntu Development [https://lists.ubuntu.com/mailman/listinfo/xubuntu-devel] mailing list.

Table of Contents

1. What is Xubuntu? 1
    - A short introduction 1
        - A Free Community-Developed Operating System 1
        - About the Name 1
        - Releases and Version Numbers 2
        - Editions 2
    - What Makes Up Xubuntu 3
        - Free and Open Source Software 3
        - Linux 3
        - Xfce 3
        - Debian and Ubuntu 4
2. Installation 5
    - Preparation 5
        - Prerequisites 5
        - Download the ISO 5
        - Write the ISO 5
        - Backup Data 6
    - Booting 6
        - BIOS / UEFI Considerations 6
        - Starting the Bootable Medium 6
        - Booting the Installer 7
        - Integrity Check 10
    - Installer 12
        - Welcome Screen 12
        - Initial Steps 13
        - Disk Space Allocation 15
        - Disk Changes Confirmation 19
        - Select Your Location 21
        - Login Details 21
        - Background Installation 23
        - Installation Completion 25
    - Conclusion 26
3. Introduction 27
    - Startup 27
        - Login Screen 27
    - Desktop 28
        - Panel 29
        - Applications Menu 30
        - Desktop Icons and Wallpaper 31
    - Session Management 31
4. Default Applications 33
    - Favorites 33
    - Accessories 33

Games 34
Graphics 34
Internet 35
Multimedia 36
Office 36
Settings 36
System 36
5. Software Management 38
Using Software Center 39
Software Repositories 40
Installing Third-Party Apps 40
Software Updates 41
Software Updater 41
Update Check Settings 41
6. Settings - Personalization 43
Panel 43
Panel Presets 44
Panel Customization 45
Menu 48
Desktop 51
Background 52
Icons 54
Menus 54
Theming 54
UI Controls and Icons 55
Window Decorations and Effects 57
More Themes 58
Installing Themes 58
7. Settings - Hardware 60
Monitor 60
High Resolution 61
Multiple Monitors 62
Colors 63
Keyboard 63
Mouse 65
Sound 66
Sound Applet 66
Sound Dialog 67
Device Drivers 68
Open Source Drivers 68
Proprietary Drivers 68
Managing Proprietary Drivers 69
8. Settings - Connectivity 71
Network Connections 71
Network Applet 71

Network Dialog ... 73
Bluetooth ... 74
Connecting to servers ... 75
9. Printing and Scanning ... 77
Printing ... 77
Managing Your Printer ... 77
Add Printer ... 78
Share Printer ... 79
Management Software ... 80
Printer Support ... 81
Printer Drivers ... 81
Scanning ... 82
Using your Scanner ... 82
No Scanners Detected ... 83
Manually installing a scanner ... 83
10. User Management ... 85
Users and groups ... 85
Managing users ... 85
Managing groups ... 86
Customizing your personal info ... 86
11. Hardware devices ... 88
Restricted drivers ... 88
Why are some drivers restricted? ... 88
Enabling restricted drivers ... 88
Disabling restricted drivers ... 88
Disks and partitions ... 89
Checking how much disk space is available ... 89
How can I free up disk space? ... 89
Partitioning a Device ... 89
Mounting and unmounting devices ... 91
Laptops ... 91
Power management settings ... 91
Touchpads ... 91
Suspending and Hibernating ... 92
My computer doesn't suspend or hibernate correctly ... 92
Enabling hibernation ... 93
I get strange patterns on the screen when I hibernate my computer ... 93
Mice and keyboards ... 93
12. File Management ... 95
Navigation ... 95
Creating and deleting files and folders ... 95
Copying ... 96
Removable Drives ... 96
Customizing Thunar ... 96
13. Media applications ... 97
Music ... 97

Listening to music ... 97
Portable music players ... 97
Movies, DVDs and videos ... 97
Playing DVDs ... 97
Playing video ... 98
Burning CDs and DVDs ... 98
14. Migrating ... 99
Migrating from Windows ... 99
A quick Windows-Xubuntu dictionary ... 99
Windows applications on Linux ... 99
Windows networking on Linux ... 99
15. Troubleshooting ... 101
Network troubleshooting ... 101
General troubleshooting ... 101
Wireless troubleshooting ... 102
Advanced troubleshooting ... 103
16. Upgrading ... 105
Upgrading Xubuntu ... 105
Upgrading to the next available release ... 105
Changing your upgrade path ... 105
Upgrading to the development version ... 106
Notifications of new Xubuntu versions ... 106
A. Application table ... 107
Settings Manager ... 107
Behind the scenes ... 108
B. Creative Commons by Attribution-ShareAlike 4.0 International ... 109

Chapter 1. What is Xubuntu?

A short introduction

A Free Community-Developed Operating System

Xubuntu is an elegant and easy-to-use desktop operating system that comes with the Xfce desktop environment, making it stable, light on resources and configurable.

It is perfect for those who want to make the most of their desktops, laptops and netbooks, featuring a modern look and enough features for efficient daily usage. It also works well on older hardware, single-board computers like the Raspberry Pi, and the Windows Subsystem for Linux (WSL).

Xubuntu was first released in 2006. It is a community-developed project led by the Xubuntu team. The team is made up of volunteers who work on different aspects of the project including design, programming, marketing, testing, website, documentation, and administration.

Find out more at the Xubuntu website [http://xubuntu.org/] or on Wikipedia [https://en.wikipedia.org/wiki/Xubuntu].

About the Name

The ”X„ in Xubuntu stands for Xfce, the user interface and bundled core applications that come with Xubuntu. The ”ubuntu„ in Xubuntu denotes its relationship with the Ubuntu base upon which the operating system is built. Xubuntu is pronounced ”zoo-bun-too„.

The word ”ubuntu„ represents the philosophical core of the operating system. Ubuntu can be roughly translated as ”humanity towards others.„ To read more about the philosophy and ideals behind Ubuntu

and Xubuntu, please refer to the Ubuntu Philosophy [http://www.ubuntu.com/project/about-ubuntu/our-philosophy] page.

Releases and Version Numbers

19.10	Oct 2019
20.04 LTS	Apr 2020
20.10	Oct 2020
21.04	Apr 2021
21.10	Oct 2021
22.04 LTS	Apr 2022
22.10	Oct 2022
23.04	Apr 2023
23.10	Oct 2023
24.04	Apr 2024

Xubuntu produces a new Long Term Support (LTS) release every 2 years. These releases are supported for 3 years and are a popular choice for users that prefer stability over new features. Every 6 months, a new interim release is made available for users who want to use the latest features at the cost of a shorter, 9-month support cycle. New releases are produced every April and October.

Xubuntu follows the Ubuntu version numbering scheme, which is based on the distribution release date. The first part of the release denotes the year, while the second part denotes the month. For example, the first official Xubuntu version was released in June, 2006, thus its version number was 6.06.

Editions

There are two editions of Xubuntu: Xubuntu Desktop and Xubuntu Core. Xubuntu Desktop targets the regular user and comes with a collection of preinstalled software carefully curated by the Xubuntu team. It includes a suite of tools appropriate for most tasks, from image and document editing to web browsing and more.

Xubuntu Core is a slimmed-down edition of Xubuntu Desktop, with apps just for the basic tasks, such as file management and terminal emulation. This results in a smaller download ISO, with fewer preinstalled plugins and libraries, that will be even lighter on resources. This edition is targeting users who want to install just the apps they want to suit their specific needs from a cleaner base, so they can create their own custom OS.

What Makes Up Xubuntu

Free and Open Source Software

The Xubuntu project is entirely committed to the principles of free software development where people are encouraged to use software that protects their freedoms, view its source code, improve it, and pass it on. You can find out more about free software and the ideological and technical philosophy behind it at the GNU website [http://www.gnu.org/].

Linux

Linux was brought to life in 1991 by a Finnish student named Linus Torvalds. At the heart of the Xubuntu operating system lies the Linux kernel. The kernel is an important part of any operating system, providing the communication bridge between hardware and software. Read more about Linux at the Linux kernel website [http://www.kernel.org/].

Xfce

Xfce is the lightweight desktop environment used in Xubuntu. It aims to be fast and low on system resources, while still being visually appealing and user friendly. Xfce embodies the traditional UNIX philosophy of modularity and reusability. Read more about Xfce at the Xfce website [http://www.xfce.org/].

Debian and Ubuntu

Xubuntu is built on the hard work of the Debian and Ubuntu GNU/Linux distributions. Based on Ubuntu, Xubuntu supports a wide variety of hardware and provides access to a large archive of free and open source software. Much of this software, including the packages that compose the Xfce desktop environment, are made available by the Debian Xfce team.

Chapter 2. Installation

Preparation

Prerequisites

Visit the System Requirements [https://xubuntu.org/requirements/] page to ensure that your computer meets the necessary hardware requirements to install and run Xubuntu. In general, Xubuntu will run on most computers (PC or Mac) that were built since 2007 and shipped with an OS (Operating System) like Windows XP and Mac OS X 10.5 or higher.

> **Note**
>
> If you are installing Xubuntu on a laptop, it is recommended to keep your laptop plugged in during the installation, in order to prevent a sudden power loss which can cause a corrupted system. If you are running Windows 10 and have Intel's RST (Rapid Storage Technology) running, you will need to turn it off [https://help.ubuntu.com/rst/] before installation.

Download the ISO

Visit the Download [https://xubuntu.org/download/] page to download the ISO image for your selected edition of Xubuntu. If you prefer stability, it is recommended to download the LTS (Long Term Support) release, which is supported for 3 years. The ISO file can be downloaded with a BitTorrent client, such as Transmission [https://transmissionbt.com/download/] or qBittorrent [https://www.qbittorrent.org/download.php], or through your browser from one of the many global mirror servers.

Write the ISO

The ISO file needs to be written to a bootable medium, like a USB flash drive, an SD memory card or a DVD optical disk.

Write to USB or SD

If you have a USB stick or an SD card with 2 GB of storage or more, you can use one of these apps to write the ISO file: Rufus [https://rufus.ie/] (Windows), Etcher [https://www.balena.io/etcher/] (Windows, Mac, Linux), GNOME Disks [https://wiki.gnome.org/Apps/Disks] (**gnome-disk-utility [apt://gnome-disk-utility]**). For more information on how to write the ISO to USB or SD, please see these guides for Windows [https://ubuntu.com/tutorials/tutorial-create-a-usb-stick-on-windows#3-usb-selection], Mac [https://ubuntu.com/tutorials/tutorial-create-a-usb-stick-on-macos#3-prepare-the-usb-stick] or Linux [https://www.maketecheasier.com/create-bootable-usb-installer-ubuntu-gnome-disks/].

Write to DVD

If you have a blank DVD disk and a DVD writer drive, you can burn the ISO with one of these apps, if your operating system doesn,t have the built-in capabilities to do so: InfraRecorder [http://infrarecorder.org/?

page_id=5] (Windows), Brasero [https://wiki.gnome.org/Apps/Brasero/] (**brasero [apt://brasero]**), Xfburn [https://docs.xfce.org/apps/xfburn] (**xfburn [apt://xfburn]**). For more information on how to burn the ISO to a DVD, please see these guides for Windows [https://ubuntu.com/tutorials/tutorial-burn-a-dvd-on-windows#2-windows-7--8--10-instructions], Mac [https://ubuntu.com/tutorials/tutorial-burn-a-dvd-on-macos#2-select-the-ubuntu-iso] or Linux [https://ubuntu.com/tutorials/tutorial-burn-a-dvd-on-ubuntu#3-install-brasero].

Backup Data

If you plan to install Xubuntu alongside an existing OS, it is recommended to back up the data of the existing OS as a precaution in case something goes wrong. You can back up the data files to an external USB drive and/or to a secondary hard drive on your computer.

Booting

BIOS / UEFI Considerations

Some computers may require additional configuration before the Xubuntu installation medium can be booted. Please refer to this section if you are unable to boot into the installer or if your hardware is not properly detected.

Warning: This is an advanced computer feature and should only be attempted with caution. *F2* and *Del* are common keys to access the BIOS settings.

... Intel RST

... Secure Boot [https://wiki.ubuntu.com/UEFI/SecureBoot] / Windows 8/10 [https://windows.gadgethacks.com/how-to/access-boot-menu-and-bios-windows-8-0139059/] / Fast Boot [https://www.tenforums.com/tutorials/21284-enable-disable-fast-boot-uefi-firmware-settings-windows.html] / Fast Startup [https://winaero.com/blog/how-to-disable-or-enable-fast-startup-in-windows-8-1/]

... macOS T.2 Security

Starting the Bootable Medium

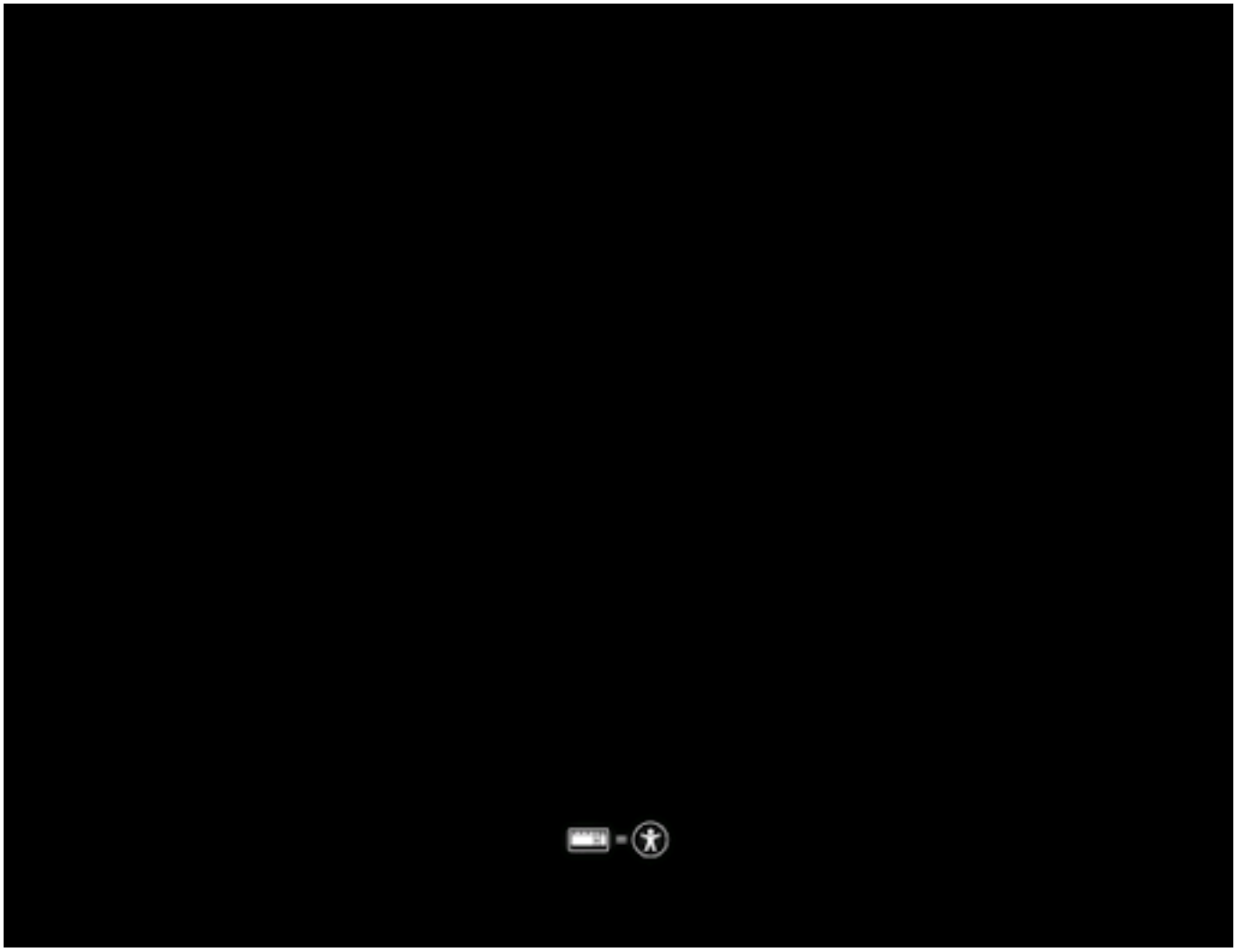
Insert the bootable medium into the respective device (the USB drive in a USB port, the SD card in the SD card reader or the DVD disk in the DVD drive) and restart your computer. If your computer is set to first boot from the bootable medium of your choice, then the medium will automatically boot. If it doesn,t start automatically, please refer to the computer manufacturer,s documentation for entering the boot menu. This could consist of pressing a key, such as *F12*, or using a dedicated button on the computer.

In some cases, you may need to boot into Windows to access the BIOS. Once you have entered the boot menu, select the appropriate boot medium device.

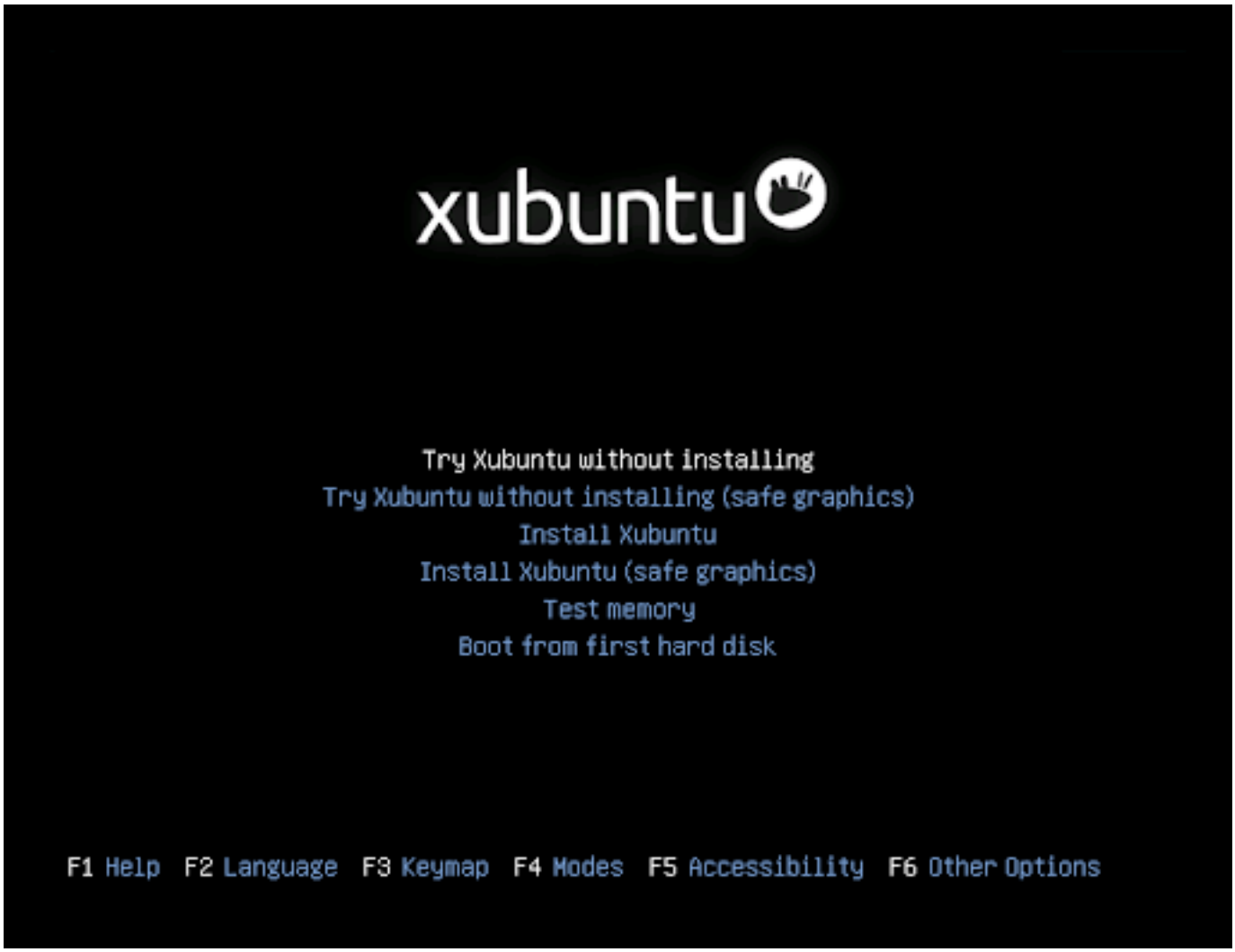
> **Note**
>
> The key to press for your computer,s boot menu will depend on the manufacturer of the computer or motherboard. *F12* is the most common boot menu key, but other common alternative keys are *Escape* and *F10*. Less common keys include *F11*, *F9*, and *F8*. If your computer is not capable of booting through USB, but has a CD or DVD drive, you can utilize PLoP [http://www.howtogeek.com/howto/16822/boot-from-a-usb-drive-even-if-your-BIOS-wont-let-you/].

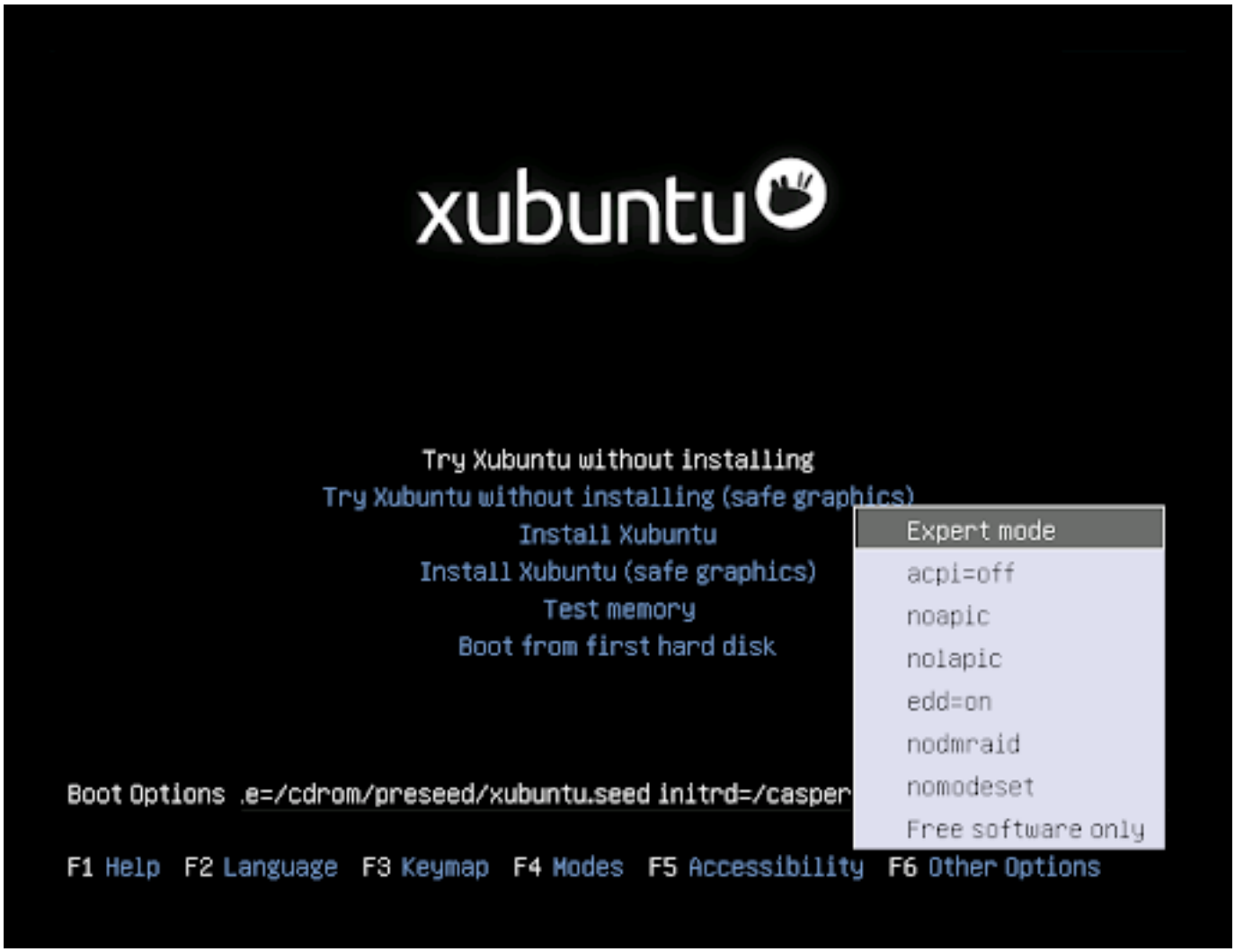
Booting the Installer

Once the bootable media starts, a blank screen will appear with a keyboard and accessibility icons. At this point, you have 5 seconds to press any key to access the installer boot menu, if you wish to. The boot menu will initially present a language selection menu, followed by a simple menu with options to install or try Xubuntu, test memory, boot from the hard disk, as well as other options accessible by pressing the *F1* through *F6* keys (for more information about the Fn keys options, click here [https://help.ubuntu.com/community/BootOptions#Changing_the_CD.27s_Default_Boot_Options]).



Language
Amharic
Arabic
Asturianu
Беларуская
Български
Bengali
Tibetan
Bosanski
Català
Čeština
Dansk
Deutsch
Dzongkha
Ελληνικά
English
Esperanto
Español
Eesti
Euskara
Suomi
Français
Gaeilge
Galego
Gujarati
Hindi
Hrvatski
Magyar
Bahasa Indonesia
Íslenska
Italiano
日本語
Qasaq
Khmer
한국어
Kurdî
Lao
Lietuviškai
Latviski
Македонски
Malayalam
Marathi
Burmese
Nepali
Nederlands
Norsk bokmål
Norsk nynorsk
Punjabi (Gurmukhi)
Polski
Português do Brasil
Português
Română
Русский
Sámegillii
Slovenčina
Slovenščina
Shqip
Српски
Svenska
Tamil
Тоик
Thai
Tagalog
Türkçe
Uyghur
Українська
Tiếng Việt
中文(简体)
中文(繁體)
F1 Help F2 Language F3 Keymap F4 Modes F5 Accessibility F6 Other Options


xubuntu
Try Xubuntu without installing
Try Xubuntu without installing (safe graphics)
Install Xubuntu
Install Xubuntu (safe graphics)
Test memory
Boot from first hard disk
F1 Help F2 Language F3 Keymap F4 Modes F5 Accessibility F6 Other Options



Integrity Check

After the initial boot screen, releases of Xubuntu 20.04 and later default to checking the integrity of the install media, which can be skipped by pressing *Ctrl+C*. This check is important as it is common for corrupted installation media to cause failed installations.

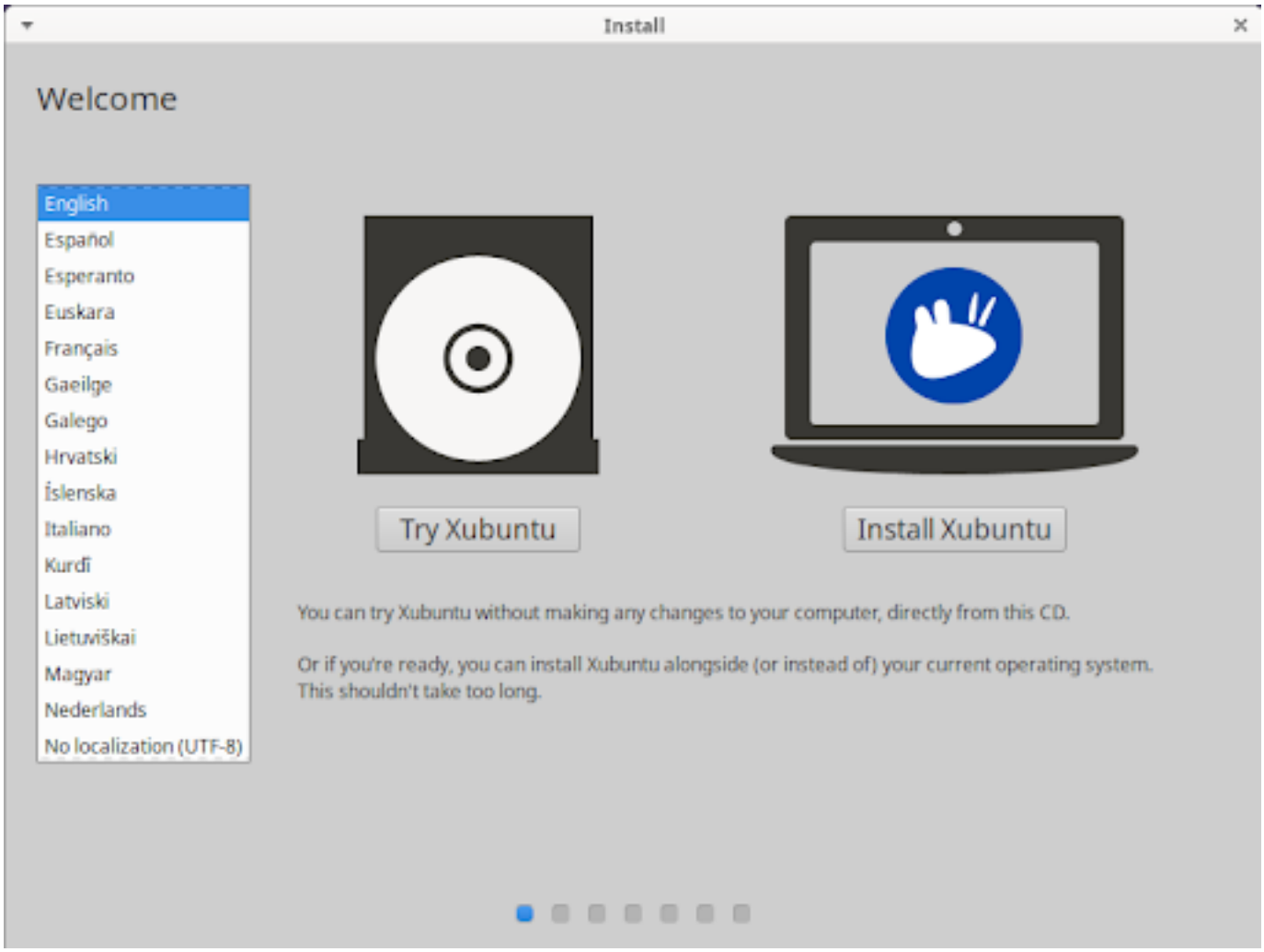
> **Note**
>
> If you get a black screen after the integrity check, reboot your system and select one of the *safe graphics* options in the GRUB menu. This sometimes happens when graphics cards don,t work properly with their open source drivers. If this happens after installation with your NVidia graphics card, select the 'recovery mode, option in the GRUB menu and then install the proprietary NVidia graphics driver from the **Additional Drivers** app.

xubuntu
Checking ./casper/filesystem.size
./casper/filesystem.size: OK
Checking ./casper/filesystem.manifest
./casper/filesystem.manifest: OK
Checking ./casper/filesystem.squashfs

Installer

Welcome Screen

You will be greeted with the installer,s welcome screen when the installer begins. There you can select the language of the installer from the list on the left and press the **Install Xubuntu** button to begin the installation process.



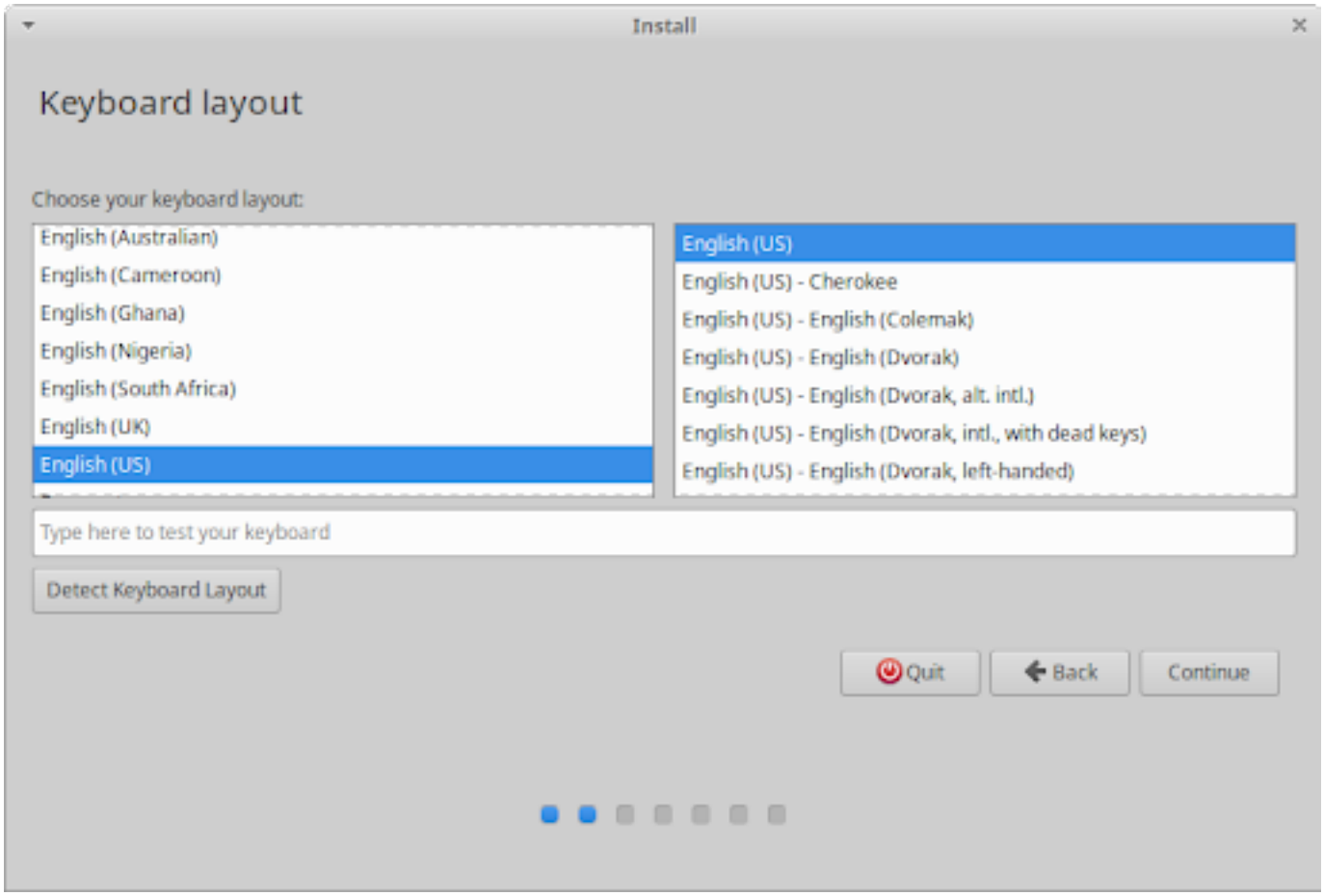
> **Note**
>
> If you selected one of the *Try Xubuntu …* entries in the installer boot menu or the **Try Xubuntu** button on the welcome screen, you can start or restart the installer by clicking the *Install Xubuntu* desktop icon.

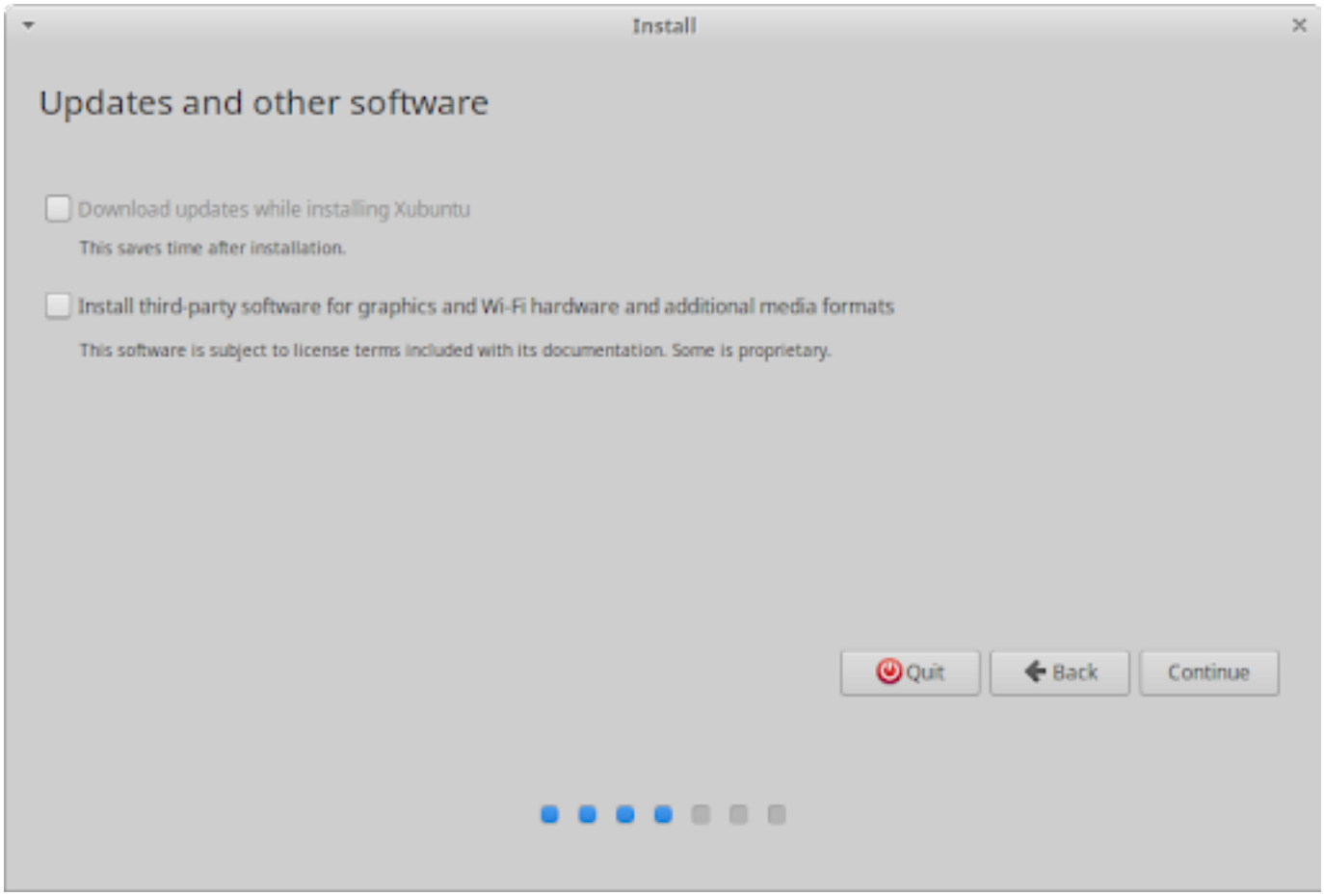
Initial Steps

The next screen of the installer will be the *Keyboard layout* screen. There you can select your keyboard layout, if it wasn,t correctly detected. If you are unsure of your keyboard layout, you may press the *Detect Keyboard Layout* button to go through a brief configuration procedure and test that the layout works as intended in the keyboard test field. Click the *Continue* button to proceed.

If you are not connected to the internet but your computer has Wi-Fi, you will see the *Wireless* screen, where you can either connect to one of the available networks or continue without connecting.

After clicking the **Continue** button, you will arrive at the *Updates and other software* screen. There you have the options to download updates during the installation, if you have an internet connection, and whether to install third-party software, like the Nvidia graphics card driver and multimedia codecs for playing media files. It is recommended to have both of them checked.


Install
Keyboard layout
Choose your keyboard layout:
English (Australian)
English (Cameroon)
English (Ghana)
English (Nigeria)
English (South Africa)
English (UK)
English (US)
English (US)
English (US) - Cherokee
English (US) - English (Colemak)
English (US) - English (Dvorak)
English (US) - English (Dvorak, alt. intl.)
English (US) - English (Dvorak, intl., with dead keys)
English (US) - English (Dvorak, left-handed)
Type here to test your keyboard
Detect Keyboard Layout
Quit
Back
Continue

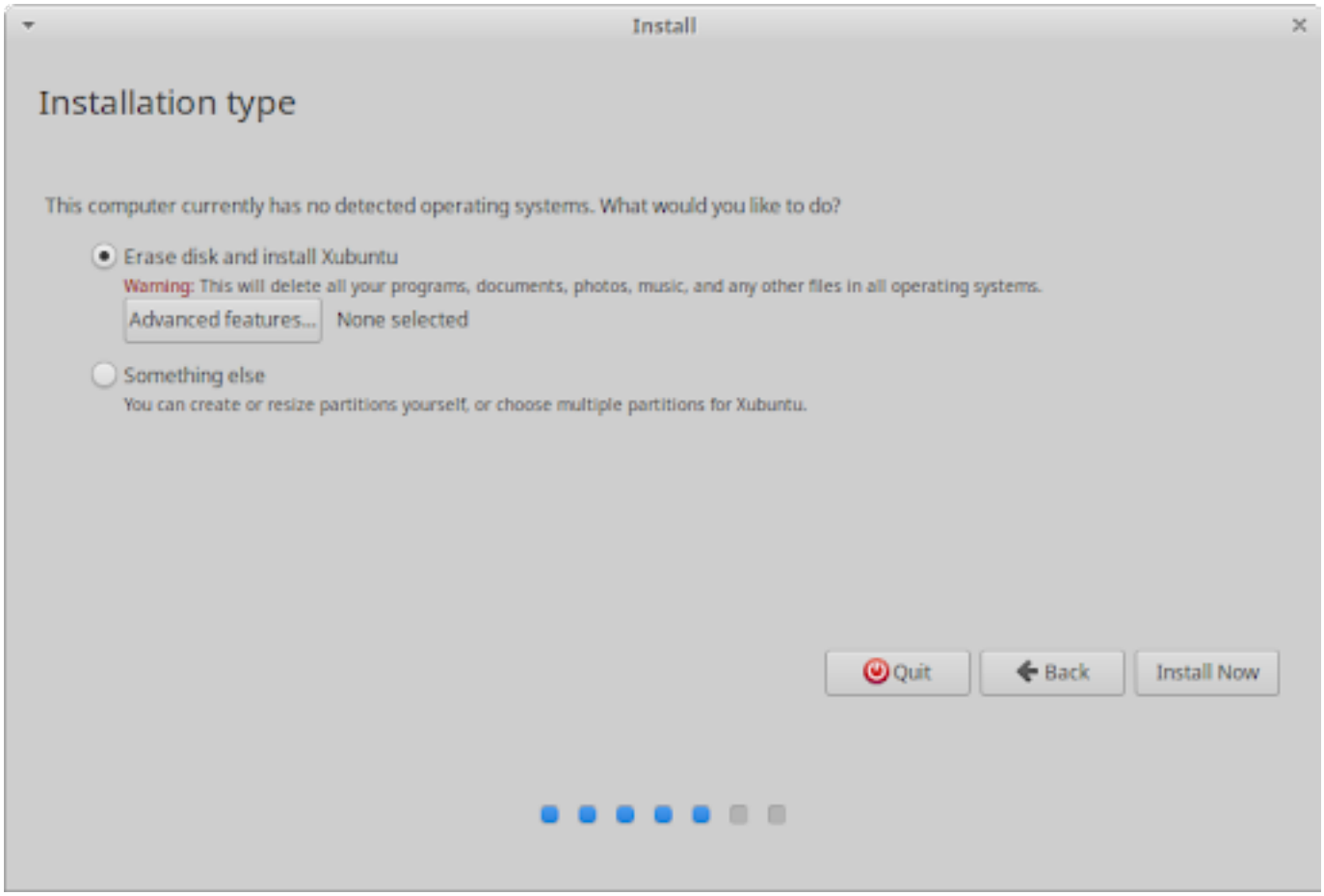


> **Note**
>
> Note: If **Download updates while installing Xubuntu** was disabled or unselected, you can run the *Software Updater* application after the installation. If **Install third-party software for graphics and Wi-Fi hardware and additional media formats** was unselected during installation, you can open the Software & Updates app after the installation, enable the **Proprietary drivers for devices (restricted)** repository on the Ubuntu Software tab, and then install the drivers on the *Additional Drivers* tab to install drivers. You would also need to install the **ubuntu-restricted-extras [apt://ubuntu-restricted-extras]** package.

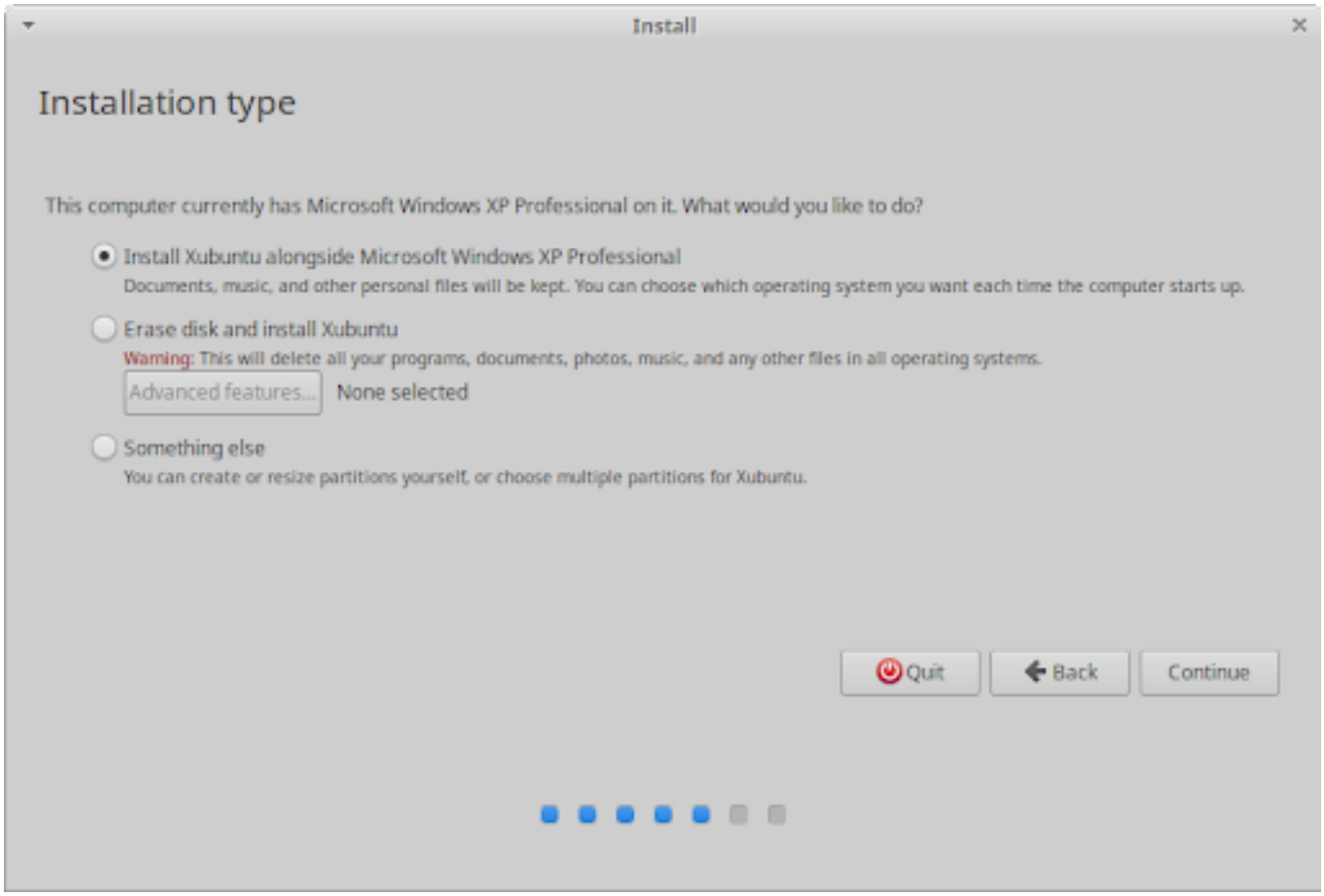
Disk Space Allocation

The next screen of the installer is the *Installation type* screen, which will vary in its list of installation and reinstallation options depending on which operating system(s) are currently on your hard disk. Regular users are recommended to choose either *Erase disk and install Xubuntu*, to completely wipe the disk and install Xubuntu as the only OS, or *Install Xubuntu alongside [OS]*, to create a dual boot setup with Xubuntu and an existing operating system ([OS] is the existing OS, e.g. Microsoft Windows XP Professional in the screenshot). Advanced users can choose the *Something else* option, which gives them the ability to create, format, delete and assign partitions.

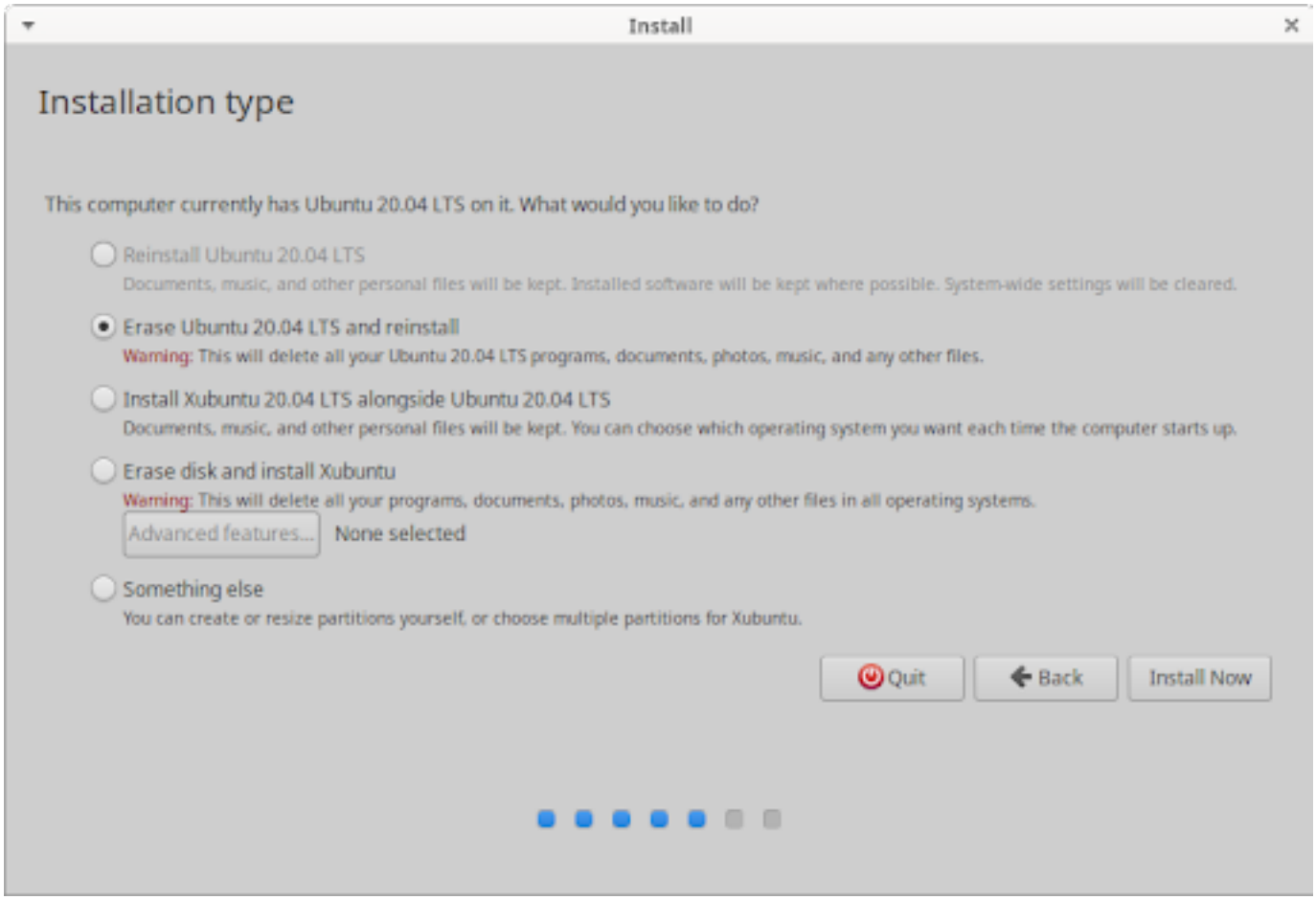
If you choose to install Xubuntu alongside another existing operating system, you will be given the option to adjust how much hard disk space Xubuntu will use after you click the **Continue** button.



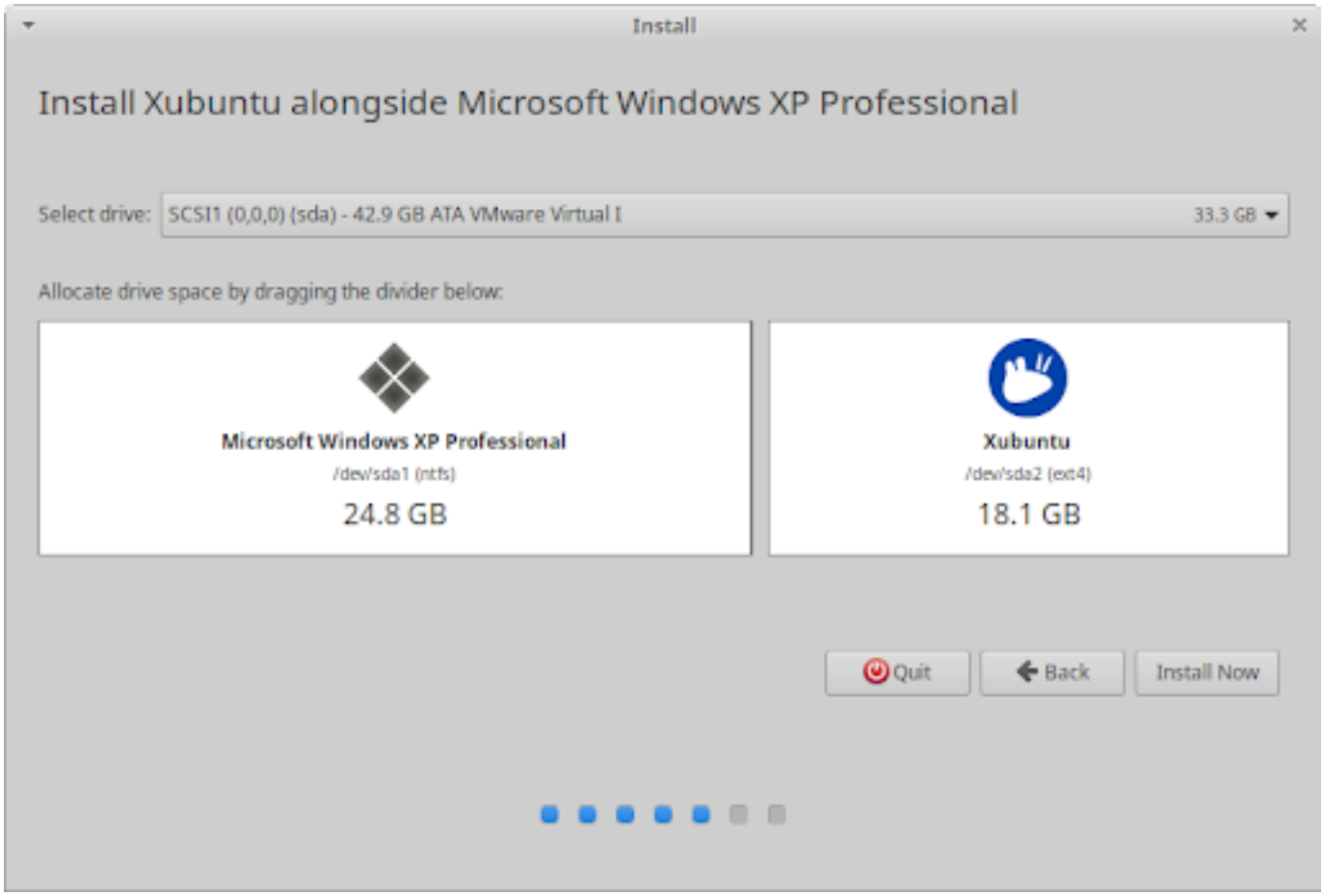
When no OS is found



When an OS is found



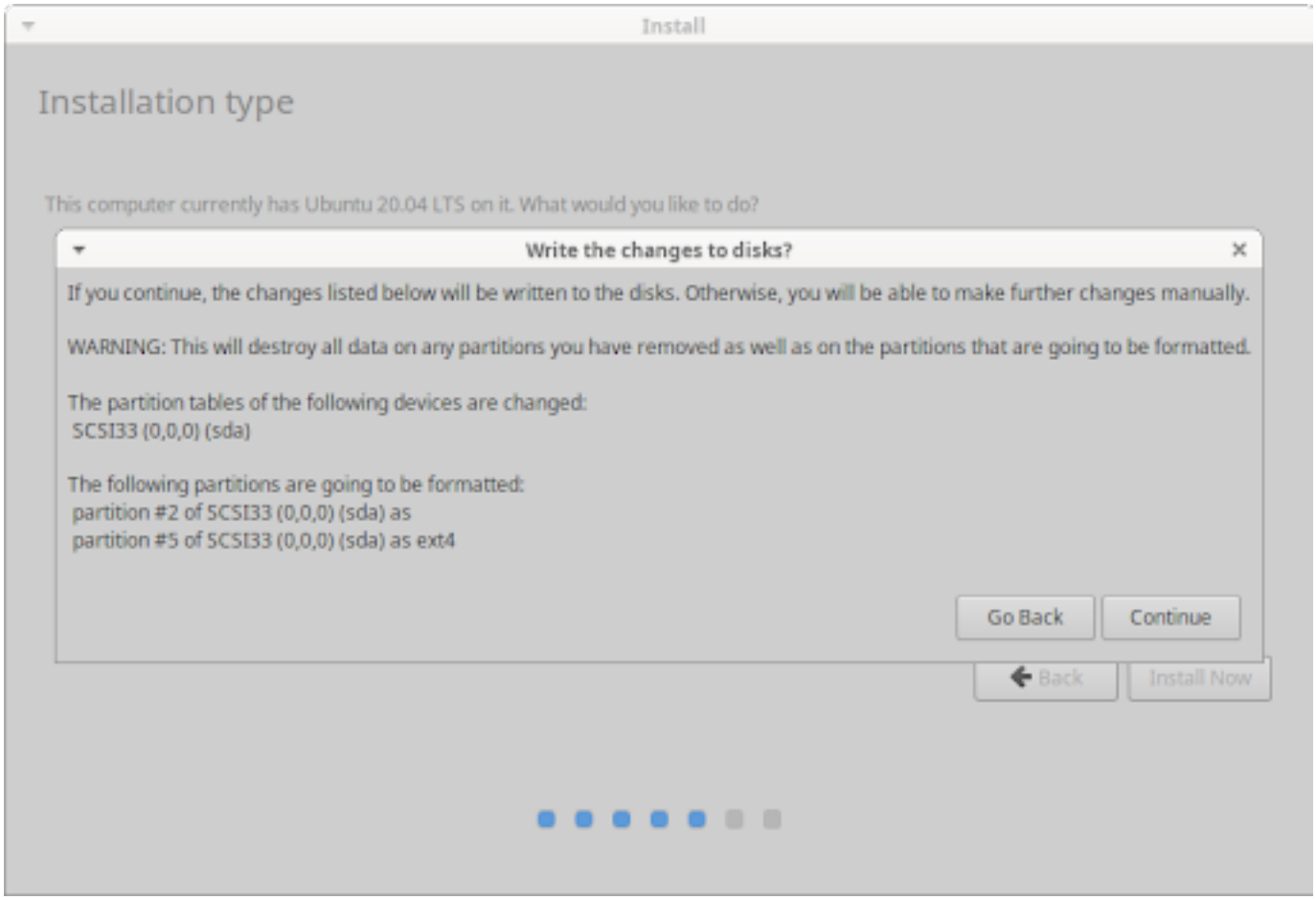
Options to reinstall



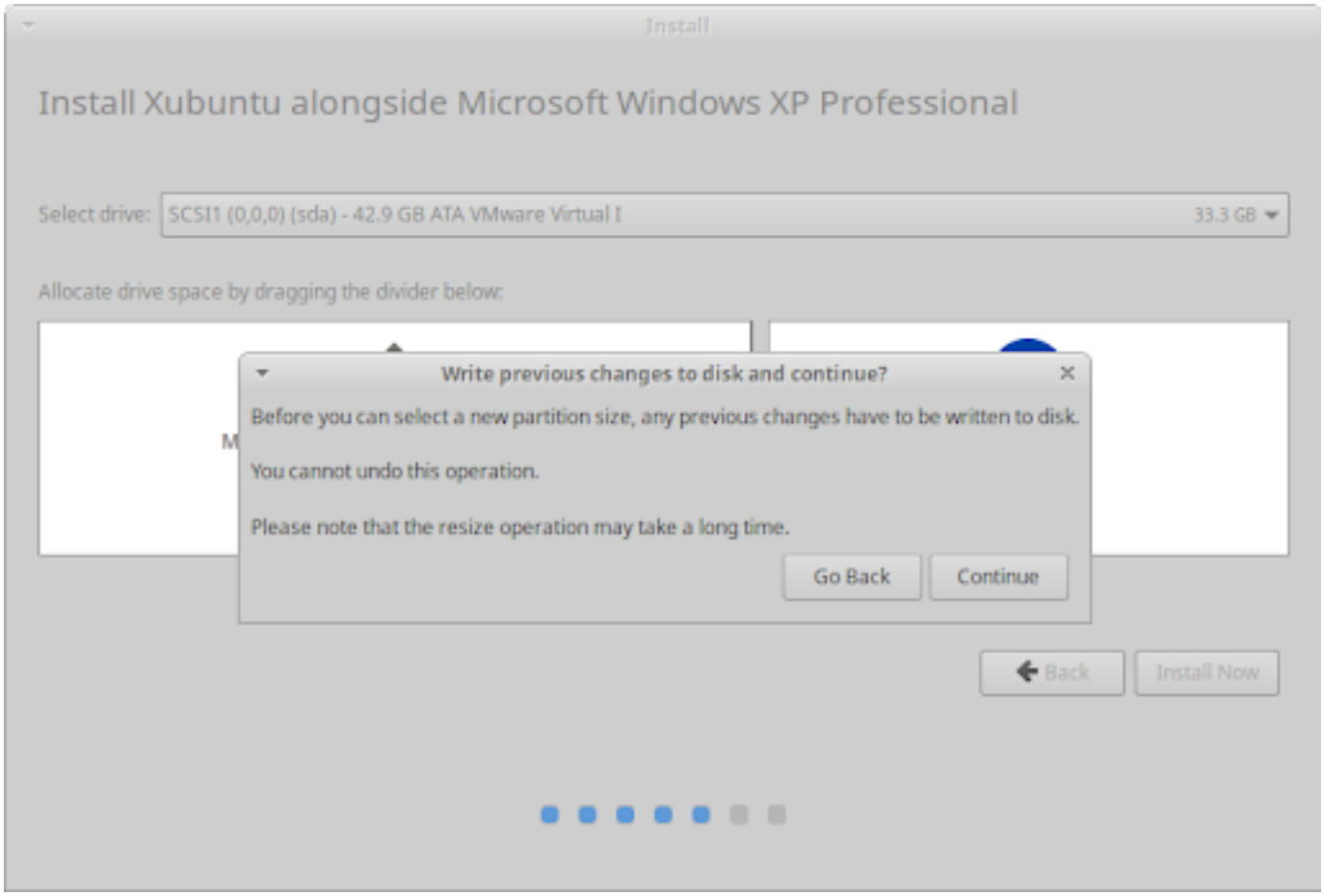
Adjust space taken by Xubuntu

Disk Changes Confirmation

When clicking the **Install Now** button, the installer will show a confirmation dialog before it makes non-reversible changes to your hard disk's partitions and data. Read the changes carefully and, if you agree, click the **Continue** button.



Write automated disk changes



Write alongside disk changes

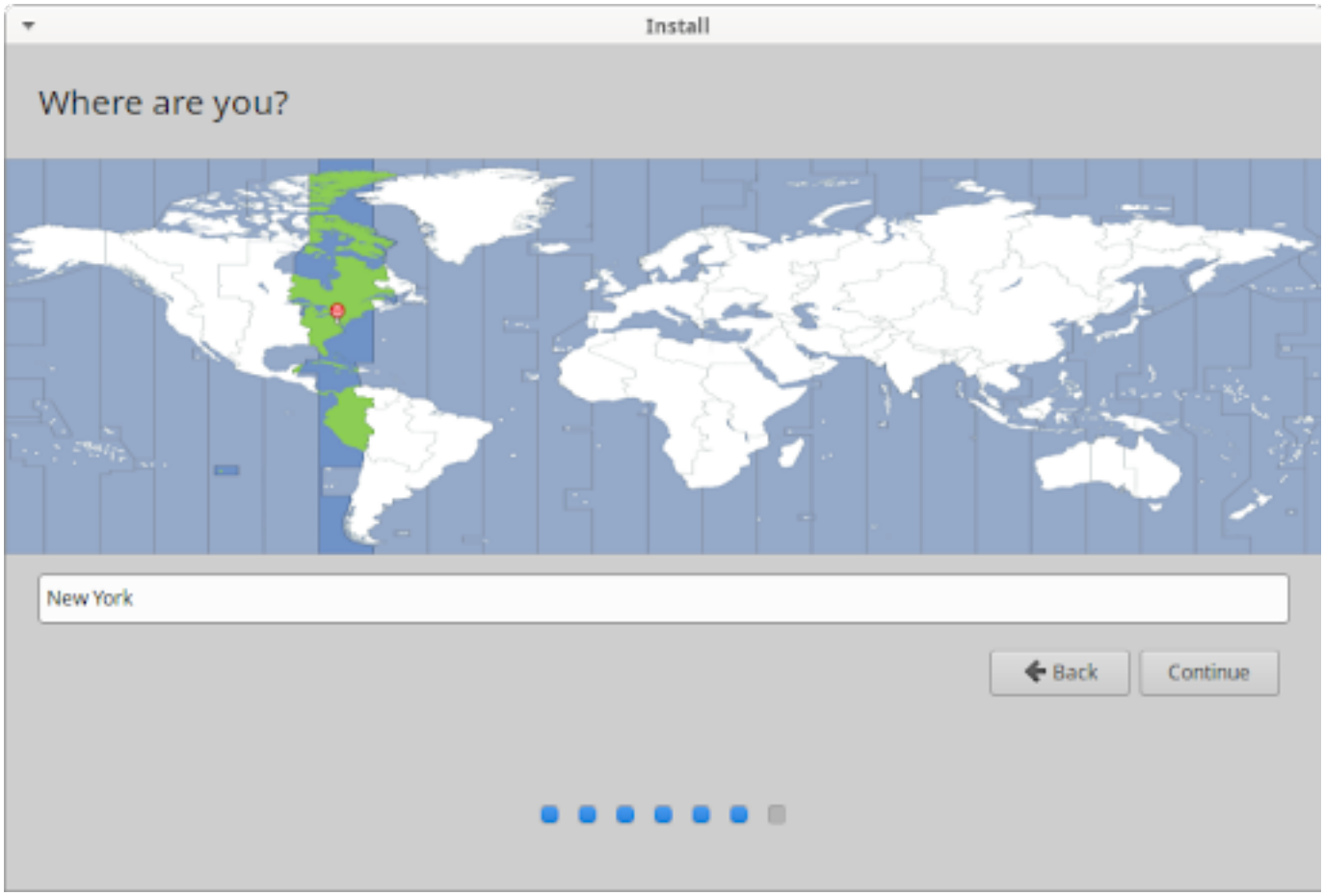
Select Your Location

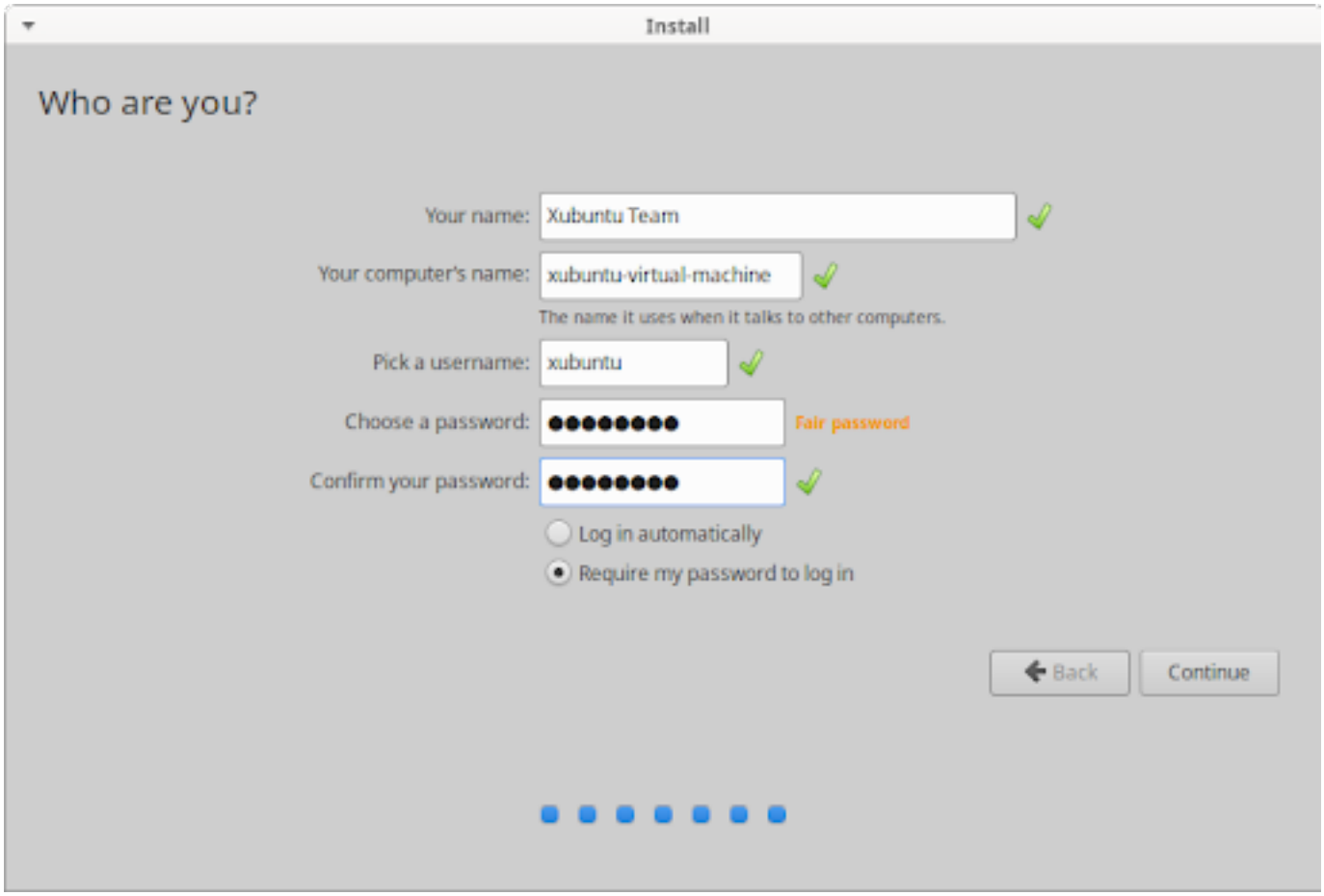
The next screen of the installer will be the *Where are you?* screen. There you can type the name of the town or city in the text field or click on the map to select your time zone. If you are connected to the internet, your location will be automatically detected. Click the **Continue** button to proceed.

Login Details

At the *Who are you?* screen, once you enter your name, a computer name and username will be automatically suggested. You can change both as you prefer. The computer name, aka hostname, is the name your computer will have when it appears on the network, while the username will be your login and account name.

Next, enter a password, which will be evaluated, yielding a grade of 'short', 'weak', 'fair', 'good' or 'strong'. A strong password is one with a minimum of 8 characters, containing a mixture of uppercase letters, lowercase letters, numbers and symbols. It is highly recommended to use a strong password. You then have the option to select whether your computer will require you to type your password to log in when you first turn it on or have it log in automatically. You will always be required to type your password if you lock your computer or if the screen times out due to inactivity.

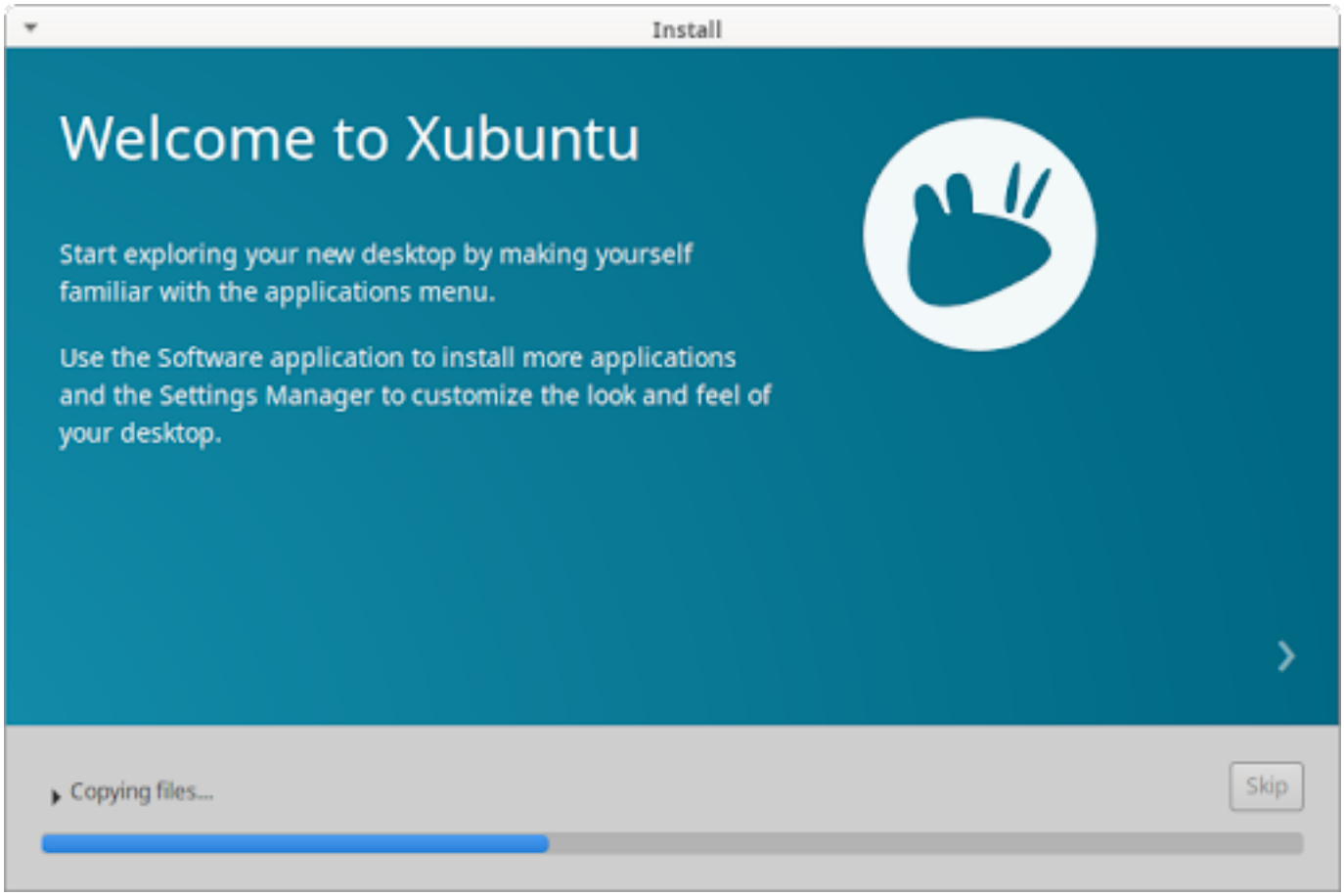

Install
Where are you?
New York
Back
Continue

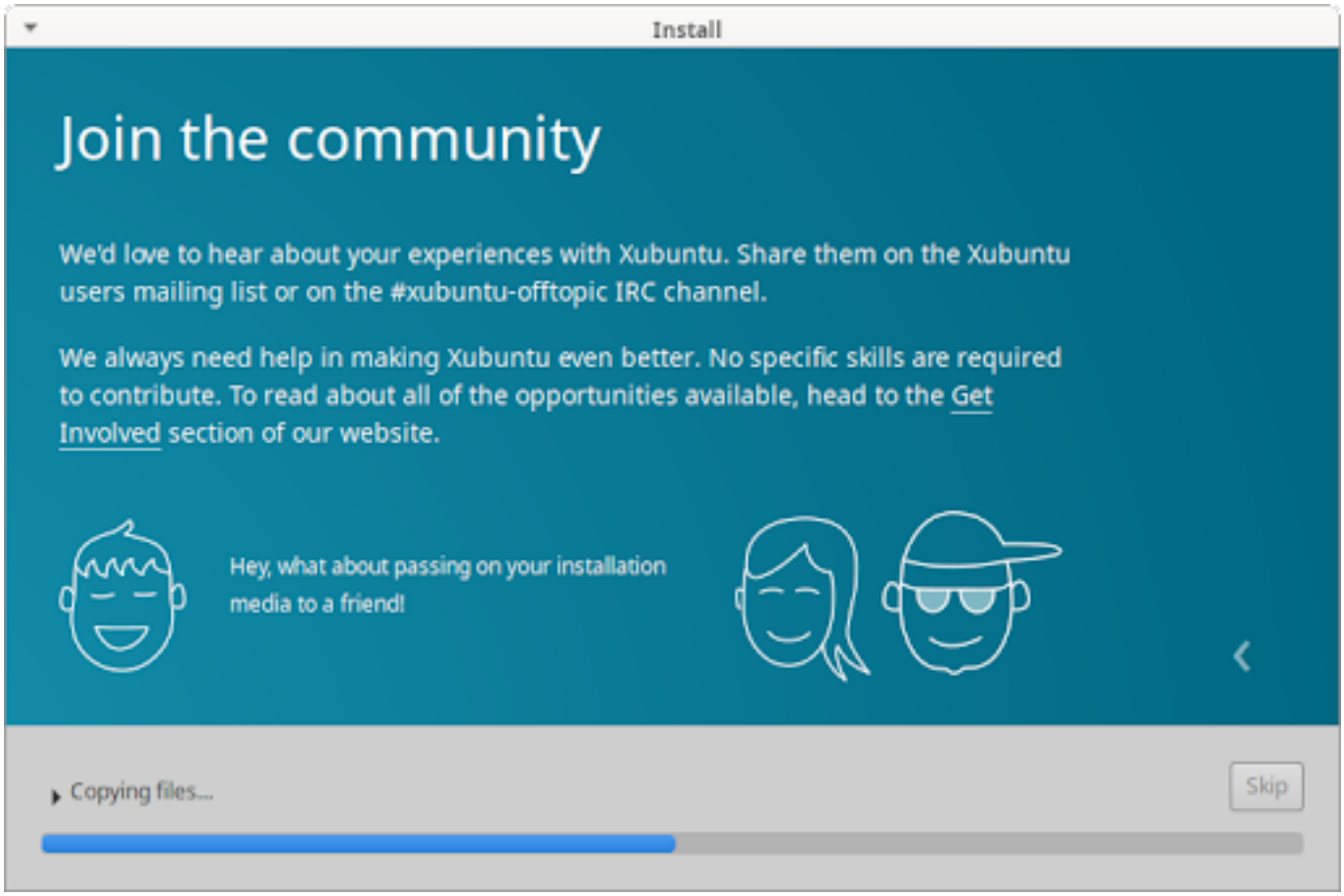


> **Note**
>
> It is recommended to store your passwords in a password manager application, like KeePassXC [https://keepassxc.org/] (**keepassxc [apt://keepassxc]**) or Bitwarden [https://bitwarden.com/#download], which can also generate passwords for you.

Background Installation

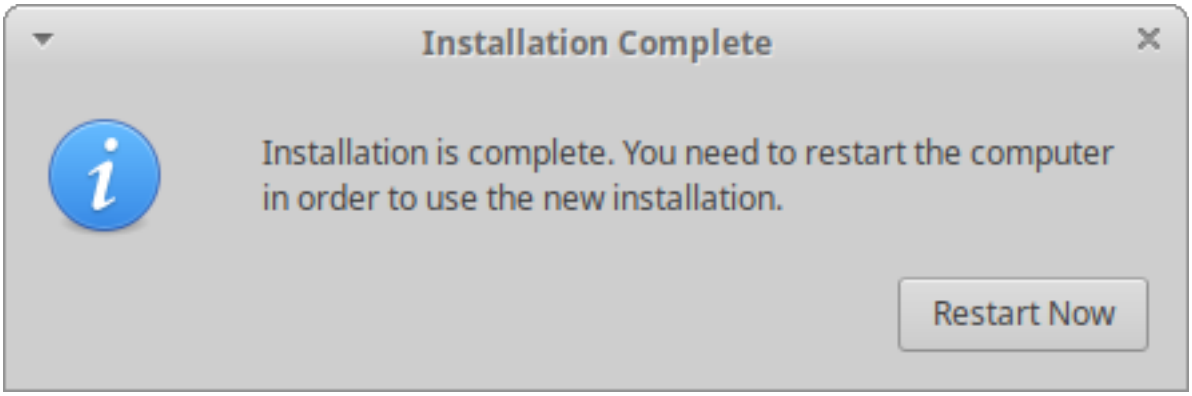
The installer will now begin installing Xubuntu in the background. While this is happening, installation slides will teach you a little bit more about Xubuntu, its support channels and community.


Install
Welcome to Xubuntu
Start exploring your new desktop by making yourself familiar with the applications menu.
Use the Software application to install more applications and the Settings Manager to customize the look and feel of your desktop.
Copying files...
Skip



Installation Completion

After all the files have been copied to the hard disk and the configurations have been set, a dialog window will appear asking to restart the computer. Click the **Restart Now** button and you will be prompted to remove the installation medium and press *Enter* to restart.



Conclusion

Congratulations! You have successfully installed Xubuntu and now it,s time to start enjoying it. Once the computer restarts, you will either be automatically started into Xubuntu and see the login screen or, if you have multiple operating systems installed on your hard disk, the GRUB boot menu, which lets you choose between starting Xubuntu or another installed OS.

Chapter 3. Introduction

Startup

If you have installed Xubuntu alongside another OS (Operating System), also known as dual booting, then you will be presented with the GRUB boot menu when you turn on your computer. This menu gives you options to start Xubuntu, start Xubuntu with advanced options, run a memory test or start other OSes. You may press the Escape key before booting to access the GRUB menu if you are not on a dual boot system.

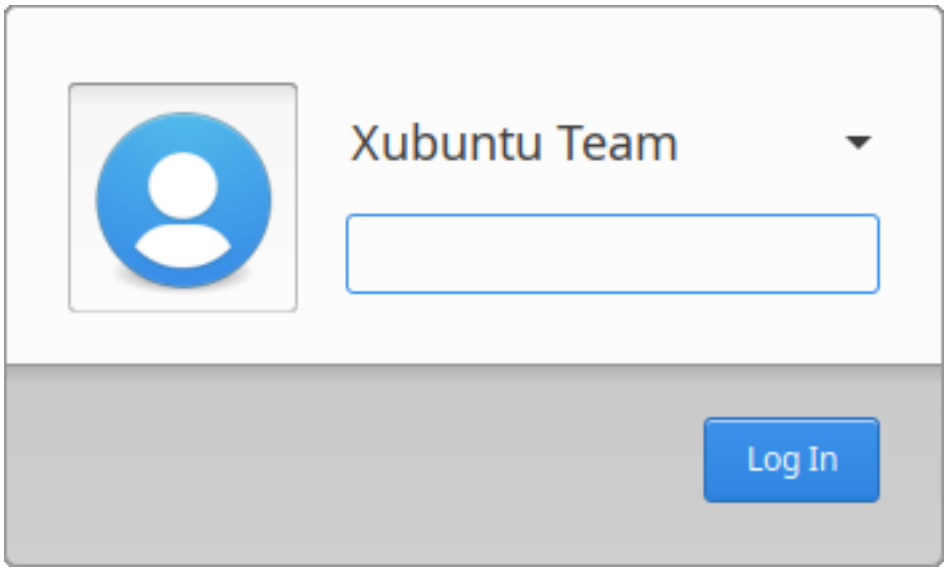
Once the booting process begins, you will see the Xubuntu splash screen with a circular animation.

> **Note**
>
> If you would like to customize the look and behaviour of the GRUB boot menu, you can install Grub Customizer (**grub-customizer [apt://grub-customizer]**, PPA [https://launchpad.net/~danielrichter2007/+archive/ubuntu/grub-customizer])

Login Screen

When the booting process is complete, the login screen appears. It contains a panel at the top and a login dialog in the center of the screen. From left to right, the panel contains the computer name, the session selector, locale/language selector, accessibility options selector, date & time, and log out options.

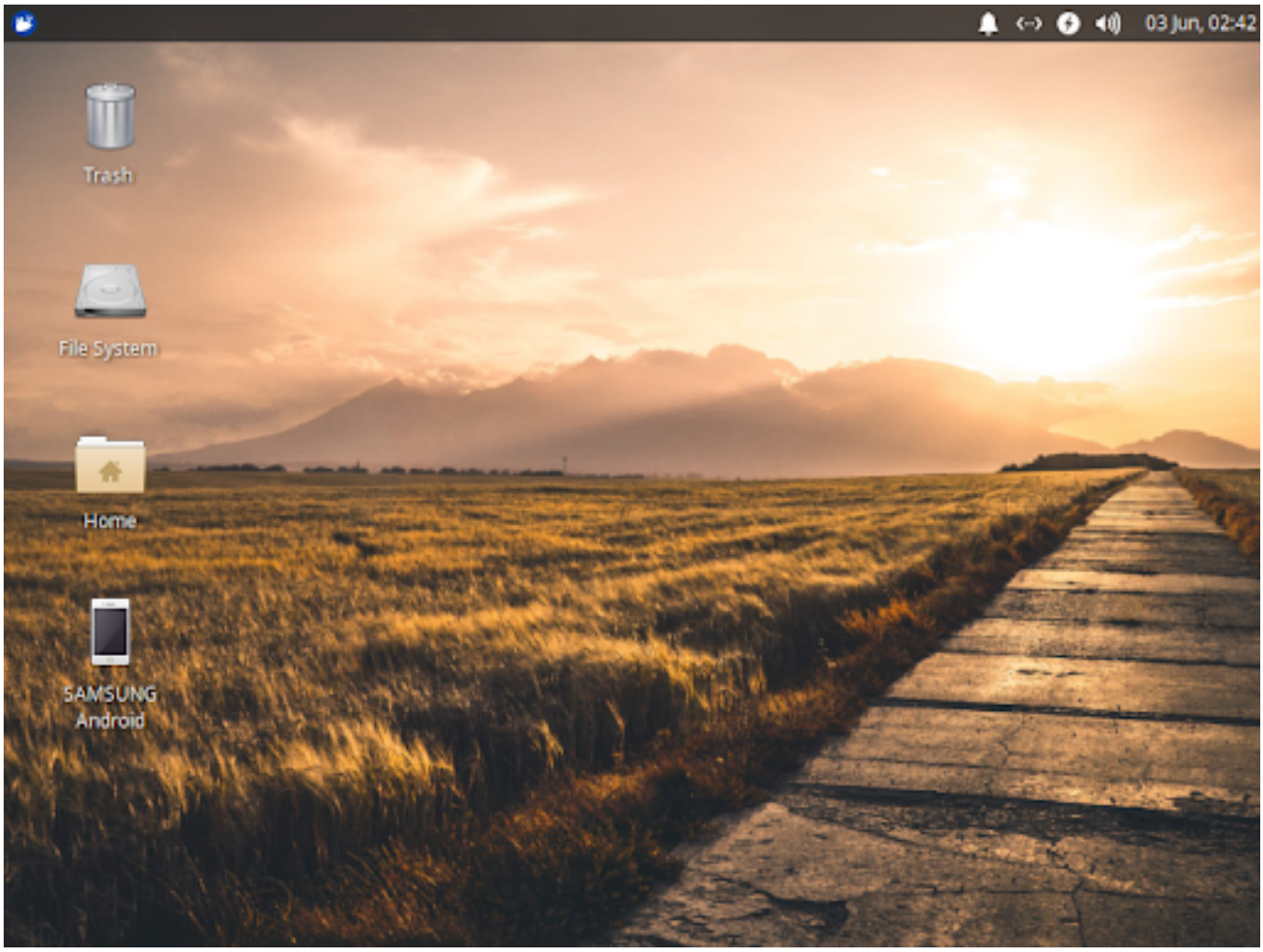
The login dialog allows you to select an account name and type in the password to log into that session. You will not see the login screen if you selected the *Log in automatically* option on the *Who are you?* screen of the installer.



> **Note**
>
> To enable or disable automatic login of a user account, open **Users and Groups**, found in the **Applications Menu** or **Settings Manager**, select the account in the list on the left, click the **Change...** button on the *Password* line and check or uncheck the *Don't ask for password on login* checkbox. To configure the appearance of the login screen, open **LightDM GTK+ Greeter settings**.

Desktop

Similar to the login screen, the default Xubuntu desktop has a single panel located at the top of the screen, along with a wallpaper and desktop icons.



Panel

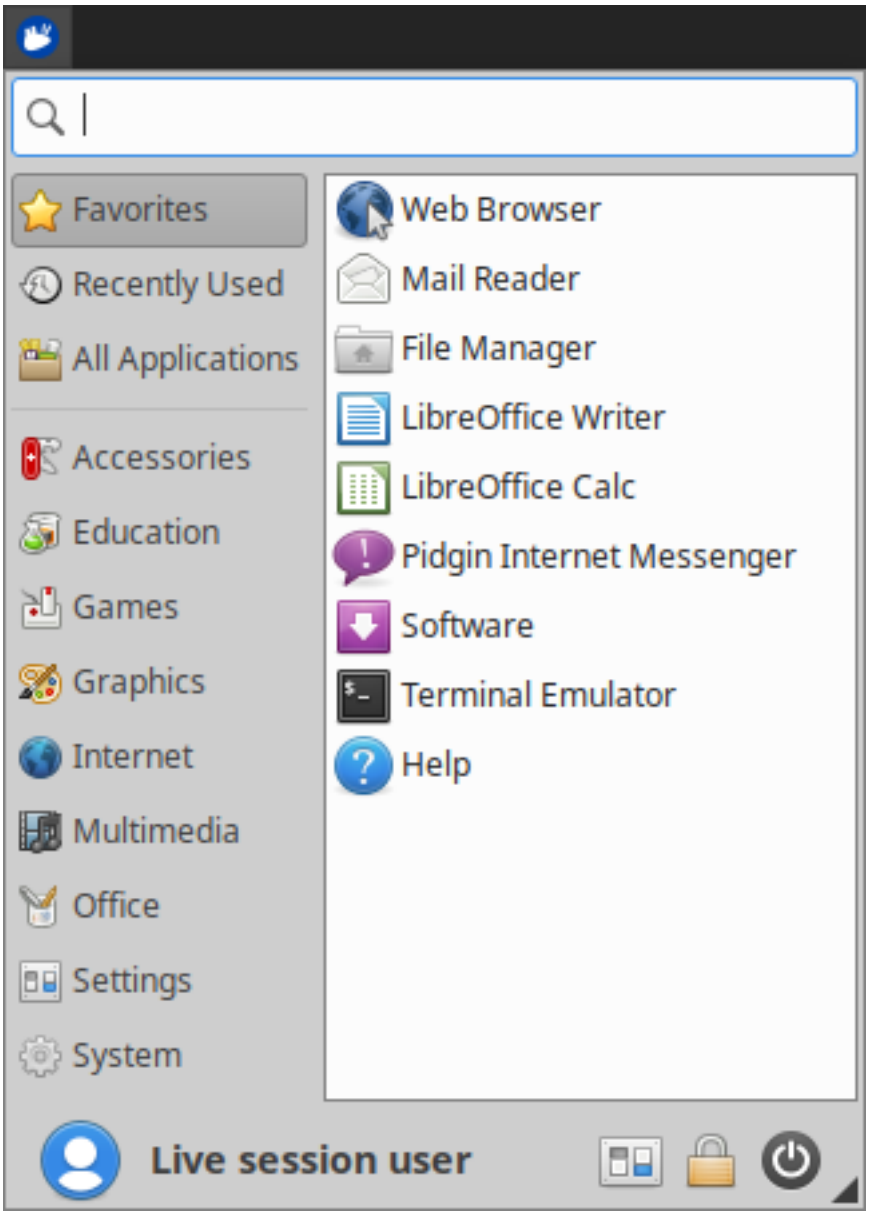
The panel is used for launching and switching applications as well as providing easy access to interactive system status indicators in order to see and change the status of important components of your system.

On the left side of the panel you will find the **Applications Menu** button, which has the icon of the Xubuntu logo. Next to that is the list of running applications with available windows, known as the window list or taskbar buttons.

On the right of the panel is the Notification Area, which contains indicators showing status information, like network connectivity and sound volume level. The first indicator on the far right is the clock, which displays the system date and time. Clicking on the clock displays the calendar. Some indicator icons appear and disappear based on context. The bluetooth icon, for example, will appear when a bluetooth adapter is present. The notification area also hosts system tray icons of running applications that support this feature, such as **Transmission** or **Audacious**.

> **Note**
>
> The location of the panel and its components along with various options can be customized by right-clicking on the panel and selecting *Panel* → *Panel Preferences*.

Applications Menu



Clicking the **Applications Menu** button on the panel or pressing the *Ctrl+Escape* keyboard shortcut will open the menu, which has five (5) sections:

1. A search field to filter installed applications.
2. A column listing application categories.
3. A list of applications in the selected category. Favorites is selected and displayed by default.
4. The user account,s name and photograph.
5. Command buttons for the Settings Manager, locking the screen and the log out dialog.

> **Note**
>
> To customize the appearance and behaviour of the **Applications Menu**, right-click the menu icon and select *Properties*. To customize which applications appear in the menu and their properties (icon, text, command), right-click the menu icon and select *Edit Applications* or open **Menu Editor**.

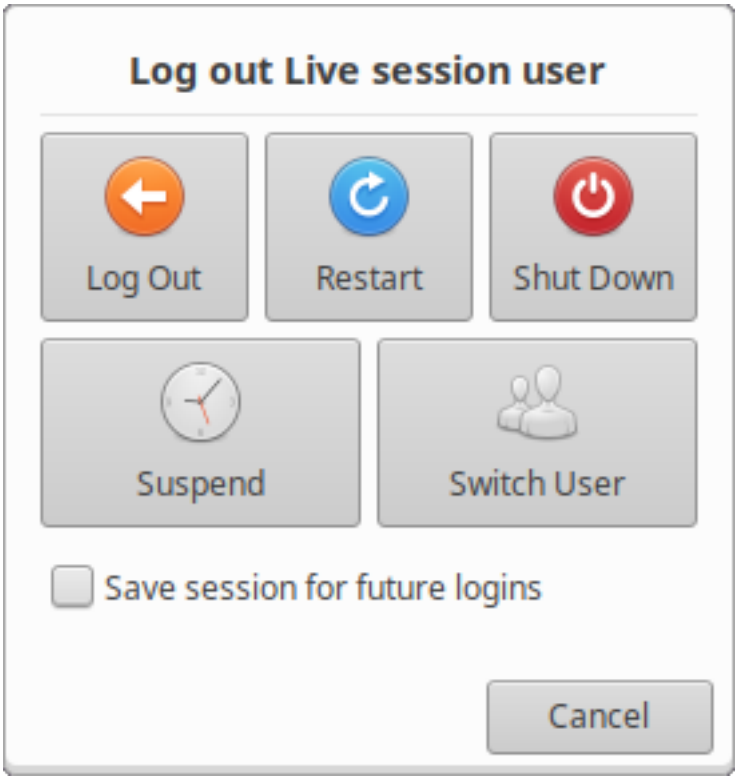
Desktop Icons and Wallpaper

The default desktop has three primary icons -- *Home*, *File System* and *Trash* -- as well as icons for partitions and removable devices, if they are present. Additional files, folders, application launchers and website shortcuts can be added to the desktop and can be manually or automatically arranged. You can set the desktop wallpaper and which desktop icons are visible, as well as their options, by right-clicking in a blank area of the desktop and choosing *Desktop Settings* from the context menu.

Session Management

Xubuntu provides a collection of commands for managing your session. These commands are accessible from the command buttons section of the **Applications Menu** as well as through shortcut keys.

The first of the these commands is the **Lock Screen** button, which locks the current session and presents the login dialog to resume the session. Locking the screen is also accessible by two keyboard shortcuts: *Super+L* and *Ctrl+Alt+L*.



The remaining session commands are accessible through the **Log Out** button, as well as the *Ctrl+Alt+Delete* keyboard shortcuts, which opens a dialog and gives access to commands to:

1. *Log Out* - End the current session.
2. *Restart* - Restart the computer.
3. *Shutdown* - Shut down the computer.
4. *Suspend* - Put the computer to sleep and have it run with minimal power.
5. *Hibernate* - Save the current desktop session and shut down the computer. When you restart the computer, you will resume the session.
6. *Switch User* - Log in to another user account.

> **Note**
>
> It is possible to access the session management commands from the panel by right-clicking on the panel and then *Panel* → *Add New Items...* and then adding the *Action Buttons* entry. It is also possible to add additional session management commands to the **Applications Menu** by right-clicking the Menu icon and selecting *Properties* and then enabling them in the *Commands* tab.

> **Note**
>
> Hibernation is disabled by default in Xubuntu and instructions to enable it can be found in the section called ”Enabling hibernation„.

Chapter 4. Default Applications

Xubuntu comes with a collection of preinstalled applications curated by the Xubuntu team which are accessible from the **Applications Menu** (*Ctrl+Escape*) as well as the **Application Finder** (*Alt+F3* or *Super+R*).

Favorites

By default, Xubuntu displays a number of commonly used applications in the *Favorites* category of the **Applications Menu**. These applications include the software manager, word processor, and help documentation, as well as the default web browser and file manager. To add or remove entries from the *Favorites* category, right-click on an application entry and select the *Add to Favorites* or *Remove from Favorites* entry in the context menu.

> **Note**
>
> To change the default web browser, mail reader, file manager, terminal emulator and more, open the **Default Applications** app.

Accessories

Catfish is a file search utility that is able to locate files by name, text content and more. It provides external search capability to the **Thunar** file manager.

Links: Website [https://bluesabre.org/catfish/], Documentation [https://docs.xfce.org/apps/catfish/usage], Donate [https://bluesabre.org/donate/]

Alternatives: MATE Search (**mate-utils [apt://mate-utils]**), FSearch [https://cboxdoerfer.github.io/fsearch/], ANGRYsearch [https://github.com/DoTheEvo/ANGRYsearch], Recoll [https://www.lesbonscomptes.com/recoll/]

> **Note**
>
> The search results can be enhanced by the installation of **zeitgeist** user activity logging service (**zeitgeist [apt://zeitgeist]**).

Engrampa is an archive manager which provides the ability to create, view, modify, and extract data from archive files such as .zip and .gz files.

Alternatives: File Roller (**file-roller [apt://file-roller]**), Xarchiver (**xarchiver [apt://xarchiver]**)

> **Note**
>
> To open a .RAR file, the **p7zip-rar [apt://p7zip-rar]** package is required.

MATE Calculator is designed to resemble a hand-held calculator and has basic, advanced, financial, and programming modes.

Alternatives: Galculator (**galculator [apt://galculator]**), GNOME Calculator (**gnome-calculator [apt://gnome-calculator]**), Speedcrunch (**speedcrunch [apt://speedcrunch]**)

Mousepad is a simple text editor with features for displaying line numbers and white space, word wrapping, source code syntax highlighting, etc.

Links: Website [https://gitlab.xfce.org/apps/mousepad], Documentation [https://docs.xfce.org/apps/mousepad/start]

Alternatives: Pluma (**pluma [apt://pluma]**), GEdit (**gedit [apt://gedit]**), Geany (**geany [apt://geany]**), Visual Studio Code [https://code.visualstudio.com/Download]

Screenshot is a screen capture utility that lets you capture the entire screen, an active application window, or a region of the screen.

Links: Website [https://gitlab.xfce.org/apps/xfce4-screenshooter], Documentation [https://docs.xfce.org/apps/xfce4-screenshooter/start]

> **Note**
>
> The three capture modes can be activated with the *PrintScreen*, *Alt+PrintScreen* and *Shift+PrintScreen* keyboard shortcuts, respectively.

Games

Mines is a single-player puzzle game where you locate mines floating in an ocean with the help of clues about the number of neighboring mines in the area. Clicking on a square reveals what is under it: either empty ocean or a mine. If you click on a mine, the game is over.

SGT Puzzles Collection is a set of over 30 unique single-player puzzle games. The games are designed to be played in a few short minutes, while taking a break or looking to pass the time.

Links: Website [https://github.com/bluesabre/sgt-launcher], Donate [https://bluesabre.org/donate/]

Sudoku is a Japanese logic-based puzzle game. The objective is to fill a 9×9 grid with the numbers 1 to 9 so that each column, row, and each of the 3×3 subgrids contain all of the digits from 1 to 9. Each game starts with a partially completed grid, with many games having only a single solution.

Graphics

Document Scanner, also known as Simple Scan, is a utility to scan text or images/photographs and save them to an image or PDF file.

GIMP (GNU Image Manipulation Program) is an image editing application for enhancing and retouching photos, free-from drawing, as well as image format conversion.

Links: Website [https://www.gimp.org], Documentation [https://www.gimp.org/docs/], Donate [https://www.gimp.org/donating/]

Alternatives: Krita (**krita [apt://krita]**), MyPaint (**mypaint [apt://mypaint]**), Adobe Photoshop [https://www.makeuseof.com/tag/install-adobe-photoshop-linux/]

Ristretto is an image viewer with basic editing features, slideshow capabilities, and the ability to set an image as the desktop wallpaper.

Links: Website [https://gitlab.xfce.org/apps/ristretto], Documentation [http://docs.xfce.org/apps/ristretto/start]

Alternatives: Eye of MATE (**eom [apt://eom]**), gThumb (**gthumb [apt://gthumb]**), Gpicview (**gpicview [apt://gpicview]**), nomacs (**nomacs [apt://nomacs]**)

Internet

Firefox is a mature and stable web browser which can be extended with a wide variety of add-ons.

Links: Website [https://www.mozilla.org/en-US/firefox/new/], Documentation [https://support.mozilla.org/en-US/home], Donate [https://donate.mozilla.org/en-US/]

Alternatives: Chromium (**chromium-browser [apt://chromium-browser]**), Google Chrome [https://www.google.com/chrome/], Opera [https://www.opera.com/computer/opera], Vivaldi [https://vivaldi.com/download/], Brave [https://brave.com/download/]

Pidgin is a multi-platform instant messaging client capable of connecting with XMPP, Google Talk, IRC, ICQ and more.

Links: Website [https://www.pidgin.im/], Documentation [https://developer.pidgin.im/wiki/Using Pidgin], Donate [https://imfreedom.org/donate/]

Alternatives: Telegram (**telegram-desktop [apt://telegram-desktop]**), Empathy (**empathy [apt://empathy]**), Skype [https://www.skype.com/en/get-skype/], Zoom [https://zoom.us/download]

Thunderbird is a versatile mail client which can handle multiple email accounts and different identities simultaneously. Like Firefox, it can also be enhanced with add-ons to extend its functionality.

Links: Website [https://www.thunderbird.net/en-US/], Documentation [https://support.mozilla.org/en-US/products/thunderbird], Donate [https://donate.mozilla.org/thunderbird/]

Alternatives: Geary (**geary [apt://geary]**), Claws Mail (**claws-mail [apt://claws-mail]**), Evolution (**evolution [apt://evolution]**), Sylpheed (**sylpheed [apt://sylpheed]**)

Transmission is a simple BitTorrent client for downloading and sharing files which also provides a web interface.

Alternatives: qBittorrent (**qbittorrent [apt://qbittorrent]**), Deluge (**deluge [apt://deluge]**), Tixati [https://www.tixati.com/download/linux.html], Fragments [https://flathub.org/apps/details/de.haeckerfelix.Fragments]

Multimedia

Parole is a simple media player that can play video and audio files.

Links: Website [https://gitlab.xfce.org/apps/parole], Documentation [https://docs.xfce.org/apps/parole/start], Donate [https://bluesabre.org/donate/]

Alternatives: VLC (**vlc [apt://vlc]**), SMPlayer (**smplayer [apt://smplayer]**), Celluloid (**celluloid [apt://celluloid]**).

> **Note**
>
> In order to play some proprietary media formats, such as MP3, the **ubuntu-restricted-extras** is required (**ubuntu-restricted-extras [apt://ubuntu-restricted-extras]**).

Xfburn is a program for creating audio discs and writing ISO files to CDs and DVDs.

Alternatives: Brasero (**brasero [apt://brasero]**), K3b (**k3b [apt://k3b]**)

Office

Atril is a document reader that is capable of opening multiple-page document files, such as PDF, XPS, ePub, and Comic Books.

Alternatives: Evince (**evince [apt://evince]**), Okular (**okular [apt://okular]**), Zathura (**zathura [apt://zathura]**)

LibreOffice is an office suite which has programs for word processing (Writer), spreadsheets (Calc), presentations (Impress), diagrams (Draw), mathematical formulae (Math) and databases. It is a continuation of Open Office.

Alternatives: Microsoft Office [https://www.makeuseof.com/tag/install-use-microsoft-office-linux/], WPS Office [https://www.wps.com/linux/], Free Office [https://www.freeoffice.com/en/download/applications], OnlyOffice [https://www.onlyoffice.com/download-desktop.aspx], GOffice (Abiword, Gnumeric)

Settings

Applications listed in this category are also present and organized in **Settings Manager** and include applications to adjust hardware preferences, manage software, change the look and feel of the UI (User Interface), and configure login settings.

System

Gigolo is an easy way to connect to local and remote file systems, such as FTP or SFTP (SSH) connections and SMB (windows shares).

GParted is a partition manager that allows you to create, resize, format and delete partitions.

Alternatives: GNOME Disks (**gnome-disk-utility [apt://gnome-disk-utility]**), KDE Partition Manager (**partitionmanager [apt://partitionmanager]**)

> **Note**
>
> **GParted** is only present in the live installer, but can be installed after installation (**gparted [apt://gparted]**).

Task Manager provides a graphical overview of the running applications and shows the percentage of CPU and RAM that is currently being utilized.

Alternatives: GNOME System Monitor (**gnome-system-monitor [apt://gnome-system-monitor]**), MATE System Monitor (**mate-system-monitor [apt://mate-system-monitor]**), LXTask (**lxtask [apt://lxtask]**).

Thunar is a file manager that allows you to browse the filesystem.

Alternatives: Caja (**caja [apt://caja]**), Nemo (**nemo [apt://nemo]**), PCManFM (**pcmanfm [apt://pcmanfm]**), Nautilus (**nautilus [apt://nautilus]**)

Chapter 5. Software Management

Software that is readily available to install on Xubuntu is stored in online software repositories which contain trusted software. Software repositories on Linux are similar to the software catalogs used by desktop app stores like the Microsoft Store and Mac App Store, or mobile app stores like the Google Play Store and Apple's App Store.

These repositories store software packages, which are the individual components that collectively make up the software your computer uses. The software packages are stored in this fashion so that they can be shared by different programs. Xubuntu's software repositories are organized and maintained by OS (Operating System) maintainers and contain a large selection of free and open source software. OS maintainers ensure that the software functions properly and does not contain spyware or viruses.

Xubuntu comes with applications which make it easy for users to install, update, and uninstall software from repositories.

- **Software Center** (**gnome-software [apt://gnome-software]**) is an app store which is good for new users because it makes it easy to discover desktop applications. The list of available software can be expanded with the installation of plugins for the snap package repository (**gnome-software-plugin-snap [apt://gnome-software-plugin-snap]**) and the flatpak package repository (**gnome-software-plugin-flatpak [apt://gnome-software-plugin-flatpak]**).
- **Snap Store** (install [https://snapcraft.io/install/snap-store/ubuntu#install]) is an app store for the management of applications that use the snap package management system. Snap applications are confined for extra security, update automatically, and can run across many different Linux distributions. The Snap Store is also available as a web interface [https://snapcraft.io/store].
- **Synaptic** (**synaptic [apt://synaptic]**) is a package manager with a GUI (Graphical User Interface) for users who want more control over package management. It has options to view installation history, view packages by repository, and lock a package to a particular version.
- **apt** or **apt-get** is a CLI (Command-Line Interface) tool for package management that provides similar functionality to **Synaptic** and is beneficial for those who don't have access to a GUI or prefer to use the terminal. For information on the basic **apt** commands, see the Ubuntu apt documentation [https://ubuntu.com/server/docs/package-management].
- **snap** (**snapd [apt://snapd]**) is a command-line utility for the management of snap packaged applications. For information on the basic **snap** commands, see the Getting started documentation [https://snapcraft.io/docs/getting-started] and the download and offline install tutorial [https://snapcraft.io/tutorials/snap-download#1-introduction].

> **Note**
>
> You will need administrative access to add, update, and remove software and you can only utilize one package manager at a time for package management. There are additional app stores and package managers including Flathub [https://flathub.org/], AppImageHub [https://appimage.github.io/], Ubuntu MATE Software Boutique, AppGrid [https://www.appgrid.org/], Aptitude (**aptitude [apt://aptitude]**).

Using Software Center

You can launch the GNOME Software Center from the **Applications Menu** (*Ctrl+Escape*) or **Application Finder** (*Alt+F3*). It will be named **Software** and is found by default in the *Favorites* category, so it will be visible once you open the **Applications Menu**.

Once launched, you will be on the *Explore* tab of the **GNOME Software**, which allows you to browse the categories or click the **search** button in the title bar, to easily find an application by name or keyword. When you click on an application, you will arrive at its information page, which contains its description, images, website link, reviews, and other details. On this page you have the option to either install, launch, or remove the application, as well as write a review.

The other two tabs in the title bar are *Installed* and *Updates*. The *Installed* tab lists all the applications installed on the system and provides easy access to remove them. The *Updates* tab shows which applications are eligible for updating and it also has a **Refresh** button in the title bar to search for new updates.

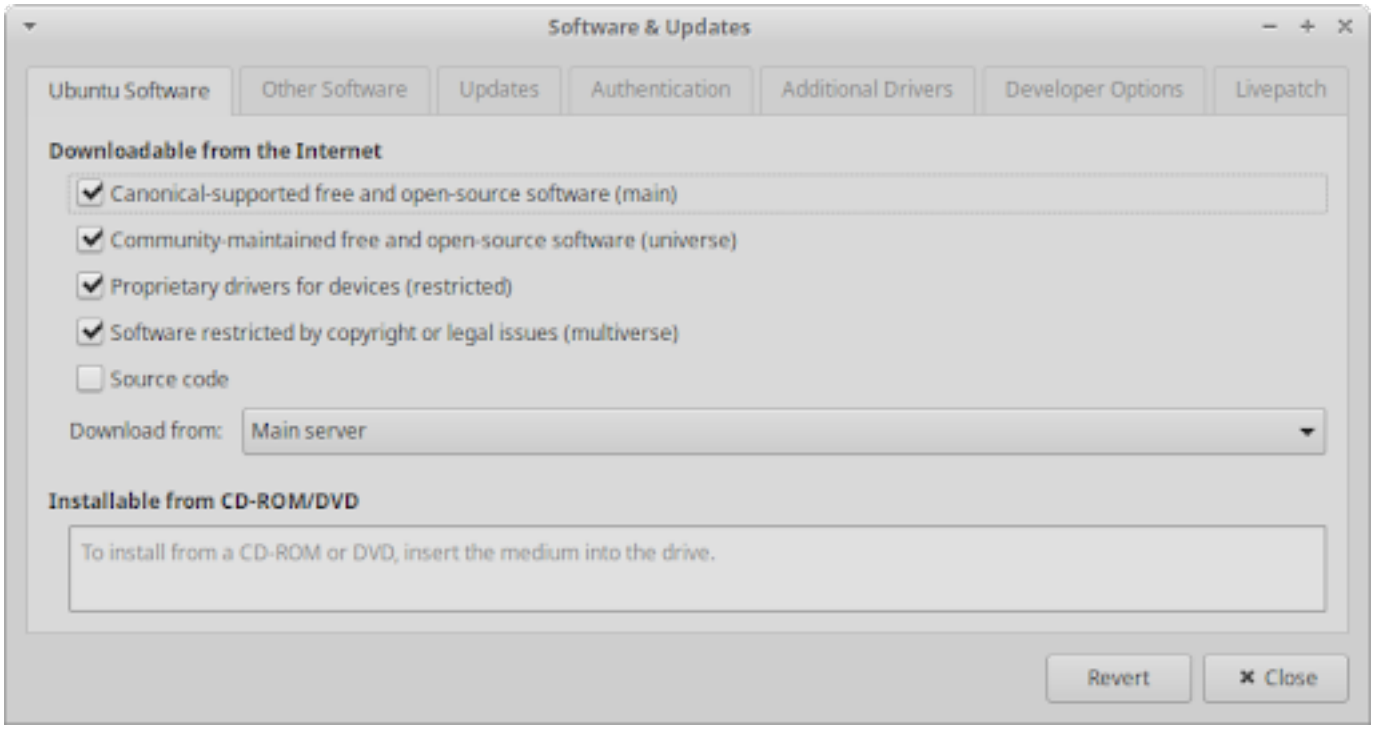
> **Caution**
>
> Some applications depend on others being installed in order to work properly. If you try to remove an application which is needed by another application, both of them will be removed. You will be asked to confirm that this is what you want to happen before the applications are removed.

> **Note**
>
> **GNOME Software** does not remove the software package dependencies that get installed with an application. To remove any dependencies that are no longer needed by the system, run **sudo**

> **`apt autoremove`** in a terminal. Before agreeing to the removal, check that the packages being marked for removal are the expected ones.

Software Repositories

The Ubuntu software repositories contain thousands of applications curated from the best FOSS (Free and Open Source Software) for both entertainment and productivity. Management of these software repositories and additional ones is possible in the **Software & Updates** app found in the *Settings* category of the **Applications Menu**, as well as in the **Settings Manager**. It can also be opened through the **Gear** button menu in the title bar of **GNOME Software** or the **Application** button menu found on the left corner of the title bar.



On the *Ubuntu Software* tab, you can enable and disable the main four Ubuntu software repositories, as well as select the server where the downloaded packages should come from. The *Other Software* tab allows you to enable, disable, add, edit, and remove extra online and offline repositories.

Installing Third-Party Apps

For applications that aren,t available or outdated in the software repositories, users can visit the software author,s website and download their Linux or Ubuntu installation file. This file will have a .deb file extension and is a Debian software package. Once downloaded, simply open the file, and it will open in **GNOME Software** with the option to install. Alternatively, it can be installed through the **GDebi Package Installer** (**gdebi [apt://gdebi]**).

Some application authors may provide a third-party repository, known as a PPA (Personal Package Archive), which can be added to your system. Other application authors may provide their software in the form of an installable Flatpak or as an AppImage, which runs without installation.

> **Note**
>
> Only download third-party apps from trusted sources in order to limit the risk of getting malware, junkware, or ransomware. If you,d like to install Windows applications, please see Chapter 14, *Migrating*.

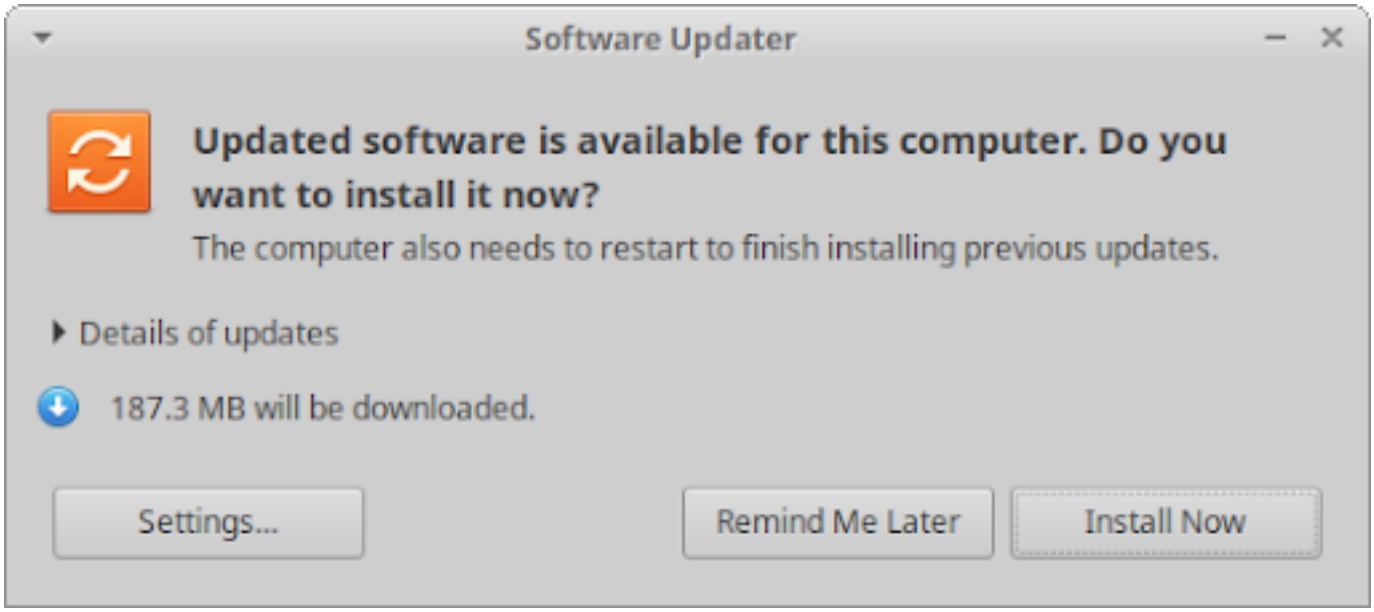
Software Updates

In order to keep your system updated and protected from potential security issues, Xubuntu has a software updates notifier running in the background. It checks for updates once a week and when updates are found, the **Software Updater** app will launch.

> **Note**
>
> To disable the software updates notifier service, disable the *Update Notifier* entry in the *Application Autostart* tab of the **Session and Startup** app. However, this is not recommended.

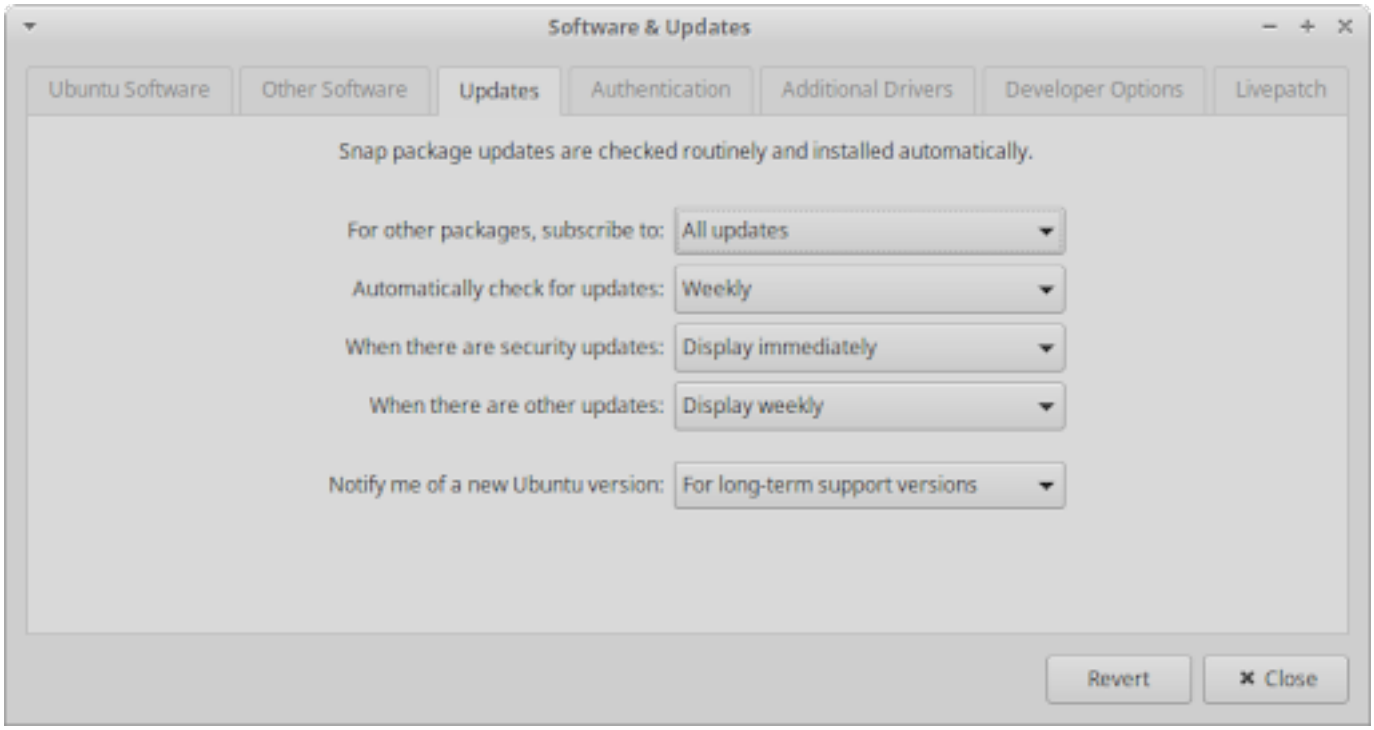
Software Updater

To manually check for software updates, you can open the **Software Updater** found in the *Settings* category of the **Applications Menu** as well as in the *System* category of the **Settings Manager**. Once opened, it will query the software repositories, compare the software list against the versions installed on your system, and present those that can be updated.



Update Check Settings

You can set how often the **Software Updater** checks for updates, which updates to check for and what should happen when updates are found. These settings can be accessed when **Software Updater** is run by clicking the **Settings...** button at the bottom left. Pressing this will open the **Software & Updates** dialog with the *Updates* tab selected.

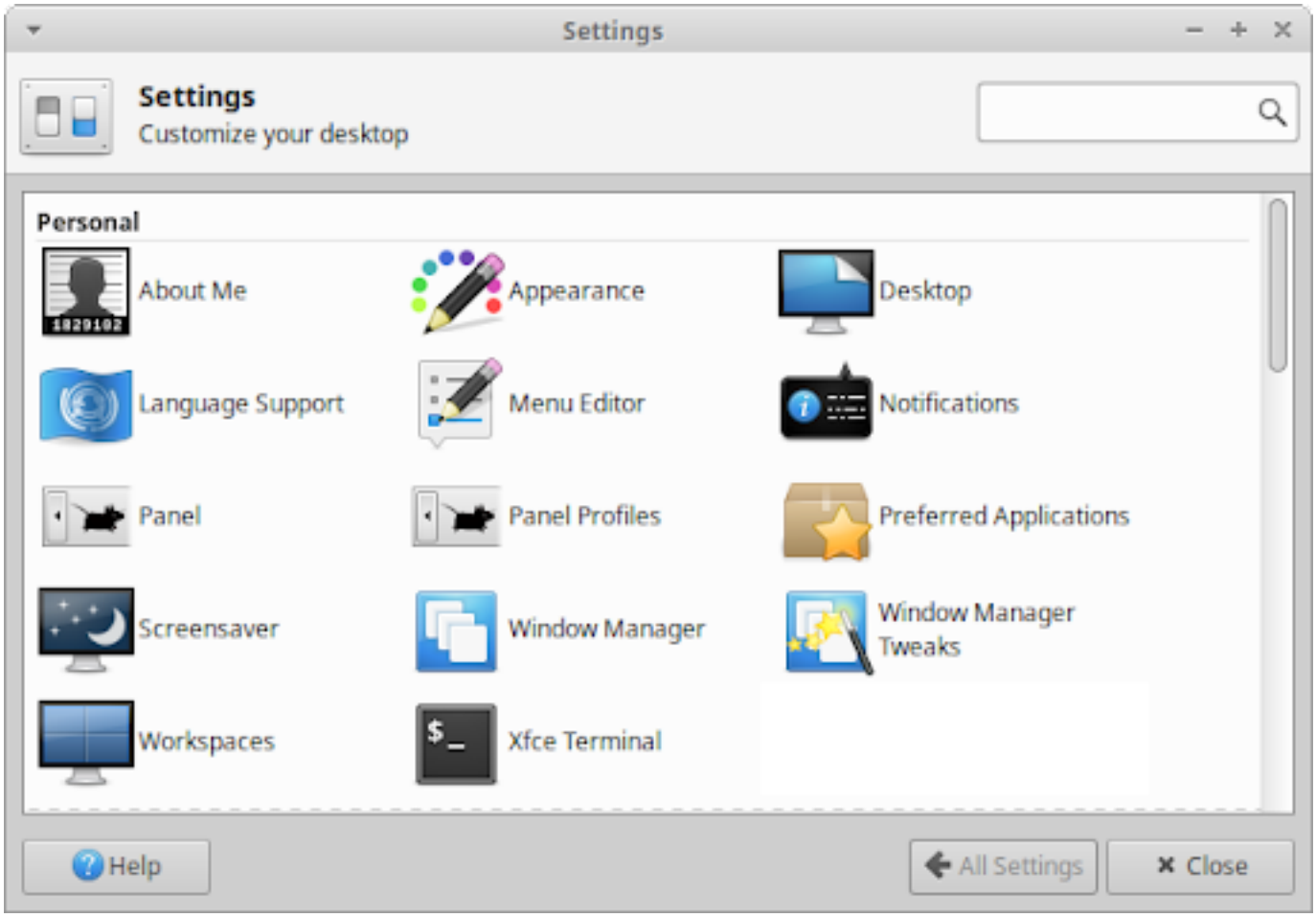


> **Note**
>
> Software Updater will also notify you when a new version of Xubuntu is available. Learn more in the Chapter 16, *Upgrading*.

Chapter 6. Settings - Personalization

Similar to other desktop or mobile operating systems, Xubuntu comes with a default look and feel that some users will prefer to customize to their needs. Unlike Windows, Mac OS and some Linux desktop environments, Xubuntu comes pre-installed with many customization tools that give users a lot of control.

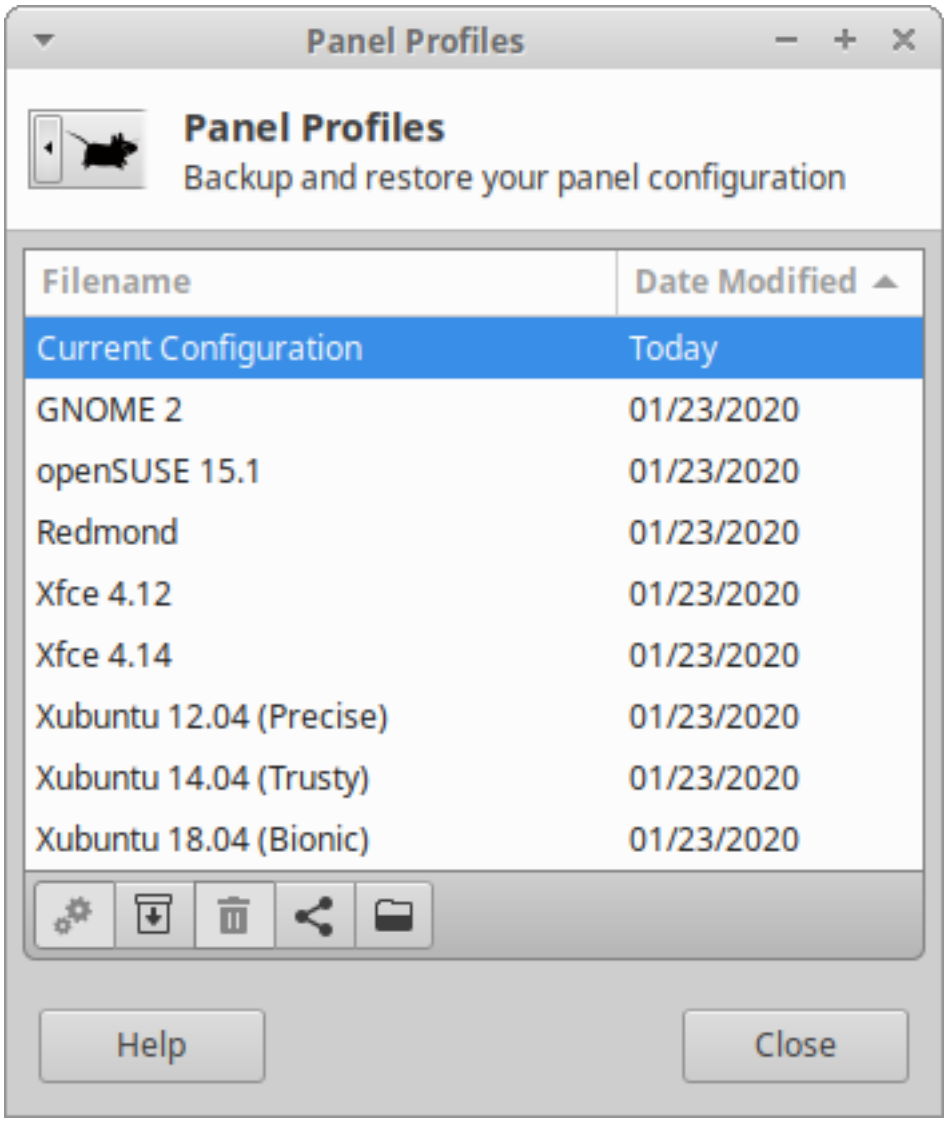
Xubuntu,s customization settings can be accessed from the *Personal* category of the **Settings Manager**, the *Settings* category of the **Applications Menu** (Ctrl + Escape), **Application Finder** (Alt + F3), or the right-click menu of an object.



Panel

Xubuntu,s default panel layout has a single panel at the top of the screen with the menu, window list, and notification area. This panel layout can be switched to another bundled panel layout or can be manually customized.

Panel Presets



The **Panel Profiles** settings dialog makes it easy to switch to any of the bundled panel layouts or apply an imported panel layout. It also makes it easy to save your current panel layout and export it.

... **GNOME 2** - This layout is inspired by the default GNOME 2 desktop environment panel layout, which has a panel at the top and bottom. The top panel has a classic tree menu, places context menu, settings and browser launchers, and notification area, while the bottom panel has the show desktop button, window list and workspace switcher.

... **openSUSE 15.1** - This is the default layout found in the Xfce edition of openSUSE, which has a single panel at the bottom with a modern searchable menu, show desktop button, window list, workspace switcher, and notification area.

... **Redmond** - This layout is inspired by Microsoft Windows XP, with a single panel at the bottom that has a classic menu, windows list and notification area.

... **Xfce 4.12** - This is the default Xfce 4.12 layout that contains a panel at the top and bottom. The top panel has a classic menu, window list, workspace switcher and notification area, while the bottom centered panel has a show desktop button, user folders button, and various application launchers.

... **Xfce 4.14** - This is the default Xfce 4.14 layout and is similar to the *Xfce 4.12* panel layout, with the exception of having a smaller top panel with additional audio, battery and notification indicators.

... **Xubuntu 12.04 (Precise)** - This was the default panel layout used in Xubuntu,s 2012 LTS release and is similar to the *Xfce 4.12* panel layout, but has an auto-hide panel at the bottom.

... **Xubuntu 14.04 (Trusty)** - This was the default panel layout used in Xubuntu,s 2014 LTS release and has a single panel at the top, with a modern searchable menu, window list and notification area.

... **Xubuntu 18.04 (Bionic)** - This was the default panel layout used in Xubuntu,s 2018 LTS release and is similar to the *Xubuntu 14.04 (Trusty)* panel layout, with the addition of audio and notification indicators.

Panel Customization

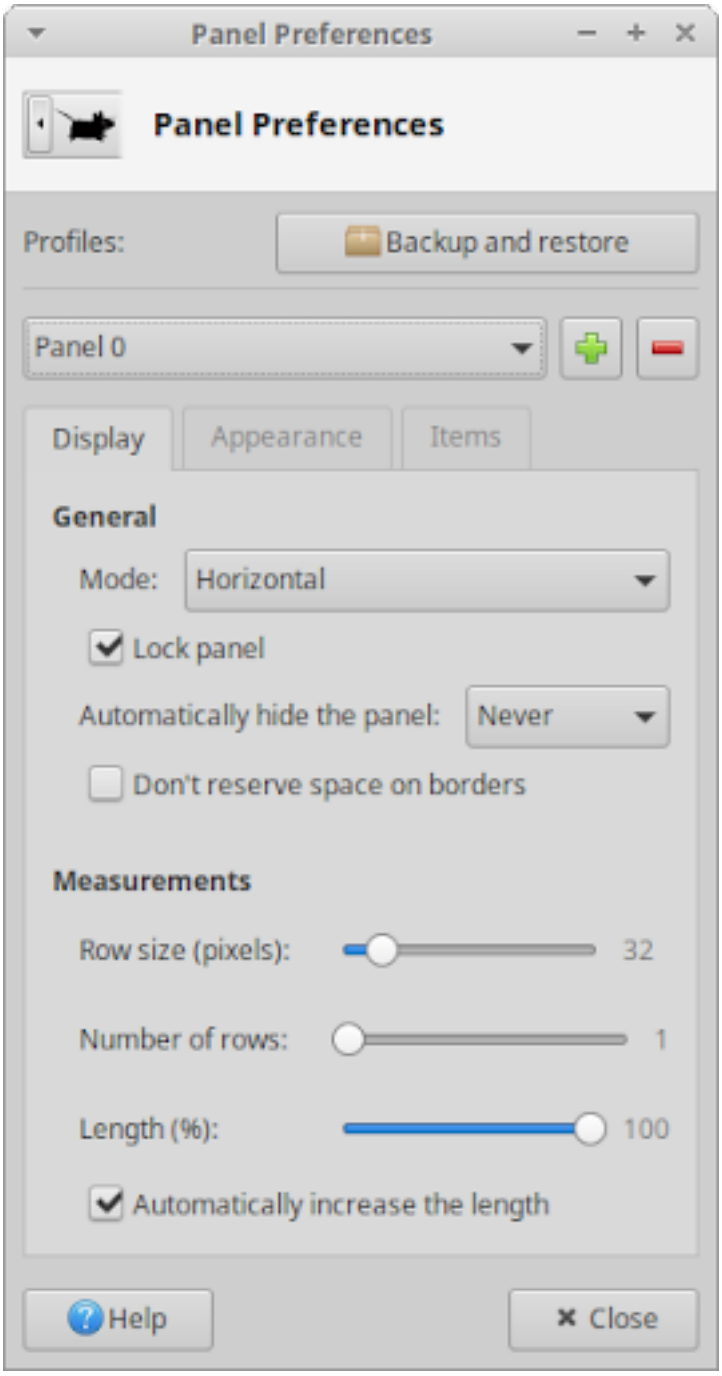
To make minor changes to Xubuntu,s panel(s), you can do the following:

··· Drag an application launcher from the **Applications Menu**, *Desktop* or **Application Finder** onto the panel to add it to the panel.

··· Right-click an application launcher in the **Applications Menu** and select the *Add to Panel* entry in the context menu to add it to the panel.

... Right-click on any of the panel items and select the *Properties*, *Move*, or *Remove* entries in the context menu to customize, move to the desired position, or remove from the panel.

... Right-click on any of the panel items and selecting *Panel -> Add New Items...* to add a new item to the panel.



For other changes to panel(s), you will need to open the **Panel** settings dialog, which is also accessible by right-clicking on any of the panel items and selecting *Panel -> Panel Preferences...*. The top section of the dialog gives access to open the **Panel Profiles** settings dialog and the ability to select, add and remove panels. The remainder of settings are broken up across three tabs.

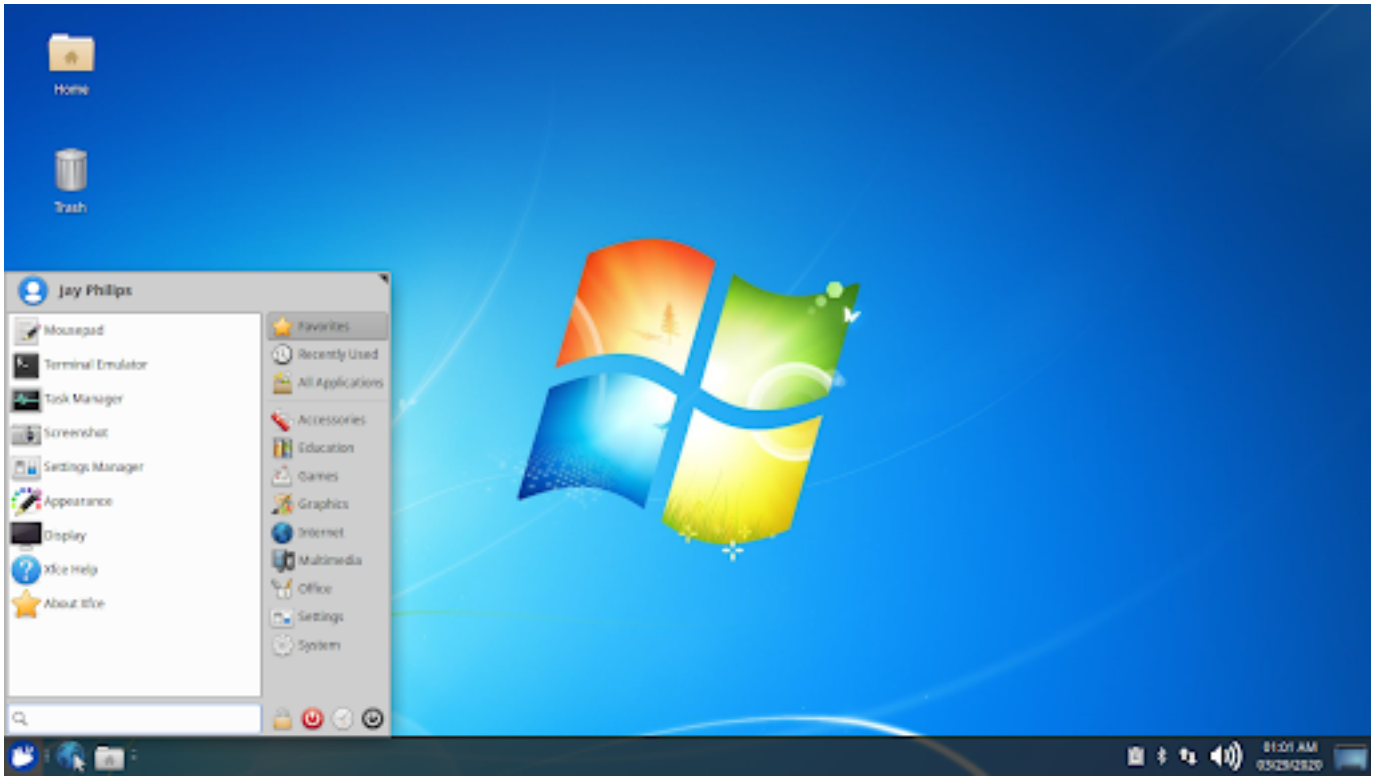
... **Display** - On this tab, you can set the panel,s width and height, vertical or horizontal orientation, position on the screen, and hiding behaviour. To move the panel, you will need to uncheck the *Lock panel* checkbox and drag it by one of the two handles that appear on either side.

... **Appearance** - On this tab, you can set the panel,s transparency, icon size and whether its background is a color or image.

... **Items** - This tab allows you to add, arrange, and remove plugins, as well as access plugin properties through the button bar. It is also possible to rearrange items by dragging with the mouse, and access properties by double-clicking.

It is possible to install additional panel plugins, also known as panel applets. Panel plugins not listed in the *Add New Items* dialog will need to be installed before they can be used. Some of the plugins are listed here [https://docs.xfce.org/xfce/xfce4-panel/start#external_plugins] and the more popular/useful ones are for clipboard management (**xfce4-clipman-plugin [apt://xfce4-clipman-plugin]**), global menu (**xfce4-appmenu-plugin [apt://xfce4-appmenu-plugin]**), etc.

Users who want a dock similar to the one found on Mac OS and elementary OS can choose from these docks - Plank (**plank [apt://plank]**), DockbarX (PPA [https://launchpad.net/~xuzhen666/+archive/ubuntu/dockbarx]), Docky, or Cairo Dock. Users who want a Windows 7-like taskbar with window list buttons can install the DockbarX (PPA [https://launchpad.net/~xuzhen666/+archive/ubuntu/dockbarx]) or Docklike (PPA [https://launchpad.net/~xubuntu-dev/+archive/ubuntu/extras]) panel plugins. Below are sample layouts customized by Xubuntu users.



Windows 7

Mac OS

> **Note**
>
> If you have multiple screens, additional panel configurations will appear on the *Display* tab, including the options to configure which display the panel should appear on or whether the panel should span all monitors.

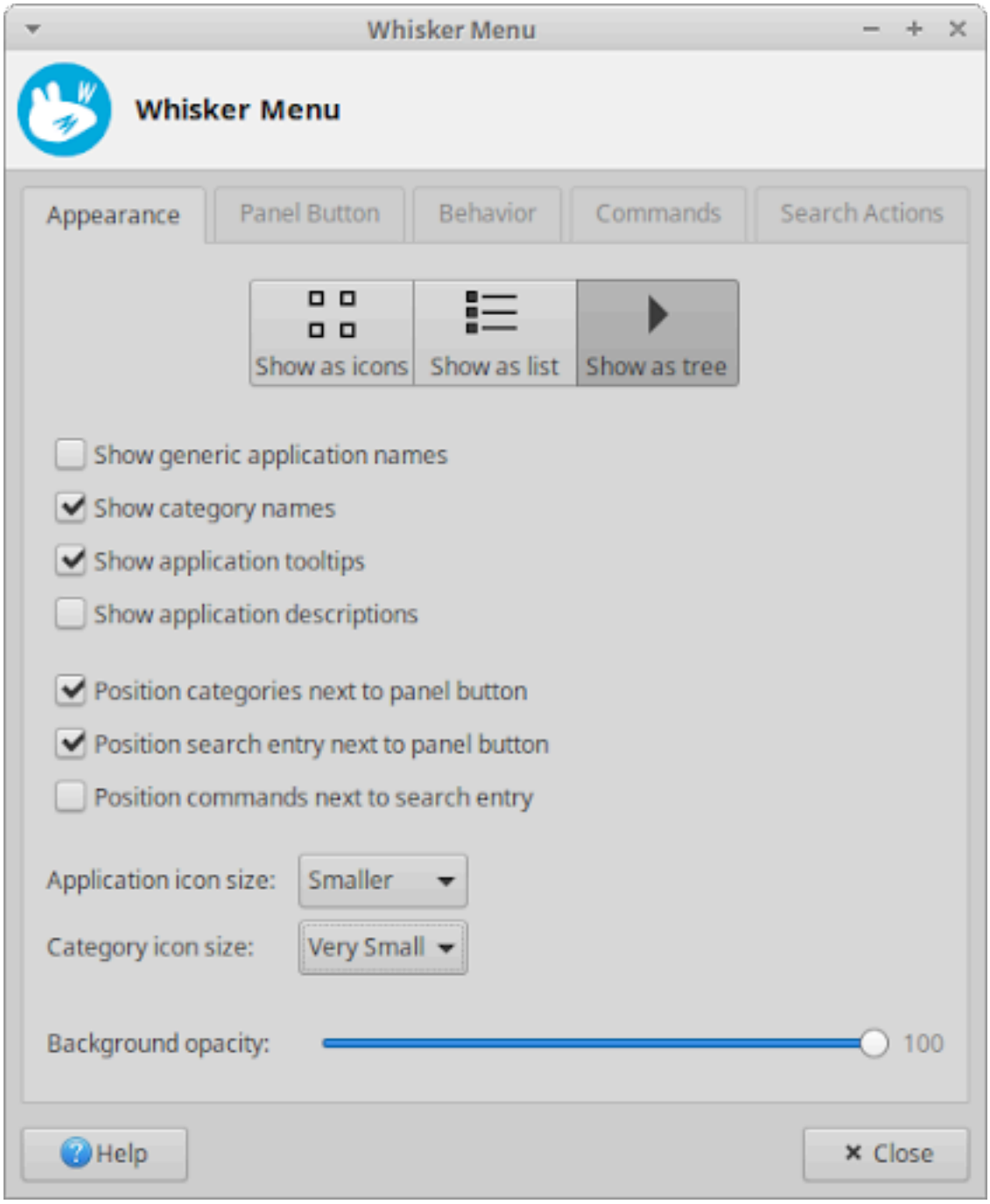
Menu

The easiest tweak you can make to the **Applications Menu** is to customize your *Favorites*, so you have easy access to your most important/used applications as soon as you open it. You have the options to:

... Add an application by locating the application either by searching for it by name or by browsing the categories, right-clicking on it and selecting *Add to Favorites* from the context menu.

... Remove an application by right-clicking on an application in *Favorites* and selecting *Remove From Favorites* from the context menu.

... Rearrange/reposition an application by left-clicking an application in *Favorites* and dragging it to the desired position.



For options to customize the look and feel of the **Applications Menu**, right-click on the menu button and select *Properties* in the context menu to launch the **Whisker Menu** settings dialog. The dialog is divided into tabs for:

... *Appearance* - Contains options for how the applications and categories will look, as well as the placement of the application list, category list, search field, and command buttons.

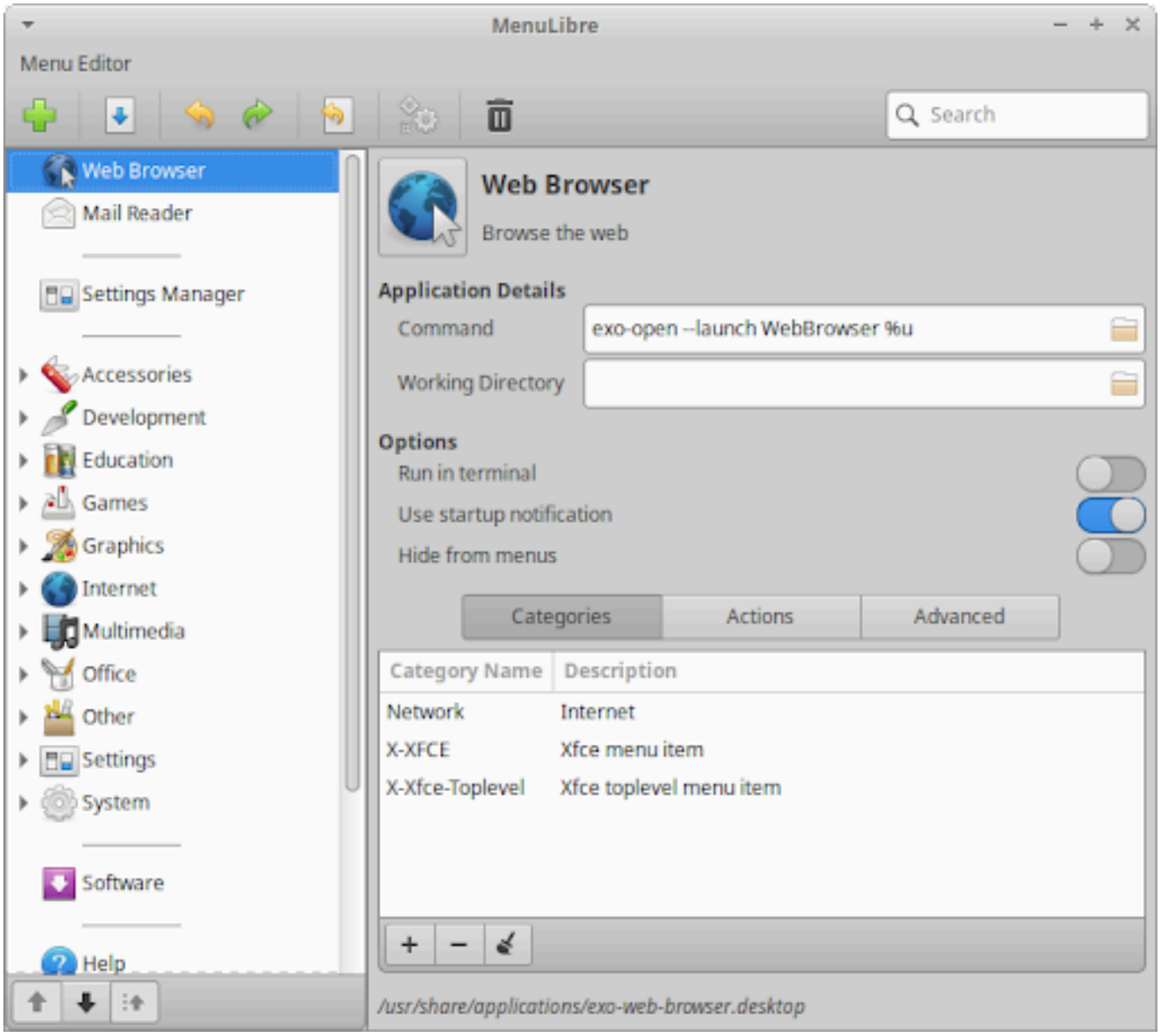
... *Panel Button* - Select whether the Menu button is an icon, a text label, or icon and label, and what that label should be.

... *Behavior* - Decide on the feel of the Menu, including whether categories should be selected once the mouse hovers over them, whether the Menu should stay open even when focus is lost, whether the

Recently Used category should be displayed by default, and whether session commands should have confirmation dialogs.

... *Commands* - Enable or disable the appearance of the Settings Manager and session commands in the command buttons section of the Menu, as well as the appearance of the *Edit Applications* entry in the Menu button,s context menu.

... *Search Actions* - List the various keyword patterns that can be used to extend the functionality of the search field and make it easy to search other sources like Wikipedia or the file system.



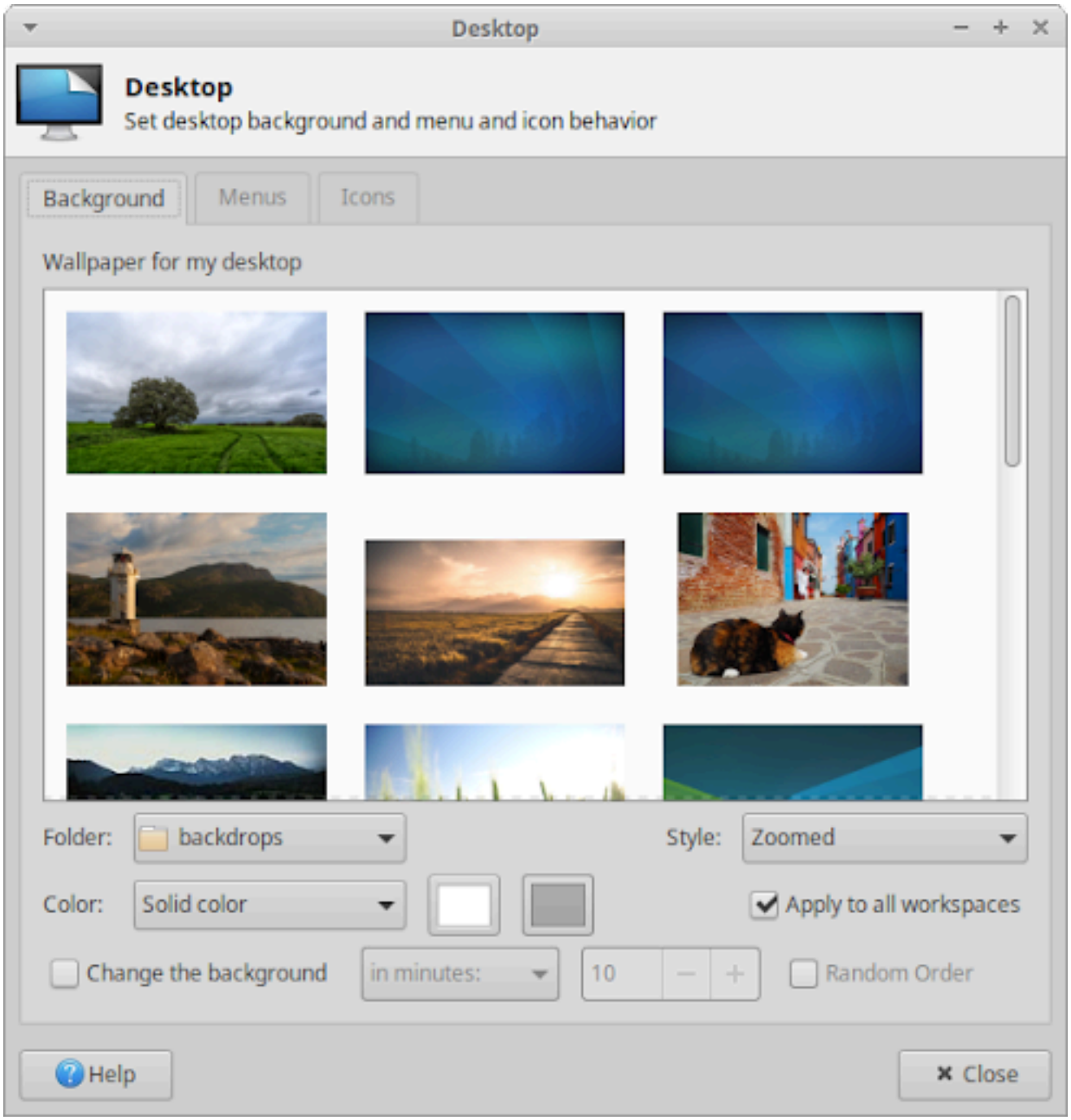
To customize which applications appear in the **Applications Menu**, open the **Menu Editor** utility, which is also accessible by right-clicking the Menu button and choosing *Edit Applications* from the context menu. Using this editor you can create new application launchers or categories, as well as edit the details of existing ones, including which categories the application appears in, whether the application will be visible in the menu, and the icon or name used by the application.

> **Note**
>
> For more in-depth information on how to use all of those options, consult the MenuLibre [https://github.com/bluesabre/menulibre/wiki/Usage] online documentation.

Desktop

The desktop is visible once you login to your account and its background is also present on the login and lock screens. To access customization options, open the **Desktop** settings dialog, which is also accessible by right-clicking a blank area of the desktop and selecting *Desktop Settings* from the context menu.

Background



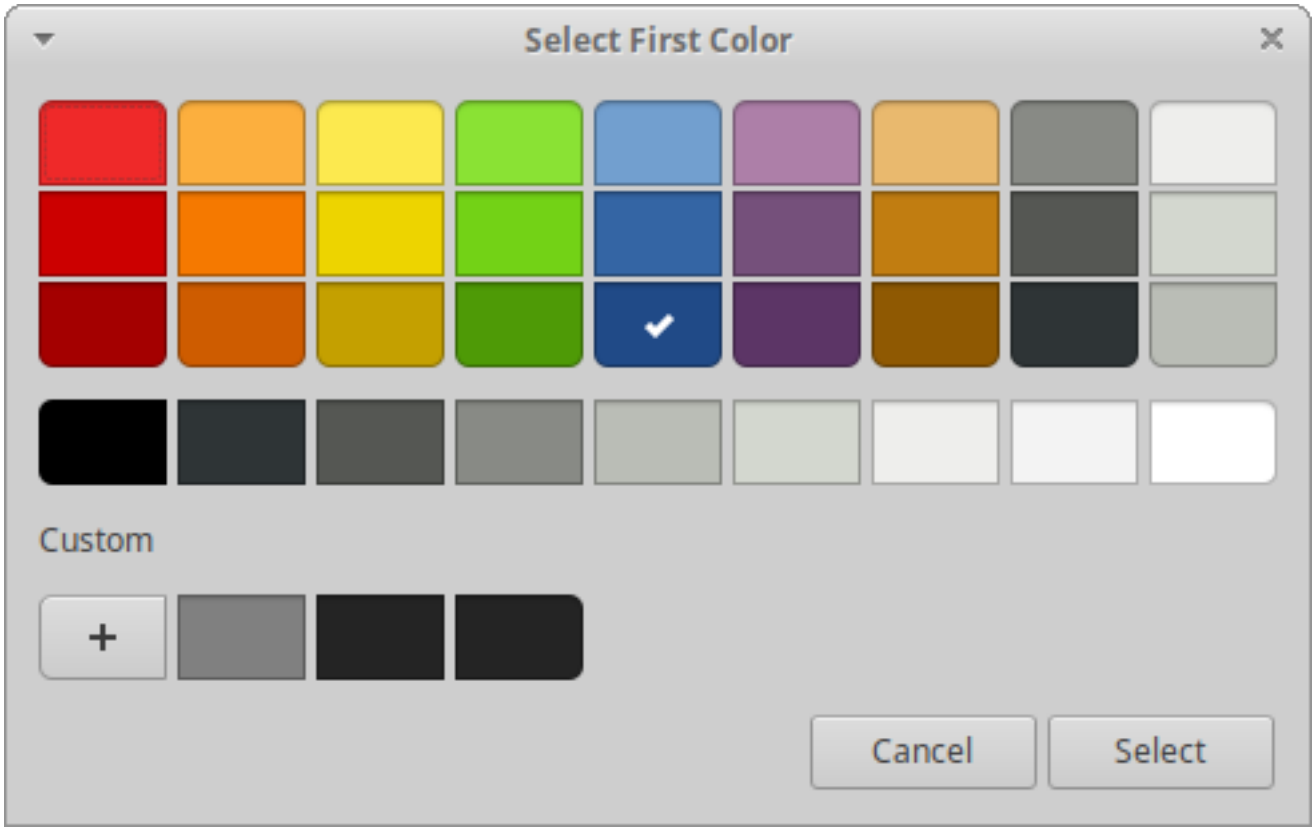
Once the **Desktop** settings dialog is launched, the *Background* tab gives you options to choose between a wallpaper image, a color gradient, a single color, or a combination of wallpaper(s) and color(s) as the desktop background.

When choosing an image as the background from the wallpaper list, you may choose from the default selection that comes with Xubuntu or select an image from a different folder by changing the *Folder* dropdown. You have the option to set how the wallpaper will fit on the screen in the *Style* dropdown. The default is *Zoomed*, which resizes the image preserving its aspect ratio and cropping the image to fill the

screen. If you have multiple monitors connected, then the dropdown will also have a *Spanning screens* entry, to stretch the wallpaper the displays.

If there are multiple images in the wallpaper list, you also have the option to set the background to automatically cycle through them in an ordered or random sequence. By enabling the *Change the background* checkbox, you have several time-based options to choose from. The last option, *Chronologically*, sets the wallpapers to appear over evenly timed periods of a day.

> **Note**
>
> The default selection of wallpapers shipped with Xubuntu includes wallpapers created by the Xubuntu team for different releases and wallpapers submitted by the community. For more community contest-winning wallpapers, search for the packages that begin with xubuntu-community-wallpapers in the **Synaptic** package manager.



To set the background as a single color or a two-color gradient, set *Style* to 'None, and then set *Color* to the appropriate entry. You can then click on the color buttons next to the dropdown list to open the *Select Color* dialog. You have the option to select from the list of color presets, right-click on a color preset to customize that color, or create a custom color from scratch by pressing the plus button.

If you have multiple workspaces, also known as virtual desktops, you can choose to have the same background appear across all workspaces or use a different background for each workspace. To use a different background, uncheck the *Apply to all workspaces* checkbox,then move the dialog to each workspace individually and select a different background. This can be done by dragging the window to the left or right corners of the screen or pressing the keyboard shortcuts Ctrl + Alt + Home or Ctrl + Alt + End. This also is the case when you have multiple monitors connected, where each display will have the default wallpaper unless the window is dragged to other displays and the background is changed.

> **Note**
>
> The easiest way to set an image as the background wallpaper is to right-click the image on the current workspace or display and select *Set as wallpaper* from the context menu.

Icons

In the *Icons* tab of the **Desktop** settings dialog you can set the properties of the icons that appear on the desktop, including their sizes, sort arrangement, label font size, click activation behavior, whether or not they should have tooltips and thumbnails, and which system icons appear by default. The *Icon type* dropdown list gives you the option to have desktop icons for files and launchers, minimized application windows, or no icons at all.

Menus

The *Menus* tab of the **Desktop** settings dialog provides customization options for the two menus that can appear when using the mouse.

... Desktop Menu - This menu appears when right-clicking the desktop. You may choose whether or not this menu includes the **Applications Menu** in a tree hierarchy.

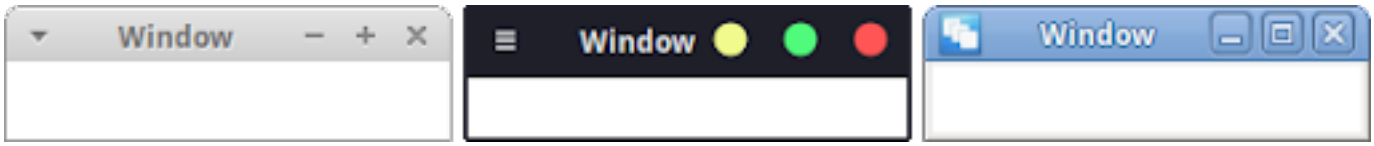
... Window List Menu - This menu appears when middle-clicking the desktop. You may choose whether or not to display this menu, as well as application and workspace customization options within the menu.

Theming

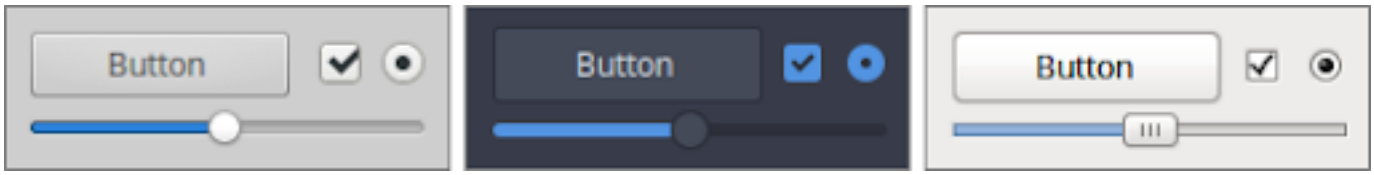
A desktop theme is used to change the look and feel of the GUI (Graphical User Interface) and can consist of many things, including the desktop wallpaper, user interface styling and colors, fonts, icons, and sounds. In Xubuntu, you may change many of these individual components, so your desktop can be as unique as you like it to be.

The three main theming components that you should know about are:

... **Window Decorations** - This is the appearance of the outer section of a window, including the title bar and window borders. It is also known as the window manager theme.

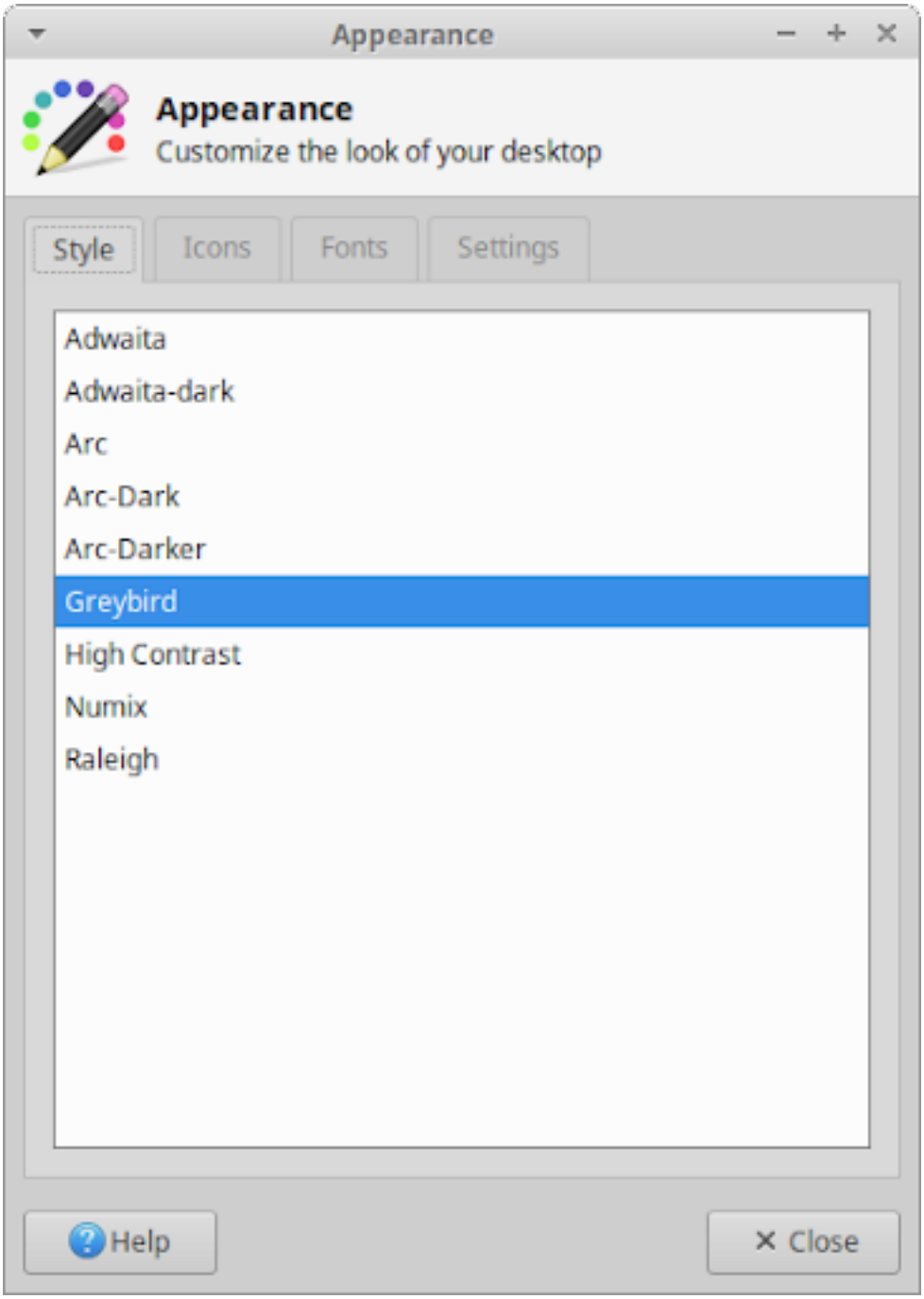


... **UI Controls** - This is the appearance of the user interface elements found within the inner section of the window, such as the buttons, scroll bars, and window background. It is also known as the Gtk theme.



... **Icons** - This is the icon set used to style the icons found in toolbars and menus, on files and folders, on application launchers and buttons. It is also known as the Icon theme.

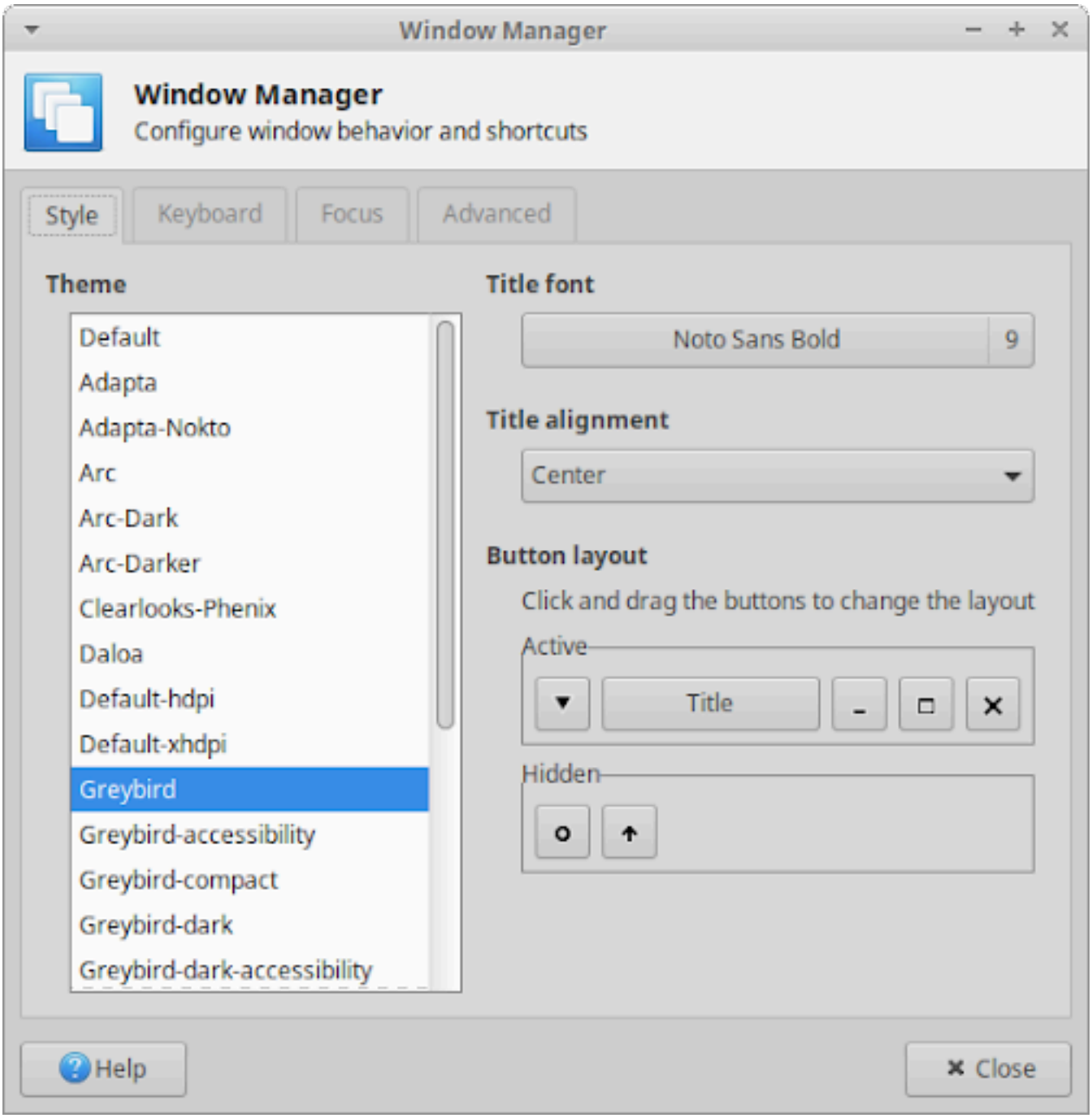
UI Controls and Icons



Open the **Appearance** settings dialog and you will be on the *Style* tab which will allow you to set your UI (User Interface) controls theme by selecting an entry in the list. If you switch to the *Icons* tab you will be able to set your icon theme by selecting an entry in the list. The *Fonts* tab will allow you to set the default font used for UI text, as well as setting font rendering options. The *Settings* tab has options to enable and disable images in menus and on buttons, as well as change how toolbar entries are styled.

> **Note**
>
> Not all icon themes will work well with dark panels and window backgrounds.
>
> If you install applications that use the Qt UI toolkit [https://en.wikipedia.org/wiki/Qt_(software)], such as Qbittorrent or Clementine, the Qt5 Settings (**qt5ct [apt://qt5ct]**) utility will allow you to configure their theming, while the **qt5-style-plugins [apt://qt5-style-plugins]** package will use the current theme on Qt apps.
>
> If you,d like to change the theme of the mouse cursor, open the *Theme* tab of the **Mouse and Touchpad** app.

Window Decorations and Effects



Once you open the **Window Manager** settings dialog, you will be on the *Style* tab which will allow you to set the window decoration theme, as well as customize the various elements of the title bar. This includes the alignment and font size used in the title bar text and the arrangement and visibility of the title bar buttons.

Xubuntu doesn't come with many desktop effects, but the Xfce compositor is enabled by default. The Xfce compositor is used to draw shadows behind windows and panels, as well as set the transparency of window decorations and windows in various states. To access these desktop effects, open the **Window Manager Tweaks** settings dialog to its *Compositor* tab.

> **Note**
>
> If you have a low-end GPU or you don't like the desktop effects mentioned, you can turn off the compositor by unchecking *Enable display compositing* or modifying the other settings.

More Themes

If the default selection of themes doesn't satisfy you, you can easily download and install new themes. Sometimes window decoration and UI control themes will come bundled together as a single Gtk theme, while Icon themes may also include a mouse cursor theme. You can find new themes in the software repositories, such as:

... UI themes - Adapta (**adapta-gtk-theme [apt://adapta-gtk-theme]**), Arc (**arc-theme [apt://arc-theme]**), Materia (**materia-gtk-theme [apt://materia-gtk-theme]**)

... Icon themes - Papirus (**papirus-icon-theme [apt://papirus-icon-theme]**), Numix Circle (**numix-icon-theme-circle [apt://numix-icon-theme-circle]**), Moka (**moka-icon-theme [apt://moka-icon-theme]**)

Additional themes can be found on the Internet, as **.deb** Debian package files, in PPA software repositories, on websites like Xfce-look.org [http://xfce-look.org/] and Github.com, or from the theme author,s website. Here are some popular choices:

... UI themes - Xfce Simple Dark [https://www.xfce-look.org/p/1150488], Mint Mac Dark [https://www.xfce-look.org/p/1174937/], Matcha [https://github.com/vinceliuice/Matcha-gtk-theme], Plano [https://www.xfce-look.org/p/1174518/], Pop [https://www.xfce-look.org/p/1299758/], Flat Remix [https://drasite.com/flat-remix-gtk], Dracula [https://draculatheme.com/gtk/]

... Icon themes - Flat Remix [https://drasite.com/flat-remix], Paper [https://snwh.org/paper/download]

Installing Themes

If you install new themes from the repositories, or through a **.deb** Debian package file, they will automatically appear in the relevant lists. If you download a theme from the Internet, you will need to install the theme before it will appear in the relevant list. Here are three means to install downloaded themes:

... **Drag and Drop** - With the **Appearance** settings dialog open to either the *Style* or *Icons* tabs, you can drag and drop a compressed **.tar.xz** theme file onto the theme list.

... **OCS URL** - If you are installing themes from Xfce-look.org, you can install the ocs-url [https://www.pling.com/p/1136805/] installation helper tool and then click the 'Install, buttons in the *OCS-Install* column on the Files tab of the theme,s page.

... **Manually** - Open the compressed UI or Icon theme file and extract its contents into the appropriate folder. If these directories do not exist, you will need to create them first.

... UI themes - /home/username/.themes/

... Icon themes - /home/username/.icons/

Note

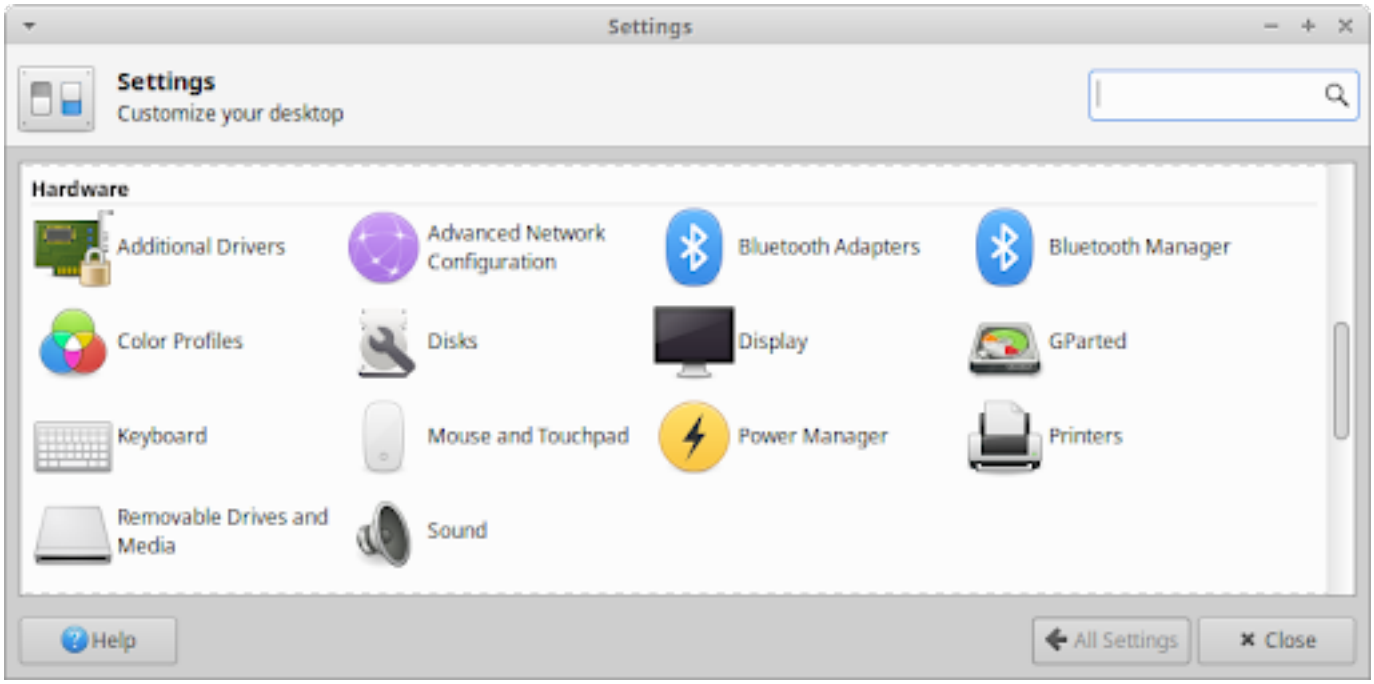
The **username** part of the folder path should be replaced with your username.

In Linux, files and directories starting with a . (dot) are hidden by default and to unhide them in the file manager, open the *View* menu and check the *Show Hidden Files* entry or alternatively press Ctrl + H. To unhide them in the file open or save dialogs, right-click in the files list area of the dialog and select Show Hidden Files from the popup menu.

Chapter 7. Settings - Hardware

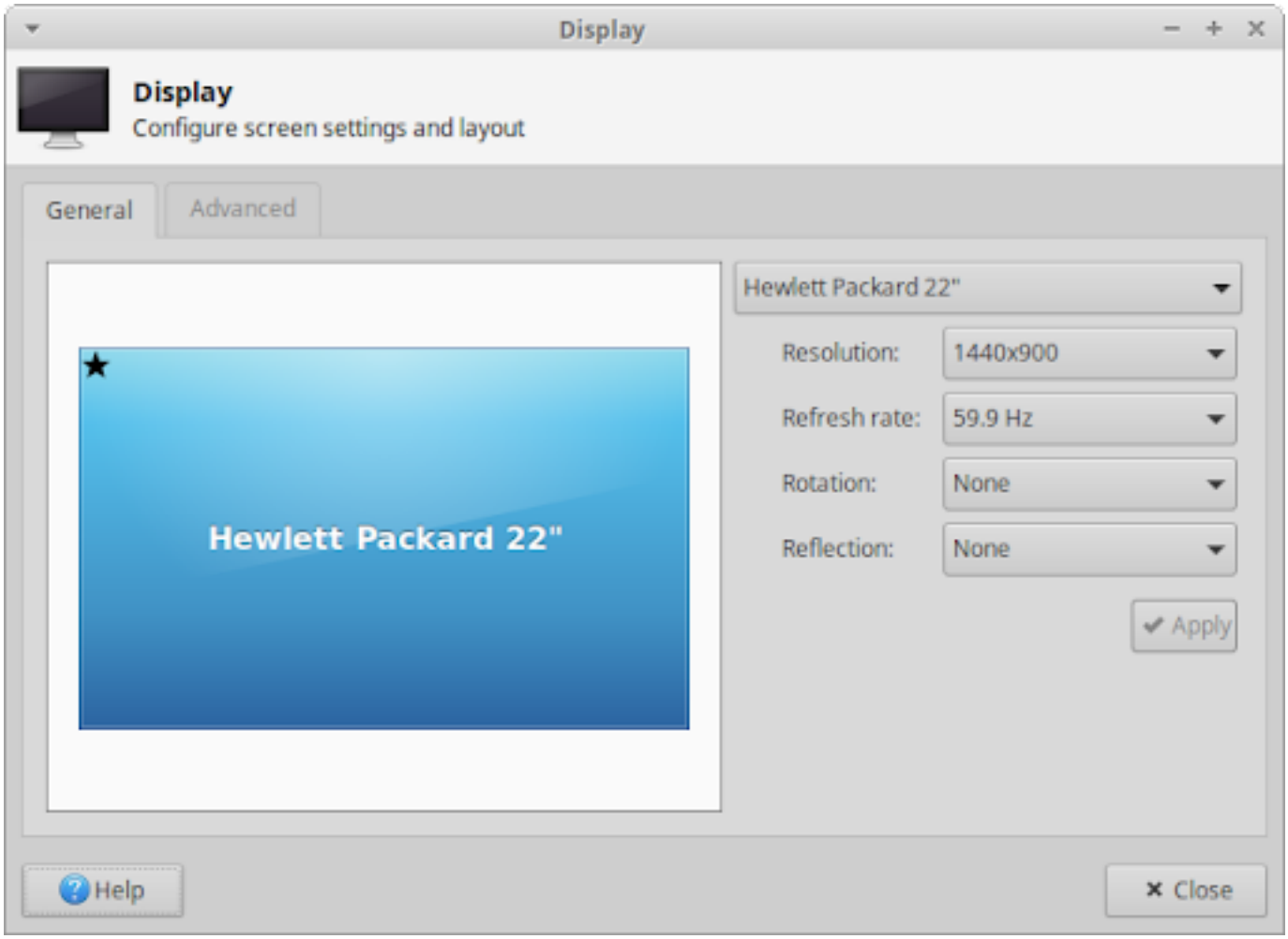
Your computer consists of a number of components and devices that collectively are known as computer hardware. This includes internal components, such as the CPU, motherboard, hard disk, graphics card, sound card, wifi adapter, and bluetooth adapter, as well as external peripheral devices, such as the monitor, mouse, keyboard, and printer.

Xubuntu configures your hardware automatically with optimal defaults, but there may be occasions when you need to make changes to these hardware settings. This section provides information on tools to configure them, which can be accessed from the *Hardware* category of the **Settings Manager**, the *Settings* category of the **Applications Menu** (Ctrl + Escape), and in the **Application Finder** (Alt + F3).



Monitor

Whether you have a single screen or multiple monitors, you can easily access their customization options by opening the **Display** settings dialog, which is also accessible with the keyboard shortcut Super + P.



On the *General* tab, you can change the screen,s resolution, refresh rate, rotation and reflection in the various drop-down lists. Click the *Apply* button to try out the changes and a confirmation dialog will appear to let you confirm or reject the changes. The previous configuration will be restored if you don,t confirm or reject the changes within 10 seconds.

> **Note**
>
> Note: To change how fonts are rendered or set a custom DPI text size, see the options in the *Fonts* tab of the **Appearance** settings dialog. To manage monitor power saving options such as when it should enter power-save mode or how much to lower the brightness after inactivity (only applicable to laptops), see the options in the *Display* tab of the **Power Manager** settings dialog. If you are experiencing screen tearing when playing videos, you may change the vblank value of the compositor or modify the xorg config file.

High Resolution

High resolution displays may require specific settings to achieve readability of text and other screen objects. High-end laptop screens and other ultra-high resolution displays may have high pixel density in a small form factor. They are commonly referred to as HiDPI (High Dots Per Inch), 4K, UHD, WQHD, QHD, or 1440p displays. Some laptops with these types of screens include MacBooks with ”Retina Display„, Dell XPS 13, and ThinkPad X1 Carbon. 4K and 8K UHD TVs may also require customization to make text readable at the viewing distances typical of these displays.

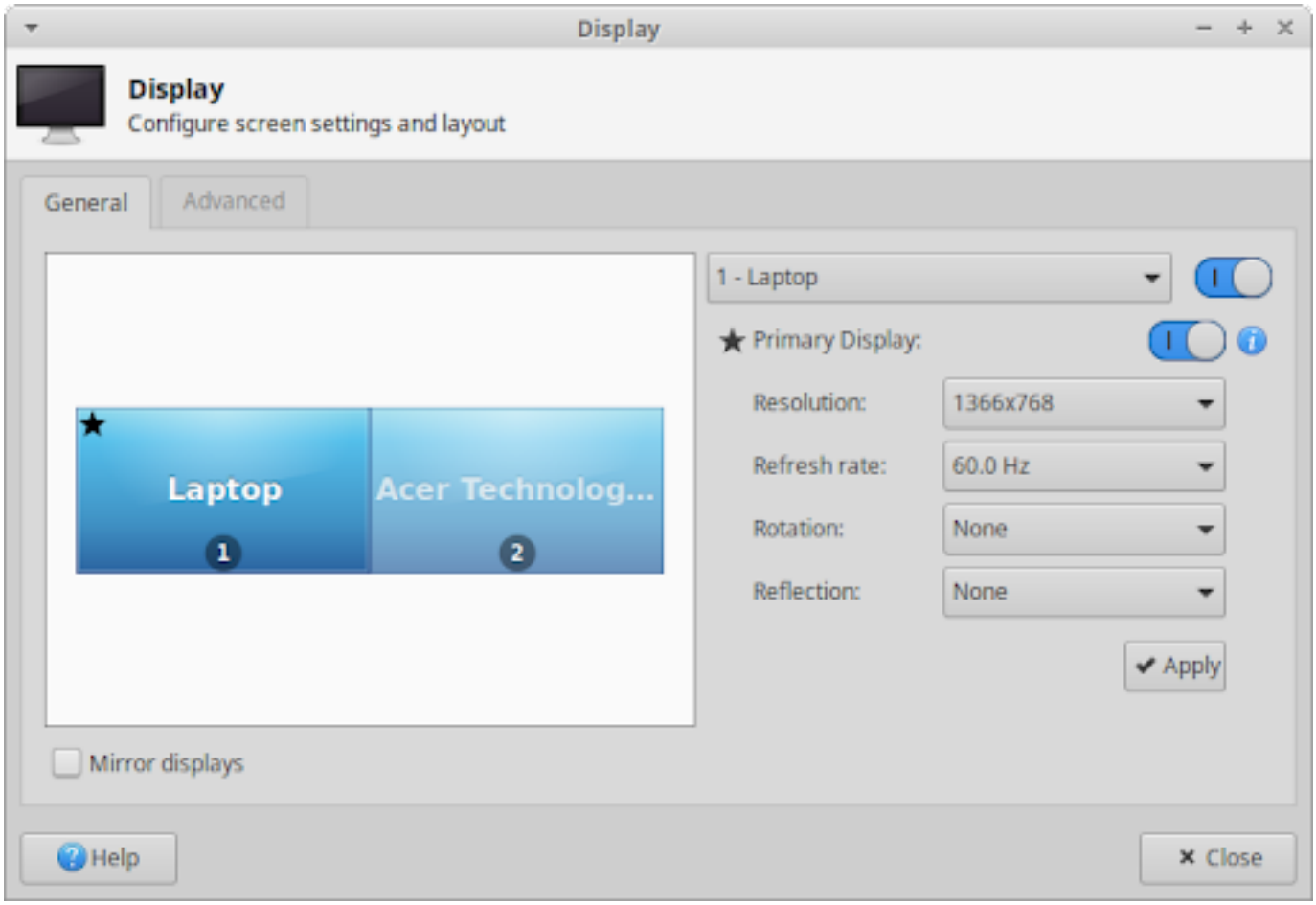
To improve the visibility of text and objects on these large resolution displays, you can make the following changes.

... Open the **Appearance** settings dialog, change to the *Settings* tab, and change *Window Scaling* to '2x,.

... Open the **Window Manager** settings dialog and in the *Style* tab, change to a HiDPI theme like 'Default-hdpi, or 'Default-xhdpi,.

Multiple Monitors

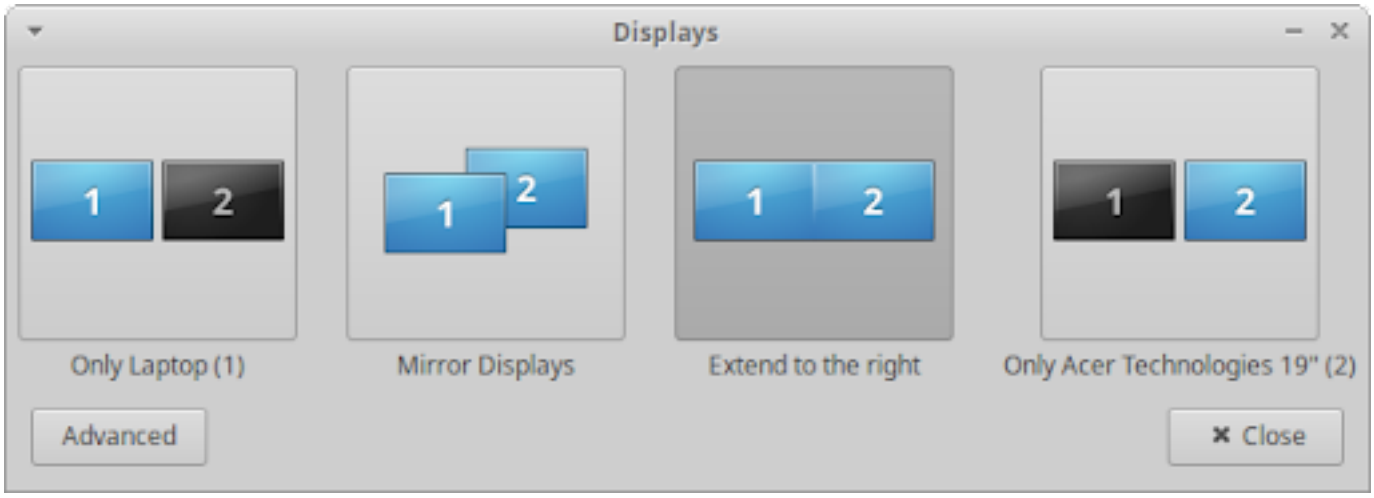
When you have an external monitor or TV screen connected to your laptop or multiple monitors and/or screens connected to your desktop, more options will become visible on the *General* tab of the **Display** settings dialog. Select the screen that you wish to change the settings of by selecting it in the preview area or changing the entry in the screen drop-down list.



One of the additional options presented in a multi-screen setup is the option to rearrange the displays in the preview area by dragging and dropping them to match how they are physically placed. Additional multi-screen options include turning off a screen, setting a monitor as the primary display, mirroring the desktop on multiple displays, or extending the desktop across both screens.

> **Note**
>
> Note: With a screen set as the primary display, you can then configure the panels, desktop icons, and notifications to appear on that screen. Click the information icon next to the *Primary Display* toggle button to open the respective setting dialogs.

The *Advanced* tab provides even more multi-monitor options, including the option to save a display configuration so that it can be easily applied at a later time. When the *Configure new displays* when connected option is toggled, the below **Displays** mini dialog will appear, providing the most common display configurations, as well as any user-saved display configurations. The keyboard shortcut Super + P will open this dialog in a multi-monitor setup and clicking the 'Advanced, button opens the **Display** settings dialog.



The *Automatically enable profiles when new displays are connected* toggle will apply a user-saved display configuration when the connected displays match the displays found in a saved display configuration.

Colors

For color-sensitive work, the **Color Profiles** settings dialog allows you to install and manage color profiles for your displays, printers, and scanners. In order for color profiles to be used, the required daemon will need to be installed and running in the background:

... **xiccd [apt://xiccd]** for display profiles

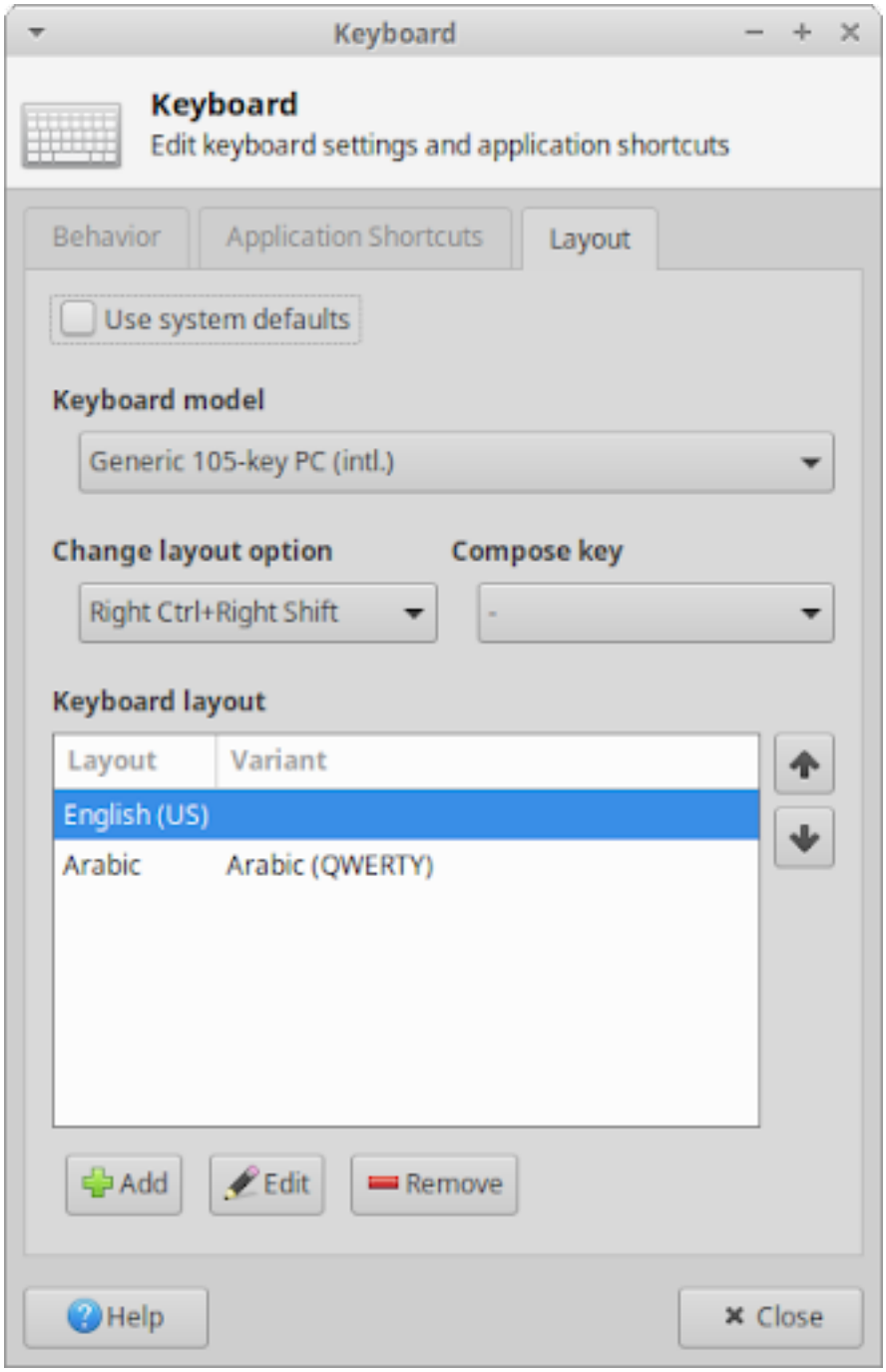
... **cupsd [apt://cupsd]** for printer profiles

... **saned [apt://saned]** for scanner profiles

To calibrate your display, you will need to install DisplayCAL [https://displaycal.net/#download], GNOME Color Manager (**gnome-color-manager [apt://gnome-color-manager]**) with a ColorHug device, or a similar tool. If you would like to add a "night-mode„ or "blue-blocker„ feature, that will automatically transition the color temperature of the display throughout the day, you can install RedShift (**redshift [apt://redshift]**).

Keyboard

During the installation of Xubuntu, options to select the keyboard,s language and layout were presented and applied. In order to make changes to these and additional keyboard options, open the **Keyboard** settings dialog.



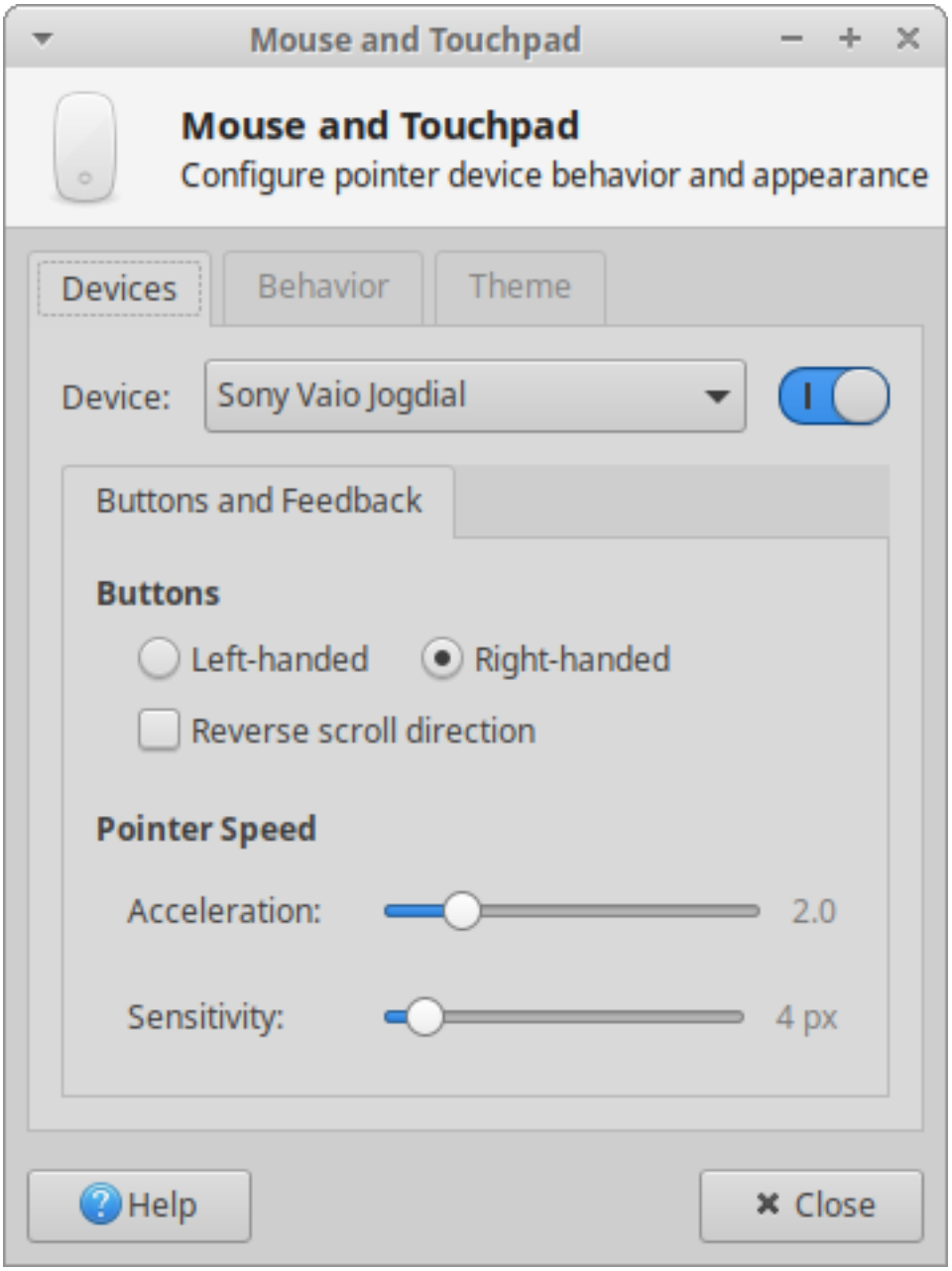
The *Behavior* tab provides options for the Num Lock key state, key repeat speed and delay, as well as text cursor blinking speed. The *Application Shortcuts* tab allows you to manage the keyboard shortcuts for the launching of applications. The *Layout* tab provides options to select the keyboard model and manage keyboard languages and layouts. With multiple keyboard layouts present, you also have the option to set a keyboard shortcut to cycle through the keyboard layouts.

> **Note**
>
> Note: To easily determine which keyboard layout is currently active and switch between them, you can add the *Keyboard Layouts* plugin to the panel. For additional non-application keyboard shortcuts, see the *Keyboard* tab of the **Window Manager** settings dialog. For control over the

> behavior of various power related keyboard buttons, see the *General* tab of the **Power Manager** settings dialog.

Mouse

Pointer devices like a mouse, trackpad, trackball, or graphical tablet are automatically detected and configured during startup or when plugged in. If you want to make changes to the default options and behaviour of a device, open the **Mouse and Touchpad** settings dialog.



The *Devices* tab allows you to select each individual device from the Device drop-down list and adjust their individual options. This includes whether it is enabled, as well as its button arrangement, scroll direction, pointer speed, and trackpad sensitivity. If the selected device is a trackpad that is using the Synaptics driver, a *Touchpad* tab will appear next to the *Buttons and Feedback* tab with options to enable

and disable the trackpad while typing, tap to click, as well as edge and two-finger scrolling. A *Tablet* tab will appear when a device is detected to be using the Wacom driver.

The *Behavior* tab has global settings that affect all pointer devices, including how sensitive the drag and drop and double click operations are. The *Theme* tab allows you to set the cursor theme.

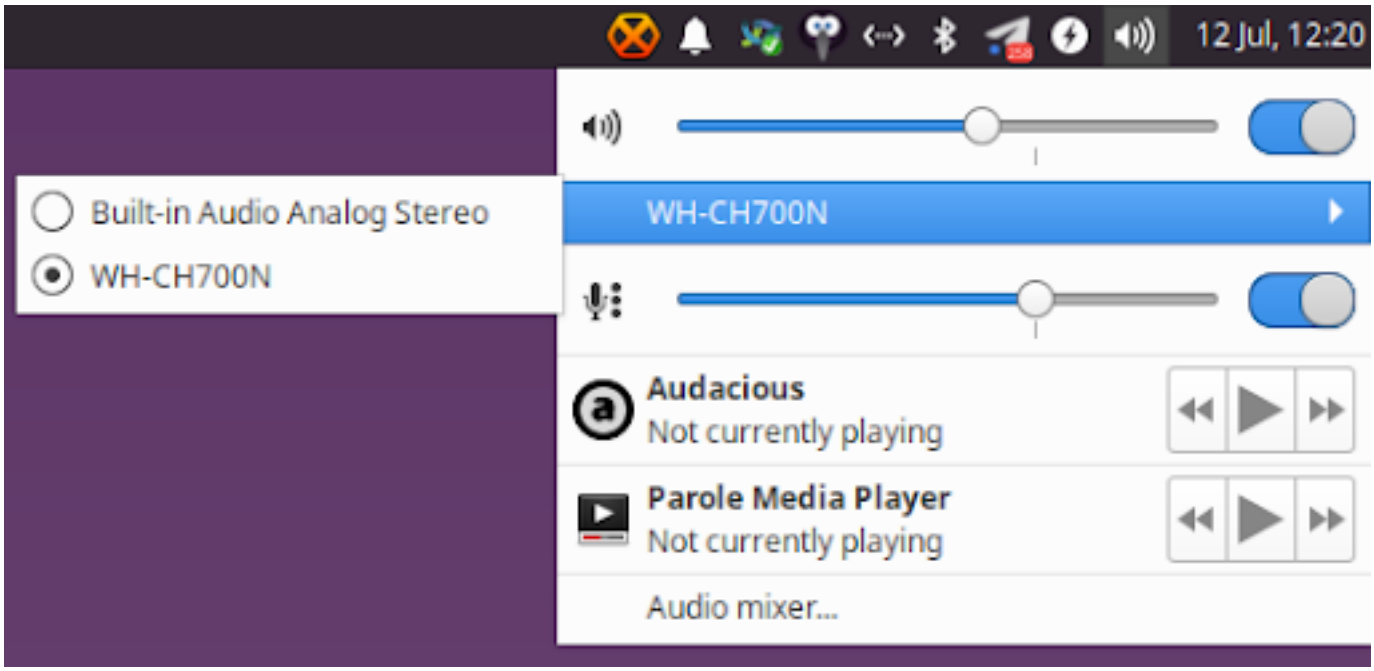
Some touchpads may be detected as normal mouse devices, even though they are actually touchpads. In this case, the *Touchpad* device will not be available in the mouse preferences. See the Touchpads [https://help.ubuntu.com/community/SynapticsTouchpad] page in the Ubuntu community wiki for more information on touchpads.

Sound

Sound in Xubuntu is processed through the PulseAudio sound server, which is capable of performing advanced operations on sound data going to and from your hardware devices. Making changes to the sound preferences can be done through the multimedia keyboard keys, the sound plugin in the notification area of the panel or the **PulseAudio Volume Control** settings dialog.

Sound Applet

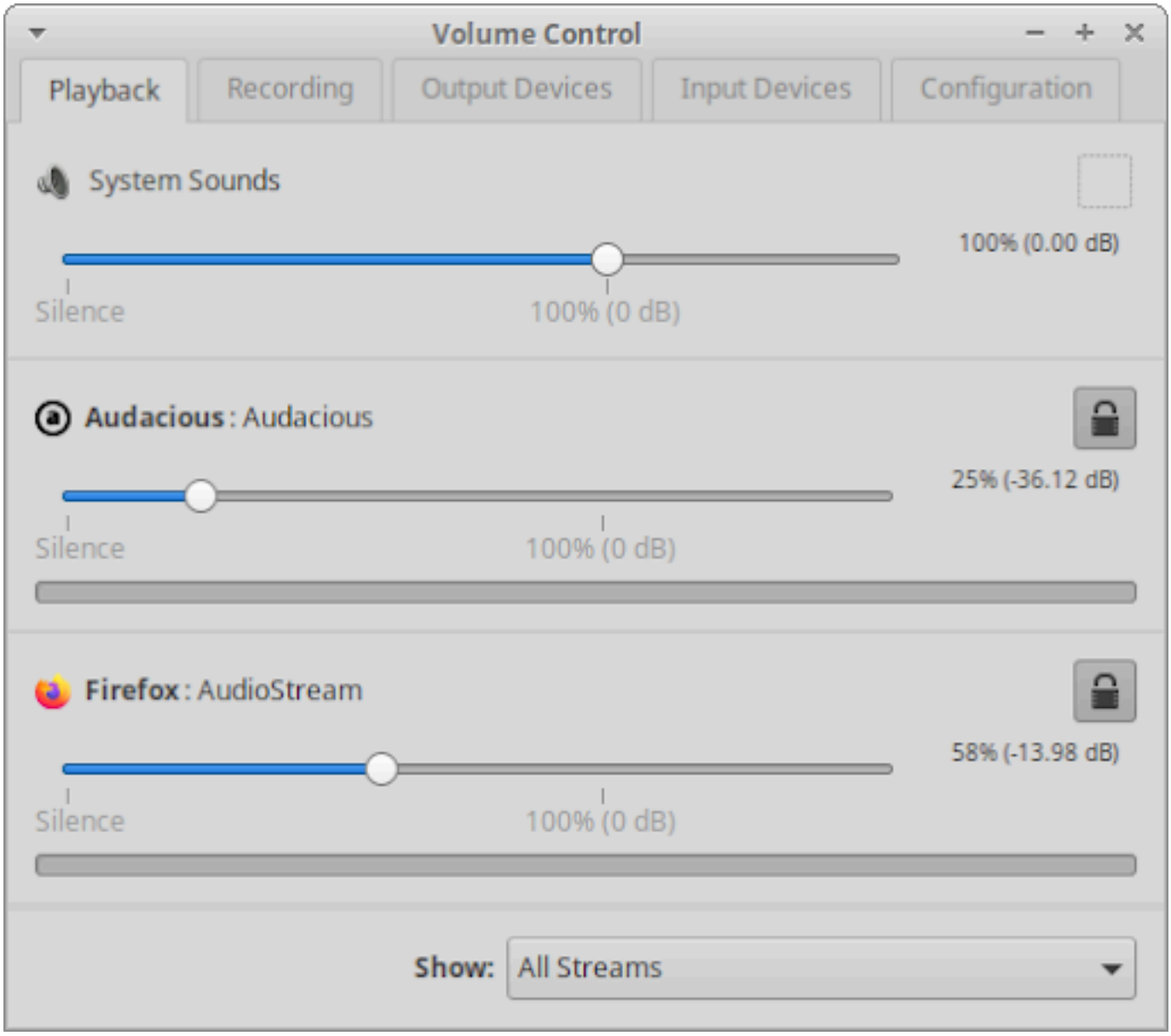
The panel sound plugin gives you easy access to raise, lower and mute the volume of devices, select from multiple input and/or output devices when applicable, as well as control the playback of various audio and video media players. The *Audio mixer...* entry at the bottom of the plugin popup window will open the **PulseAudio Volume Control** settings dialog.



It is possible to adjust the output volume by using the mouse scrollwheel above the sound plugin icon. To customize whether multimedia keys are enabled, if a notification appears when the output volume is changed, and which media players will appear in the plugin popup window, right-click on the sound plugin.

Sound Dialog

The **PulseAudio Volume Control** settings dialog, which is found in the *Multimedia* category of the , has various tabs to view and configure sound settings.



... Playback - You can adjust the volume of system sounds, as well as set the volume, channel balance, and output device of each running application.

... Recording - Lists applications that are currently recording and allows the adjustment of the volume and input device.

... Output Devices - Lists audio output devices and allows the adjustment of their output source, volume, and latency.

... Input Devices - Lists audio input devices and allows the adjustment of their input source, volume, and latency.

> **Note**
>
> Note: To enable system sounds, open the **Appearance** settings dialog, change to the *Settings* tab and enable 'Enable event sounds,. Install one of the sound themes, such as FreeDesktop (**sound-theme-freedesktop [apt://sound-theme-freedesktop]**), Yaru (**yaru-theme-sound [apt://yaru-theme-sound]**) or Pop (**pop-sound-theme [apt://pop-sound-theme]**). If you use a sound theme other than FreeDesktop, open **Settings Editor**, change to *xsettings* in the left side pane, and under the *Net* category, edit the *SoundThemeName* value to the name of the sound theme.

Device Drivers

A device driver is a computer program that controls a particular device connected to a computer. It acts as a bridge to allow the operating system and other software to communicate with the hardware. A device driver gets activated when the device is found on a computer or when the device is plugged in.

Most device drivers are installed by default in Xubuntu, so everything should work automatically when you plug it in. Device drivers can either be open source or proprietary and are provided by the hardware manufacturer or the open source community.

Open Source Drivers

Xubuntu is a Linux distribution and the foundational part of the operating system is the Linux kernel. The Linux kernel contains thousands of device drivers and the majority of them are open source, which allows kernel developers to modify them. To update these open source drivers, you only need to update the Linux kernel, which is one of the components updated through the **Software Updater**.

When hardware manufacturers do not release sufficient technical details for their hardware, it is not possible to create a complete open source driver, so the hardware may not have an open source driver or will have an open source driver with limited functionality. Some open source drivers are reverse-engineered to provide an alternative to the hardware manufacturer,s proprietary driver, but these will not be as feature complete.

Proprietary Drivers

Some hardware manufacturers do not provide open source drivers for their hardware, but instead provide a proprietary driver, also known as a closed-sourced driver or binary blob. Without these proprietary drivers or firmware, the components and devices may not function properly or at all. These drivers will normally need to be installed manually, as they can,t be included in the kernel. They will primarily be drivers for graphics cards, wireless adapters, and processor firmware, with the most common ones being:

... NVidia Graphics Driver - Though there is a reverse engineered open source driver, called 'Nouveau,, it does not have re-clocking and power management features to make it run optimally for gaming and may cause issues on legacy cards not supported by the current version of the driver.

... AMD Graphics Driver - The open source 'RadeonSI, driver is recommended for gaming and general home-use, while the proprietary 'AMDGPU-PRO, driver is recommended for workstation users requiring features not implemented in the open source driver, primarily OpenCL 2.0 support.

... Intel Wireless Driver - The wireless driver is open source but requires a proprietary firmware to run.

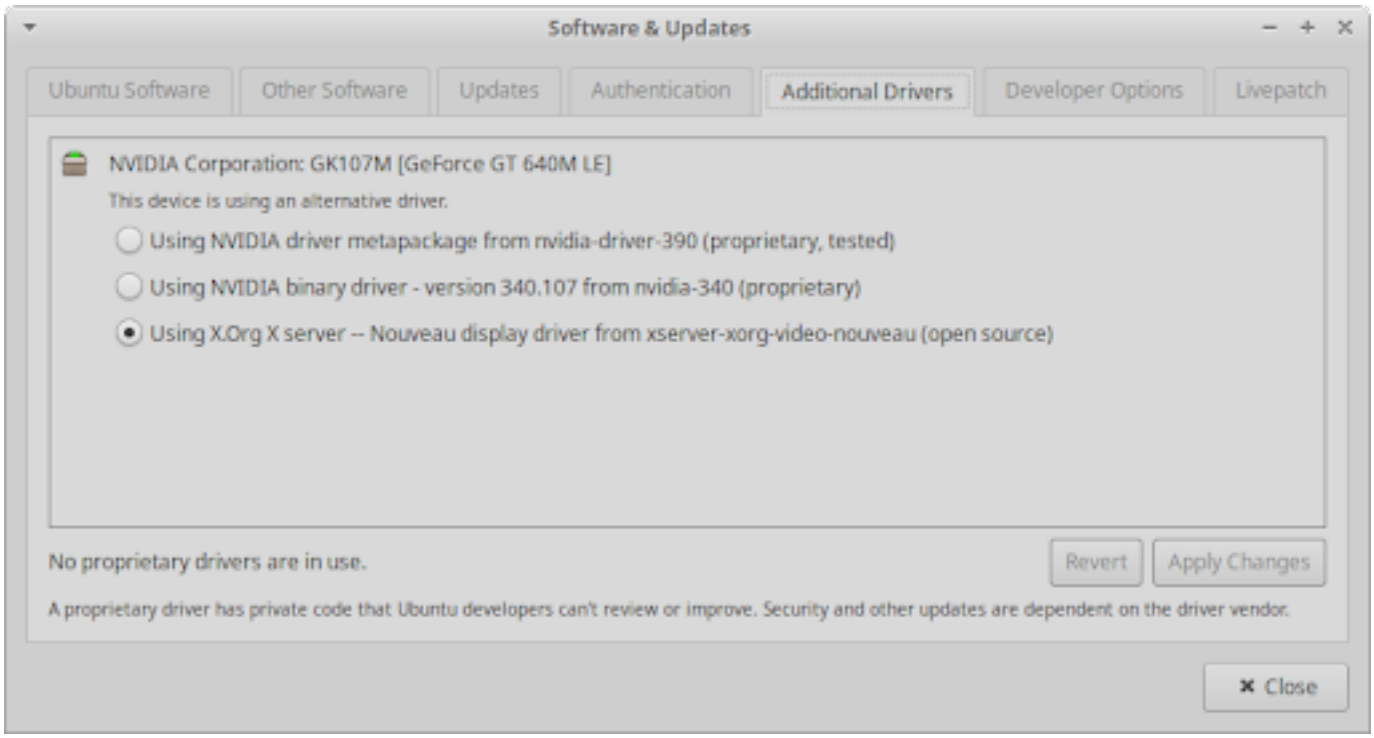
... Broadcom Wireless Driver - The wireless driver is open source but requires a proprietary firmware to run.

... AMD/Intel Microcode - These are stability and security updates to the processor firmware and are recommended to be enabled.

> **Note**
>
> Note: If you enabled the 'Install third-party software for graphics and Wi-Fi hardware and additional media formats, checkbox during installation, then the required proprietary drivers will be automatically installed and enabled.

Managing Proprietary Drivers

To view and manage which proprietary devices are used on your system, you can open **Additional Drivers**, which will open the **Software & Updates** settings dialog to the *Additional Drivers* tab.



Some computers may not have any devices listed because either the open source drivers are fully supported or because there are no proprietary drivers for the devices. If there are any proprietary drivers listed, you will have the options to:

... enable them if the device does not currently have an open source driver.

... switch between the open source and proprietary drivers.

... switch between different versions of the proprietary driver.

... disable them if they are causing problems or you would just like to turn them off.

Note

Note: Proprietary drivers are stored in the restricted software repository. If this repository wasn,t enabled during installation, you will need to enable it to see entries listed in the dialog. You can do so by switching to the *Ubuntu Software* tab and enabling the 'Proprietary drivers for devices (restricted), checkbox.

Note

You will need to be connected to the internet to install drivers. You will be prompted to enter your password when changing the driver and may need to restart your computer to finish enabling or disabling the driver.

Note

Caution: It will generally be rare to find device drivers on a hardware manufacturer,s website. If you wish to install a driver manually, please make a backup of your data and system as a precaution and be careful to follow the instructions correctly.

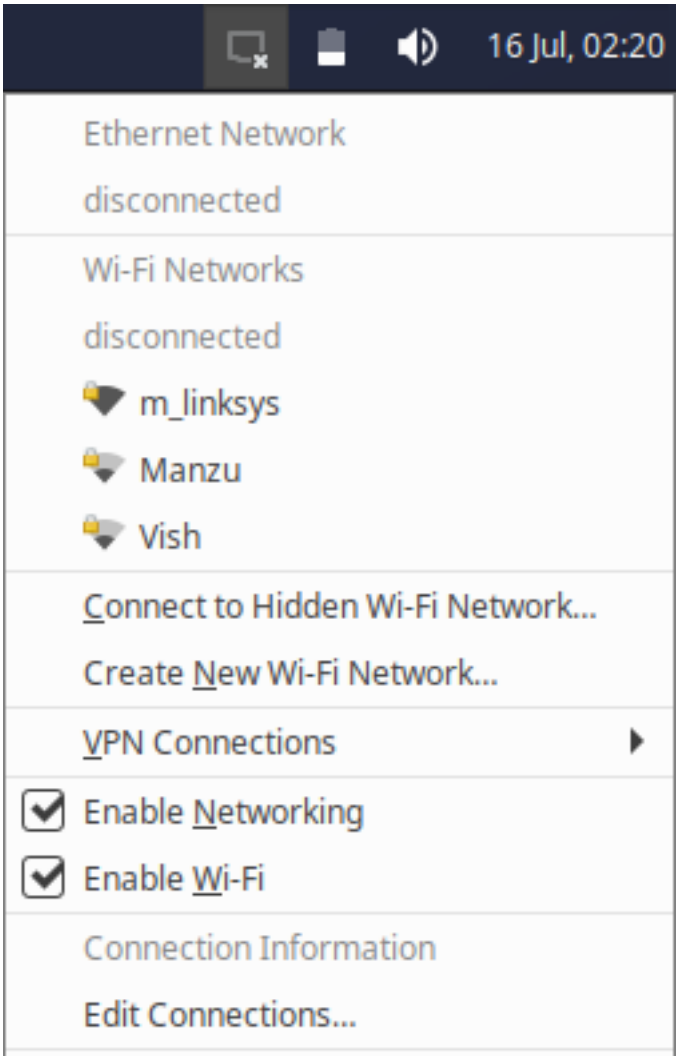
Chapter 8. Settings - Connectivity

Network Connections

Whether you are connected to a computer on your home,s LAN (Local Area Network) or a computer kilometers away on the Internet, the status of your network connection is always visible to you in the notification area of the panel. Network customization settings are available in the **Advanced Network Configuration** settings dialog, which is accessible from the *Hardware* category of the **Settings Manager**, the Settings category of the **Applications Menu** (Ctrl + Escape), and in the **Application Finder** (Alt + F3).

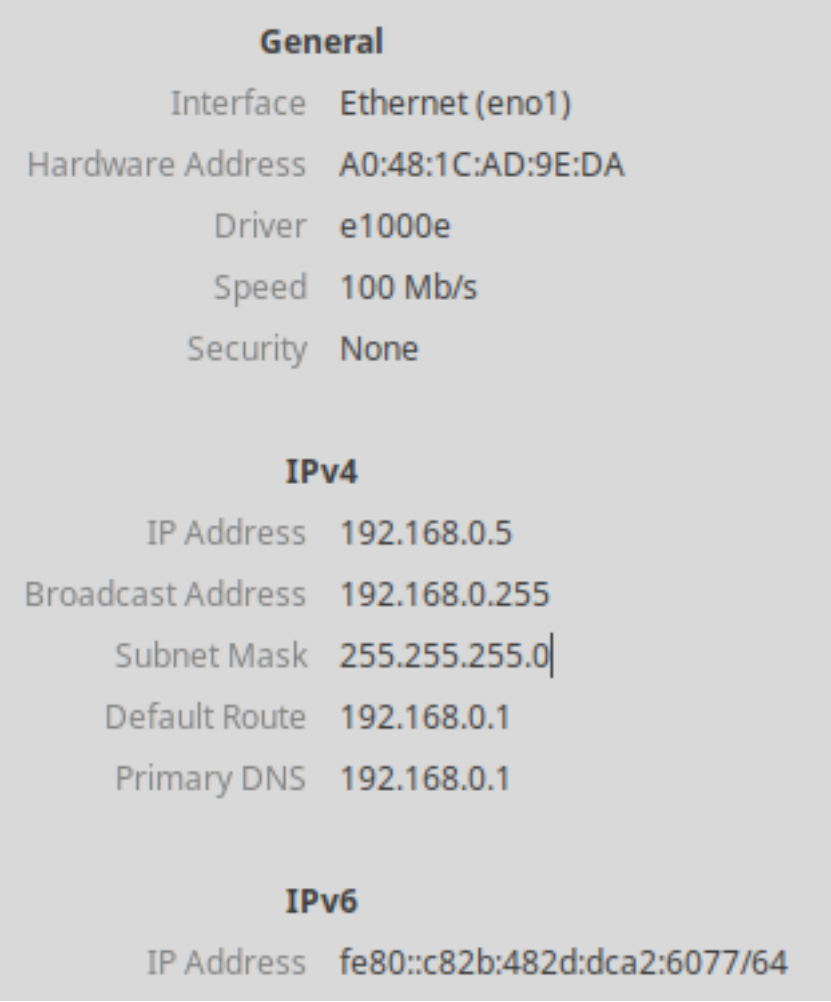
Network Applet

When there is no access to the network, either because networking has been disabled or a connection to the network hasn,t been established, a disconnected **Network** icon will appear on the panel to indicate this status. When you are connected, the icon will vary depending on which connection type the network is using.



Clicking on the **Network** icon will open a menu that displays the connectivity status to the Ethernet and Wi-Fi networks, as well as listing any Wi-Fi networks that are in range. If you are connecting using a wired ethernet cable, it will connect automatically, whereas if you select a Wi-Fi network in the menu that wasn,t previously connected, a dialog box may open if a password is needed.

The *Connect to Hidden Wi-Fi Network...* menu entry will allow you to connect to a Wi-Fi network that is hiding its network name by entering the network name and, if required, the password. The *Create New Wi-Fi Network...* menu entry will allow you to create a new wireless hotspot from your computer. The entry will open a dialog where you can set the network name, security method and key to be used.

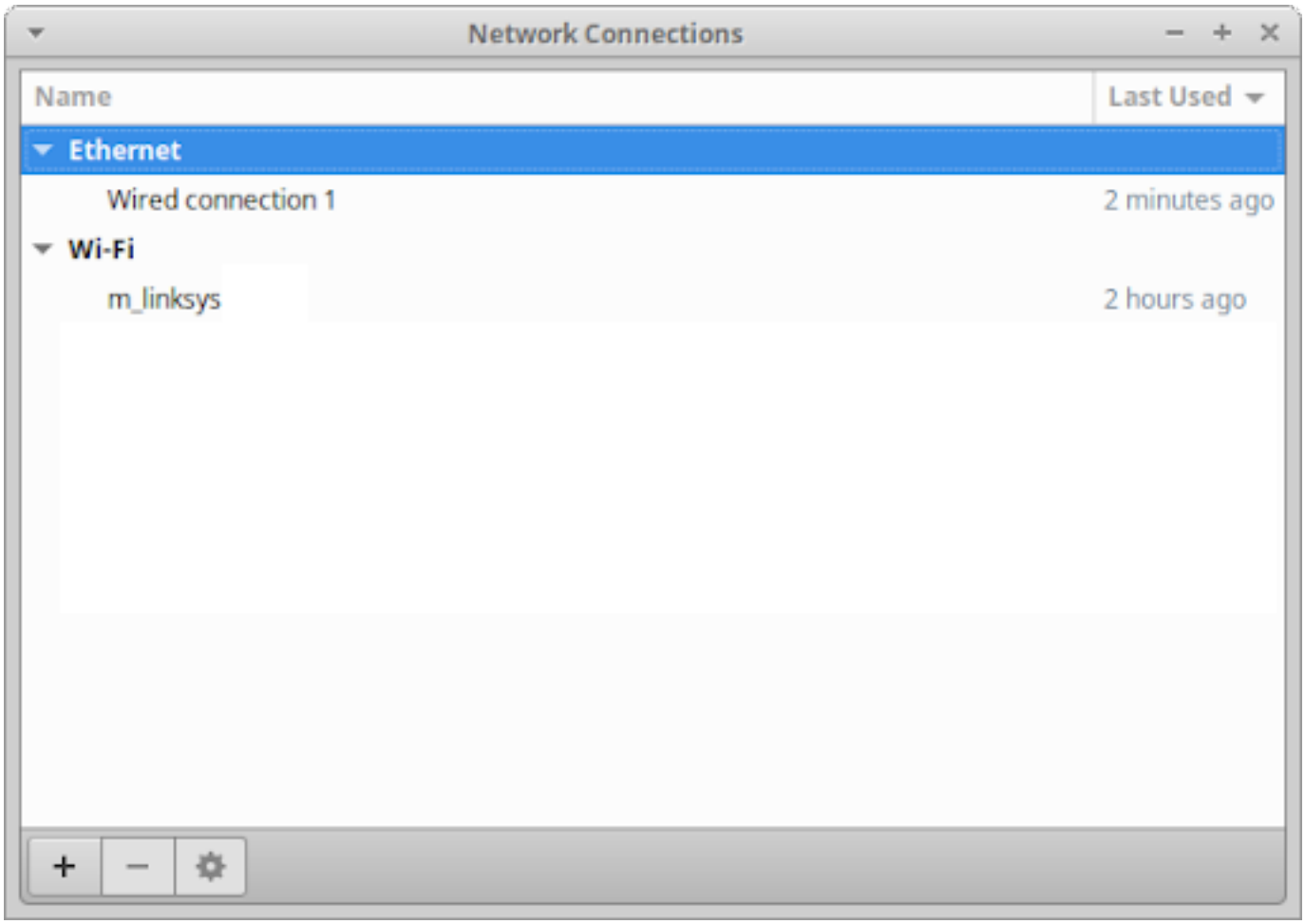


Selecting the *Connection Information* menu item will open a dialog that displays information about the connection devices, including their MAC addresses, drivers, and speed, as well as IP address information in both IPv4 and IPv6. Selecting the *Edit Connections...* menu entry will open the network configuration dialog.

To disconnect from a network, select the *Disconnect* menu entry under the appropriate connection type. Enabling and disabling the wired and wireless connections is possible by selecting the *Enable Networking* or *Enable Wi-Fi* checkboxes. *Enable Networking* will enable or disable all wired and wireless connections, while *Enable Wi-Fi* is limited to enabling or disabling wireless connections.

Network Dialog

To make configuration changes to network connections, select the *Edit Connections...* entry in the **Network** applet,s menu or open the **Advanced Network Configuration** settings dialog through the **Applications Menu**, **Application Finder**, or **Settings Manager**.



The dialog lists existing network connections categorized by connection type. The bottom of the dialog has buttons to add and remove network connections or edit the selected network connection. When editing a network connection, you can set features such as the connection,s name, whether it should use a VPN, MAC address clone, security options, proxy options, IP address options, and DNS servers.

If you click the *Add a new connection* button at the bottom of the **Network Connections** dialog, a dialog will appear asking you to select the connection type. The connection type list includes hardware types, such as DSL and Mobile Broadband, virtual types, such as Bond and Bridge, and VPN (Virtual Private Network) types. If the VPN connection type you wish to create isn,t listed, you will need to install its plugin, with OpenVPN (**network-manager-openvpn-gnome [apt://network-manager-openvpn-gnome]**), WireGuard (PPA [https://launchpad.net/~wireguard/+archive/ubuntu/wireguard], **wireguard [apt://wireguard]**) and OpenConnect (**network-manager-openconnect-gnome [apt://network-manager-openconnect-gnome]**) being popular options. To be able to connect to certain networks, you may need connection details that will be supplied to you by your network administrator or ISP (Internet Service Provider).

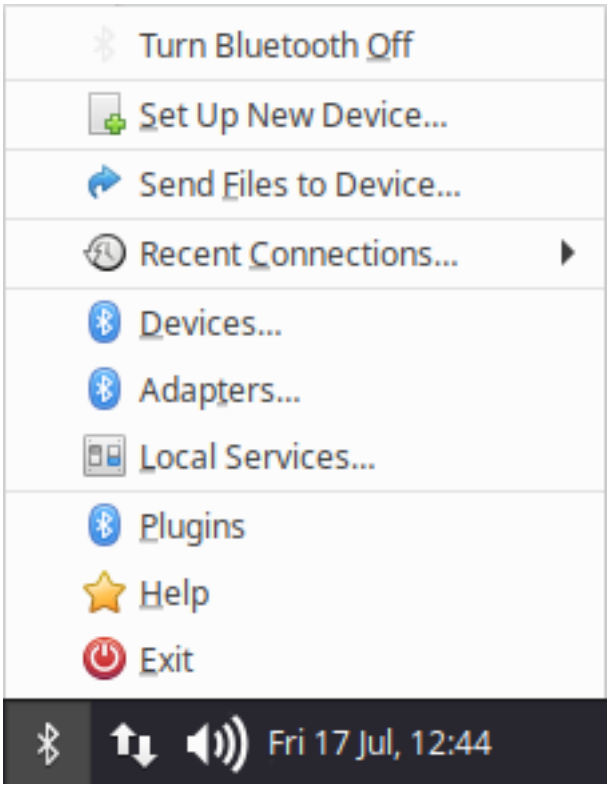
> **Note**
>
> Unfortunately, dialup modems are not supported by the **NetworkManager**. To read about connecting with a dialup modem, please refer to the Ubuntu community wiki,s Dialup modem How-to [https://help.ubuntu.com/community/DialupModemHowto].

Sharing Your Connection With Another Computer

If you are connected to a network connection by Ethernet cable or by cellular and have a Wireless adapter connected to your computer or laptop, you can share your connection with another computer. To set up the wifi hotspot, the simple method is to select the *Create New Wi-Fi Network...* menu entry through the **Network** panel applet. Alternatively open the **Network Connections** settings dialog and either add or modify a Wi-Fi connection. In the connection properties dialog, switch to the *IPv4 Settings* tab and change **Method** to *Shared to other computers* from the drop-down list.

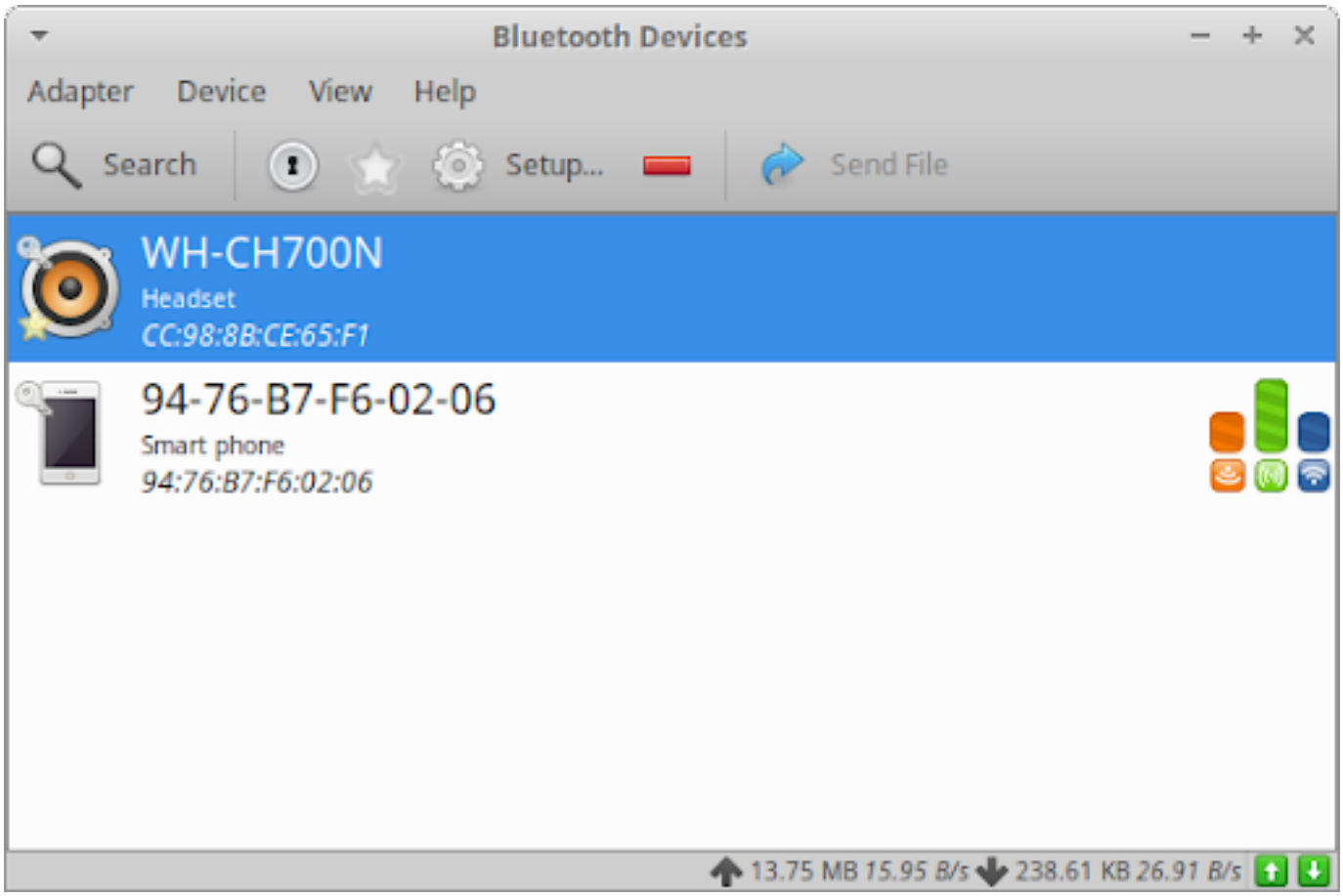
Bluetooth

Bluetooth is a popular wireless technology that allows us to easily pair our computers, mobile phones, and tablets to input and output peripherals, like headsets, speakers, mice, keyboards, and printers. If a bluetooth adapter is connected to your computer, a bluetooth applet will appear in the notification area of the panel. If the bluetooth icon is dimmed, then the bluetooth adapter is disabled and hovering the mouse over the icon will also show this status in the tooltip. Clicking the **Bluetooth** icon will display a menu with action options, such as changing the adapter,s status and sending a file to a device, as well as configuration options, such as adapter and device settings.



The top menu item will allow you to enable or disable the bluetooth adapter depending on its current status. The *Set Up New Device...* menu item will open a wizard dialog to assist you in connecting your new

bluetooth device. The *Adapters...* menu entry will open a dialog where you can set the adapter,s visibility and broadcast name. The *Devices...* menu entry will open the **Bluetooth Manager** settings dialog, which is also accessible through the **Applications Menu**, **Application Finder**, or **Settings Manager**.



The settings dialog will list all of the bluetooth devices that have been connected to your computer. To connect to new devices, click the *Search* button and visible devices will appear in the list. Select the new device and either pair or connect to it through the *Pair* button in the toolbar or the items in the right-click context menu. Additional options to rename, trust, remove, or send a file to a device can be found in the toolbar or context menu. To make changes to the adapter settings, open the *Adapter* menu and select *Preferences*.

Connecting to servers

To connect to various types of servers, you can use → ***System*** → ***Gigolo***. To connect to a server, follow the steps below:

... Go to *Actions* → *Connect*

... Select the appropriate *Service type* and insert connection information

... Click **Connect**; if you are attempting to connect to a server that requires you to log in, you will be prompted to enter a password

Upon successfully connecting to the server, an icon labeled with connection details will appear in the **Gigolo** window. To bookmark connections, right-click on a connection and select *Create Bookmark*. In the

Edit Bookmarks dialog, you can name the bookmark and set other options, including the option to auto-connect. Once you are done, click **OK** to create the bookmark.

> **Note**
>
> The Windows Share username should be in the format **DOMAIN\username**

> **Note**
>
> In order to connect to Samba networks (Windows shares) using the **Thunar File Manager**, you will need to have the package **gvfs-backends** installed.

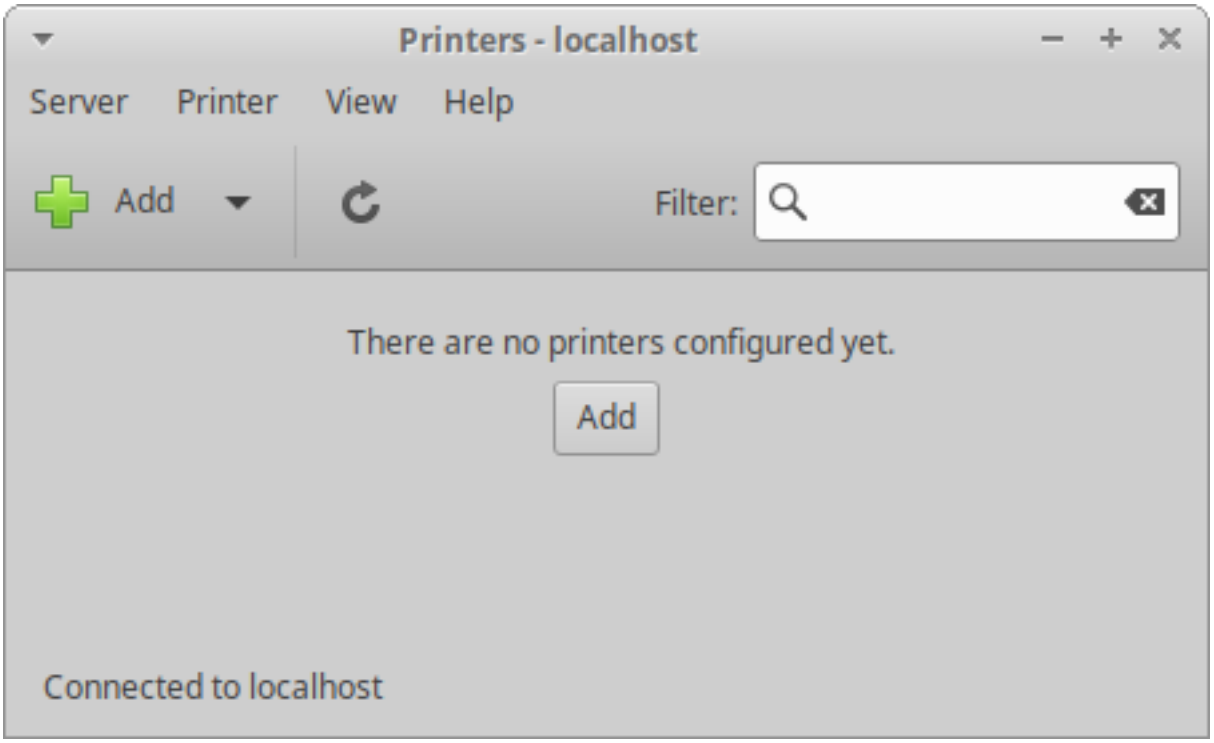
Chapter 9. Printing and Scanning

Printing

The majority of consumer printers are automatically supported by Xubuntu, as it uses the CUPS (Common UNIX Printing System) back-end. This includes support for driver-less WiFi/wired network printing with printers that support IPP Everywhere and Apple AirPrint. If your printer is not immediately supported by Xubuntu you may need to install additional software, such as Gutenprint (**printer-driver-gutenprint [apt://printer-driver-gutenprint]**) and IPP-USB (install [https://software.opensuse.org//download.html?project=home%3Apzz&package=ipp-usb]). Gutenprint extends CUPS by providing support for printers seen less often in end-user consumer settings, while IPP-USB is a more robust replacement to the default installation of the **ippusbxd** package. Normally CUPS and Gutenprint support is better adapted to Xubuntu than what will be available from the printer manufacturer.

Managing Your Printer

Printer management can be done in the **Printers** settings dialog, which is accessible from the *Hardware* category of the **Settings Manager**, the *Settings* category of the application **Applications Menu** (Ctrl + Escape), and in the **Application Finder** (Alt + F3).

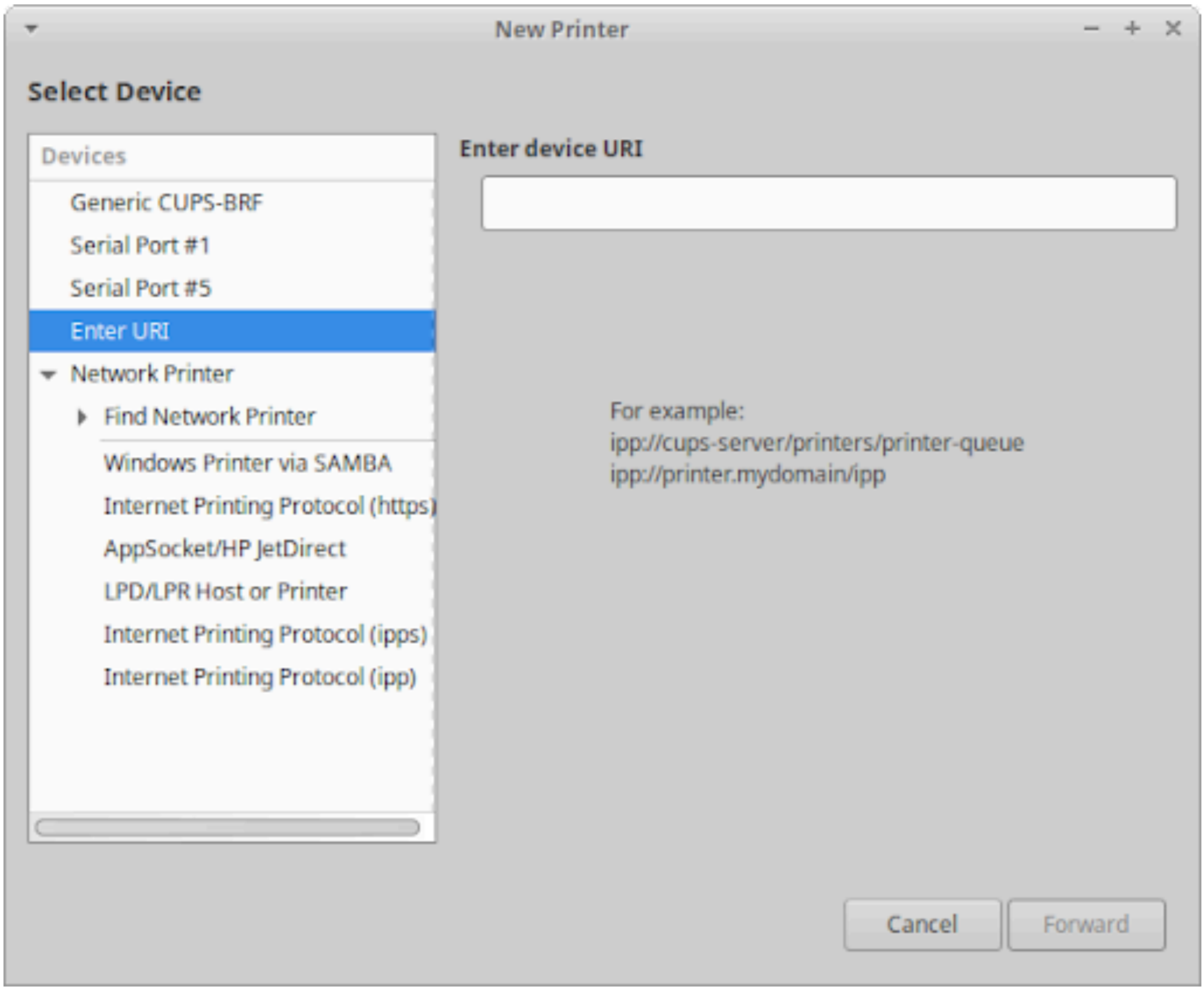


The **Printers** settings dialog allows you to add a new local printer (a printer directly connected to your computer through a USB, serial or printer port) or network printer (a printer connected on your network or a printer shared on the network through another computer). It also allows you to modify listed printers, settings, such as renaming how they are labeled on your system, restarting, or disabling them.

You can also share a printer with other computers on your network thereby making it a network printer. Depending upon the make and model of your printer, you can also check your printer,s consumables, such as toner or ink as well as paper, or send test print jobs.

Add Printer

Setting up a new local printer should be as easy as plugging it into your computer and powering it on. The printer should be automatically detected and configured. Once it is successfully detected, a printer icon will appear in the notification area of the panel and a notification popup will appear with the text *Printer is ready for printing*.



If your printer was not detected, you will need to follow these steps:

... Open the **Printers** settings dialog.

... Click the Add button in the toolbar or *Server* → *New* → *Printer* in the menu to open the **New Printer** dialog.

... Select the appropriate Printer, Port, URI, Protocol or Network Printer entry in the *Devices* list on the left of the dialog. If your printer is not visible, you may need to click on the triangle next to ”Find Network Printer„ to expand the list of printers on your network.

... Where applicable, fill in any relevant details into the text fields and/or dropdown lists on the right of the dialog and then click the **Forward** button.

... If you are adding a local printer, your computer will search for it and install its drivers. If you are installing a network printer, you will go through additional steps of selecting the printer manufacturer, printer model and driver.

... You will then be prompted to enter a short name, description, and location of the printer.

... Press the **Apply** button to finalize the configuration of the printer.

... You will be prompted with a dialog asking *Would you like to print a test page?*

... If you press the **Print Test Page** button, a test page will print and you can verify if it printed correctly or you can press **Cancel**. Either way, your printer is ready to print.

If you are experiencing problems adding a printer with the steps above, you can try using the CUPS browser-based interface. It can be accessed at http://localhost:631/. Click the *Administration* menu item at the top of the page for options to add and find new printers. Do not make any changes in the **Printers** settings dialog or other system printer management utilities until you are finished using the CUPS browser-based interface. You may need to restart CUPS for it to reflect any changes that you make directly in the browser-based interface.

> **Note**
>
> If the printer is directly connected to a Windows machine on your network, choose the *Windows Printer via SAMBA* entry from the *Devices* list. If you do not know the protocol or details of your network printer, you should consult the printer,s manual or ask your network administrator.
>
> Search the OpenPrinting database [https://wiki.linuxfoundation.org/openprinting/database/databaseintro] or check the Community Help Printer page [https://help.ubuntu.com/community/Printers] for information on your printer.

Share Printer

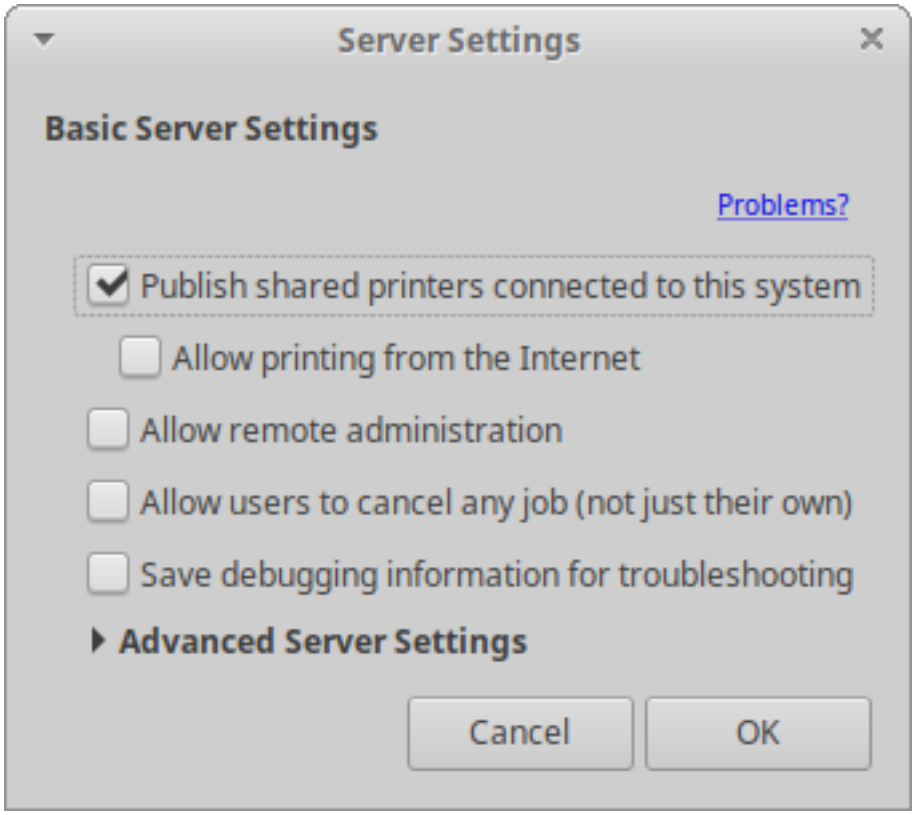
If you want to share your local printer with other computers on your network:

... Open the **Printers** settings dialog.

... Click *Server* → *Settings* in the menu.

... Enable the *Publish shared printers connected to this system* checkbox.

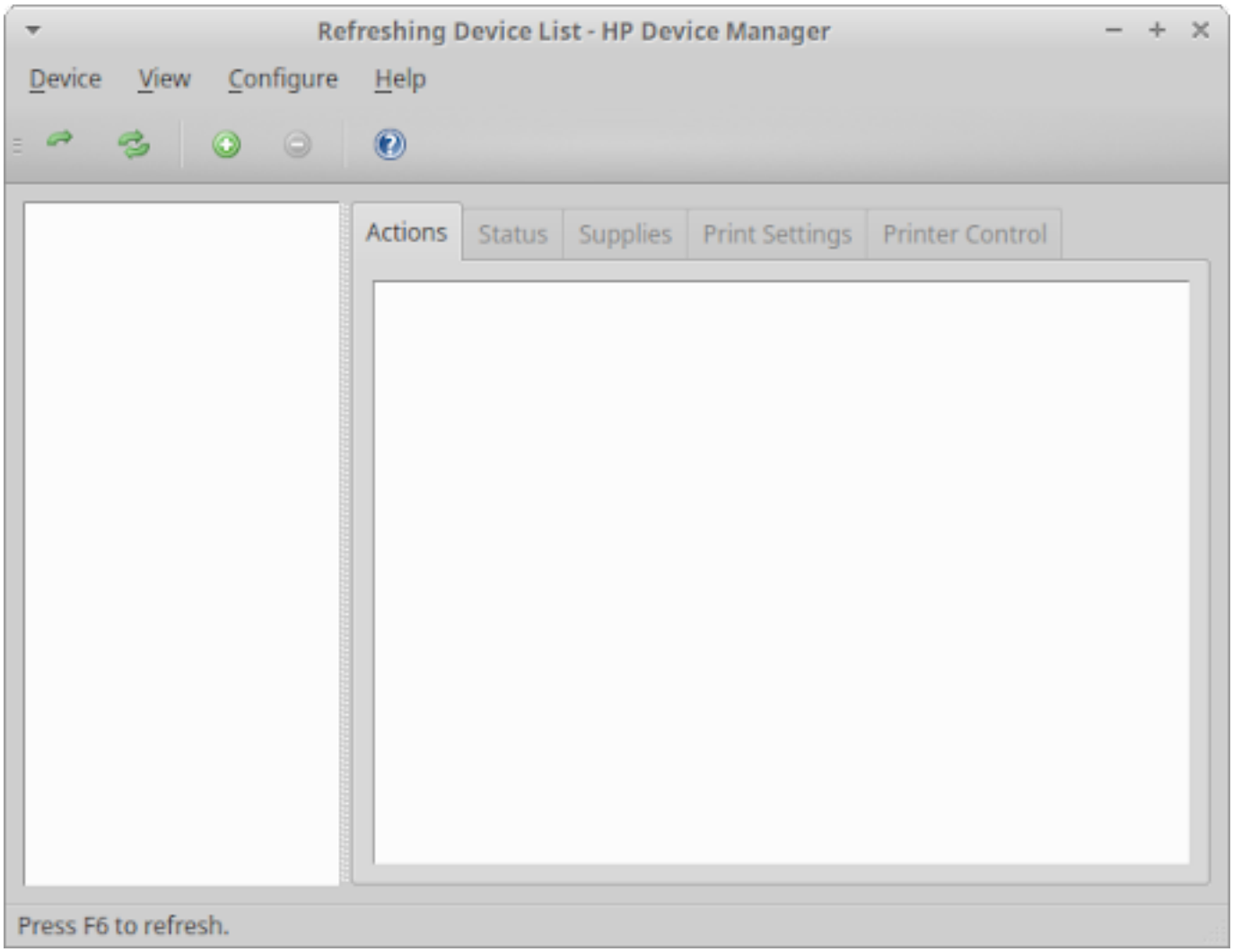
... Click the **OK** button.



Then go to your secondary Xubuntu installation and open the Printers settings dialog. Click the Add button in the toolbar, then expand the *Network Printer* option. The shared printer should appear below as the sharing computer,s IP address. You may need to first search for the IP address using the *Find Network Printer* option.

Management Software

If you have an HP (Hewlett Packard) printer and would like additional software to manage it, you can install the *HP Linux Imaging and Printing (HPLIP) GUI utilities* (**hplib-gui [apt://hplip-gui]**). These utilities include the **HPLIP Toolbox** application which will be found in the *Settings* category of the **Applications Menu** and the *Others* category of the **Settings Manager**. On supported inkjet printers, you will be able to monitor ink levels, check printer status, change page size and print quality, as well as clean the printer heads. On supported laser printers you will be able to monitor toner level, check printer status, change page size, and manage print quality. For all-in-one (multi-function) devices, you will be able to change fax settings and functionality. For more information about HPLIP click here [https://developers.hp.com/hp-linux-imaging-and-printing/features].



Printer Support

The OpenPrinting database stores information about printers, their drivers, and how well they are supported under Linux. If you are not sure about how well a printer is supported in a Linux environment check that database. It is also a good database to check before buying a new printer.

Printer Drivers

If your printer doesn,t work automatically or you,d like to install the printer drivers and utilities from the printer manufacturer, here are some links to assist.

HP [https://developers.hp.com/hp-linux-imaging-and-printing], Canon [https://www.usa.canon.com/internet/portal/us/home/support/product-finder/support-printers], Brother [https://support.brother.com/g/s/id/linux/en/index.html], Epson [https://epson.com/Support/wa00821], Xerox [https://www.support.xerox.com/], Lexmark [http://support.lexmark.com/index?page=driverSupport&locale=en&userlocale=EN_US]

Scanning

Similar to Xubuntu,s support for printers, it also has plug and play support for many scanners, as many of them today come as part of multi-function devices. Scanner support on Linux is provided by the SANE project which maintains a list of supported scanners [http://www.sane-project.org/sane-backends.html]. Additional scanner support can be achieved with the installation of SANE-airscan (install [https://github.com/alexpevzner/sane-airscan]), which allows driver-less network scanning with scanners that support Apple AirScan (eSCL) and Microsoft WSD.

Using your Scanner

To begin using your scanner, open the **Document Scanner** or **Simple Scan** app, which is accessible from the *Graphics* category of the **Applications Menu** (Ctrl + Escape) and in the **Application Finder** (Alt + F3). Follow the next steps to scan a document, picture/image, etc.:

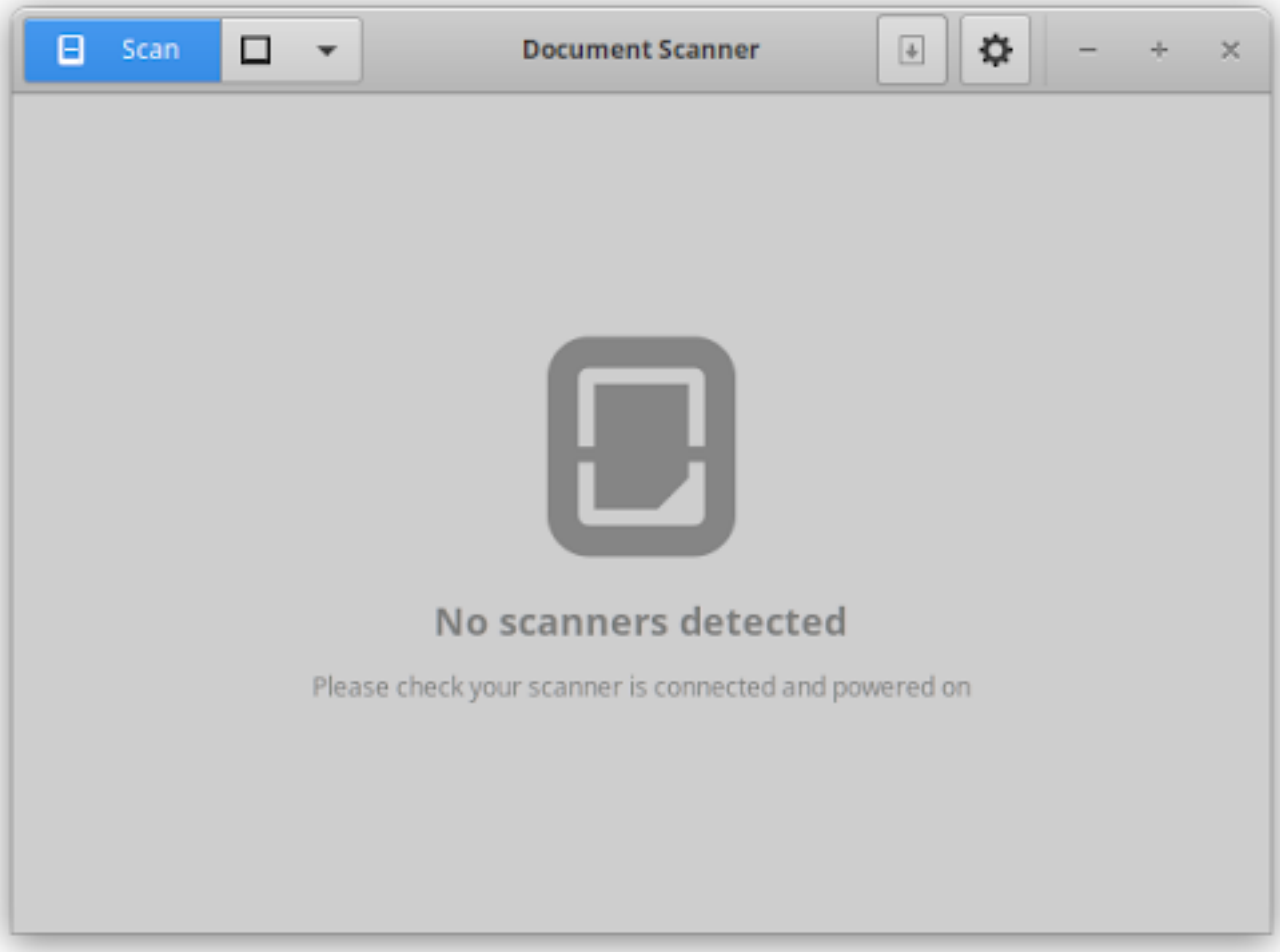
... Connect your scanner and power it on.

... Place what you want to scan on the scanner flatbed or feeder.

... Close the lid if you have a lid.

... Click the arrow to the right of the **Scan** button and choose the type of media you are scanning, *Text* or *Photo*.

... Click the **Scan** button to begin your scan.



No Scanners Detected

There are two reasons why you might get this message:

... Your scanner is not automatically supported, which includes most parallel port scanners and Lexmark All-in-One printer/scanner/faxes.

... The driver for your scanner is not being loaded automatically.

You may be able to get your scanner working by installing a driver or altering some configuration files. Please ask for advice on the Ubuntu forums [http://ubuntuforums.org/] or on AskUbuntu [http://askubuntu.com/].

> **Note**
>
> To get some scanners working, you may need to plug the scanner in after the computer has booted.

Manually installing a scanner

There are some scanners that have incomplete drivers from the SANE project. They can sometimes be used, but not all the features may work. For these scanners:

... Install the **libsane-extras [apt://libsane-extras]** package.

... Run **`pkexec mousepad /etc/sane.d/dll.conf`** at the command line to open the SANE driver file for editing.

... Enable the correct driver for your scanner by removing the **#** from in front of the name of the driver. You may need to search the web to find out which driver is the right one.

... Save the file and open **Simple Scan**. If all goes well, your scanner will now work.

Chapter 10. User Management

For security reasons, administrative tasks in Xubuntu can only be performed by users with special privileges. The first user account created during installation will, by default, be able to perform administrative tasks.

When you run an application that requires administrative privileges, you will be asked to enter your password. This helps protect your system from malicious activity and lessens the chance that you will accidentally change the way your system works.

Each time you type your password in a terminal session, it will be remembered for 15 minutes, so that you do not have to type it again.

> **Note**
>
> Users must be a member of the 'sudo' group in order to carry out administrative operations. Information on how to change groups can be found below.

Users and groups

When Xubuntu is installed, only one user account is created. If multiple users use the computer, it is highly encouraged to create separate user accounts for everyone. This allows users to have their individual settings, files and access rights.

To modify the users or groups on your system, navigate to → ***Settings Manager*** → ***Users and Groups***.

> **Note**
>
> You need administrative rights to make changes to users and groups.

Managing users

To add a new user:

... Click the **Add** button

... Enter your password

... Fill in the *Name* and *Username*

... Click the **OK** button

If you want to give a user administrative rights to the system:

... Select the user whose account type you want to change and press the **Change...** button

... Enter your password if prompted to do so

... Select the *Administrator* option (or select *Desktop User* to revert)

... Press **OK** to apply the selected changes

> **Tip**
>
> For more fine-grained access control, click the **Advanced Settings** button in the *User Settings* dialog, enter your password, click the *User Privileges* tab and from there select or deselect the desired options.

To remove a user from the system, select the user you want to delete and click the **Delete** button.

Managing groups

To add a new group:

... Click the **Manage Groups** button

... Click the **Add** button

... Enter your password

... Choose a name for the new group and, if you want, change the default value for the *Group ID*

... At this time, you have the option of selecting *Group Members* from the list

... Click the **OK** button

To remove a group from the system, click on the **Manage Groups** button, select the group you want to delete and click the **Delete** button.

Customizing your personal info

Mugshot is a lightweight user configuration utility that allows you to easily set the profile image and user details for your user profile and any supported applications.

To launch **Mugshot** navigate to → ***Settings Manager*** → ***About Me***.

To change your profile image, click the **image** button on the left of the GUI, select one of the given options and follow the instructions.

> **Note**
>
> Mugshot requires the installation of **gstreamer1.0-tools [apt://gstreamer1.0-tools]** package to use the *Capture from camera...* feature.

Fill the text-fields with the required personal data and click **Apply**. When applying these details with **Pidgin** and/or LibreOffice installed, you will be prompted to update their settings as well.

> **Warning**
>
> If the personal data inserted in the *First Name* and *Last Name* text-fields differ from the existing values held in **`/etc/passwd`**, you'll be prompted to insert your password as a security measure to prevent unwanted updates to your personal information.

Read more at the Mugshot [https://wiki.bluesabre.org/doku.php?id=mugshot-docs] official documentation.

Chapter 11. Hardware devices

Your computer consists of a number of connected devices collectively known as computer hardware.

Xubuntu normally configures your hardware automatically, but there may be occasions when you need to make changes to hardware settings yourself. This section provides information on tools which can be used to configure your hardware.

Restricted drivers

Why are some drivers restricted?

Restricted drivers are drivers for your hardware that are not freely available or open source.

Most of the devices (hardware) attached to your computer should function properly in Xubuntu. These devices are likely to have unrestricted drivers, which means that the drivers can be modified by the Xubuntu developers and problems with them can be fixed.

Some hardware does not have unrestricted drivers, usually because the hardware manufacturer has not released details of their hardware that would make it possible to create such a driver. These devices may have limited functionality or may not work at all.

Enabling restricted drivers

If a restricted driver is available for a certain device, it can be installed in order to allow your device to function properly, or to add new features. For example, installing a restricted driver for certain graphics cards may allow you to use more advanced visual effects.

Some computers may not have any devices that can use restricted drivers, either because all of the devices are fully supported by unrestricted drivers or because no restricted drivers are yet available for the device.

If any drivers are available for your hardware they will be installable from the **Software and Updates** application:

... Go to → ***Settings*** → ***Additional Drivers***

... You will, if necessary, be prompted to enter the administration password.

... You may be prompted to reboot to finish installation.

Disabling restricted drivers

If a restricted driver is causing problems, or you would just like to turn it off, follow the procedure below:

... Go to → ***Settings*** → ***Additional Drivers***

... Find the driver that you would like to disable and press the **Deactivate** button.

... You will be prompted to enter your password.

> **Note**
>
> You may need to restart your computer to finish disabling the driver.

Disks and partitions

Checking how much disk space is available

A simple way to check available disk space is to launch **Thunar**. There are several ways to do this:

... Go to → ***Accessories*** → ***File Manager***

... Double-click on the *File System* or *Home* icon on your Desktop

... Click the home folder on the Launcher Panel

The status bar at the bottom of the window shows the free space for the current drive or disk. If you have more than one drive mounted or connected, you can click on them in the side pane and you will then see displayed the free space for that disk.

How can I free up disk space?

There are several simple ways of making more disk space available:

... Empty your trash by right-clicking the *Trash* icon on the Desktop or the Launcher Panel and selecting *Empty Trash*.

... Remove software packages that you no longer use.

... Delete files that you no longer need. You can install the **GNOME Disk Usage Analyzer** from **GNOME Software** to find which files are taking up the most space.

> **Warning**
>
> Be careful not to delete files that you still need!

Partitioning a Device

You can use **GParted (GNOME Partition Editor)** to partition storage devices. Install **GParted** from **GNOME Software** and then go to → ***Settings Manager*** → ***GParted*** to start the partition editor.

> **Warning**
>
> Be careful when altering disk partitions, as it is possible to lose your data if you delete or change the wrong partition.

> **Warning**
>
> Altering disk partitions can take some time. Do not assume that GParted has hung or crashed while it is working.

> **Note**
>
> If it is necessary to unmount the installed system to proceed with changes you wish to make, you will have to work from a live CD/USB to do so.

Freeing space for a new partition

To create a new partition inside an already partitioned device, you must first resize an existing partition. If you already have free space, skip to the the section called ”Creating a new partition„ section. Otherwise, follow the instructions below:

... Select the device to partition from the drop-down list at the top-right of the main window

... A list of partitions will appear in the main window. Select the partition you want to resize and from the menu, choose *Partition* → *Unmount*

... To resize the partition choose *Partition* → *Resize/Move*. The *Resize/Move* dialog will be shown. You can use the *Free Space Following (MiB)* box to choose how much space to free after this partition, or *Free Space Preceding (MiB)* to free space before this partition. Alternatively you can use the slider to adjust the partition size.

... Click **Resize/Move**

... To apply the changes, click *Edit* → *Apply All Operations*

Creating a new partition

To create a new partition:

... Select the device to partition from the drop-down list at the top-right of the main window

... A list of partitions will appear. Select the one called *unallocated*, right-click on it and click *New*

... From the *File system:* pick list, choose the desired type of filesystem to use.

... If desired, enter a description for the partition in the *Label:* field.

... Click the **Add** button.

... To apply the changes, click *Edit* → *Apply All Operations*

Formatting a partition

To format a partition, do the following:

... Select the device to partition from the drop-down list at the top-right of the main window

... A list of partitions will appear. Select the desired partition and choose *Partition* → *Unmount*.

... Select the partition you want to format and choose *Partition* → *Format to* and select from the list the type of filesystem to format the partition to

... To apply the changes, click *Edit* → *Apply All Operations*

Mounting and unmounting devices

When you connect a removable storage device to your computer, it must be mounted by the operating system so that you are able to access the files on the device.

To find out how to mount and unmount storage devices manually and/or automatically, see the Ubuntu community wiki page for the mount command [https://help.ubuntu.com/community/Mount].

When you copy files to a removable storage device, they are not always written to the device immediately. Instead, they are often stored in a queue so that they can all be transferred across to the device at the same time (for reasons of efficiency). Running the command **sync** can force pending data to be written to removable storage devices. If you disconnect the device before all of the files have been transferred, you could lose the files. To prevent this, you must always unmount a removable device before disconnecting it.

Laptops

Power management settings

You may wish to change the power management settings of your laptop in order to help extend its battery life and save energy.

... Go to → ***Settings Manager*** → ***Power Manager***

... Change settings as appropriate

... Changes are applied instantly

> **Tip**
>
> When your laptop is running on battery, one of the biggest drains on power is the display. Turning the brightness of the display down could improve battery life significantly; many laptops allow you to do this by pressing *Fn+F7* (or other marked key) several times.

Touchpads

Most laptop computers come with a touchpad, which is used to control the mouse pointer. There are many ways of changing the way that the touchpad behaves; the most basic touchpad settings can be configured in the following way:

... Go to → ***Settings Manager*** → ***Mouse and Touchpad***

... From the *Device:* field pick list, select the touchpad.

... Here you can change the touchpad settings to your liking. Changes should take effect immediately.

> **Note**
>
> Some touchpads may be detected as normal mouse devices, even though they are actually touchpads. In this case, the *Touchpad* device will not be available in the mouse preferences.

> See the Touchpads [https://help.ubuntu.com/community/SynapticsTouchpad] page in the Ubuntu community wiki for more information on touchpads.

Suspending and Hibernating

In order to save power, you can put your computer into one of a number of power-saving modes when you are not using it:

... Suspending a computer is like putting the computer to sleep. The computer will still be turned on and all of your work will be left open, but it will use much less power. You can wake the computer by pressing a key or clicking the mouse.

... Hibernating is turning the computer off completely while saving the current state of the computer (such as keeping all of your open documents). When you turn the computer back on after hibernating, all of your work should be restored as it was before hibernation. No power is used when the computer is hibernating.

... Resuming is bringing the computer out of a power saving mode and back into normal operation. You can resume the computer from being suspended by pressing a keyboard button or by clicking the mouse. You can resume from hibernation by pressing the power button on your computer.

> **Note**
>
> Note that hibernate is disabled by default in Xubuntu and does not appear as an option in any menus. For a command line workaround, see the section called ”Enabling hibernation„.

You can manually put your computer into a power-saving mode by pressing → ***Log Out*** and then pressing the appropriate button.

> **Note**
>
> Some computers may have problems going into certain power-saving modes. The best way of checking if your computer can handle a power-saving mode is to try to switch to that mode and see if it behaves as you expected. Always make sure you save important documents before suspending or hibernating.

My computer doesn't suspend or hibernate correctly

Some computers are unable to suspend or hibernate correctly with Xubuntu. If this is the case for your computer, you may notice some of the following symptoms:

... The computer does not turn off after you click to hibernate it.

... When you turn the computer on after hibernating it, your previously open programs are not restored.

... The computer will not wake up after you have suspended it.

... Certain programs or hardware devices stop working correctly after resuming from hibernation or waking-up from being suspended.

If you suffer from any of these problems, you should report a bug to Launchpad [http://launchpad.net/]. The problems will hopefully be fixed in a subsequent version of Xubuntu. If your hardware does not work properly after suspending or hibernating your computer, restart your computer and it should return to normal. If a program does not work properly, try closing the program and then starting it again.

> **Warning**
>
> Make sure that you save all of your open documents before testing for suspend and hibernate problems.

Enabling hibernation

To enable and use hibernation with Xubuntu, do the following:

... Install the **pm-utils [apt://pm-utils]** package from **GNOME Software**.

... From the command line, enter: **`sudo pm-hibernate`**.

... Enter your password.

... To resume from hibernation, press the power button.

I get strange patterns on the screen when I hibernate my computer

Your screen may show a black and white pattern just after you click to hibernate your computer. This is usually nothing to worry about and is just how the graphics cards of some computers respond to the initial stages of the hibernation process. If the computer displays the pattern for a prolonged period of time without turning itself off then you may have a problem with hibernation. See the section called ”My computer doesn't suspend or hibernate correctly„ for more information.

Mice and keyboards

When you install Xubuntu, you are given the option of selecting your keyboard type and language. During the installation, your pointing devices should be automatically detected and configured. If you want or need to change the settings of any of these devices after installation, you can do so by going to → ***Settings Manager*** → ***Mouse and Touchpad*** or → ***Settings Manager*** → ***Keyboard***.

Options for mice and touchpads include:

... *Button orientation*

... *Pointer speed and sensitivity*

... *Double-click sensitivity*

... *Cursor theme*

Some of the options for configuring your keyboard include:

... *State of the Num Lock key on startup*

... *Key repeat speed and delay*

... *Cursor blinking speed*

... *Application keyboard shortcuts*

... *Keyboard layout and language*

> **Tip**
>
> If you are using a mouse on a laptop that also has a touchpad, you can change the behavior of each of them individually by selecting the appropriate device from the *Device:* pick list on the *Devices* tab page.

Chapter 12. File Management

Xubuntu comes with Xfce's file manager, **Thunar**. For simplicity's sake, it will be referred to as the File Manager from now on. Load it from → ***Accessories*** → ***File Manager*** or by double-clicking the *Home* or *File System* icons on your desktop.

Navigation

The File Manager's default view consists of a shortcut pane on the left side, the main area on the right, and a pathbar above the main area. The shortcut pane provides shortcuts to different folders on your system. The first shortcut under *PLACES* takes you to your home directory (/home), the directory where all your personal data and data from the applications you use are stored, and has the name of the current user.The *File System* shortcut under *DEVICES* will takes you to the root (/) of the filesystem. You may want to explore it a bit, even though it may be confusing if you are new to Linux. Just click on the different folders and see what's inside. When you're done, return to your home directory by clicking on the top shortcut.

> **Note**
>
> You can add your own shortcuts by simply dragging folders to the shortcut pane. This will allow you to access important folders instantly!

> **Note**
>
> When using **Thunar** you will, in general, only have read rights to files you see while browsing under the *File System* shortcut.

The main area will always display the contents of the current folder. Double-click on folders to enter them, and right-click on files/folders to get a pop-up window offering you some choices of what to do with them. Select multiple files by dragging a rectangle over them with the mouse. Alternatively, select one file, hold down the *Shift* key, and increase/decrease the selection using the arrow keys.

To easily see the path you took to get to the current directory, you can change the default View options. From the File Manager menu, select *View* → *Location Selector* → *Pathbar Style*. Now you can click on any pathbar icon to change to the directory it represents. Note that right-clicking on pathbar icons will also bring up a pop-up window with some options.

Creating and deleting files and folders

To create a new document, right-click on some empty space in your home directory and select *Create Document* → *Empty File* from the pop-up menu. The File Manager will prompt you for a name. Just go with the suggested name for now. After this, you will see the new file in your home directory. Right-click on it and choose *Properties*. This will show you some details about the file. Right-click on the file once more and choose *Move to Trash* to remove it. The file will be put into the Trash.

> **Note**
>
> If you ever want to undo the deleting of a file, open *Trash*, right-click the file and click *Restore*.

To create a new folder, right-click on the empty space, and choose *Create Folder*. You will be prompted for a name. Type something and hit *Enter*. You will see this new folder in your home directory. Double-click on it to enter it. To rename or remove the folder, right-click on it and choose the appropriate option from the pop-up menu.

Copying

To copy and move files on your computer, just click and drag files and folders to other folders.

Removable Drives

When inserting CDs, USB sticks or other removable media into your computer, or inserting removable devices like a music player, Xubuntu should automatically detect the new device. For example, after inserting a CD into your optical drive, you will see a new shortcut in the left pane of the **File Manager** representing the CD. Clicking on it will open the CD in the main area, just like clicking on a regular folder. To remove the CD, right-click on the shortcut, and choose **Eject**. The same applies for any other removable media.

> **Note**
>
> Please note that pressing the eject button on your CD drive may not work. This may be surprising to some users, but it is in fact the expected behavior. Before the CD can be ejected, it needs to be properly ”released„ (unmounted) by the system. To remove a CD, always right-click on its shortcut and choose *Eject*.

Customizing Thunar

There are many ways to customize the **File Manager**. If you do not like the way the icons are displayed, choose *View* → *View as Detailed List* to have the contents of the current directory displayed as a list.

You can have the **File Manager** display a location bar instead of the pathbar by selecting *View* → *Location Selector* → *Toolbar Style*. If you prefer a tree view in the left pane, choose *View* → *Side Pane* → *Tree*.

Finally, you can add Custom Actions, which can add useful options to the menu. Many custom actions can be found at the Ubuntu Wiki Thunar Custom Action [https://help.ubuntu.com/community/ThunarCustomActions] page.

For more choices, explore the options under *Edit* → *Preferences*.

Chapter 13. Media applications

Music

Listening to music

You can use **Parole Media Player** to listen to music on your computer. **Parole Media Player** will open audio files when they are double-clicked. Alternatively, you can right click on audio files and select *Open with Parole Media Player*.

In order to play some popular audio formats like MP3, you will need to install some additional software. Unfortunately, this software cannot be provided by default in Xubuntu due to legal restrictions in some countries.

> **Caution**
>
> Read the section called ”Restricted formats„ before following the instructions below. There are some legal issues that you should be aware of.

Portable music players

Xubuntu will work with most portable audio players, including iPods. Normally, all you have to do is plug the player into your computer and then use **File Manager** to manually copy songs to and from the player.

> **Note**
>
> Newer iPods (6th generation and newer) will not work automatically with Xubuntu unless you have done an initial synchronization with **iTunes** first.

If you have a portable music player which can also display photos and videos, you may prefer to use **Banshee**, which is a music player with good support for such devices. iPod owners may also like to try specialized applications such as **GPixPod**, **gtkpod**, and **ideviceinstaller** for handling multimedia.

Movies, DVDs and videos

You can watch movies and video clips with the **Parole Media Player**.

Playing DVDs

In order to play DVDs you must install some additional software. Unfortunately, DVD support cannot be provided by default in Xubuntu due to legal restrictions in some countries.

> **Caution**
>
> Read the section called ”Restricted formats„ before following the instructions below. There are some legal issues that you should be aware of.

To be able to play DVDs, do the following:

... Install the **libdvdnav4 [apt://libdvdnav4]**, **libdvdread4 [apt://libdvdread4]** and **gstreamer1.0-plugins-ugly [apt://gstreamer1.0-plugins-ugly]** packages.

... Insert a DVD into your drive. It should open automatically in the **Parole Media Player**.

... If you would like to play encrypted DVDs, open → ***Accessories*** → ***Terminal Emulator*** and type the following into the **Terminal** followed by the *Enter* key: **`sudo apt-get install libdvd-pkg`** Take note of the information provided in the terminal during installation, particularly with regard to upgrades to the package.

... Once libdvd-pkg is finished run **`sudo dpkg-reconfigure libdvd-pkg`** The installation of libdvdcss2 will now complete.

Playing video

Parole Media Player supports most video types. If you try to play an unsupported video file, **Parole Media Player** may notify you of a missing plugin. You can then install this plugin by following the wizard. Afterwards, you may need to restart **Parole Media Player**.

If you are having difficulties getting a video to stream in your browser, **Parole Media Player** supports streaming most types of video. To open a video in **Parole Media Player**, right-click the video and select *Open with Parole Media Player*.

Restricted formats

Some video formats, such as Adobe Flash, QuickTime and Windows Media Video, are proprietary and so support for them cannot be included in Xubuntu by default. You must install some extra software to allow playback.

In order to play the most common proprietary formats in **Parole Media Player** or **Firefox**, install the **xubuntu-restricted-extras [apt://xubuntu-restricted-extras]** package.

Burning CDs and DVDs

You can make your own CDs and DVDs by burning files onto a blank disc using the CD or DVD writer drive of your computer.

Xfburn is the default application in Xubuntu to complete these tasks. **Xfburn** allows you to to easily create audio CDs, burn CDs and DVDs with either plain data or disk images and prepare blank re-writable disks for a new burn.

In order to launch **Xfburn**, go to → ***Multimedia*** → ***Xfburn***.

Once launched, you can insert a CD-R(W) or DVD-R(W) you wish to write to and then select the button corresponding to the action you wish to take (**New Data Composition**, **Audio CD**, etc.).

Chapter 14. Migrating

Migrating from Windows

A quick Windows-Xubuntu dictionary

Windows: Add/Remove Programs
Xubuntu: → ***Software***
Windows: Control Panel
Xubuntu: → ***Settings Manager*** for personal preferences → ***System (menu)*** for additional configuration
Windows: Windows Explorer
Xubuntu: → ***Accessories*** → ***File Manager***
Windows: My Documents
Xubuntu: **/home/username/**

Windows applications on Linux

It is possible to run Windows applications under Xubuntu. Three popular choices are:

... Wine [http://winehq.org/] (**wine [apt://wine]**), the Windows emulator. Wine allows running Windows applications without having to install a Windows operating system. Refer to the Wine AppDB [http://appdb.winehq.org/] to find out which applications will run on Wine and the Wine documentation [http://www.winehq.org/help/] for FAQ's and user support.

... PlayOnLinux [https://www.playonlinux.com/] is an easy to use frontend for Wine, which makes it easy to install popular Windows applications.

... VirtualBox [https://www.virtualbox.org/], virtualization software. You can install a Windows operating system along with any application into a virtual machine managed by VirtualBox. Note that 3D support on VirtualBox is still quite unreliable. To read more about VirtualBox and virtualization, refer to the VirtualBox end-user documentation [https://www.virtualbox.org/wiki/End-user_documentation].

> **Tip**
>
> Both Wine and VirtualBox are available in the software repositories.

Windows networking on Linux

Accessing Windows network shares under Xubuntu can be easily done using:

... → ***Accessories*** → ***File Manager***, where you can browse publicly visible shares by clicking on the *Network* item in the sidebar. Alternatively, you can browse a remote file system by going to *Go* → *Open Location...* and entering **`smb://computername/sharename`**.

... → ***System*** → ***Gigolo***, which allows you to save bookmarks and manage remote file systems. To connect, click the first toolbar button. Select *Windows Share* from *Service Type*, then enter the remote share's details.

If some options are not available or do not work, ensure that the **gvfs-backends [apt://gvfs-backends]** is installed.

Chapter 15. Troubleshooting

Network troubleshooting

Before attempting any troubleshooting, ensure that the network connections are enabled:

... Click the **NetworkManager** icon in the notification area

... Check *Enable Networking*

... Check *Enable Wi-Fi*

If your network connection still doesn't work:

... For wired (Ethernet) connections, please see the section called ”General troubleshooting„

... For wireless connections, please see both the section called ”General troubleshooting„ and the section called ”Wireless troubleshooting„

... If your network connection problems are still not resolved, see the section called ”Advanced troubleshooting„

General troubleshooting

If your network connection is not working properly, there are a few tools that can be used to help diagnose the problem.

Get information about the current connection

To get information about your network connection and network devices, you have two options:

... Using **NetworkManager**

... Click on the **NetworkManager** icon

... Select *Connection Information*. If this is disabled, it is likely there is no active connection. Try using the **ip** command to find out more.

... Each active connection will have its own tab where you can find relevant connection information

... Using **ip**

... Open a terminal (→ ***Accessories*** → ***Terminal Emulator***), type the command **`ip address`** then press the *Enter* key.

... **ip** will show you extensive information about your connection, including logical or connection name(s) (e.g. enp3s0) in the first row, IP address in the *inet* row and the MAC address for your device in the *link/ether* row

Check if a connection is working properly

A reliable method to check if a connection is working properly is to ping another computer on the network or the Internet.

To check if your computer is connected to the Internet, open a terminal (→ ***Accessories*** → ***Terminal Emulator***), type the command **`ping -c 3 www.xubuntu.org`** then press the *Enter* key.

The computer will then attempt to contact www.xubuntu.org three times and display the results. The ping statistics display the number of packets transmitted, how many packets were received, the percentage of packet loss, and the total time spent.

... 0% packet loss indicates that your computer is connected to the Internet

... Greater than 0% but less than 100% packet loss indicates that your computer has a poor connection to the Internet or a poor wireless signal

... 100% packet loss indicates that your computer has a very bad connection, or is connected to an access point or router that is not connected to the Internet

If you get an error message that says ”www.xubuntu.org can not be found„ or ”unknown host„, then your computer is probably not connected to the Internet or is unable to reach a Domain Name System (DNS) server.

Wireless troubleshooting

This section covers some common problems faced with wireless support. There is much more information available in the Community Help Wiki [https://help.ubuntu.com/community/WifiDocs].

> **Note**
>
> Please note that the steps in this troubleshooting guide are designed to be carried out in the order shown, unless you are pointed to a different subsection.

Check that the device is turned on

Many wireless network devices can be turned on or off. Check for a hardware switch or a keyboard function key to turn the wireless device on.

If the device is turned on, continue to the next topic.

Check if the device is recognized

Open a terminal (→ ***Accessories*** → ***Terminal Emulator***), type the command **`sudo lshw -C network`**, then press the *Enter* key. You will see some output, along with the words *CLAIMED*, *UNCLAIMED*, *ENABLED* or *DISABLED*.

... *CLAIMED* indicates that a driver is loaded but not functioning. Continue to the section called ”Using Windows wireless drivers„.

... *UNCLAIMED* indicates that there is no driver loaded. Continue to the section called ”Using Windows wireless drivers„.

... *ENABLED* indicates that the driver is installed and working. Continue to section the section called ”Checking for a connection to the router„.

... *DISABLED* indicates the driver is installed, but disabled. Continue to the section called ”Check that the device is turned on„.

Using Windows wireless drivers

Xubuntu supports a system known as **NDISWrapper**. This allows you to use a Windows wireless device driver under Xubuntu. To start using **NDISWrapper**:

... Obtain the Windows driver for your network device and locate the file that ends with **.inf**

... Install the **ndisgtk [apt://ndisgtk]** package

... Go to → ***Settings Manager*** → ***Windows Wireless Drivers***

... Select **Install new driver**

... Choose the location of your Windows .inf file and click **Install**

... Click **OK**

Checking for a connection to the router

Open a terminal (→ ***Accessories*** → ***Terminal Emulator***), type the command **`iwconfig`** then press the *Enter* key.

If the *ESSID* for your router is displayed, there may be a problem with ACPI support. Boot Xubuntu with the **pci=noacpi** option.

Advanced troubleshooting

The following troubleshooting methods are a bit more technical. Please try these methods only if the above methods failed.

Checking IP assignment

Open a terminal (→ ***Accessories*** → ***Terminal Emulator***), type the command **`ip address`** then press the *Enter* key. If there is an IP address displayed, continue to the section called ”Check Domain Name Servers (DNS)„.

From the terminal enter the following command, replacing **enp3s0** with the name of the connection shown in the output from the **ip address** command: **`sudo dhclient enp3s0`**

... If you receive a message that says bound to **xxx.xxx.xxx.xxx** continue to the section called ”Check Domain Name Servers (DNS)„

... If not, reboot the system

Check Domain Name Servers (DNS)

Open a terminal (→ ***Accessories*** → ***Terminal Emulator***), type the command **`nmcli device show`** then press the *Enter* key. Look for the entries under **IP4.DNS**

To check if the listed DNS works, open a terminal (→ ***Accessories*** → ***Terminal Emulator***), type the command **`dig xubuntu.org`** then press the *Enter* key. If you see the word **NOERROR** in the header section of the output, your DNS is working.

If there are no DNS settings listed, contact your Internet Service Provider (ISP), and find out your primary and secondary domain name servers.

Chapter 16. Upgrading

Upgrading Xubuntu

New regular releases of Xubuntu are released every 6 months and Long Term Support (LTS) releases every 2 years. Currently, regular releases are supported for 9 months and LTS releases for 3 years.

The Software Updater will inform you when a new version for your upgrade path is available for download. To change the upgrade path, see the section called ”Changing your upgrade path„.

Upgrades usually take a while to complete. Typically, around 1000 MB of packages must be downloaded and installed, although the actual figure depends on how many packages are already installed on your computer.

Upgrading to the next available release

... Go to → ***Settings Manager*** → ***Software Updater*** and wait for the list of available updates to be downloaded

... If a new version of Xubuntu is available, a box at the top of the window will appear saying that a new distribution release is available

... To upgrade to the next available release, save all of your open documents and click the **Upgrade** button in → ***Settings Manager*** → ***Software Updater***

> **Note**
>
> If you are not getting an upgrade notification, or aren't seeing the release you are expecting to upgrade to, see the section called ”Changing your upgrade path„.

Changing your upgrade path

There are two main upgrade paths you can follow: either upgrade to long-term support (LTS) releases only, or upgrade to all releases.

If you decide to follow the LTS upgrade path, you will be notified of new releases every two years. If you decide to follow the regular releases upgrade path, you will be notified of new releases every 6 months. You can change from regular to LTS upgrade path once you have reached the next LTS release.

If you want to change your upgrade path, you can do it when running an LTS version. To do so, choose one of the following options:

... Navigate to → ***Software*** → ***Software & Updates*** and select the *Updates* tab. In the *Updates* tab, select either *For any new version* or *For long-term support versions* from the *Notify me of a new Ubuntu version* dropdown menu depending on your choice.

... Open the → ***Accessories*** → ***Terminal Emulator*** and run **`sudo edit /etc/update-manager/release-upgrades`** and change the line starting with **`prompt=`** to **`prompt=normal`** (for all releases) or **`prompt=lts`** (for LTS releases) depending on your choice

> **Note**
>
> If you are running a regular release that is not immediately followed by an LTS release, you should not change the upgrade target to long-term support (LTS) releases only.

> **Caution**
>
> Upgrading an LTS version to anything other than another LTS version will lose the long term support.

Upgrading to the development version

> **Warning**
>
> Development releases often suffer from package breakages and other problems. Only install a development release if you are prepared to attempt to fix these problems for yourself or if you want to help the Xubuntu team by testing and giving feedback.

> **Note**
>
> You will need to be running the latest regular version to be able to upgrade to the version currently under development.

If you would like to install and test the latest development version of Xubuntu before it is released, run **`update-manager -c -d`** at the command line. This will allow you to upgrade to the current development release. Please consider getting involved [http://xubuntu.org/contribute/qa] with reporting usage of development versions and associated packages.

Notifications of new Xubuntu versions

This section of the **Software Updater** deals with the way you wish future versions to be given to you. You have three options:

... *For any new version* - You will get notifications of all new releases, once in 6 months.

... *For long-term support versions* - You will get notifications of new Long-term Support (LTS) releases, once in 2 years.

... *Never* - You will not get notifications of new releases.

> **Tip**
>
> Opting in for Long-term Support (LTS) notifications is usually the recommended option, especially if you are running Xubuntu on a production machine and/or need maximum stability.

> **Warning**
>
> It is not recommended to user the *Never* setting. Unless you remember to manually upgrade often enough, this will leave you with an unsupported system. Additionally, you will be missing out on bug fixes, updates for potential security problems and hardware support improvements.

Appendix A. Application table

Friendly name: Catfish File Search
Package name: catfish
Short description: File searching tool which is configurable via the command line
Friendly name: Document Viewer
Package name: atril
Short description: Document (PostScript, PDF) viewer
Friendly name: Calculator
Package name: mate-calc
Short description: Desktop calculator
Friendly name: Character Map
Package name: gucharmap
Short description: Unicode character picker and font browser
Friendly name: LibreOffice Calc
Package name: libreoffice-calc
Short description: Spreadsheet application
Friendly name: LibreOffice Writer
Package name: libreoffice-writer
Short description: Word processor
Friendly name: Mousepad
Package name: mousepad
Short description: Simple Xfce oriented text editor
Friendly name: PulseAudio Volume Control
Package name: pavucontrol
Short description: PulseAudio Volume Control
Friendly name: Simple Scan
Package name: simple-scan
Short description: Simple Scanning Utility
Friendly name: Application Finder
Package name: xfce4-appfinder
Short description: Find and launch applications installed on your system
Friendly name: Run Program
Package name: xfce4-appfinder
Short description: Run a program
Friendly name: Dictionary
Package name: xfce4-dict
Short description: Dictionary plugin for Xfce4 panel
Friendly name: Task Manager
Package name: xfce4-taskmanager
Short description: Process manager for the Xfce4 Desktop Environment

Settings Manager

Friendly name: Menu Editor
Package name: menulibre

Short description: Menu layout editor
Friendly name: About Me
Package name: mugshot
Short description: Lightweight user-configuration application
Friendly name: Network Connections
Package name: network-manager-gnome
Short description: Network management framework
Friendly name: Additional Drivers
Package name: software-properties-gtk
Short description: Configure third-party and proprietary drivers
Friendly name: Software & Updates
Package name: software-properties-gtk
Short description: Configure the sources for installable software and updates
Friendly name: Printers
Package name: system-config-printer-gnome
Short description: Printer configuration GUI

Behind the scenes

Package name: gvfs-backends
Short description: Allows GVFS to connect to many network protocols (smb://, nfs://, etc)
Package name: gvfs-fuse
Short description: Let non-GNOME apps use GVFS via fuse
Package name: libnotify-bin
Short description: Binaries to send notification bubbles
Package name: light-locker
Short description: Simple session-locker for **lightdm**
Package name: tumbler
Short description: Xfce thumbnail daemon used by **thunar** and **xfdesktop4**
Package name: xfce4-notifyd
Short description: Daemon used to display notification bubbles
Package name: xfce4-indicator-plugin
Short description: Panel plugin for the indicators (**indicator-application**, **indicator-sound**)

Appendix B. Creative Commons by Attribution-ShareAlike 4.0 International

Creative Commons Corporation ("Creative Commons") is not a law firm and does not provide legal services or legal advice. Distribution of Creative Commons public licenses does not create a lawyer-client or other relationship. Creative Commons makes its licenses and related information available on an "as-is" basis. Creative Commons gives no warranties regarding its licenses, any material licensed under their terms and conditions, or any related information. Creative Commons disclaims all liability for damages resulting from their use to the fullest extent possible.

Using Creative Commons Public Licenses

Creative Commons public licenses provide a standard set of terms and conditions that creators and other rights holders may use to share original works of authorship and other material subject to copyright and certain other rights specified in the public license below. The following considerations are for informational purposes only, are not exhaustive, and do not form part of our licenses.

Considerations for licensors: Our public licenses are intended for use by those authorized to give the public permission to use material in ways otherwise restricted by copyright and certain other rights. Our licenses are irrevocable. Licensors should read and understand the terms and conditions of the license they choose before applying it. Licensors should also secure all rights necessary before applying our licenses so that the public can reuse the material as expected. Licensors should clearly mark any material not subject to the license. This includes other CC-licensed material, or material used under an exception or limitation to copyright. More considerations for licensors. [https://wiki.creativecommons.org/Considerations_for_licensors_and_licensees#Considerations_for_licensors]

Considerations for the public: By using one of our public licenses, a licensor grants the public permission to use the licensed material under specified terms and conditions. If the licensor,s permission is not necessary for any reason–for example, because of any applicable exception or limitation to copyright–then that use is not regulated by the license. Our licenses grant only permissions under copyright and certain other rights that a licensor has authority to grant. Use of the licensed material may still be restricted for other reasons, including because others have copyright or other rights in the material. A licensor may make special requests, such as asking that all changes be marked or described. Although not required by our licenses, you are encouraged to respect those requests where reasonable. More considerations for the public. [https://wiki.creativecommons.org/Considerations_for_licensors_and_licensees#Considerations_for_licensees]

Creative Commons Attribution-ShareAlike 4.0 International Public License

By exercising the Licensed Rights (defined below), You accept and agree to be bound by the terms and conditions of this Creative Commons Attribution-ShareAlike 4.0 International Public License ("Public License"). To the extent this Public License may be interpreted as a contract, You are granted the Licensed Rights in consideration of Your acceptance of these terms and conditions, and the Licensor grants You such rights in consideration of benefits the Licensor receives from making the Licensed Material available under these terms and conditions.

1. **Definitions.**

a. **Adapted Material** means material subject to Copyright and Similar Rights that is derived from or based upon the Licensed Material and in which the Licensed Material is translated, altered, arranged, transformed, or otherwise modified in a manner requiring permission under the Copyright and Similar Rights held by the Licensor. For purposes of this Public License, where the Licensed Material is a musical work, performance, or sound recording, Adapted Material is always produced where the Licensed Material is synched in timed relation with a moving image.

b. **Adapter's License** means the license You apply to Your Copyright and Similar Rights in Your contributions to Adapted Material in accordance with the terms and conditions of this Public License.

c. **BY-SA Compatible License** means a license listed at creativecommons.org/compatiblelicenses [https://creativecommons.org/compatiblelicenses], approved by Creative Commons as essentially the equivalent of this Public License.

d. **Copyright and Similar Rights** means copyright and/or similar rights closely related to copyright including, without limitation, performance, broadcast, sound recording, and Sui Generis Database Rights, without regard to how the rights are labeled or categorized. For purposes of this Public License, the rights specified in Section 2(b)(1)-(2) are not Copyright and Similar Rights.

e. **Effective Technological Measures** means those measures that, in the absence of proper authority, may not be circumvented under laws fulfilling obligations under Article 11 of the WIPO Copyright Treaty adopted on December 20, 1996, and/or similar international agreements.

f. **Exceptions and Limitations** means fair use, fair dealing, and/or any other exception or limitation to Copyright and Similar Rights that applies to Your use of the Licensed Material.

g. **License Elements** means the license attributes listed in the name of a Creative Commons Public License. The License Elements of this Public License are Attribution and ShareAlike.

h. **Licensed Material** means the artistic or literary work, database, or other material to which the Licensor applied this Public License.

i. **Licensed Rights** means the rights granted to You subject to the terms and conditions of this Public License, which are limited to all Copyright and Similar Rights that apply to Your use of the Licensed Material and that the Licensor has authority to license.

j. **Licensor** means the individual(s) or entity(ies) granting rights under this Public License.

k. **Share** means to provide material to the public by any means or process that requires permission under the Licensed Rights, such as reproduction, public display, public performance, distribution, dissemination, communication, or importation, and to make material available to the public including in ways that members of the public may access the material from a place and at a time individually chosen by them.

l. **Sui Generis Database Rights** means rights other than copyright resulting from Directive 96/9/EC of the European Parliament and of the Council of 11 March 1996 on the legal protection of databases, as amended and/or succeeded, as well as other essentially equivalent rights anywhere in the world.

m. **You** means the individual or entity exercising the Licensed Rights under this Public License. **Your** has a corresponding meaning.

2. **Scope.**

a. **License grant.**

i. Subject to the terms and conditions of this Public License, the Licensor hereby grants You a worldwide, royalty-free, non-sublicensable, non-exclusive, irrevocable license to exercise the Licensed Rights in the Licensed Material to:

A. reproduce and Share the Licensed Material, in whole or in part; and

B. produce, reproduce, and Share Adapted Material.

ii. Exceptions and Limitations. For the avoidance of doubt, where Exceptions and Limitations apply to Your use, this Public License does not apply, and You do not need to comply with its terms and conditions.

iii. Term. The term of this Public License is specified in Section 6(a).

iv. Media and formats; technical modifications allowed. The Licensor authorizes You to exercise the Licensed Rights in all media and formats whether now known or hereafter created, and to make technical modifications necessary to do so. The Licensor waives and/or agrees not to assert any right or authority to forbid You from making technical modifications necessary to exercise the Licensed Rights, including technical modifications necessary to circumvent Effective Technological Measures. For purposes of this Public License, simply making modifications authorized by this Section 2(a)(4) never produces Adapted Material.

v. Downstream recipients.

A. Offer from the Licensor — Licensed Material. Every recipient of the Licensed Material automatically receives an offer from the Licensor to exercise the Licensed Rights under the terms and conditions of this Public License.

B. Additional offer from the Licensor — Adapted Material. Every recipient of Adapted Material from You automatically receives an offer from the Licensor to exercise the Licensed Rights in the Adapted Material under the conditions of the Adapter,s License You apply.

C. No downstream restrictions. You may not offer or impose any additional or different terms or conditions on, or apply any Effective Technological Measures to, the Licensed Material if doing so restricts exercise of the Licensed Rights by any recipient of the Licensed Material.

vi. No endorsement. Nothing in this Public License constitutes or may be construed as permission to assert or imply that You are, or that Your use of the Licensed Material is, connected with, or sponsored, endorsed, or granted official status by, the Licensor or others designated to receive attribution as provided in Section 3(a)(1)(A)(i).

b. **Other rights.**

i. Moral rights, such as the right of integrity, are not licensed under this Public License, nor are publicity, privacy, and/or other similar personality rights; however, to the extent possible, the Licensor waives and/or agrees not to assert any such rights held by the Licensor to the limited extent necessary to allow You to exercise the Licensed Rights, but not otherwise.

ii. Patent and trademark rights are not licensed under this Public License.

iii. To the extent possible, the Licensor waives any right to collect royalties from You for the exercise of the Licensed Rights, whether directly or through a collecting society under any voluntary or waivable statutory or compulsory licensing scheme. In all other cases the Licensor expressly reserves any right to collect such royalties.

3. **License Conditions.**

Your exercise of the Licensed Rights is expressly made subject to the following conditions.

a. **Attribution.**

i. If You Share the Licensed Material (including in modified form), You must:

A. retain the following if it is supplied by the Licensor with the Licensed Material:

i. identification of the creator(s) of the Licensed Material and any others designated to receive attribution, in any reasonable manner requested by the Licensor (including by pseudonym if designated);

ii. a copyright notice;

iii. a notice that refers to this Public License;

iv. a notice that refers to the disclaimer of warranties;

v. a URI or hyperlink to the Licensed Material to the extent reasonably practicable;

B. indicate if You modified the Licensed Material and retain an indication of any previous modifications; and

C. indicate the Licensed Material is licensed under this Public License, and include the text of, or the URI or hyperlink to, this Public License.

ii. You may satisfy the conditions in Section 3(a)(1) in any reasonable manner based on the medium, means, and context in which You Share the Licensed Material. For example, it may be reasonable to satisfy the conditions by providing a URI or hyperlink to a resource that includes the required information.

iii. If requested by the Licensor, You must remove any of the information required by Section 3(a)(1)(A) to the extent reasonably practicable.

b. **ShareAlike.**

In addition to the conditions in Section 3(a), if You Share Adapted Material You produce, the following conditions also apply.

i. The Adapter,s License You apply must be a Creative Commons license with the same License Elements, this version or later, or a BY-SA Compatible License.

ii. You must include the text of, or the URI or hyperlink to, the Adapter's License You apply. You may satisfy this condition in any reasonable manner based on the medium, means, and context in which You Share Adapted Material.

iii. You may not offer or impose any additional or different terms or conditions on, or apply any Effective Technological Measures to, Adapted Material that restrict exercise of the rights granted under the Adapter's License You apply.

4. **Sui Generis Database Rights.**

Where the Licensed Rights include Sui Generis Database Rights that apply to Your use of the Licensed Material:

a. for the avoidance of doubt, Section 2(a)(1) grants You the right to extract, reuse, reproduce, and Share all or a substantial portion of the contents of the database;

b. if You include all or a substantial portion of the database contents in a database in which You have Sui Generis Database Rights, then the database in which You have Sui Generis Database Rights (but not its individual contents) is Adapted Material, including for purposes of Section 3(b); and

c. You must comply with the conditions in Section 3(a) if You Share all or a substantial portion of the contents of the database.

For the avoidance of doubt, this Section 4 supplements and does not replace Your obligations under this Public License where the Licensed Rights include other Copyright and Similar Rights.

5. **Disclaimer of Warranties and Limitation of Liability.**

a. **Unless otherwise separately undertaken by the Licensor, to the extent possible, the Licensor offers the Licensed Material as-is and as-available, and makes no representations or warranties of any kind concerning the Licensed Material, whether express, implied, statutory, or other. This includes, without limitation, warranties of title, merchantability, fitness for a particular purpose, non-infringement, absence of latent or other defects, accuracy, or the presence or absence of errors, whether or not known or discoverable. Where disclaimers of warranties are not allowed in full or in part, this disclaimer may not apply to You.**

b. **To the extent possible, in no event will the Licensor be liable to You on any legal theory (including, without limitation, negligence) or otherwise for any direct, special, indirect, incidental, consequential, punitive, exemplary, or other losses, costs, expenses, or damages arising out of this Public License or use of the Licensed Material, even if the Licensor has been advised of the possibility of such losses, costs, expenses, or damages. Where a limitation of liability is not allowed in full or in part, this limitation may not apply to You.**

c. The disclaimer of warranties and limitation of liability provided above shall be interpreted in a manner that, to the extent possible, most closely approximates an absolute disclaimer and waiver of all liability.

6. **Term and Termination.**

a. This Public License applies for the term of the Copyright and Similar Rights licensed here. However, if You fail to comply with this Public License, then Your rights under this Public License terminate automatically.

b. Where Your right to use the Licensed Material has terminated under Section 6(a), it reinstates:

i. automatically as of the date the violation is cured, provided it is cured within 30 days of Your discovery of the violation; or

ii. upon express reinstatement by the Licensor.

For the avoidance of doubt, this Section 6(b) does not affect any right the Licensor may have to seek remedies for Your violations of this Public License.

c. For the avoidance of doubt, the Licensor may also offer the Licensed Material under separate terms or conditions or stop distributing the Licensed Material at any time; however, doing so will not terminate this Public License.

d. Sections 1, 5, 6, 7, and 8 survive termination of this Public License.

7. **Other Terms and Conditions.**

a. The Licensor shall not be bound by any additional or different terms or conditions communicated by You unless expressly agreed.

b. Any arrangements, understandings, or agreements regarding the Licensed Material not stated herein are separate from and independent of the terms and conditions of this Public License.

8. **Interpretation.**

a. For the avoidance of doubt, this Public License does not, and shall not be interpreted to, reduce, limit, restrict, or impose conditions on any use of the Licensed Material that could lawfully be made without permission under this Public License.

b. To the extent possible, if any provision of this Public License is deemed unenforceable, it shall be automatically reformed to the minimum extent necessary to make it enforceable. If the provision cannot be reformed, it shall be severed from this Public License without affecting the enforceability of the remaining terms and conditions.

c. No term or condition of this Public License will be waived and no failure to comply consented to unless expressly agreed to by the Licensor.

d. Nothing in this Public License constitutes or may be interpreted as a limitation upon, or waiver of, any privileges and immunities that apply to the Licensor or You, including from the legal processes of any jurisdiction or authority.

Creative Commons is not a party to its public licenses. Notwithstanding, Creative Commons may elect to apply one of its public licenses to material it publishes and in those instances will be considered the ”Licensor.„ The text of the Creative Commons public licenses is dedicated to the public domain under the CC0 Public Domain Dedication [https://creativecommons.org/publicdomain/zero/1.0/legalcode]. Except for the limited purpose of indicating that material is shared under a Creative Commons public license or as otherwise permitted by the Creative Commons policies published at creativecommons.org/policies [https://creativecommons.org/policies], Creative Commons does not authorize the use of the trademark ”Creative Commons„ or any other trademark or logo of Creative Commons without its prior written consent including, without limitation, in connection with any unauthorized modifications to any of its public licenses or any other arrangements, understandings, or agreements concerning use of licensed material. For the avoidance of doubt, this paragraph does not form part of the public licenses.

Creative Commons may be contacted at http://creativecommons.org/.