

NEW

Ubuntu

The Complete Manual

The essential handbook for Ubuntu users



Welcome to **Ubuntu**

The Complete Manual

Many people who want to make the move from Windows to a Linux distribution choose Ubuntu as their first step. It provides a clean, attractive GUI with Unity, and usability by the bucket-load. It is the perfect environment in which to begin learning about the command line and creating a more customisable workspace. Meanwhile you still get many of the benefits you are used to in Windows and other desktop systems. This book serves as an introduction to the beauty and power of Ubuntu. From the default software to the best FOSS apps to download from the Software Centre, we'll tour the top programs and applications, so soon you'll be flying with Ubuntu.



Ubuntu

The Complete Manual

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•Getting up to speed might take a bit of time, but you will eventually see it's more than worth it.Ž

Get to know Ubuntu

This free, open-source operating system has gained a lot of momentum in recent years

Ubuntu is a user-friendly Linux-based operating system that has found its place in every corner of the world. Best of all, Ubuntu is absolutely free, including future updates. It is also extremely light on PC hardware, so you can install it on computers that are three to four years old and it'll still run smoothly. So it's for good reason that Ubuntu is the most widely used Linux operating system – for desktops and in the cloud. It boasts both community and professional support, and Ubuntu is suitable for both desktop and server use. But that's not all:

Ubuntu is everywhere. Almost all computer manufacturers are shipping models based on Ubuntu.

Ubuntu is well supported. Few other Linux distros provide the same kind of long-term support. It is more important than ever to provide long-term support when it comes to open source projects.

Ubuntu is easy to use. It's easy to pick up and use, even if you come from a Windows background (Fig. 1).

Ubuntu is pretty stable. For most users, Ubuntu just works. This is because the OS is being tweaked and fixed all the time. Since all the latest packages are not integrated during the development cycle, it also helps in providing better stability.

Start with the trial version

Try out Ubuntu before installing it

System requirements vary among Ubuntu products. For the Ubuntu desktop release 16.04, a PC with at least 512MB of RAM and 5GB of disk space is highly recommended. For less powerful computers, it's best to use one of the other Ubuntu distributions.

Ubuntu can be booted from a USB drive or CD and used without even installing it. Let's take a look at the different ways to download and use the Ubuntu trial version...

Live booting and virtual machines

One of the easiest ways to get started with Ubuntu is by creating a live USB drive, CD or DVD. After placing Ubuntu onto it, you can insert your USB stick or disc into any computer, then restart it. The computer should then boot from the removable medium and you can use Ubuntu without making changes to the hard drive.

You may be wondering how to create a live Ubuntu USB drive or disc. For this, you can download the latest Ubuntu disk image from Ubuntu's website. Use the UNetbootin tool to put Ubuntu on your USB flash drive or burn the downloaded ISO image to a disc. All you need to do now is to restart your computer from the removable medium you provided and select the 'Try Ubuntu' option.



Fig 2 (above) If successful, you will be presented with the standard Ubuntu desktop

Getting started

Boot Ubuntu from a disc or USB stick

As a newcomer to Ubuntu, you will be able to try it out before installing it. This can be done using either an Ubuntu DVD in the drive or a USB stick with Ubuntu on it in a USB port.

01 If using a DVD, put the Ubuntu DVD into the drive and restart the computer. You will see a welcome screen which prompts you to select your chosen language. There will also be an option to install Ubuntu or try it from the DVD.

02 If you want to use a USB drive, note that the latest computers can start up from a USB stick. Here you'll also see a welcome screen that prompts you to choose a language and gives an option to either install Ubuntu or try it from the USB stick.

03 Irrespective of whether you are using the DVD or USB stick method, the next step is to select your preferred language and then click on 'Try Ubuntu'. Your live desktop will then appear (as shown in the picture seen to the left, Fig 2).

04 As a final step, when you are ready to install Ubuntu, you just need to double-click on the icon on your desktop: 'Install Ubuntu 16.04 LTS'.



Getting started

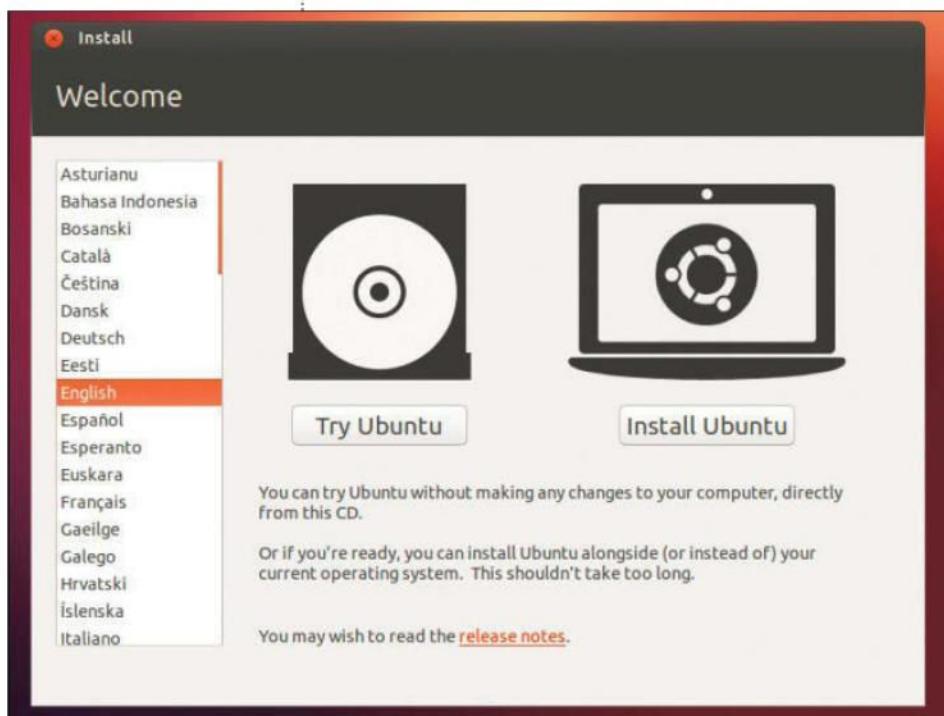
Get to know Ubuntu

Like any other operating system, Ubuntu can also be run in a virtual machine on your computer. In this way, you'll be able to try Linux without even restarting your computer, although you should note that virtual machines are slower than running the operating system on your computer itself.

To create an Ubuntu virtual machine, first you need to download and install VirtualBox. Create a new virtual machine with it, select the Ubuntu operating system, and provide the ISO file you downloaded from Ubuntu's website when prompted. The installation process is pretty self-explanatory and you can go through it in the virtual machine as if you were installing Ubuntu on a real computer.

"You'll be able to try Linux without even restarting your computer"

Fig 3 (below) Install Ubuntu or try it out with the trial version



Adopting the full version

New versions are released every six months and are supported for 18 months

As noted previously, Ubuntu is a very popular Linux distribution with many years of experience and a huge user base. After becoming comfortable with the initial aspects of Ubuntu, it is time to take a look at Ubuntu's full version. Before you start with Ubuntu, you need to obtain a copy of the Ubuntu installation image. In addition, you will have to ensure that your system meets the minimum requirements. The most common method of obtaining Ubuntu is to download the Ubuntu DVD image directly from the official site, ubuntu.com/download. To download and install it, you just need to select whether you require the 32-bit or 64-bit version and then click 'Start download'.

It is important to understand these two versions that Ubuntu is available in: 32-bit and 64-bit. They differ from each other in the way the computer processes information. So if your computer has a 64-bit processor, you will need to install the 64-bit version. On the other hand, if you have an older computer or you do not know the type of the processor in your computer, it is advisable to opt to install the 32-bit version.

Although 5GB of free space on your hard drive is required for installing Ubuntu, the recommendation is to have 15GB or more. This will mean you'll have enough space to install extra applications, as well as to store your own documents, music and more.

If you have an Internet connection, the installer will ask you now whether you want to 'Download updates while installing'. It is highly recommended to perform this step.



Internet connection

It is important to have an Internet connection during the Ubuntu installation process. If you are not connected to the Internet, the installer will ask you to choose a wireless network, if one is available. You can follow these three steps in such a scenario...

- 01** Select 'Connect to this network' and choose your network from the list.
- 02** In the 'Password' field, enter your router's WEP or WPA key.
- 03** Then click 'Connect' in order to continue.



Fig 4 (below) Make sure you have the available drive space before installing

Account setup

Ubuntu needs to know some information about you so that it can set up the primary user account on your computer. As you might expect, when configured, your name will appear on the login screen as well as the user menu.

On this screen you will need to provide the following information to Ubuntu...

- Your name
- What you want to call your computer
- Your desired username
- Your desired password

After the installation is complete and your computer has restarted, you will be greeted with the login screen of Ubuntu. The login screen will present you with your username, and you will need to enter the password that you provided previously in order to proceed. Click to enter your username and password; you can then press Enter to access the Ubuntu desktop.

Once your Ubuntu desktop is ready, you may be interested in viewing the hidden files. This can be easily done by clicking View Options>Show Hidden Files.

After successfully installing Ubuntu, you may also want to encrypt your home folder. It takes very little time and is pretty straightforward. This stage is considered to be an important step to take before you proceed any further with Ubuntu.

Get to know Ubuntu

Options for installation

You can install Ubuntu alongside another OS or replace it

The Ubuntu installer will automatically detect any existing operating system installed on your machine, and present installation options to suit your system. Please note that the following options below entirely depend on your specific system and may not all be available to you:

- Install alongside other operating systems
- Upgrade Ubuntu ... to 16.04
- Erase ... and install Ubuntu
- Something else

Out of the above four options, the most preferred is 'Upgrade Ubuntu ... to 16.04'. This is because this option will allow you to keep all your precious documents, music, pictures and any other personal files on the computer. Installed software will be retained when possible and system-wide settings will be cleared.

The 'Erase disk and install Ubuntu' option can be used if you want to erase your entire disk. As expected, this will delete any existing operating system that is installed on that disk and install Ubuntu in its place.

When you choose the 'Something else' option, you will be able to configure the partitions as you need before installing Ubuntu.

It can be noted here that in order to reduce the time required for installation, Ubuntu will continue the installation process in the background while the user configures all the important user details like username, password, keyboard settings, the default time zone and so on.

"After successfully installing Ubuntu, you may also want to encrypt your home folder. It takes very little time and is pretty straightforward. This is considered to be an important step before you proceed any further"



Fig 5 You can choose to employ the Terminal

Navigate Ubuntu

Decode the menu bar, Launcher, Dash, home directory and more

After taking a look at the initial aspects of Ubuntu, now it's time to delve deeper into the operating system. To start with, you may notice many similarities between Ubuntu and other operating systems – mainly because they are all based on the concept of a GUI (graphical user interface). It is a good idea to understand the applications and menus in Ubuntu so that you can become comfortable with using its GUI. Any GUI-based operating system makes use of a desktop environment. The main features provided by a desktop environment are related to the look and feel of the system and how easily a user can navigate the desktop.

Let us take a quick look at the menu bar in Ubuntu. The menu bar incorporates the most common functions used in Ubuntu. Each installation of Ubuntu may contain slightly different icons based on a number of factors, including the type of hardware.

Getting started

You may notice that Ubuntu is a little different to some other operating systems. The most important thing to understand is the Ubuntu packaging system. Typically it includes:

/usr
/var
/bin
/sbin
/lib

The other thing to note here is cron job management. The jobs that are under the purview of the system administrator can be found in the /etc directory. If you have a root cron job for daily, weekly or monthly runs, make sure to place them under /etc/cron.{daily,weekly,monthly}.

These jobs can be invoked from /etc/crontab.

There is a tool called 'Ubuntu After Install', which can be used to install some of the best and most essential software after installing the Ubuntu desktop. It boasts a bunch of useful applications, and will automate the installation process on a newly installed machine in order to obtain a near perfect desktop. This tool will save a lot of your time and effort, and installs all latest versions of software on your Ubuntu system.



Getting started

Get to know Ubuntu



Fig 6 (above) To run any application from the Launcher, you just need to click on the application's icon

For example, some programs add an icon to the indicator area automatically during installation. You should note that every application features its own menu system wherein different actions can be executed within it (such as File, Edit, View and so on). Appropriately, the menu system for an application is known as the application menu.

Another thing that we need to understand in Ubuntu is the 'Launcher' – the vertical bar of icons available on the left side of the desktop (Fig 6). With the help of this Launcher, one can easily access the various applications, mounted devices and trash. Note that any application that is running will have its icon placed in the Launcher bar.

In Ubuntu, we commonly come across something called 'Dash'. If you have used Windows in the past, you can consider Dash as something similar to the Windows Start menu. The Dash will help you to find the applications and files you're looking for on your machine. To explore the Dash, you need to click on the topmost icon on the Launcher. Now you will be able to see a window with a search bar on the top as well as the recently accessed applications, files and downloads.

The screenshot shows the Ubuntu Dash interface. At the top is a search bar labeled "Search Applications". Below it, there are sections for "Recently Used" (with a link to "See 2 more results") and "Installed" (with a link to "See 90 more results"). The "Installed" section displays icons for various applications: CompizConfig Settings Manager, Synaptic Package Manager, Text Editor, Files, Epiphany Web Browser, Additional Drivers, AideRiot Solitaire, Appearance, Archive Manager, Audacious, and Backup. At the bottom, there is a section for "Apps Available for Download" featuring icons for LibreOffice Calc, LibreOffice Writer, LibreOffice Impress, C:_, and gP. On the far left, a vertical bar of icons represents the application launcher.

Fig 7 Type to search for files or folders and suggested results will appear in the Dash menu



Fig 8 (above) Conduct a computer and Internet-wide search from the Dash



Fig 9 (above) Navigate to the browser app for more advanced searches

Getting started

Get to know Ubuntu

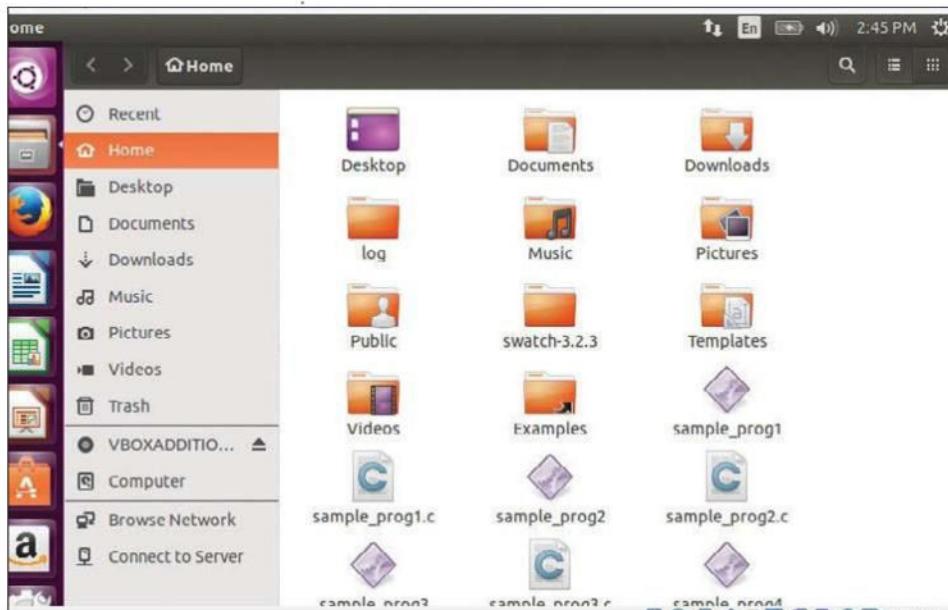
As mentioned above, Dash is a very powerful tool that can be used to search for files and applications on your computer. Find files or folders by simply typing a portion of the file or folder name (Fig 7, page 14). As you type, the results will appear in the Dash.

As expected, a standard Ubuntu installation comes with many applications, but users can additionally download thousands of applications from the Ubuntu Software Centre. The Applications lens on the Dash will automatically categorise installed applications under 'Recently Used', 'Installed' or 'More Suggestions'.

You can also enter the name of an application (or a part of it) into the search bar in the Dash, and the names of applications matching your search criteria will appear (Fig 8, page 15). Even if you don't remember the name of the application, type a keyword that is relevant to that application and the Dash will be able to find it. Another thing that we need to understand here is that in addition to searching your local machine for files and applications, Dash can help in searching various online resources.

Now let's take a look at how to browse the files on your machine. In addition to using Dash to search for files, one can also access them directly from their directory. The home directory (Fig 10) is

Fig 10 (below) Search the home directory for files on your machine



used to store all of your personal files (instead of system-related files). Sometimes, you may need to make use of the ‘Files’ file manager window. Whenever you select the Files shortcut in the Launcher, Ubuntu will open this file manager.

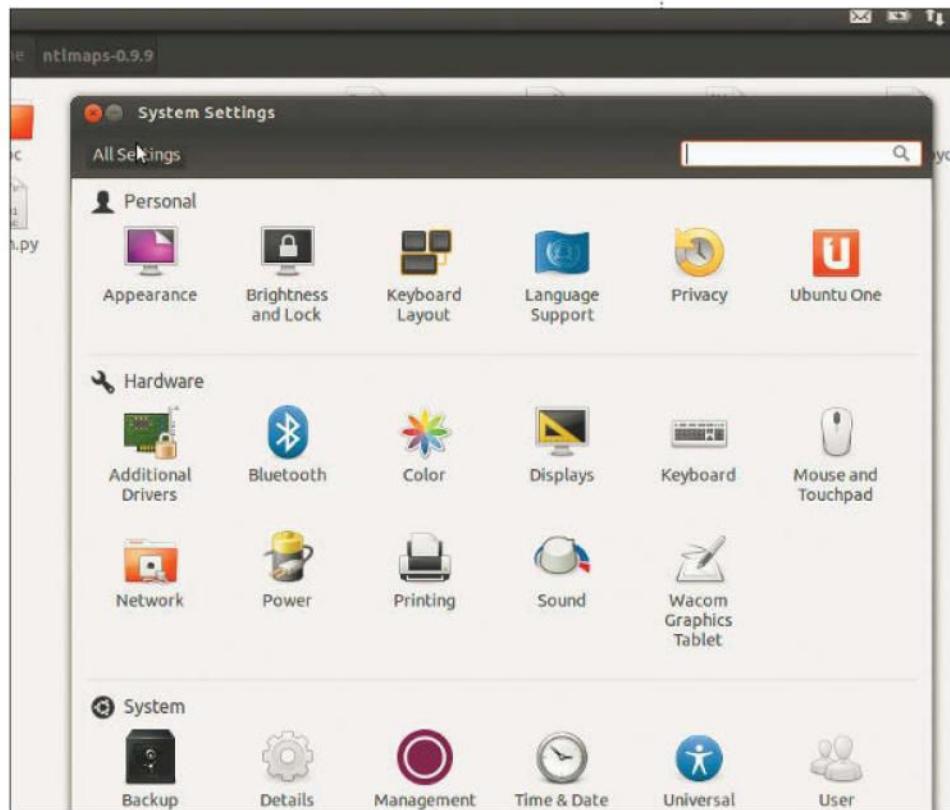
As you can see from the screenshot opposite, this window comes with the following features:

menu bar: It is located at the top of the screen. With this menu bar, one will be able to browse and remove bookmarks, open a new window, connect to a server, quit etc.

title bar: This indicates the name of the currently selected directory.

toolbar: This displays your location in the file system, a search button etc.

Fig 11 (below) Most customisation options are available in the System Settings menu



Get to know Ubuntu

"Although Ubuntu provides a nice GUI, to fully utilise the power of the OS you'll need to understand the 'terminal'"

Sometimes, you may need to customise your Ubuntu desktop. Most customisation can be achieved via the Session Indicator and then selecting System Settings to open the System Settings application window (Fig 11, page 17).

Once you are done with working on your machine, you can select from the options to log out, suspend, restart or shut down through the Session Indicator.

Understand the terminal

Go further by utilising the command line

Although Ubuntu provides a nice GUI, to fully utilise the power of the OS you'll need to understand the 'terminal'. Any operating system has two types of user interface:

GUI: This is the desktop, windows, menus and toolbars that you click to get things done.

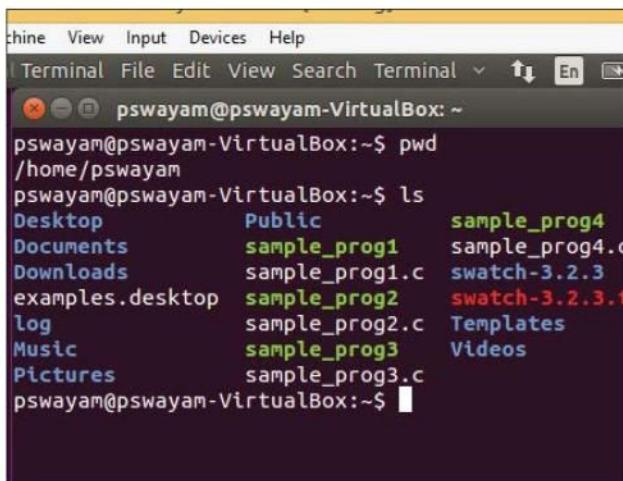
Command-line interface (CLI): The terminal is Ubuntu's CLI. It can be considered as a method for controlling some aspects of Ubuntu using only commands that you type on the keyboard. Even though users are able to perform most day-to-day activities without ever opening a terminal, it is considered to be very powerful tool and is therefore well worth investigating. With it, you will be able to perform many useful tasks.

Troubleshooting tasks: If you face any difficulties while using Ubuntu, you may need to use the terminal. If you need to perform operations on multiple files at the same time, then the terminal is the preferred method. System administration and software development skills can be significantly improved by having a good understanding of the CLI. A terminal can be opened either by hitting Alt+Ctrl+T or by right-clicking on the desktop and selecting 'Terminal' from the menu.

Please note that all the commands in the terminal follow the same approach: you can type the command, possibly followed

Ubuntu file system structure

Ubuntu uses the Linux file system and it is based on a series of folders in the root directory. These folders contain important system files that cannot be modified unless you are running as the root user or use the sudo command. With this restriction, computer viruses will not be able to change the core system files, and normal users will not be able to accidentally change anything that is critical.



The screenshot shows a terminal window with a yellow header bar containing the text 'chine' (partially visible), View, Input, Devices, Help, Terminal, File, Edit, View, Search, Terminal, and a set of icons. The main area of the terminal shows the following command-line session:

```
pswayam@pswayam-VirtualBox:~$ pwd
/home/pswayam
pswayam@pswayam-VirtualBox:~$ ls
Desktop           Public      sample_prog4
Documents         sample_prog1 sample_prog4.c
Downloads         sample_prog1.c swatch-3.2.3
examples.desktop  sample_prog2 swatch-3.2.3.t
log               sample_prog2.c Templates
Music             sample_prog3   Videos
Pictures          sample_prog3.c
pswayam@pswayam-VirtualBox:~$
```

Fig 12 (above) Use the terminal to conduct actions using the command line

by some parameters, and then press Enter in order to perform the specified action (Fig 12). In most cases, some type of output will be displayed in order to confirm that the action was completed successfully, although this can depend on whether the command is executed.

Ubuntu offers various text editors which are installed by default. The most commonly used command-line editor is called Vim. The table below gives quick information about some of the important files in Ubuntu.

Another concept that users need to know about is mounting and unmounting removable devices. Mounting a device means associating a directory name with the device, and this in turn allows you to navigate to the directory to access the device's files. When you've finished using a device, you can safely unmount it. Unmounting a device disassociates the device from its directory, allowing you to eject it.

File	A quick description
/etc/issue	Gives info about Ubuntu version that you are currently running
/etc/apt/sources.list	Contains the available sources for software installation
lsb_release -a	Prints out the Ubuntu version you are running
/usr/share/tomcat	Installation directory for Tomcat

Securing Ubuntu

Ubuntu is considered to be so secure primarily thanks to the following reasons...

- Many viruses designed to primarily target Windows-based systems do not affect Ubuntu systems.
- Security patches for open-source software like Ubuntu are often released quickly.
- Open source software like Ubuntu allows security flaws to be easily detected.
- The basic security concepts such as file permissions, passwords and user accounts are also available with Ubuntu. Understanding these concepts will help you in securing your computer.

Navigate the Ubuntu desktop

Find everything you need on the intuitive and attractive Ubuntu desktop interface, Unity

When Ubuntu first introduced its Unity desktop, some users threatened to move back to Windows Vista. But as time went by, the desktop became more reliable: as of 12.04 LTS, there is no real reason to dislike Unity. Unity initially started out as a research product trying to create a GUI that was better suited to netbooks: their extremely wide displays did not work particularly well with traditional desktop managers that had been intended for workstations utilising the standard 4:3 displays. This explains two important changes to the interface: first of all, the Launcher was moved to the side of the screen to preserve the valuable vertical real estate. Secondly, the menu bars of the various different applications were grouped together into one top bar that is always dedicated to the currently enabled application. This is one of the main differences you will find from Windows and other distros in terms of usability, but it is one that you will become accustomed to over time. While getting up to speed with Unity might take users a bit of time, rest assured that you will eventually see are more than worth it.

Quick-launch apps

Right-click on the symbol of a running application to open a short menu. Selecting 'Lock to Launcher' from the available options ensures that the symbol will always remain in the bar for quick access to that specific application, even if it is not currently running

View app status

All of the running applications are shown below the Dash symbol. The arrows located on the left side of the icon let you know the number of windows that are currently open. On dual-screen workstations, an 'empty' arrow here indicates that the window is not located on the display that is showing this particular version of the bar

Trash

Just where you'd expect to find it, the trash can is always visible at the bottom of the quick launch bar

"Unity initially started out as a research product trying to create a GUI that was better suited to netbooks"

Navigate the Ubuntu desktop

Ubuntu essentials

The Dash

Unity's start menu is keyboard-driven and opening it in this way can save time. Savvy users will open it using the Windows key on their keyboard. You can get a real productivity boost by following it up with a few characters describing the app you are looking for, for example by entering 'Thun' after tapping the Windows key virtually ensures that the Thunderbird icon appears right in the middle of the application list

The menu bar

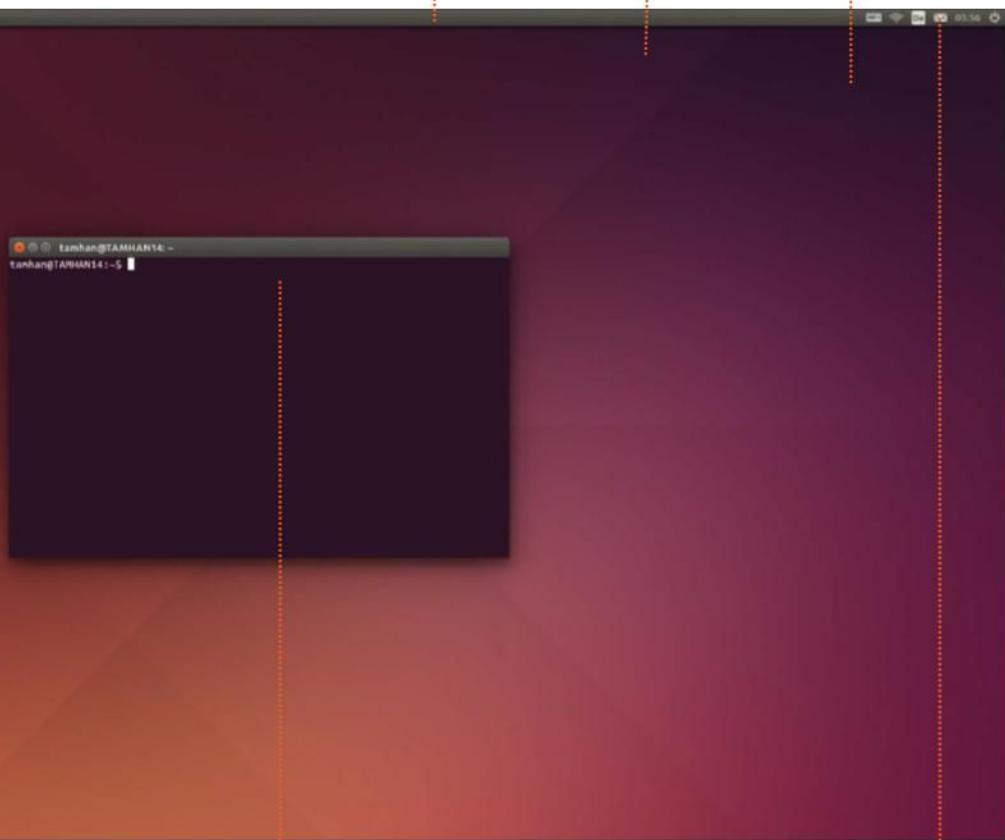
Move your mouse cursor up to the very top of the screen to enable the menu display. This is a really helpful tool for accessibility as less dexterity is required to complete it. Simply flick the cursor to the top of the screen and let Unity take care of any overshoot

The keyboard cheatsheet

Unity comes with a set of helpful keyboard shortcuts that increase productivity and get things done faster. Press and hold on the Windows key to display a list of shortcuts in the middle of the screen that is currently active

Wallpaper

As with practically any other distro or OS, your wallpaper is a blank canvas to put your own stamp on. The default Ubuntu offering isn't too shabby, though



Active workspace

Front and centre is the window you're working on. To switch to another without closing the current window, just click on or search for the app you want to open next. It can be minimised if you hover at the top of the window – the classic three buttons will appear with options to close, minimise or maximise. Be aware that clicking the close option will mean you need to start the program again

The indicator menu

Ubuntu will display symbols alerting you about any events and/or important system state changes that are taking place or need your attention. Click on any of these icons when they appear to reveal a short menu providing you with further options about the situation at hand



Dual boot with Ubuntu

Get Ubuntu running alongside your existing Windows installation

Most users who want to try Ubuntu already have desktop PCs or laptops with the Windows OS. Ubuntu can be installed alongside Windows and both systems will coexist just fine, without interfering with each other.

Ubuntu's installation wizard has an advanced disk partition stage, where you can either trust the installer to automatically shrink the Windows partition and let Ubuntu use the freed space, or you can do it manually. Shrinking NTFS partitions from Linux is considered stable enough and if you didn't have any problems with your C drive in Windows (such as severe fragmentation), Ubuntu will resize it correctly. The installer will create the mandatory root partition (/) in the free disk area and sometimes also create separate partitions for user data (/home) and swap space.

After the installer copies Ubuntu files to the root partition, it'll perform post-installation arrangements and install the GRUB2 bootloader into the master boot record (MBR) of the hard drive on older systems, or GRUB2-EFI into the dedicated FAT32 partition on modern systems with Windows 8 or 10 and a GPT-formatted drive. The Ubuntu installer supports the Secure Boot feature of many modern Windows PCs and installs the GRUB2-EFI bootloader correctly. After rebooting, you'll see the GRUB2/GRUB2-EFI interface, where you can choose Ubuntu or Windows.

You will find that it's possible for you to access Windows files from Ubuntu, but not vice versa.

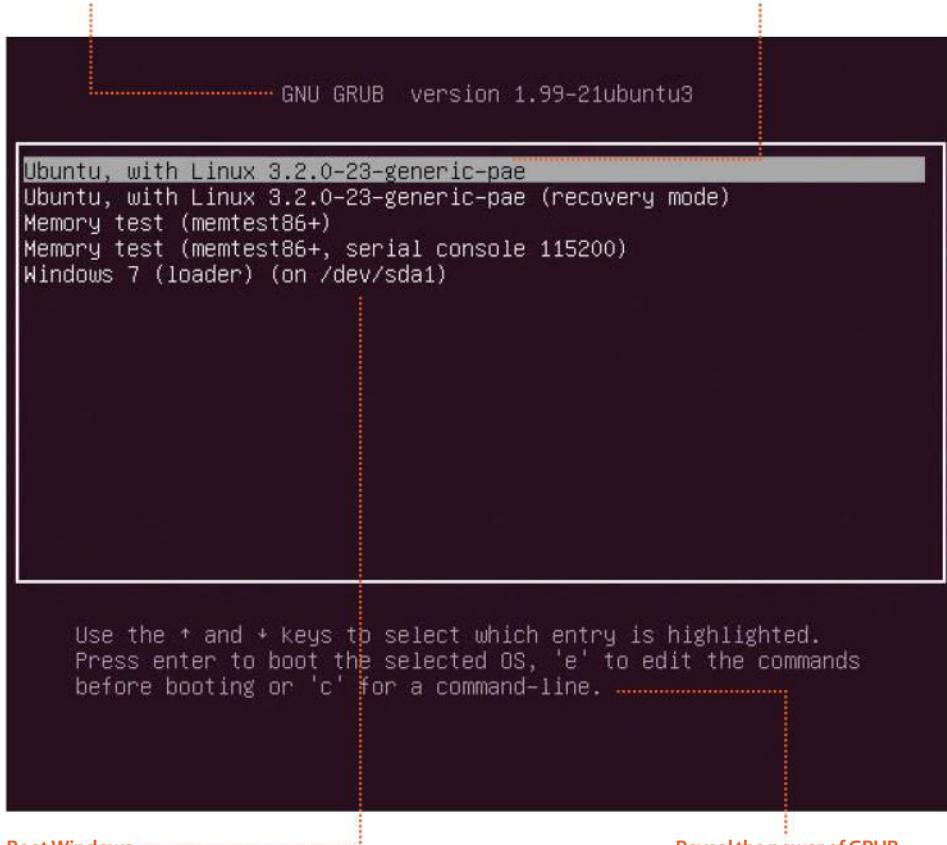
"Ubuntu can be installed alongside Windows and both systems will coexist just fine"

Discover bootloader menu

Find out how to use the GRUB2 bootloader

Meet the GNU GRUB

GRUB in Ubuntu looks nearly identical on systems with a BIOS or UEFI setup. The version of the program is displayed on the top



Boot Windows

Select the last entry to boot Windows. GRUB will redirect you to the Microsoft standard bootloader that sits on the Windows partition

The default entry

If you do nothing, GRUB will load the default menu entry, which is the first one in the list. It always points to the latest installed kernel version with default parameters

Reveal the power of GRUB

You can instantly change boot settings by pressing the E key, editing an entry and then pressing F10. This is a one-time solution: GRUB will discard such custom settings after reboot

"You will find that it's possible for you to access Windows files from Ubuntu, but not vice versa"

Ubuntu essentials

Discover bootloader menu

The automatic partitioning option in the Ubuntu installer is definitely more comfortable for non-tech-savvy users, but it does have certain limitations, such as the inability to add an extra Home partition or define the swap space manually. Let's use the fully fledged partitioning method by choosing the 'Something else' option in the previous step, or by clicking the 'Advanced partitioning tool' link in the 'simple' mode. First, you'll need to resize the NTFS volume and make it smaller by some number of gigabytes. Make sure that you don't have excessive hard disk fragmentation in Windows, otherwise

you turn your NTFS in Ubuntu installer file. Try to guess how much space you'll need in unallocated area after resizing. For instance, it looks like the bare minimum – go with at least twice as much as that for the Ubuntu root partition. That's ahead to cover aspects like swapping and a separate partition for /home.

Dual boot with Ubuntu

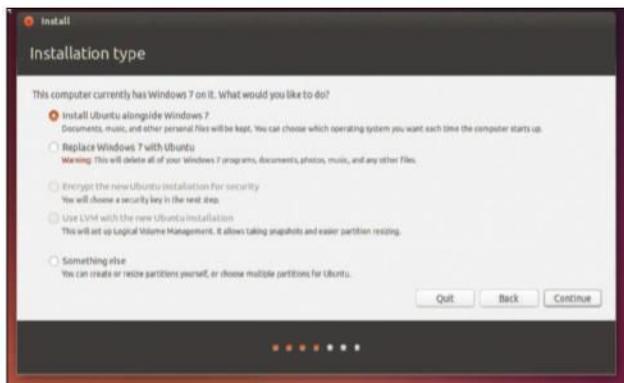


Fig 1 (above) The installation type has been automatically detected

Dare to go for manual setup

Ubuntu's installation program has been polished in recent years and now looks very smooth. Soon after completing basic steps (like language selection), a user faces the first real obstacle during the 'Installation type' step. You can see above that Ubuntu has automatically detected our Windows 7 copy and offered the simple solution that does not require any extra user input (Fig 1). Here you can let the installer automatically guess what OS you already have and how to keep it intact. It's safe, and you'll be able to define how much space you want to allocate for Ubuntu in the next step.

Note the second option with the red Warning label – we are going to install Ubuntu and keep Windows working, so do not choose this. The last option is a path to a more expert-like drive allocation program. Dual-booting in UEFI mode introduces more routines for the Ubuntu installer. If you're unsure what to choose, go with auto mode. If your system uses a BIOS interface, you can repartition your drive manually.

"The automatic partitioning option in the Ubuntu installer is definitely more comfortable for non-tech-savvy users, but it does have certain limitations"

Select target drive for the bootloader

This option only requires your attention if it's the case that you have more than one hard drive inside or attached to your computer. Otherwise, if you had previously installed custom operating systems onto your Windows desktop PC or laptop, you might find it useful to get to grips with this option as well. First of all, in order to boot correctly, Ubuntu needs a properly installed GRUB bootloader.

You can install it on a hard drive (eg /dev/sda) or on a drive partition (eg /dev/sda3). If you have a relatively modern UEFI/Secure Boot setup, then Ubuntu will act differently: it will install GRUB2-UEFI on /dev/sdal, which is a FAT32 partition, and mount it as /boot/efi. Furthermore, a special loader entry in your computer's UEFI internals will be made by the means of the 'efibootmgr' utility. Don't worry though, Ubuntu does all of this automatically.

"If you go with a single root partition, that means all your personal files and settings will be kept together"

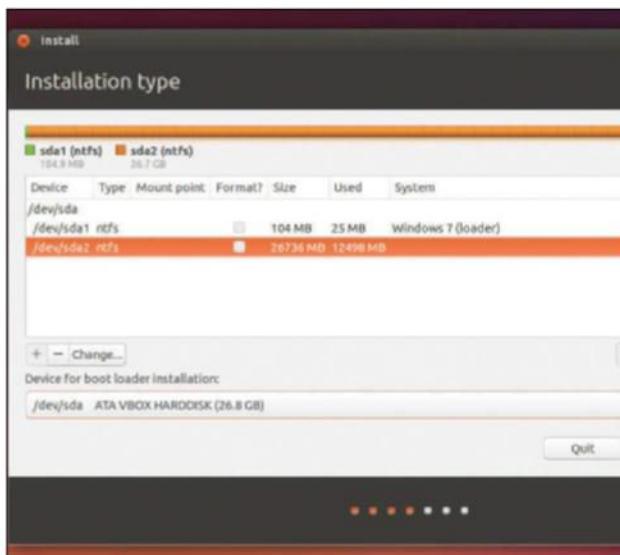


Fig 2 (above) Install GRUB bootloader onto a hard drive or drive partition

Create Ubuntu partitions

Many older articles concerning the installation of Linux strongly advise users to create a swap partition with a size twice that of the RAM volume (for instance, 2GB if you have 1GB of RAM). However, modern computers generally have larger amounts of RAM and therefore this rule is not that important any more. That being said, you could go without the swap partition altogether unless you feel that you really need it. The separate partition for your home folder in Ubuntu is another aspect to consider. If you go with a single root partition, that means all your personal files and settings will be kept together with the rest of the system on a single partition (/), just like if you only had the C: drive in Windows for storing everything. Sometimes it is more sensible to create another partition and mount it as /home – this means that your files and settings will not get lost, even if you decide to reinstall or remove Ubuntu in the future.



Customising the desktop

Change desktop settings and add a personal touch to Ubuntu's exterior

The default desktop environment in Ubuntu is called Unity. It provides users with a consistent and easy-to-use graphical interface for performing everyday tasks. The default settings are quite simple, based on studies into the features people find comfortable and intuitive. However, with so many people with so many different tastes, Unity allows all essential features, such as appearance and behaviour of the desktop, to be customised to the user's liking.

This is done with the Look and Feel settings, localisation, input options as well as privacy-related settings. Some of the above don't affect Ubuntu behaviour – such as various aesthetic settings (theme, icons), but some do.

It is worth mentioning that sometimes people need more precise control over their Ubuntu installation and require some extra features that are not part of the out-of-the-box Ubuntu. For that reason, there are different ways to work around it in the form of commands (`$ gsettings`) and even stand-alone tweakers (eg `Unity-tweak-tool`). Such extras let you change advanced settings like fonts, window control placement, desktop effects and more. Next you can find out how you can change the most common settings and resolve frequently occurring issues.

Adjust the Launcher

01 The taskbar panel or the Launcher works just fine, but sometimes you need to get rid of some of the default icons and add your favourite apps instead. To remove an icon, right-click on it and select the 'Unlock from Launcher' option. To add an application to the taskbar you first need to find it in the Dash and drag it to the desired position on the taskbar. You can also drag and rearrange the existing icons on the taskbar. Use the Appearance>Look section in System Settings to change the taskbar icon size. If you make it smaller, more icons will fit there, which is helpful for small displays. Also, check the Behaviour tab for auto-hiding option, enabling multiple workspaces and more.

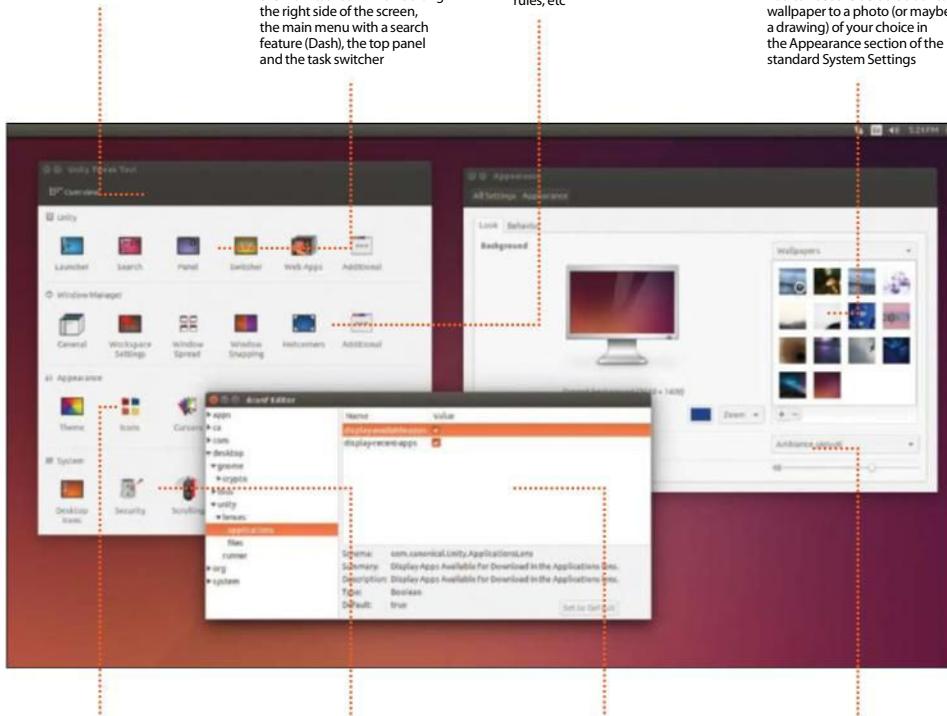
"With so many people with so many different tastes, Unity allows all essential features, such as appearance and behaviour of the desktop, to be customised"

Tweak desktop settings

Use related sections in Ubuntu's System Settings app

Unity Tweak Tool

It's not included right out of the box, but it is instantly available in the standard Ubuntu online repository. Get it with \$ sudo apt-get install unity-tweak-tool



Appearance settings

Here you can change GTK style, window decoration theme and fonts separately, change mouse cursor look and move window buttons to another edge of a window

Change specific settings

Unity is made up of various different elements, including the main taskbar which is along the right side of the screen, the main menu with a search feature (Dash), the top panel and the task switcher

Window manager

There are ways to can change the behaviour of window manager in Unity. Shadows, translucency, animations, hot corners, snapping, focusing rules, etc

Default wallpaper

You can set the default Ubuntu wallpaper to a photo (or maybe a drawing) of your choice in the Appearance section of the standard System Settings

System settings

Unity Tweak Tool offers advanced system settings, eg enabling desktop icons, extra security measures, control over scroll icons as well as mouse behaviour

A Register Editor for Ubuntu

Use the command \$ sudo apt-get install dconf-editor to install a twin panel settings manager. It behaves similarly to the Register Editor in Windows OS and lets you adjust many hidden settings

Change the theme

This defines how various UI controls look, and this includes buttons, scroll bars, menu background, window decorations and lots of other details

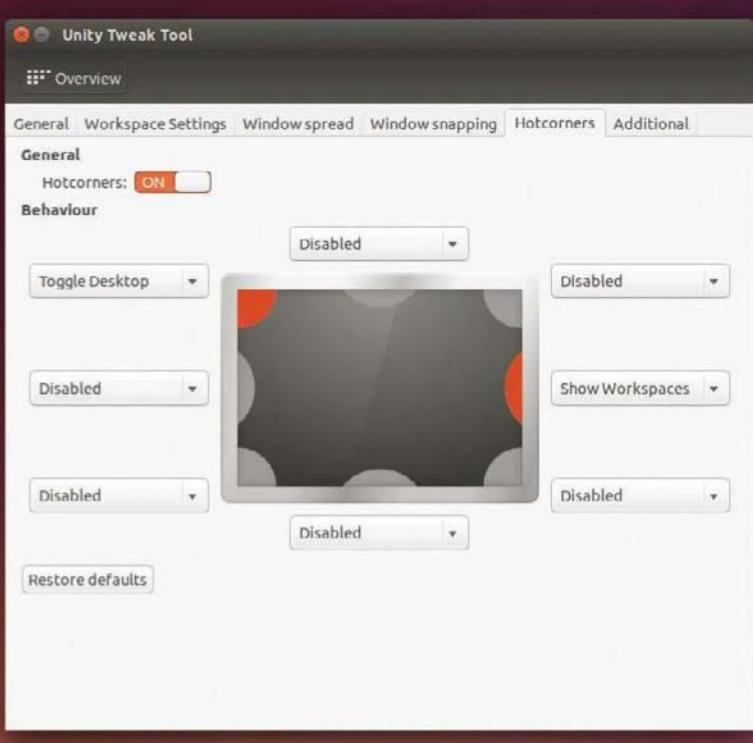


Fig 1 (above) You can use hot corners to streamline your Ubuntu experience

Change privacy settings

02 Ubuntu includes certain mechanisms for gathering users' data and collecting statistics – of course, this is meant entirely for the sake of better usability in future Ubuntu releases. Some find this behaviour controversial, so let's adjust it a little. In System Settings>Security and Privacy go to the Files & Applications tab and uncheck or maybe turn completely off files and applications usage statistics. On the Search tab you can actually turn the online search results in Unity Dash on or off. For example, if you don't like shopping suggestions while looking for a local app on your computer, simply turn it off.

Change look and feel

03 Changing the interface theme can dramatically alter the working experience. It is perfectly safe: you don't change how your desktop works, you change how it looks. By default, Ubuntu ships with three themes: Ambiance (the default one), Radiance (light colours) and High Contrast (for visually challenged). You can add more by installing new themes via command line (adding a PPA with a theme and installing its package for example), or download themes manually from sites like gnome-look.org. Ubuntu looks for themes in the system-wide /usr/share/themes directory and in ~/themes inside your home.

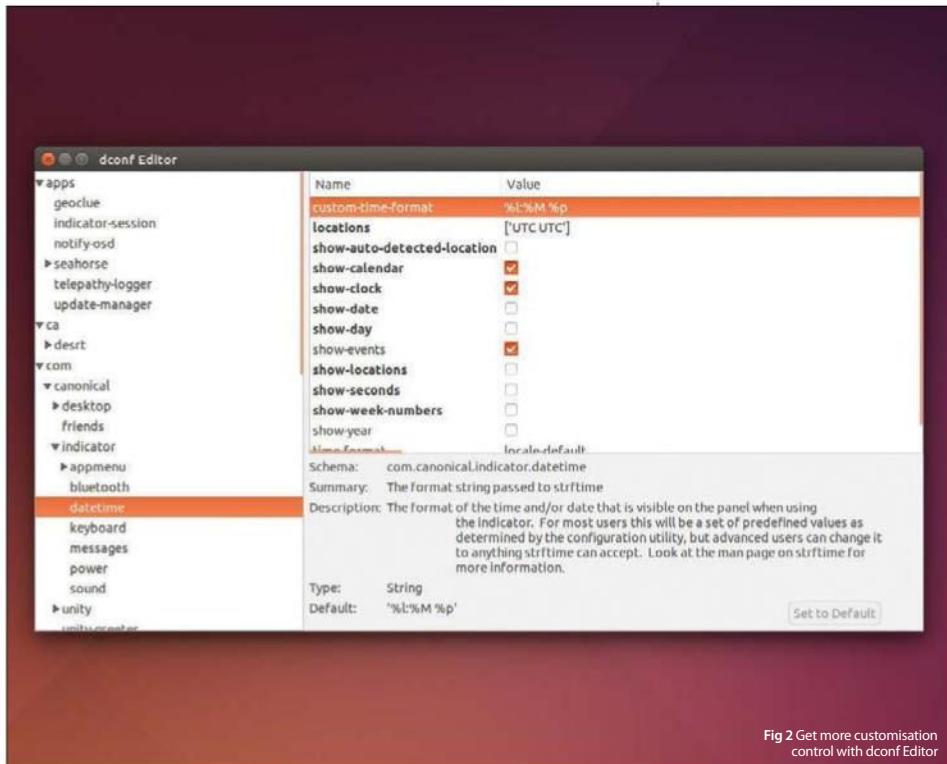


Fig 2 Get more customisation control with dconf Editor

Use hot corners

04 The Unity desktop lets you assign an action to any corner of the screen, plus to any of its sides. In order to do this, we need to access advanced window manager settings. Launch Unity Tweak Tool and go to Window Manager>Hotcorners. There are eight areas (four corners and four sides) with a drop-down menu next to each, letting you choose what action will be performed once you move your mouse to the respective area of the screen. You can set a corner or a side to toggle the desktop (for example, minimise all windows or bring them back on), spread windows or show workspaces. All changes are applied instantly, and you can check by driving your mouse to a corner or side where an action has been assigned.

"Check hot corners have been applied by driving your mouse to a corner or side where an action has been assigned"

Rule the indicators

05 The 'System Tray' area resides in the far-right corner of the top bar. Some indicators can be configured individually but for more control you will need to deal with dconf-editor (Fig 2). This twin-panel app has a categories list on the left and the contents on the right allows you adjust aspects of Unity indicators. Go to com>canonical>indicator and explore the parameters of each one. You can turn indicator presence on the top bar on and off by toggling the 'visibility' parameter and change indicators' display format by playing with 'show-*' parameters. This way you can keep your system tray area clean and tidy.



Discover System Settings

Discover system details, manage user accounts and configure hardware

The System Settings application houses various settings and acts the same way as the Control Panel in Windows. You can launch System Settings from the farthest indicator in the top bar, or even from the command line (`$ unity-control-center`). Of course, the set of system-related settings here isn't the only place where you can change such settings, but it is the most convenient and safe place to do it. Traditionally in Linux (and Ubuntu is no exception), system settings could be changed via editing configuration files in the `/etc` directory, or by issuing certain commands while being in root. While these work in Ubuntu, it requires advanced skills and sometimes involves putting your Linux installation at risk. The System Settings shell in Ubuntu contains a limited number of neatly designed items that help you manage essential system-related settings with ease and minimum skill. The System subsection contains settings for Backup, System Details, Landscape Service, Software Sources, Time & Date, Universal Access and User Accounts. Some of the above are applicable for enterprise Ubuntu users (such as the paid subscription for technical support, which is called Landscape), while other settings are covered in detail in separate chapters (Backup, Time & Date, etc). This overview focuses on Details and User Accounts as well as on certain hardware-related settings.

"The System Settings shell in Ubuntu contains a limited number of neatly designed items that help you manage essential system-related settings with ease and minimum skill"

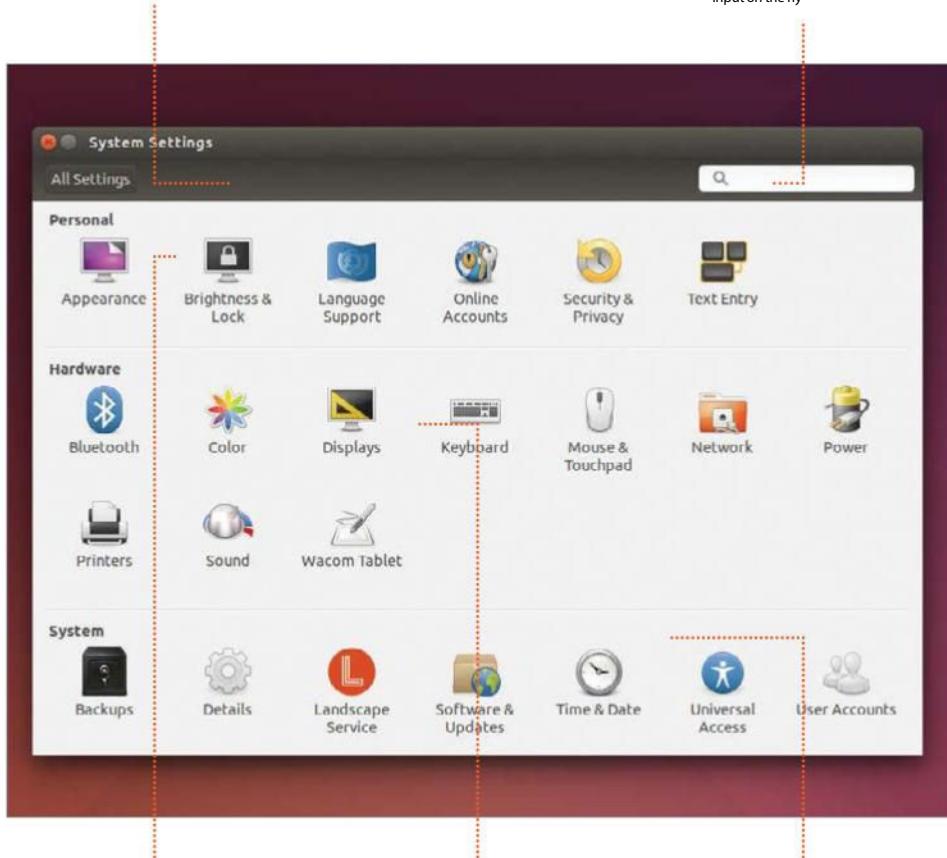
View important subsections Configure your Ubuntu installation

Navigation

It's not included right out of the box, but it is instantly available in the standard Ubuntu online repository. Get it with `$ sudo apt-get install unity-tweak-tool`

Search for a setting

If you cannot find the required settings but you know its name, type it into the search bar and see how System Settings filter the results according to your input on the fly



Personal settings

Most settings here are user-specific. You can also change look and feel settings here, adjust privacy, manage online accounts etc

Hardware settings

You might set up extra peripherals, input devices, change power settings, or even manage colour profiles for printers and displays

System-related settings

Backups, system details, updates and software sources, accessibility options, time and date and more, can be managed within this category

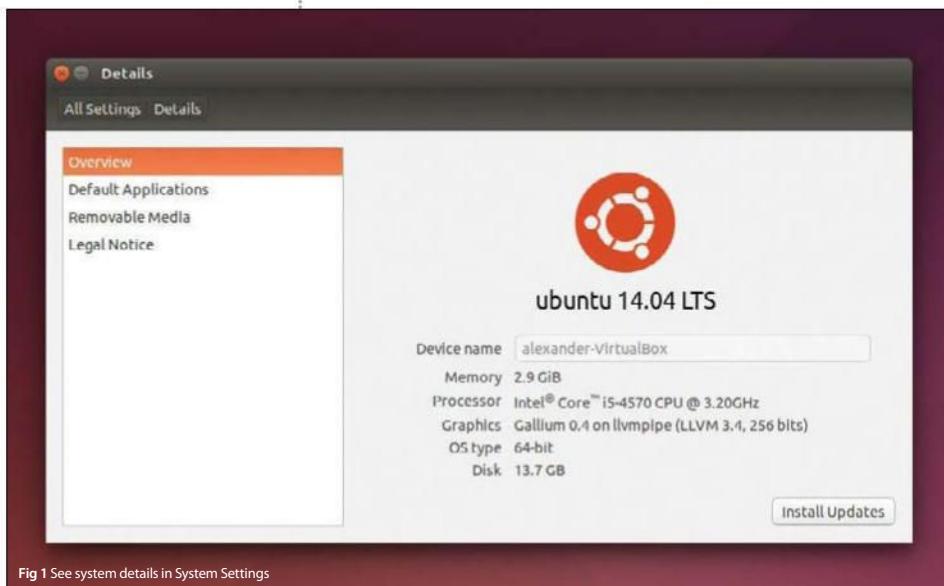


Fig 1 See system details in System Settings

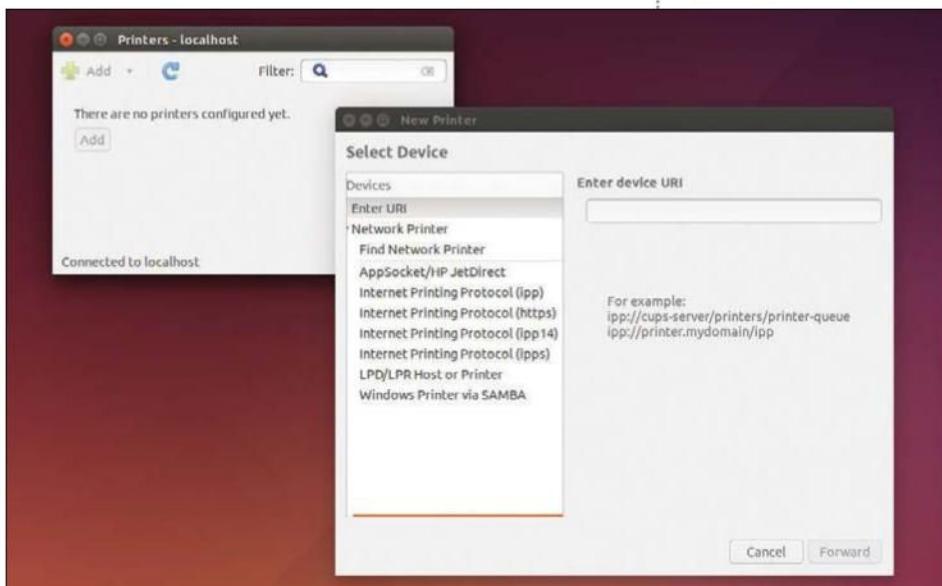
Manage Ubuntu users

If your PC is mainly used as a private or personal computer then perhaps you are the only user in the system. Here's what you do you need to do if you want to create another user for testing purposes, or for guest logins. If there is actually already more than one person that accesses the PC (in a public place for example), you'll need the correct number of login accounts. These are managed in the User Accounts subsection. By default, you can only see the list and the settings, but can't change anything. To add or remove users you must click the 'Unlock' button and enter the root password. After that you'll be able to click the tiny '+' and '-' buttons displayed at the lower left corner of the screen, watch an activity log of other users (the History button) and toggle their automatic login.

Explore system details and change some defaults

Sometimes you need to know more information about your version of Ubuntu. Is it 32 or 64 bit? How much memory is there in your PC? In order to prevent you from getting lost, there is a dedicated subsection in System Settings that's called Details. The main screen in Details shows a summary of the most important specs of your system, including CPU name and clock, graphics driver, hard disk volume and more (Fig 1). You can also update your system with the Install Updates button on the right. There are other useful tabs in Details – see the list on the left side of the screen. Go to Default Applications to change your default web browser, email client, music player or image viewer. Similarly, on the Removable Media tab you can define what Ubuntu should do when an optical disc (CD/DVD/BD) is inserted. Again, all changes are then applied immediately.

"Sometimes you need to know more information about your version of Ubuntu. Is it 32 or 64 bit? How much memory is there in your PC? To avoid getting lost, head to System Settings"



Set up a printer

Ubuntu automatically detects and configures local printers in case it has a driver for them. Most consumer printers are supported without any problems in Linux, so if you open the Printers subsection, you should see the icon for a configured printer. You can edit the printer's preferences, change its driver, or you can create several instances of the same printer with different settings. Press the 'Add' button and follow the wizard to set up a local or remote printer – much of it's automatic (Fig 2). If you need more control or you want to resolve a printing issue, use `$ sudo service cups restart`. This is the command for restarting the system-wide printing service in Ubuntu. To enjoy the feature-rich CUPS admin interface instead, try going to <http://localhost:631> in your web browser. Note that all changes to printer settings require the root password of your Ubuntu system.

Tune up power settings

These settings mostly affect laptop users, but they can help optimise desktop power consumption as well. Under the Hardware category of System Settings, go to Power and use the first drop-down menu to set up the inactivity period – this is the period after which your computer will automatically suspend. The second option down lets you disable the battery indicator for example. When your laptop always runs from AC, there is no need for this. Another power-related tunable is screen brightness. Either follow the link on the Power tab or open up the Brightness & Lock subsection directly. Here you can set a period of inactivity, after which the display will be turned off automatically and the computer will be locked. You can define whether the user is required to provide a previously set password to unlock the computer.

Fig 2 (above) Ubuntu should automatically detect both local and network printers



Tweak your security settings

Make sure your Ubuntu setup provides proper privacy protection

Privacy is a cornerstone of secure computing. Your data should be protected, your computer should prevent unauthorised access and you should be aware of the personal data that's sent from your system to remote servers. Ubuntu provides a good balance between usability and security. For example you cannot log in to Unity directly; instead you can actually use the 'sudo' prefix to run commands as an administrator. For regular desktop activities there is the System Settings>Security & Privacy subsection, where you can change many settings. Most relate to password protection, keeping logs and history for files and applications, online search results in Ubuntu Dash and diagnostics information that Canonical would use to fix bugs and collect users' statistics. The reasons as to why you may want to change anything may vary. Maybe you don't want others to see what you have been using recently or maybe online search results in Dash distract you. There is another security setting in Ubuntu outside its System Settings shell. When you launch Firefox for the first time it asks you to choose what data you'd like to share. By default Firefox sends crash and help reports to Mozilla, but you still decide and approve them.

Generate a stronger password

01 There is no sense in setting your Ubuntu password as something simple such as 12345678 or P@sswOrd. It is sensible to invent a combination of symbols that is unique, complex, long enough and most importantly something that you are sure you will not forget. A good password contains lower and uppercase letters, special characters and digits. Thankfully, Ubuntu can help you deal better with stronger passwords via the APG utility. Install it with `$ sudo apt-get install apg` and run simply with `$ apg`. APG will prompt you to enter a random word of your choosing, and then converts your suggestion into a stronger combination of characters, but still something readable and not too hard to remember by heart, such as WoudElc6 (Woud-El-Ic-SIX).

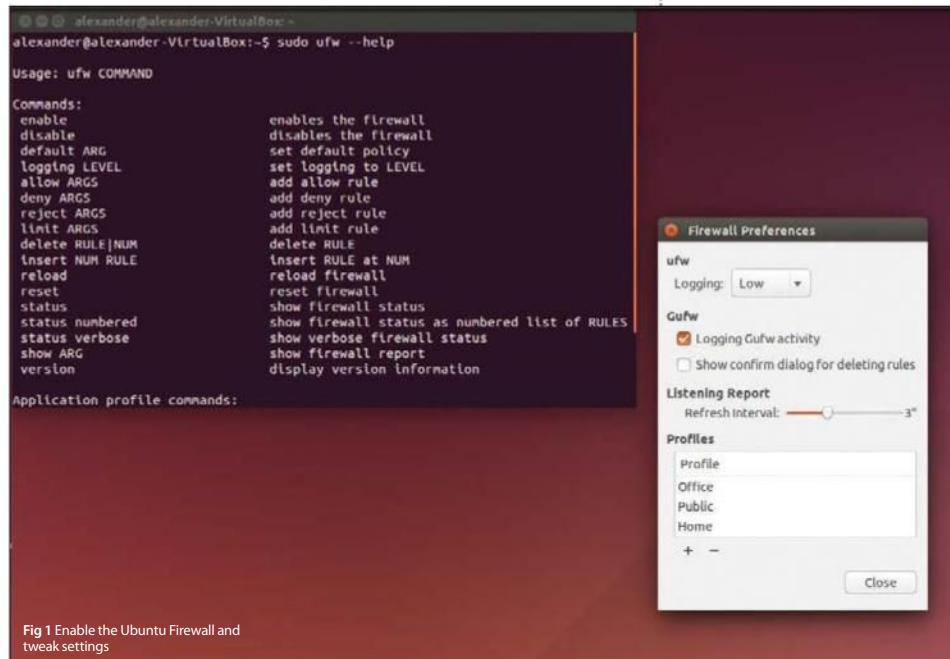


Fig 1 Enable the Ubuntu Firewall and tweak settings

"A good password contains lower and uppercase letters, special characters and digits. Thankfully, Ubuntu can help you"

Enable automatic security updates

02 Let's go a little further and make Ubuntu receive important security updates without any interaction with a user. This feature is very useful because not all updates are installed without your awareness, but only security-related ones that fix vulnerabilities, critical bugs, memory leakage and so on. To enable this feature, first start by installing the package along with the required scripts:

\$ sudo apt-get install unattended-upgrades.

Next, enable updates with the following command:

\$ sudo dpkg-reconfigure -priority-low unattended-upgrades.

All you have to do is to add unattended upgrades command to your Cron list on a daily/weekly/monthly basis. Find more details at bit.ly/1EtLKKF.

Enable uncomplicated firewall

03 Firewall is an effective tool for blocking network intrusions from the outer world and limiting suspicious network activity in both directions by blocking certain network packets in IPv4 and IPv6 protocols. Linux has the 'iptables' tool for doing this job, but it is not very intuitive for newcomers. Luckily, Ubuntu has a nice front end to iptables called UFW – the Ubuntu FireWall (Fig 1) in its standard repositories. Install it with:

**\$ sudo apt-get install ufw
gufw**

You can control it either from command line (**\$ sudo ufw --help**), or within a graphical interface (search for 'firewall' in Dash or simply launch **\$ gufw**).

"Ubuntu provides a good balance between usability and security. For example you can't log in to Unity directly; you can use the 'sudo' prefix to run commands as an administrator"

Find the security settings

Check out the Security & Privacy tools

Protect your PC

If your PC suspends or turns off the display after a period of inactivity, you can set Ubuntu to require a password in order to resume using the PC



Related settings

The first link takes you to the User Accounts subsection, where you can change your password; the second link is for Power settings, where you can change the time period before your system suspends.

Usage activities record

Here is the global switch that triggers file and application usage logging. You can turn it off with just one mouse click, or alternatively decide to make more precise adjustments



Choose what to include

There are default places inside your home directory for Music, Pictures, Downloads, etc. You can decide what items you want to include in Ubuntu logging. Aside from directories, there are also chat logs and office documents

Exclude specific directories and apps

Use the '+' and '-' buttons to select specific directories or applications that Ubuntu will not log or trace. You can even create sophisticated combinations of apps

What about online search results?

A rather controversial feature, which is why Canonical decided to put in the Off mode in 16.04. You can always change the trigger's position here

Diagnostic reporting

Canonical needs your feedback in order to make Ubuntu better. If something goes wrong (eg a program crashes), Ubuntu will send details of the problem in a report to its headquarters

```

alexander@alexander-VirtualBox: ~
GNU nano 2.2.6                               File: /etc/sudoers.tmp

#
# This file MUST be edited with the 'visudo' command as root.
#
# Please consider adding local content in /etc/sudoers.d/ instead of
# directly modifying this file.
#
# See the man page for details on how to write a sudoers file.
#
Defaults      env_reset
Defaults      mail_badpass
Defaults      secure_path="/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin"

# Host alias specification

# User alias specification

# Cmnd alias specification

# User privilege specification
root    ALL=(ALL:ALL) ALL

# Members of the admin group may gain root privileges
%admin  ALL=(ALL) ALL

# Allow members of group sudo to execute any command
%sudo   ALL=(ALL:ALL) NOPASSWD:ALL

^G Get Help          ^O WriteOut        ^R Read File        ^Y Prev Page
^X Exit             ^J Justify         ^W Where Is         ^V Next Page
^K Cut Text          ^U Uncut Text

```

Configure 'sudo'

04 The 'sudo' is a command that you can put before another command in order to make it run with root privileges (Fig 2). You can use sudo anytime and for any command but practically you only need to do so if you haven't got enough permissions with your regular user account – for managing printers, or in case you need to write a file into a directory outside your home for example. Ubuntu comes with sudo enabled by default, which lets you run any command, but requires entering your current password (not the root password, root is disabled in Ubuntu by default). You can change the sudo settings by issuing the \$ sudo visudo command, which will open the /etc/sudoers file in the Nano editor. You can discover the magic of sudo with \$ man sudo, but there are also instant solutions you can use by changing the following line:

username ALL=(ALL) ALL

to the one below:

username ALL=(ALL) NOPASSWD: ALL

to stop sudo asking for a password.

Fig 2 (above) Get root privileges by using the 'sudo' prefix



Find your way around Dash

The nerve centre of the desktop, these essential tips and tricks will have you using Dash like a pro

It is very common for people switching from a Windows platform to a Linux system to look for the ever-popular Start menu. Generally, the Start menu serves as the starting point of your interaction with the computer, and once you get used to it, it feels like the most natural way to work on the computer. Thankfully, Unity – the standard desktop environment for Ubuntu systems – offers Dash. Think of Dash as the equivalent Start menu of your Ubuntu system. Dash allows you to search for applications, files, music and videos, and shows you items that you have recently used. Dash also helps you to launch application and file shortcuts.

To start Dash, simply click on the Ubuntu logo on the top-left portion of the menu bar. You can also press the super key on your keyboard (marked with the Windows logo) to launch it. To exit Dash, all you need to do is click the 'esc' button.

Dash segregates the search results as a series of scopes (or lenses). These are used to provide views to your files, folders, applications and data. There are a few basic scopes installed by default with an option to disable them. Switching off a scope means you won't see any results from that scope in your search results. With so many configurable features, it is evident that Dash is more than a search box for finding files, but rather it provides a view of the whole operating system.

"Generally, the Start menu serves as the starting point of your interaction with the computer, and once you get used to it, it feels like the most natural way to work"



Dash scopes and lenses

Dash serves as the universal window for finding content, but as there are several types of content on the computer, the results are segregated into smaller scopes or lenses (Fig 1). Dash has a series of scopes that logically separate the results and provide views to your files, folders, applications and data. The following scopes are installed by default: Home, Applications, Files, Videos, Music, Photos and Online (social media).

When you launch Dash, you'll see a search bar on the top. This is common to all scopes. Simply start typing and a list of results will appear below. Note that this is the home lens. The home lens is the default and will appear unless you explicitly select another lens. You can explicitly select a lens by clicking one of the options on the bottom bar (when Dash is active). Other lenses will only show the items from the corresponding scope that is relevant to your search query. For example, if you type text as a search query, home lens will show the results from all over the computer, but if you change it to an application lens, you'll see the text editor as the first result.

Dash keyboard shortcuts

There are several shortcuts you can use to speed up your interaction with it. For example, press the super key and hold it for a while; a list of numbers will appear against the Launcher. You can open any of the applications by simply pressing the associated number on the keyboard. While you hold the super key, you will see a window with several shortcuts listed.

To go straight to the applications lens, simply press the super key and the letter A at the same time. Similarly for the music lens, press the super key and M at the same time. For videos, press the super key and V.

Super key+C takes you to photo lens and Super key+F opens the file lens. If you would rather switch between lenses on the fly, you can use Ctrl+Tab to switch between lenses once you are inside Dash.

Fig 1 (above) Search results in Dash are separated into logical categories

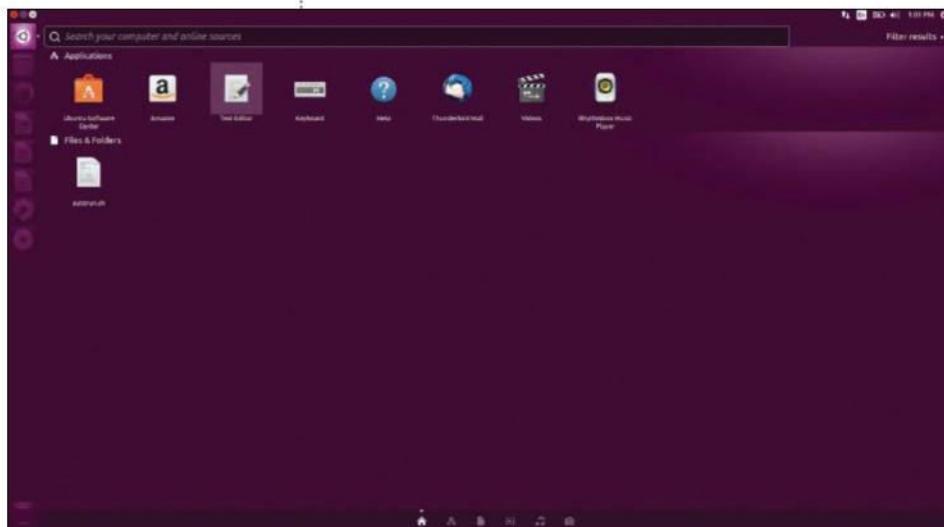


Fig 2 (above) It's possible to customise your Dash search results using the Ubuntu Software Centre

Managing lenses in Dash

Though Dash offers a lot of flexibility in showing search results, you may wish to remove some of the results listed, or add some that are either hidden by default, or simply don't exist. There is a small application available in the Ubuntu Software Centre to help you to do this. Let's install it first. Open Dash. Change the scope to Applications and search for the main menu. In the results that appear, click on the link to the Ubuntu Software Centre. Click Install on the top-right corner of the page to install the software. Now, open the main menu application using the Launcher or Dash.

You can now enable, disable and even permanently delete items or whole categories from here. Check out the categories in the left-hand column. You can uncheck items or categories to hide them, and check to make them searchable again. This will not install or uninstall any software, but just stop results from showing in the Dash search results (Fig 2). This way, you can be sure of not breaking anything important.

Filtering Dash responses

The top-right corner of each lens has the filter option. You can click on the 'Filter results' link to expand the options. Note that the options are contextual – that is to say that there are options under different lenses. In the Home tab the filter option lets you choose which categories are shown and the online sources from where results can be pulled.

The filters for the Applications tab include the ability to filter by type (such as graphics), games, Internet applications and so on. The filters also enable you to narrow down the search between applications that are already installed and applications that appear in the Ubuntu Software Centre. Similarly, if you are in the Files lens, you will be able to filter the results by type, size and the last edited time. Music lens filters by genre and decade. Photo lens filters based on the date that the photo was taken.

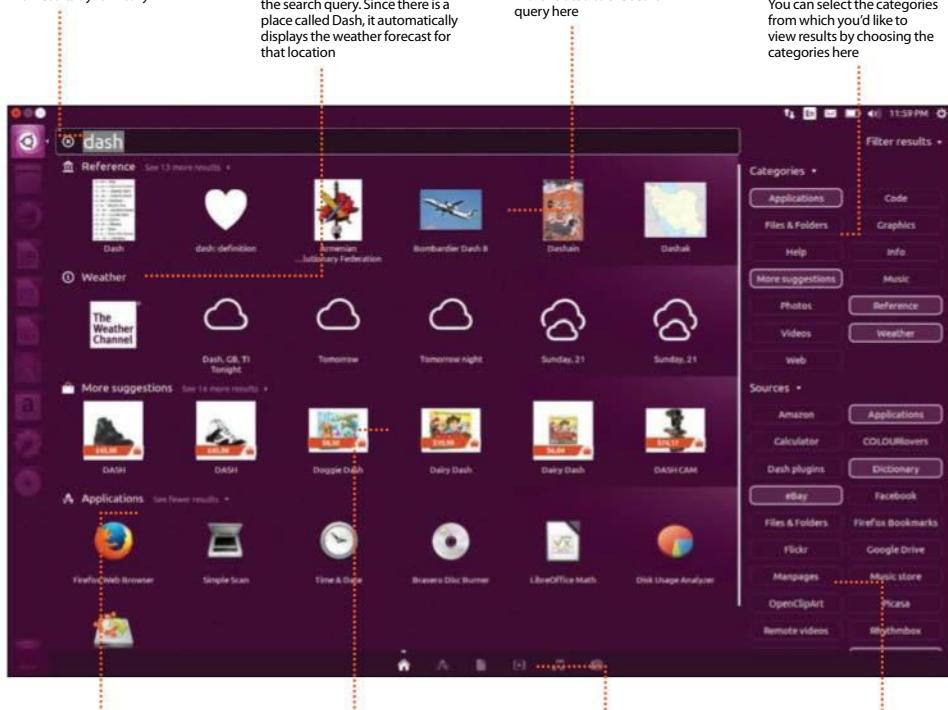
"The top-right corner of each lens has the filter option. You can click on the 'Filter results' link to expand the options. Note that the options are contextual"

Navigate the Dash display

Get familiar with the display and filter options

Text area

This is the space where you type your queries into Dash. As you type in the text, you will see the space below being populated with results dynamically



Applications

This section displays results related to the applications scope. You'll see all the applications that match the search query here

More suggestions

This is the section that displays results from online shopping websites and other sources that are relevant to the search query entered

Reference

This is the Dash result section that displays references related to the search query. You can see the definition, images and more related to the search query here

Categories

You can select the categories from which you'd like to view results by choosing the categories here

Scopes

Dash, by default, shows results from all the available scopes. You can limit the results to specific scopes by selecting them here

Sources

This section allows you to select the sources from where Dash will look for results when you enter a search query



Understanding the file system

Learn about the file system in Ubuntu to keep everything organised

One of the most complex things about any Linux-based computer is probably its file system. There are so many files and folders that serve so many different purposes. To a newcomer just getting started with Linux, all this appears like a huge maze. This calls for a basic, yet clear understanding of how files and folders are organised in Linux, and specifically Ubuntu. This is exactly what we are going to do in this guide. Let's start with the basics.

Ubuntu (like all Unix-like systems) organises files in a hierarchical tree, where relationships are thought of in terms of child and parent. Directories can contain other directories as well as regular files. Any element of the tree can be referenced by a path name – absolute or relative. An absolute path name starts with the character '/' (identifying the root directory, which contains all other directories and files), then every child directory that must be traversed to reach the element is listed, each separated by a '/' sign. A relative path name is one that doesn't start with '/'; in that case, the directory tree is traversed starting from a given point, which changes depending on context, called the current directory. The fact that all files and directories have a common root means that, even if several different storage devices are present on the system, they are all seen as directories somewhere in the tree, once they are mounted to the desired place.

"There are so many files and folders that serve so many different purposes. To a newcomer just getting started with Linux, all this appears like a huge maze"

"Ubuntu (like all Unix-like systems) organises files in a hierarchical tree, where relationships are thought of in terms of child and parent"

Understand file listing

File listing command

The 'ls' command lists all the files in the current directory and the '-l' extension shows the files in long format, along with all the hidden files. When executed from the root directory, it shows all the directories in the top-level hierarchy

First column
The first character indicates whether it is a directory or a file. The other nine characters indicate the permissions for file owners, groups and everybody else

```
total 39
drwxr-xr-x 24 root root 4096 Mar 5 14:51 .
drwxr-xr-x 24 root root 4096 Mar 5 14:51 ..
drwxr-xr-x 2 root root 4096 Mar 5 13:57 bin
drwxr-xr-x 3 root root 4096 Feb 15 17:45 boot
drwxr-xr-x 2 root root 4096 Feb 15 17:33 cdrom
drwxr-xr-x 18 root root 4288 Mar 8 22:19 dev
drwxr-xr-x 134 root root 42288 Mar 5 14:26 etc
drwxr-xr-x 3 root root 4096 Feb 15 17:34 home
lrwxrwxrwx 1 root root 32 Feb 15 17:35 initrd.img -> boot/initrd.img-4.2.0-16-generic
drwxr-xr-x 24 root root 4096 Feb 15 17:40 lib
drwxr-xr-x 2 root root 4096 Mar 5 13:47 lib64
drwx----- 2 root root 16384 Feb 15 17:25 lost+found
drwxr-xr-x 3 root root 4096 Mar 5 14:51 mattermost
drwxr-xr-x 3 root root 4096 Feb 19 09:38 media
drwxr-xr-x 2 root root 4096 Oct 19 14:44 net
drwxr-xr-x 3 root root 4096 Feb 19 09:39 opt
dr-xr-xr-x 182 root root 0 Mar 8 22:18 proc
drwxrwxrwx 2 root root 4096 Oct 21 21:36 root
drwxr-xr-x 26 root root 748 Mar 5 17:20 run
drwxr-xr-x 2 root root 12288 Mar 5 19:55 sbin
drwxr-xr-x 13 root root 4096 Oct 21 21:36 srv
drwxrwxrwt 13 root root 4096 Oct 21 21:28 tmp
drwxr-xr-x 11 root root 4096 Oct 21 21:28 var
drwxr-xr-x 13 root root 4096 Oct 21 21:37 var
lrwxrwxrwx 1 root root 29 Feb 15 17:35 vmlinuz -> boot/vmlinuz-4.2.0-16-generic
```

Special files

Wherever you issue the 'ls' command in Linux, you'll see these two files listed on the top. However, these aren't visible if you inspect the same directory via the GUI. The single dot indicates the current directory; double dot, the parent directory

File names

This is where all the directory/file names are listed. You can see all the top-level Linux default directories here

Second column
This column indicates the number of links or directories inside the directory

Third & fourth column

The third column shows the owner of the file, and the fourth column indicates the groups that the file belongs to

Fifth column

This column shows the size in bytes. You may modify this by using the '-h' option together with '-l'; this will have the output in kB, MB and GB for a better understanding of the size

Sixth column

This shows the timestamp of the last modification of the directory

```
nitish@nitish-UbuntuBox:/$ tree -L 1
.
├── bin
├── boot
├── cdrom
├── dev
├── etc
├── home
├── initrd.img -> boot/initrd.img-4.2.0-16-generic
├── lib
├── lib64
├── lost+found
├── media
├── mnt
├── opt
├── proc
├── root
├── run
├── sbin
├── srv
└── sys
    └── tmp
        └── vmlinuz -> boot/vmlinuz-4.2.0-16-generic

21 directories, 2 files
nitish@nitish-UbuntuBox:/$
```

Fig 1 (above) Explore Ubuntu's file system arrangement using the terminal

Filesystem Hierarchy Standard

01 The Ubuntu file system is based on the Filesystem Hierarchy Standard (FHS). This defines the main directories and their contents in Linux operating systems (Fig 1). For the most part, it is a formalisation and extension of the traditional BSD file system hierarchy. The Linux Foundation – a non-profit organisation consisting of major software and hardware vendors, such as HP, Red Hat, IBM and Dell – maintains the FHS. At the time of writing, the current FHS version is 3.0, released on 3 June 2015.

The root directory

02 Unix abstracts the nature of tree hierarchy entirely, and the root directory is the base of all the folders in the Ubuntu hierarchy. Indicated by the '/' sign, the root directory contains all the other folders (Fig 2). Though the root directory is conventionally referred to as '/', the directory entry itself has no name – its name is the empty part before the initial directory separator character (/). All file system entries, including mounted file systems, are 'branches' of this root. It is because of this layout that all the absolute paths in Unix systems start with '/'. Even if there are several physical or virtual storage devices attached to your computer, all the folders will be shown under the root directory.

Note that this is not to be confused with the /root directory that serves as the home directory for the root users.



Various directories under /

03 Let's now see the various important directories present under the root directory and get an idea of which ones serve what purpose.

/bin is a place for most commonly used terminal commands, such as ls, mount, rm, etc.

/boot contains files needed to start up the system, including the Linux kernel, a RAM disk image and bootloader configuration files.

/dev contains all device files, which are not regular files but instead refer to various hardware devices on the system, including hard drives.

/etc contains system-global configuration files, which affect the system's behaviour for all users.

/home this is the place for users' home directories.

/lib contains very important dynamic libraries and kernel modules.

/media is intended as a mount point for external devices, such as hard drives or removable media (CDs, DVDs etc).

/mnt is also a place for mount points, but it is dedicated specifically to 'temporarily mounted' devices such as network file systems.

/opt can be used to store additional software for your system which is not handled by the package manager.

/proc is a virtual file system that provides a mechanism for the kernel to send information to processes.

/root is the superuser's home directory; it's not in /home/ to allow for booting the system even if /home/ is not available.

/run is a temporary file system available early in the boot process where ephemeral run-time data is stored. Files under this directory are removed or truncated at the beginning of the boot process.

/sbin contains important administrative commands that should generally only be employed by the superuser.

/srv can contain data directories of services such as HTTP (/srv/www/) or FTP.

/sys is a virtual file system that can be accessed to set or obtain information about the kernel's view of the system.

/tmp is a place for temporary files used by applications.

/usr contains the majority of user utilities and applications, and partly replicates the root directory structure, containing for instance, among others, /usr/bin/ and /usr/lib.

/var is dedicated to variable data, such as logs, databases, websites and temporary spool (email etc) files that persist from one boot to the next. A notable directory it contains is /var/log, where system log files are kept.



Sharing files in Ubuntu

Learn to create file servers to share data from your Ubuntu system

The default Ubuntu file manager Nautilus offers an easy-to-use interface to help you share files across systems. Behind the scenes, however, Samba is running the show.

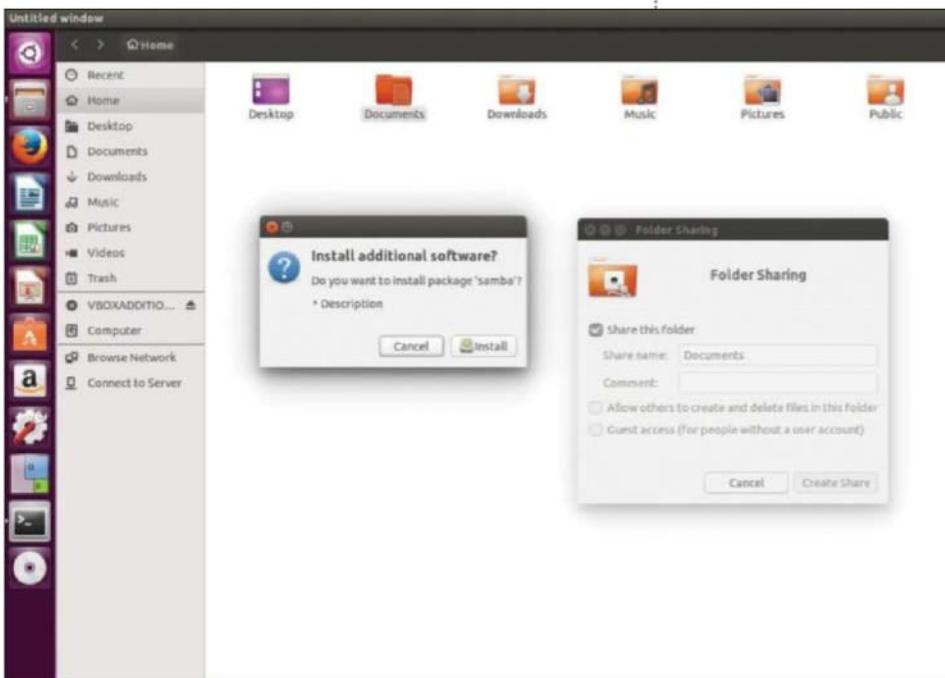
Samba is a software suite for seamless file and print services. It implements the Server Message Block (SMB)/Common Internet File System (CIFS) protocol for Unix systems, supporting file and printer sharing across Windows, OS X and other Unix systems.

Samba is freely available, unlike other SMB/CIFS implementations, and so is widely used on various systems. You can facilitate the file sharing between Ubuntu and Windows computers by configuring Samba as a file server on one of the systems.

Samba can do several other things including acting as a server for SMB clients: you can share printers, including PDF pseudo-printers so all the computers in your network may write PDF files. Samba can also act as a domain controller in a Windows network (authenticating users, and so on) and even help using a Windows domain controller to authenticate the users of a Linux/Unix machine. However we will focus only on the file sharing aspect of Samba in this feature.

Samba is not installed by default in Ubuntu 16.04 and so to start file sharing you'll have to install Samba. We'll see the installation process and the steps to set up file sharing in next sections.

"You can facilitate the file sharing between Ubuntu and Windows computers by configuring Samba as a file server on one of the systems"



Samba server configuration

01 To share a directory, you must have permission to access the directory. For demonstration purposes, let's take a folder from the user's home directory, such as Documents.

Go to your home directory. Right-click on the Documents directory and in the pop-up menu, select Local Network Share. Then check the 'Share this folder' checkbox. If Samba is not installed, you will get a pop-up menu: 'Sharing service is not installed'. Select 'Install additional software' and then click Install (Fig 1). If you get an error message that the samba.deb could not be found, open a terminal and update apt-get like this:

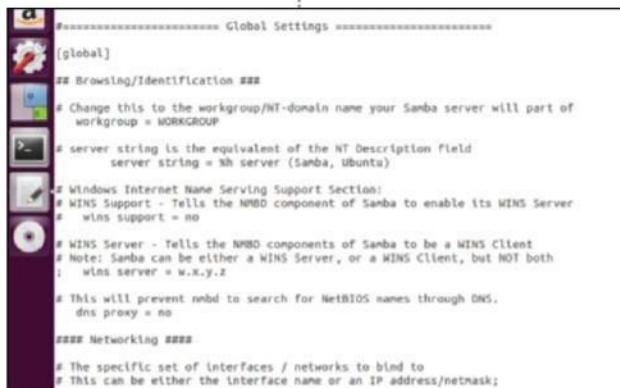
```
$ sudo apt-get update
```

Try again and Ubuntu will download and install Samba. Let's try sharing the folder again. Right-click on the Documents directory and in the pop-up menu, select Local Network Share. Next, check the 'Share this folder' checkbox. And then click the Share button. That's it; the directory should now be shared and accessible from Samba clients. You can also install Samba GUI for Ubuntu. Just type:

```
$ sudo apt-get install system-config-samba
```

...or search for Samba in the Ubuntu Software Centre and install it from there. Once installed, just search Dash for system-config-samba.

Fig 1 (above) Install Samba with just one mouse click



```
#----- Global Settings -----#
[global]
## Browsing/Identification #####
# Change this to the workgroup/NT-domain name your Samba server will part of
workgroup = WORKGROUP

# server string is the equivalent of the NT Description field
server string = %h server (Samba, Ubuntu)

## Windows Internet Name Serving Support Section:
# WINS Support - Tells the NMBD component of Samba to enable its WINS Server
# wins support = no

# WINS Server - Tells the NMBD components of Samba to be a WINS Client
# Note: Samba can be either a WINS Server, or a WINS Client, but NOT both
; wins server = W.X.Y.Z

# This will prevent nmbd to search for NetBIOS names through DNS.
dns proxy = no

#### Networking #####
# The specific set of interfaces / networks to bind to
# This can be either the interface name or an IP address/netmask;
#----- Global Settings -----#
```

Fig 2 (above) Use the configuration file to enable sharing

Samba clients

02 Ubuntu and Gnome make it easy to access files from a Samba server share. To start with, go to the files explorer and locate the 'Browse Network' link on the left vertical menu bar. Open this link and you will see a Windows network icon. Double-click to open it. The next window shows all the domains/workgroups found on your network. Inside each domain/workgroup you will see all the computers on the domain/workgroup with sharing enabled. Double-click on a computer icon to access its shares and files.

Samba configuration file

03 We have learnt about sharing files via the GUI, but directly editing the configuration file gives you several more options and flexibility to implement things exactly how you want to. So, let us now learn how to enable sharing via the configuration file. The main Samba configuration file is located in /etc/samba/smb.conf (Fig 2). The default configuration file has a significant number of comments in order to document various configuration directives. First, edit the following key/value pairs in the [global] section of the config file:

Workgroup = EXAMPLE
Security = user

Note that the 'security' parameter is further down in the [global] section, and is commented by default. Also, change the 'workgroup' value from EXAMPLE to something that better matches your environment. Then, to share a directory, create a new section at the bottom of the file, or uncomment one of the examples:

```
[share]
comment = Ubuntu File Server Share
path = /srv/samba/share
browsable = yes
guest ok = yes
read only = no
create mask = 0755
```

Let's look at the meaning of each section...

comment: a short description of the share. You can adjust it to fit your needs.

path: the path to the directory to share. This example uses /srv/samba/share because, according to the Filesystem Hierarchy Standard (FHS), /srv is where site-specific data should be served. Technically, Samba shares can be placed anywhere on the file system as long as the permissions are correct, but adhering to standards is recommended.

browsable: enables Windows clients to browse the shared directory using Windows Explorer.

guest ok: allows clients to connect to the share without supplying a password.

read only: determines if the share is read only or if write privileges are granted. Write privileges are allowed only when the value is no, as is seen in this example. If the value is yes, then access to the share is read only.

create mask: determines the permissions new files will have when created.

Now Samba is configured, the directory needs to be created and permissions changed. In a terminal, enter:

```
$ sudo mkdir -p /srv/samba/share
$ sudo chown nobody:nogroup /srv/samba/share/
```

Finally, restart Samba to enable the new configuration:

```
$ sudo restart smbd
$ sudo restart nmbd
```

Sharing files with Samba GUI

Learn to share files with Samba

Standard toolbar

In the top-right you will find quick links to settings, add file and help options

Menu bar

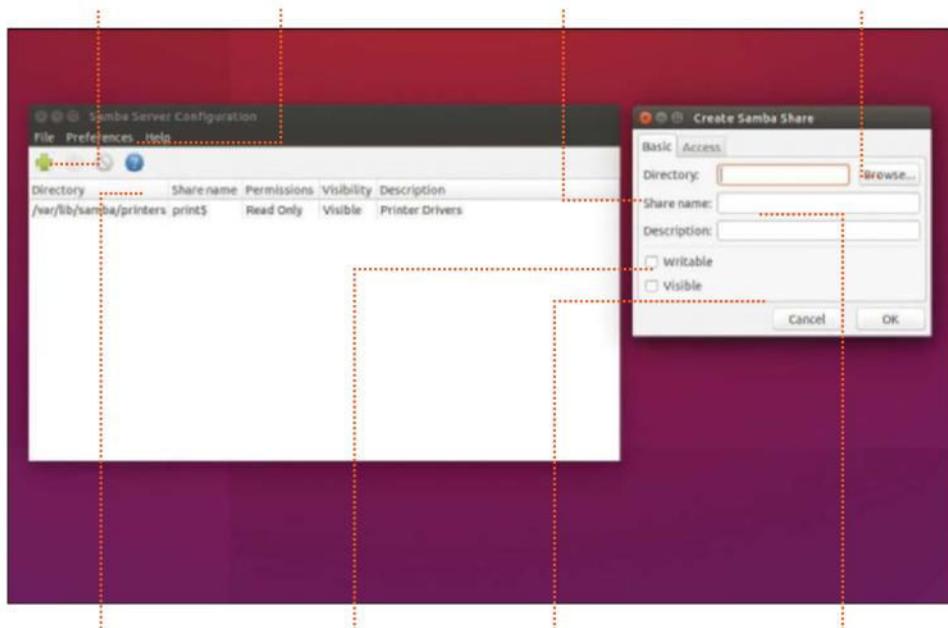
This section has the basic settings to add files to share and set preferences like server group and view all Samba users

Share name

You can set the name for the directory selected above in this section

Samba share directory

Once you click on 'Add file to share', you'll get a pop-up. In the Directory section, just browse and select the directory you'd like to share



Shared files

Here you can see the list of all the files that are available under Samba sharing

Permissions

If you'd like the directory you are sharing to be writable/visible, just tick the corresponding checkboxes

Save or cancel changes

Click OK in order to save the changes to the Samba configuration file and start sharing. If you hit Cancel, the changes are discarded

Description

Set the description for the shared directory here



Manage drives with Disks

Manage hard drives, SSDs and removable media with Ubuntu's Disks tool

Disks manages both local and removable drives, repartitioning them as well as doing backup images and restoring from them. It is quite a straightforward tool, with device list on the left and the currently selected device's details on the right. You can use it to see the model and size of your hard drive, how many partitions it has, its serial number, health status (SMART) and more. Users often launch Disks when they need to do some manipulations with the hard drives, SSDs or removable mass storage with the USB interface. Its illustrative visualisation of a drive's volumes is really useful. If you are not aware about Primary or Extended partitions, you will instantly catch the idea after looking at the graphical scheme under the "Volumes" label in Disks. You can do many advanced tasks with just a few mouse clicks, such as benchmark your drive, put it in a standby mode, create or delete partitions and so on.

Another tool in Disks is its ability to create images from drives (*.img) and to restore such images into other drives. This feature lets you clone all data, logical structure and a bootloader to, say, a newly acquired hard drive that you wish to use as a replacement drive.

Format a USB portable drive

01 Sometimes new hard drives arrive with no partitions at all and Disks will show them as a monotonous rectangle labelled as "Unknown". You may now choose what you want to do. If you go with an upper "gear" button and format the whole disk, you will only create a partition table, not volumes. There is the legacy MBR (Master Boot Record) type, and the modern GPT (GUID Partition Table). The first one is compatible with everything, the other is required by new PCs with UEFI boot and also by large disks (>2TB). Next, you may want to create the actual volume by clicking on a volume-specific "gear" button below and again choosing the Format option. If you plan to access your disk from Windows, use the NTFS filesystem. Otherwise, for Linux-only usage, the best option is to go with Ext4.

- Users often launch Disks when they need to do some manipulations with the hard drives, SSDs or removable mass storage with the USB interface.

Manage your drive

Disks offers a very neat layout with lots of powerful features

See what is connected

Disks shows you all connected drives that it can support (and that is almost everything). The Devices bar lets you select multiple drives and apply some actions to multiple drives at a time

Linux filesystem

Here you can see the drive name as well as its size. The bold label shows you the total capacity of the currently selected drive, while the next line shows the name of the drive, which you can address in console commands

More details

These helpful five lines show you the selected drive's model, size in bytes, partitioning type (MBR or GPT), serial number and assessment information

Extra features

The gear button hides lots of extra features, including options for creating and restoring disk images, benchmarking tool, drive settings dialog and if supported, SMART self-tests

Separate controls for each partition

This tiny button only works for the currently selected partition. It actually allows you to unmount or deactivate a partition and provide a set of options for formatting, removing and benchmarking

Partition details

Once you select a partition, you can see its name, size, available free space, filesystem type and mountpoint. Click the link to open the partition contents in Ubuntu's file manager

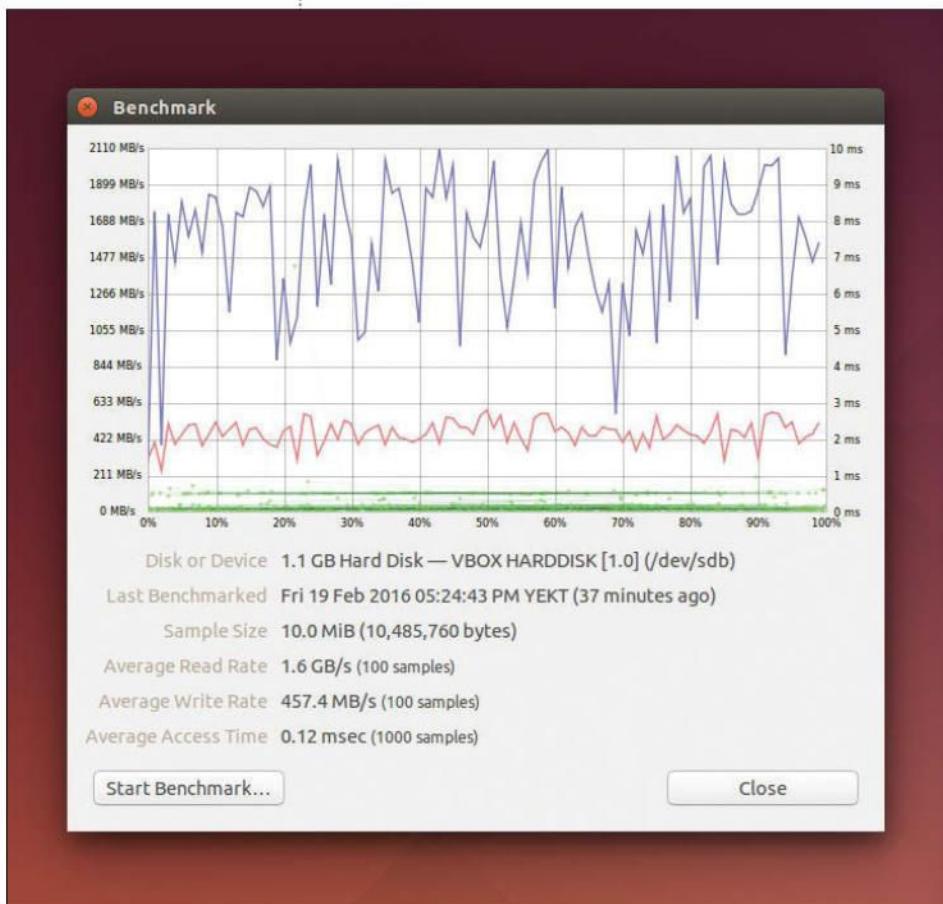
Volumes count and drive structure

Here you can find out how your drive is partitioned, whether there are any extended volumes or a swap partition. The size of the rectangles corresponds to the size of the respective partitions

Benchmark your drive

02 Conducting performance tests is fun but challenging, especially for non tech-savvy users. The Disks application in Ubuntu has a built-in tool that means you can benchmark your drive for read and write speed at any time. First you need to unmount either all volumes (for the whole drive), or a volume you'd like to test. For that reason, you cannot benchmark the root partition of your current Ubuntu system, but there are no other limitations for the rest. Click on the 'gear' tab and select the 'Start Benchmark' option and then 'Start Benchmarking'. You'll get a graph with the red curve for average write rate, blue curve for read rate and green spots for access time (Fig 1). It can help you detect a dying drive before it is too late, and also to compare real-world specs of the newly bought drive with its whitepaper.

Fig 1 (below) Disks' Benchmark tool will analyse your drive's performance



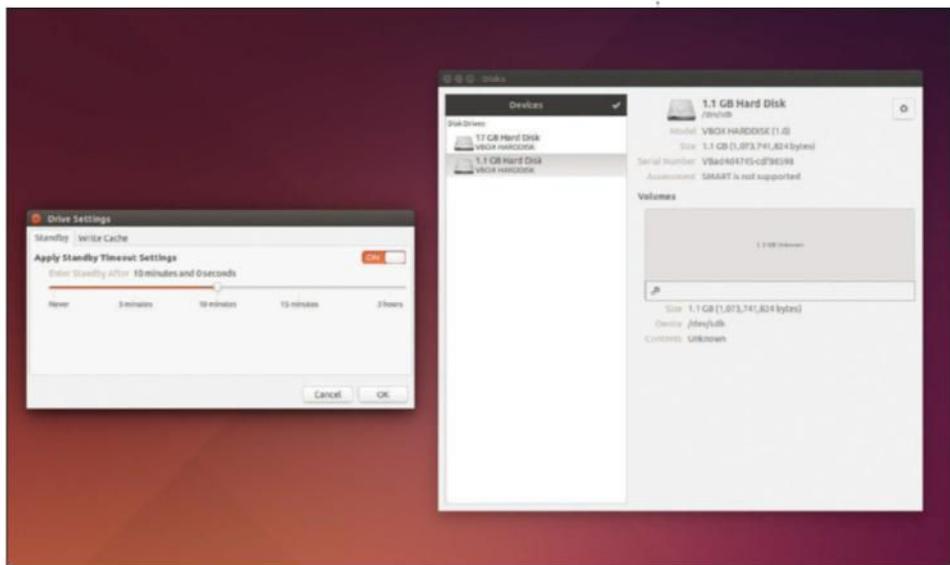
Adjust drive standby settings

03 Drive settings can be sensitive to both desktop and laptop computers. Putting a drive into standby mode not only helps save some watts but also reduces heating, and even makes the system quieter. Regardless of the default behaviour of your drive in Ubuntu, you can explicitly set it to go to sleep after a certain length of time. Click on the 'gear' icon and go to Drive Settings, where you can move the 'Apply Standby Timeout Settings' switcher to the 'on' position. Now you drag the slider and set the preferred timeout value, after which the drive will go on to standby (Fig 2). Similarly, you can decide whether you want to enable or disable write caching – just go to the 'Write Cache' tab and choose the desired mode. When caching is enabled, your drive works faster but may get corrupt your files in case of power outage.

Create an image and restore from it

04 A hard drive image is a very handy thing compared to plain file backups. It stores all drive structure, bootloader records and all other drive details, letting you replicate your setup onto another physical drive. Again, in case of an ageing drive, which you feel can break at any time, there's no better way to save it other than create an image. Depending on what 'gear' button you use, you can either create an image of the whole drive, or just the current partition. When you choose the 'Create Disk Image' option, Disks will prompt you to choose a destination directory for the image file. Note that it must be saved on another physical drive. Later on you'll be able to restore the drive form the image file using the 'Restore Disk Image' option.

Fig 2 (below) Use Disks to apply timeout settings on your system





Get to grips with the Linux command line

Well-chosen words can save you jumping through GUI hoops, so ensure you use the right commands

The command line may be an older interface, but the reason it's survived is the power to tell the computer, in a few apposite commands, exactly what you want. For example, a single command can copy all of the MP3 and MP4 files in a directory to a backup disk or a machine elsewhere on the network – or anywhere else on the Internet.

Many people's first encounter with a computer – perhaps at university in the 1970s or 1980s – was seated at a dumb terminal, known as a console, connected to a distant, and very large, computer. Nowadays, computers can be the size of a credit card – like the Raspberry Pi – but the old-fashioned terminal is remembered in the form of the terminal program that gives you a command-line interface to Ubuntu.

Depending on which flavour of Ubuntu you are running, the terminal may have a different name, but type 'term' into the app search of Unity Shell, or your menu, and you will bring up at least one choice of terminal. Open this up and you should see a fairly empty-looking window. Don't be scared of that blinking cursor – usually the '\$' sign, known as the 'dollar prompt'. It's waiting to do whatever you tell it. You just need to know the right words – or commands – to get it going.

Here's an easy one for you to try first: type **evince** into the terminal - we'll put the instructions you need to type into bold, so you can see commands more clearly; always press Enter afterwards, to let Ubuntu know it's now got to do something.

Provided you didn't mistype, you'll have just opened Ubuntu's PDF reader, without using a GUI menu or shortcut item.

```

Terminal
richard@x200t:~/Documents$ cd -
richard@x200t:~$ touch random.txt
richard@x200t:~$ ls
bin  code  Documents  github  Pictures  random.txt  test  web
blog Desktop  Downloads  Music  Public  Templates  Videos
richard@x200t:~$ mv random.txt newname.txt
richard@x200t:~$ mv newname.txt Documents/
richard@x200t:~$ ls Documents/
art      cv          job      notes    tabs
bradwall Get_Invited_Ticket_96614.pdf  meetup   pdf      write
coding   humour      newname.txt  notes    recipes
richard@x200t:~$ file Documents/newname.txt
a

```

Fig 1 (left) The mv command is used in order to move files from one location to another

Files, folders, and familiar things

Time to get the command line working for you, on your files and folders

To look inside your Documents folder, open a terminal and type `ls Documents`. Don't forget to press Enter to see a listing of all of the files in Documents. Type `ls` and you'll see a listing of the files in your home directory – that's because when you open a terminal, it places you in that directory. You can change by using the change directory command – `cd` – like this: `cd Documents`. Now `ls` alone will show you yourself.

The `cd` command will take you back because the `-` is a shortcut to tell it to get back to where you were before. You can also type `cd ~` to go straight to your home folder – `home/username` or whatever you may have named you when you are now.

Confusing file names – these are called *aliases*, because their names are preferred over other, more normally used names. If you're learning, you can replace them with your own. Open `Home/username/.bashrc` at the bottom, it's line 1:

The `~` and `..` shortcuts to the directory and parent directory, or the one above. These are very useful in place of `~`. These letters after the hyphen are called *options* and the switches for `ls -l`. For long listing, well tell you about some of that crazy looking stuff in a bit.

Moving and copying files is very much an extension of `cd`. See in our overview box for how we will replicate Fig 1 and extend it to move our files to a new location.



Look Inside

You don't need to open any applications to view files and info. The `file` command will let you see what sort of file it is, `cat` shows the contents of the file, `more` or `morepager` gives them to you page at a time. `less` does the same thing with more controls, and if you've got stuck, you don't know to press `Ctrl+C`? `C` will also exit the pages for other apps. `Ctrl+C` is a good bet for quitting. Sometimes you just want to see the head of a few lines of a file – `head` and `tail` are the commands you need, each defaulting to ten lines. `tail -n 30 /var/log/syslog` shows you the last 30 things registered by that log file. `ps aux` gives you who's using `ps`, `ps aux` to search for a term inside a file, `grep`, `ls -r` `bash_history` to pull out all the instances of what you have used so far.

```

cd ../../..
cd pdf
cd manual/lang/idris
cd ../../..../python/3.2/
cd ssnw/
cd ~/Documents/pdf/manual/
cd -
cd ..
cd ssnw/
cd ..
cd -
python3 manage.py syncdb
python3 manage.py syncdb
cd ..../code/haskell/hakyll/
cd source/
cd ../pi
cd ../Documents/pi
cd ~/Music/
cd ../../closure/
cd cftbat-code/
cd ~/Documents/code/closure/cftbat-code
cd /mnt/etc/
cd -
richard@x200t:~$ grep cd .bash_history

```

Fig 2 (above) The grep command enables you to search for terms inside files

Fig 3 (right) Most commands have manuals, accessed with the man command

```

apt(8)                               apt(8)                               apt(8)

NAME
    apt - command-line interface

SYNOPSIS
    apt [-h] [-o=config_string] [-c=config_file] [-t=target_release]
        [-a=architecture] {list | search | show | update |
        install pkg [{=pkg_version_number} | /target_release]}... |
        remove pkg... | upgrade | full-upgrade | edit-sources |
        {-v | --version} | {-h | --help} }

DESCRIPTION
    apt (Advanced Package Tool) is the command-line tool for handling
    packages. It provides a commandline interface for the package
    management of the system. See also apt-get(8) and apt-cache(8) for more
    low-level command options.

    list
        list is used to display a list of packages. It supports shell
        pattern for matching package names and the following options:
        --installed, --upgradable, --all-versions are supported.

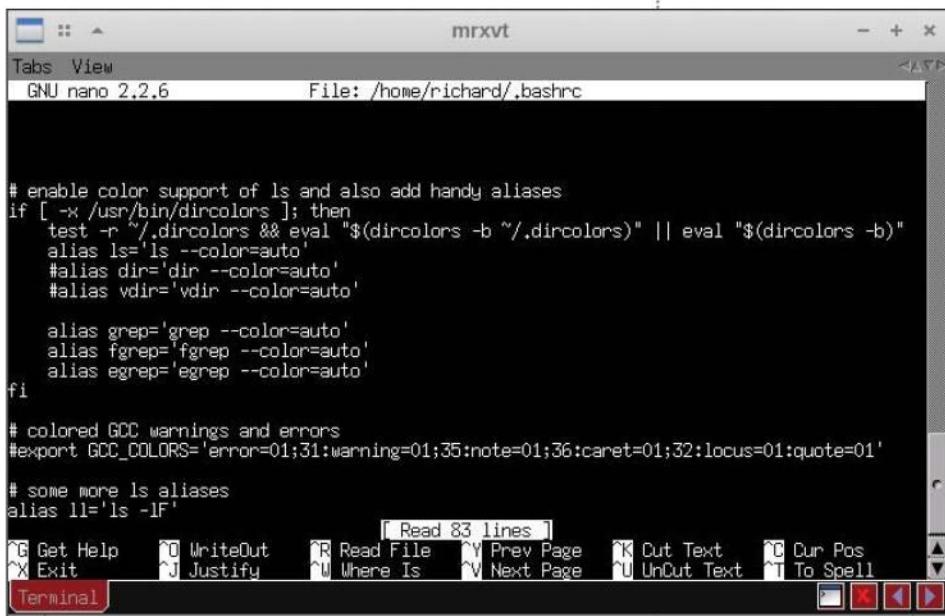
Manual page apt(8) line 1 (press h for help or q to quit)

```

Tab complete

If you think that's a lot of typing, try hitting the Tab key after a couple of letters of each word. Where there's only a single possible completion, the word will be automatically filled in. Two tab clicks brings up suggestions where there are multiple possibilities.

If you want to know more about a command, they (almost) all have manuals – or man pages (Fig 3). **man ls** will tell you all about options for **ls**; **ls** will tell you about the manual command itself.



Using Nano

Looking inside a file is all very well, but often we need to quickly change something inside it.

In this example, we're going to use Nano, a command-line text editor (Fig 4). There are many more powerful editors – and many a little friendlier, too – but Nano is included in Ubuntu, and many other flavours of Linux, so it's handy to know the basics.

We'll edit the `~/.bashrc` file, a collection of customisations for the shell environment; don't worry that much of it won't yet make sense. To offset the risk of damage to your command environment, back up the file first: `cp .bashrc .bashrc.bak` – then `nano .bashrc`.

Find the section with the alias commands near the end. Note that the ones with a # in front of them are inactive (said to be commented out) – remove the # to get one to work next time you log in or open a new terminal session.

You can use the arrows to navigate to the text you want to edit; delete and type in new text as required. Nothing too strange so far, until you've finished: note those two lines at the bottom of letters preceded by a ^ (caret). These are the keyboard commands – the ^ represents the Ctrl key – type ^O (hold down the Ctrl key and hit O), and your work will be saved; hit ^X and you'll exit Nano.

You can set a temporary alias directly, which will last until you close the terminal down (Fig 5):

```
alias myplace='ls -lahF /home/richard/'
```

Fig 4 (above) Nano is included in Ubuntu and most other Linux distros by default

```
richard@x200t:~$ alias myplace='ls -lAhF /home/richard'
richard@x200t:~$ myplace
total 368K
drwx----- 3 richard richard 4.0K Dec 20 17:52 .adobe/
drwx----- 2 richard richard 4.0K Jan  4 18:34 .aptitude/
drwx----- 8 richard richard 4.0K Feb  1 12:49 .atom/
-rw----- 1 richard richard 12K Feb 22 13:17 .bash_history
-rw----- 1 richard richard 220 Dec 20 13:10 .bash_logout
-rw----- 1 richard richard 37 Jan 11 18:36 .bash_profile
-rw----- 1 richard richard 2.7K Feb  2 07:12 .bashrc
drwx----- 2 richard richard 4.0K Feb  2 07:14 bin/
drwx----- 6 richard richard 4.0K Jan 11 18:23 blog/
drwx----- 7 richard richard 4.0K Jan 20 18:20 .cabal/
drwx----- 23 richard richard 4.0K Feb 23 11:29 .cache/
drwx----- 3 richard richard 4.0K Dec 20 13:16 .cinnamon/
drwx----- 18 richard richard 4.0K Feb 22 21:05 code/
drwx----- 49 richard richard 4.0K Feb 22 16:42 .config/
drwxr-xr-x 3 richard richard 4.0K Feb 21 21:45 .conky/
-rw-r--r-- 1 richard richard 3.0K Feb 21 21:45 .conkyrc
drwx----- 3 richard richard 4.0K Dec 20 13:15 .dbus/
drwx----- 2 richard richard 4.0K Dec 20 13:15 Desktop/
-rw-r--r-- 1 richard richard 28 Feb 22 15:56 .dmrc
drwx----- 14 richard richard 4.0K Feb 23 11:16 Documents/
```

Fig 5 (above) Setting a temporary alias means it will last until the terminal is closed

Permissions, please

Ubuntu files are protected from alterations by other users on a shared machine. All files and folders belong to a user – it doesn't have to be a person, it could be a piece of software, like a web server – and a group. Permissions on each file relate to whether a user, group or anyone else can read, write or execute the file; this is abbreviated as rwx permissions. For directories, execute permission is just permission to open. Execute a file means run it as a program – so a JPG picture file doesn't have permission to run, nor does a spreadsheet file, meaning the embedding inside one of malicious code is much harder to accomplish for virus writers.

From whichever directory you are currently in, create an empty file – `touch testfile` will do the trick – then `ls -l`. The long listing shows you permissions (see opposite), and you can see the default permissions of a newly created file. Enter `mkdir testfolder` and you can see the permissions of a newly created directory. Remove the file with `rm testfile` – you'll need the recursive switch to remove a directory: `rm -r testfolder`.

No attachment?

While the protection offered by permissions is very useful, they are also there to trip up the unwary. For example, using `sudo`, you may have copied files from another user's home folder. Unless you change the ownership (see opposite), you may be left scratching your head when you try to attach the files to an email, and they just won't stick – because you don't even have permission to read the files!

"Permissions on each file relate to whether a user, group or anyone else can read, write or execute the file; this is abbreviated as rwx permissions"

Long listing

Running `ls -l` lets you see who owns a file or folder, and who has permission to read, write and run software. Three groups of rwx in the listing apply, respectively, to the named user, the named group, and everyone else left

```

richard@x200t:~/code/sh$ ls -lh ~/code/clojure/clojure-noob/
total 48K
-rw----- 1 richard richard 790 Nov 7 23:23 CHANGELOG.md
drwx----- 2 richard richard 4.0K Nov 7 23:27 dev-resources
drwx----- 2 richard richard 4.0K Nov 7 23:23 doc
-rw----- 1 root   root   11K Nov 7 23:23 LICENSE
-rw----- 1 richard richard 371 Nov 7 23:23 project.clj
-rw----- 1 richard richard 475 Nov 7 23:23 README.md
drwx----- 2 richard richard 4.0K Nov 7 23:23 resources
drwx----- 3 richard richard 4.0K Nov 7 23:23 src
drwx----- 5 richard richard 4.0K Nov 8 23:26 target
drwx----- 3 richard richard 4.0K Nov 7 23:23 test
richard@x200t:~/code/sh$ sudo.chown richard:richard ~/code/clojure/clojure-noob/LICENSE

richard@x200t:~/code/sh$ ls -lh ~/code/clojure/clojure-noob/LICENSE
-rw----- 1 richard richard 11K Nov 7 23:23 /home/richard/code/clojure/clojure-noob/LICENS
E
richard@x200t:~/code/sh$ chmod 644 ~/code/clojure/clojure-noob/README.md
richard@x200t:~/code/sh$ ls -lh ~/code/clojure/clojure-noob/README.md
-rw-r--r-- 1 richard richard 475 Nov 7 23:23 /home/richard/code/clojure/clojure-noob/R
EADME.md
richard@x200t:~/code/sh$ ls
backup.sh
richard@x200t:~/code/sh$ /home/richard/code/sh/backup.sh
bash: /home/richard/code/sh/backup.sh: Permission denied
richard@x200t:~/code/sh$ chmod u+x backup.sh
richard@x200t:~/code/sh$ ./backup.sh
Making back up . . .

```

Give me the file

If you've copied a file into your folder using `sudo`, you may have left it with root ownership. Change the ownership with `chown jo myfile.txt` – for example – and the group with `chown :audio myfile.mp3`. Fill both sides of the `:` to change user and group ownership together

Octal code

The rwx – read / write / execute permissions – are given respective values of 4, 2 and 1. To give a file read + write + execute permissions, 4, 2 and 1 are added to give 7. For just read and execute, 4 + 1 = 5. Applying the former to user and group, and the latter to 'other', `chmod 755 file.txt`.

Run with it

A file becomes a program when it can be run. You write or download a shell script, say `backup.sh`, and try to run it `./backup.sh` – and nothing happens. You need to give it executable permissions: to save the octal adding, you can just `chmod u+x backup.sh`. You can also call it with `sh backup.sh`.

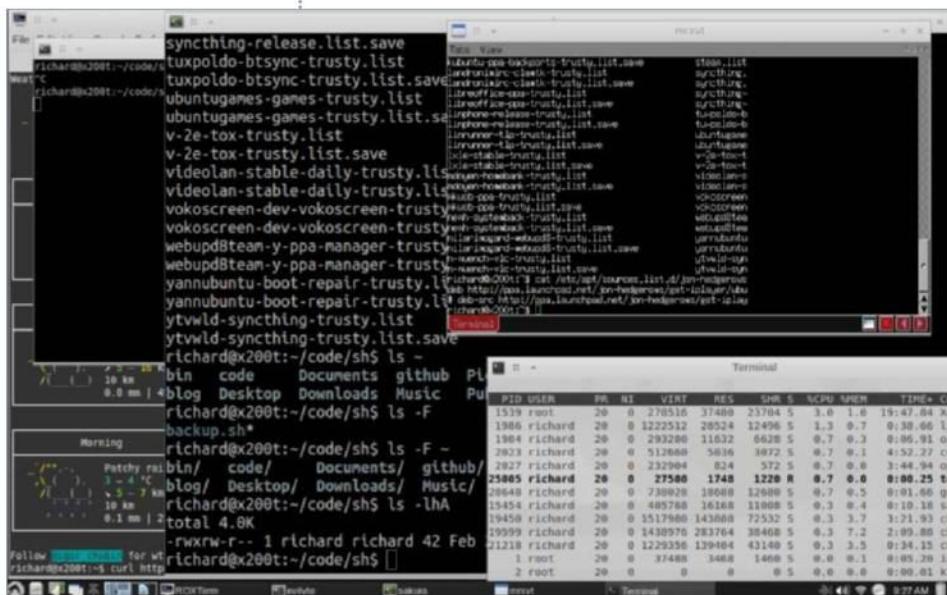


Fig 6 (above) The Linux command line may seem complicated at first but you will soon master it

Give me more software

Despite every flavour of Ubuntu having a graphical program to install software onto the system, you'll usually see projects supplying the command-line way of getting their software. The reason for this is that the command-line instructions are direct and unambiguous. Let's try it out, and you'll see what we mean.

Ubuntu, as you may have read elsewhere within these pages, is based upon Debian, one of the earliest GNU/Linux distributions, dating back to 1992. It's an open collaborative project between over a thousand developers across the world co-operating over the Internet, which has contributed to its longevity. So too has the Debian package management system, and the command-line program to manage fetching and installing the packages. Apt – the Advanced Package Tool – keeps track of all of the software in Ubuntu's repositories, and takes care of any dependencies on other packages when you install. It's what the Ubuntu Software Centre uses behind the curtain of that graphical interface.

Every step that involves installing software on your system needs root, or superuser, permissions: on Ubuntu this is done by prefixing the command with 'sudo'. On some other systems you would log in as root user; you can temporarily do this on Ubuntu by running `sudo -s` or `sudo bash`, but we don't recommend it, as it's easy to get into the habit of running with root permissions, and to accidentally cause some damage.

Update Ubuntu's knowledge of the latest available packages with `sudo apt-get update`. You can look under `/etc/apt/` to see the source files where Ubuntu remembers which repositories to look in. You can

```

mrxvt
Tabs View
Ign http://us.archive.ubuntu.com trusty/restricted Translation-en_US
Ign http://us.archive.ubuntu.com trusty/universe Translation-en_US
Fetched 204 kB in 10s (18.9 kB/s)
Reading package lists... Done
richard@x200t:~$ sudo apt-get install get-iplayer
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following packages were automatically installed and are no longer required:
  id3v2 libid3-3.8.3c2a
Use 'apt-get autoremove' to remove them.
The following extra packages will be installed:
  atomicparsley libimage-exiftool-perl libmp3-tag-perl
    libnet-smtp-tls-butmaintained-perl
Suggested packages:
  texlive-latex-extra
The following NEW packages will be installed
  libimage-exiftool-perl libmp3-tag-perl libnet-smtp-tls-butmaintained-perl
The following packages will be upgraded:
  atomicparsley get-iplayer
2 to upgrade, 3 to newly install, 0 to remove and 1 not to upgrade.
Need to get 2,811 kB of archives.
After this operation, 13.0 MB of additional disk space will be used.
Do you want to continue? [Y/n]
Terminal

```

**"Apt – the Advanced Package Tool
– keeps track of all of the software in
Ubuntu's repositories, and takes care of
any dependencies on other packages"**

edit these manually to add more, and to change version for upgrading (proceed with care!). But the simplest way to add a new repository is with `sudo apt-add-repository ppa:jon-hedgerows/get-iplayer`. After which you'll need to run `sudo apt-get update` again, before installing from the repository: `sudo apt-get install get-iplayer` (Fig 7). The `get-iplayer` script is a command-line piece of software for timeshifting BBC radio (and TV) programmes; `apt-get upgrade` will install all of the security updates and bugfixes that have been made recently.

This is something you should run regularly (but to save you the trouble, Ubuntu tells you that updates are available, and regularly asks permission to get them). Run `apt-cache search terminal` to find alternative terminal programs, and `apt-cache show eterm` to examine one of them. Now you know the basics, explore a little more.

Fig 7 (above) Use the command line to manually add a new repository



Use GNOME Terminal & Xterm

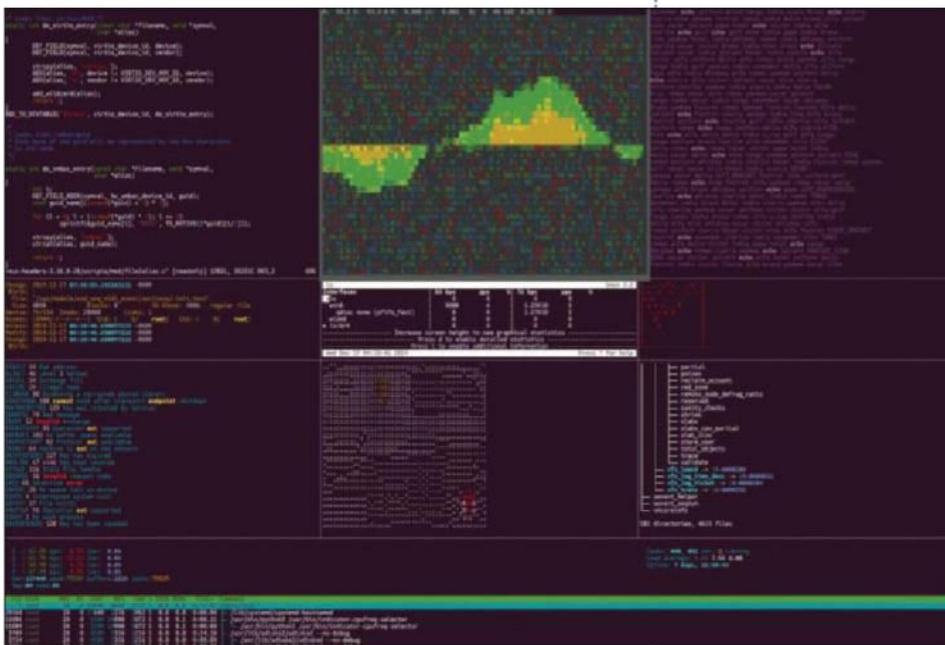
Explore the basics and benefits of the terminal emulators in Ubuntu

Ubuntu ships with two terminal emulators. One is GNOME Terminal, a widely used program and probably the only known terminal application for many Ubuntu users. GNOME Terminal is one of many GTK-based apps that Unity desktop shares with GNOME Shell – many tools and accessories are the same in Unity and GNOME.

GNOME terminal looks clean and minimalist, but it has enough settings that let you configure this small application to suit your needs and tastes. Choose Edit>Profile Preferences to edit the current ‘Default’ profile for the sake of different behaviour or a custom look and feel. GNOME Terminal makes interaction comfortable between graphical applications and the Bash shell thanks to the support of drag and drop for text strings, copy and paste with both keystrokes and context menus, and mouse scrolling in terminal mode.

Xterm is entirely different; it is a tiny, old-school thing that hasn’t changed much since 1984, and was initially developed before the X Window System saw the light. Xterm uses the same Bash shell as GNOME Terminal does, so the commands behave in exactly the same way in both terminals. Xterm is very helpful in an emergency; if your main desktop fails to load and you just need to get to graphical mode, use something like `$ xinit xterm`. It never breaks!

“GNOME terminal looks clean and minimalist, but it has enough settings to tailor to suit your needs and tastes”



Change Bash to something else

01 Every Linux distribution uses Bash (Bourne-again shell) in text mode and graphical mode within a terminal emulator, including Xterm and GNOME Terminal. Bash has a very rich set of supported commands, but the most useful feature comes from its popularity; all Linux users use their terminals with the same syntax. However, there are other shells – such as a highly customisable ZSH with an even wider feature set, or CSH with a built-in scripting language – that have similarities with the C language. To change the default shell from Bash to something else in GNOME Terminal, go to Edit>Profile Preferences, switch to the Title and Command tab, enable the ‘Run a custom command instead of my shell’ option and put the name of your desired shell in the Custom Command field.

Change fonts, colours and background

02 Let’s make the GNOME Terminal look a little more personal by changing text font, colour and background (Fig 1). Go to Edit>Profile Preferences and switch to the Colors tab. Uncheck the ‘Use colors from my system theme’ option and choose any combination of colours for text, text in bold and background. There is a list of good presets in the ‘Built-in schemes’ drop-down menu; it can save you from an agony of choosing. To change the font itself, go to the General tab and uncheck the ‘Use the system fixed width font’. After that, you’ll be able to select another Mono font.

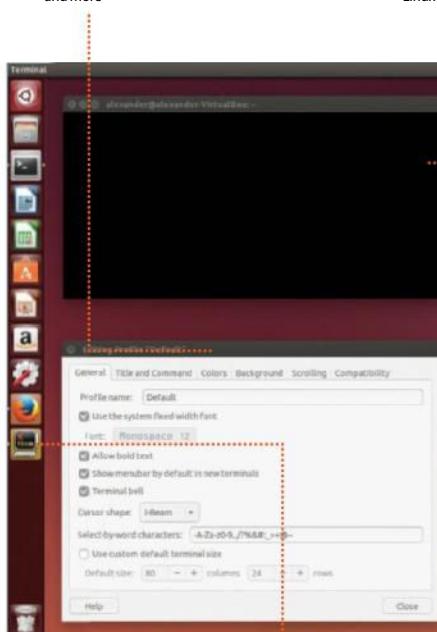
Fig 1 (above) Personalise your GNOME Terminal by adding colour

"Bash has a very rich set of supported commands, but the most useful feature comes from its popularity; all Linux users use their terminals with the same syntax"

Save yourself time Working with terminal emulators is easier than you'd think

Edit your terminal profile

Change the title, cursor shape, scrolling options and command behaviour, as well as colours, fonts, some historic legacy stuff (like Backspace and Delete-key behaviour) and more

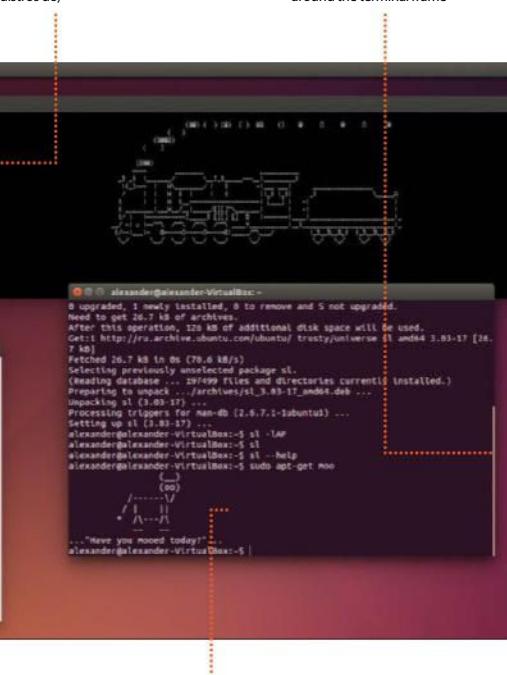


The icon says it all

You won't confuse Xterm with any other terminal emulator thanks to that distinctive icon, boasting support for 256 colours on that expressive cathode-tube display

Try a fail-safe solution

Xterm is relatively old, however, it delivers a pure Bash experience without any bells and whistles. Xterm comes in every OS that uses X.org (all Linux distros do)



Enjoy the convenience of GNOME Terminal

GNOME Terminal fits well into the Ubuntu design with its recognisable Ubuntu Mono font and deep-purple background. However, you can change these and other settings with several mouse clicks

Learn some helpful shortcuts

03 Knowing tricks for GNOME Terminal in Ubuntu can save time and increase productivity. We start with the simplest: launch the application using the Ctrl+Alt+T sequence anywhere in Unity. When browsing your files in Nautilus, it is useful to open a terminal window for the current directory. Nautilus can do it when you right-click on an empty space within a view area and select 'Open in Terminal', but this feature is not enabled by default in Ubuntu. Fix it with the following command:

```
$ sudo apt-get install nautilus-open-terminal
```

then restart the file manager. When you need to copy or paste text, use Ctrl+Ins and Shift+Ins respectively, instead of laboriously right-clicking menus. To clear the input, you can either cancel a command with Ctrl+C, or clear what has been written with Alt+R.

Have some fun

04 Working in the terminal goes long into the history of Linux and UNIX, so it's no wonder we have a decent number of discovered Easter eggs and jokes that bring in some fun and help you to feel more comfortable in the terminal. Start with \$ sudo apt-get install moo to bring up a jolly cow (Fig 2), find another Easter egg with \$ aptitude moo and then \$ aptitude --v moo and add an extra 'V' three more times to see a snake that has eaten an elephant. The \$ s1 shows a steam locomotive and finally the \$ fortune | cowsay shows a cow that tells your fortune. However, to finish up, let's do something massive and change our boring GNOME Terminal to a Hollywood Technodrama showcase, mimicking an FBI command centre (Fig 1, page 63):

```
sudo apt-add-repository ppa:hollywood/ppa
sudo apt-get update
sudo apt-get install Hollywood
```

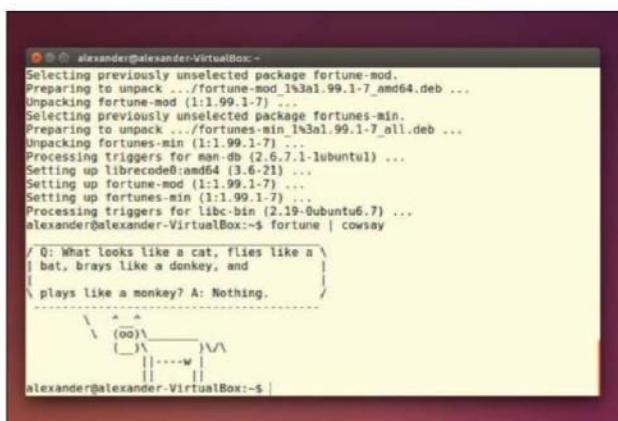


Fig 2 (left) Perform the \$ fortune | cowsay command and see this guy



Secure files with Déjà Dup

Create an extra copy of your valuable data and keep it updated

Having a backup copy of your photos, documents, music and video files is a high priority to keep them safe, even though some novice users opt to skip the process. Imagine that something has gone wrong with your hard drive and it can no longer boot up. The bad news is that while you can buy a new hard drive, you may well lose your data on the old one, which is often more precious than any hardware you might have lost.

So here comes the finest hour for a backup copy that you have prepared beforehand and kept updating regularly. And there's no excuse not to do it, since Ubuntu includes a great tool for automatic and hassle-free backups called Déjà Dup – also known by the simpler name, Backups.

Using Déjà Dup is as simple as it can be: you choose what you want to back up and where, opt to specify what directories it should skip and then put the task into the automatic queue of the Ubuntu scheduler, which can perform backups periodically and even keep new and older backups at the same time. The interface of Déjà Dup has a category tree on the left and a main part to the right, with a clear arrangement of easy-to-use controls. The default setup assumes you might want to back up your ~/home directory with an exception for Trash and ~/Downloads, so you may leave it intact and go ahead with this safe assumption, or opt to customise the list of included and ignored directories to your liking.

"Having a backup copy of your photos, documents, music and video files is a high priority to keep them safe"

Secure your data quickly

Check destination

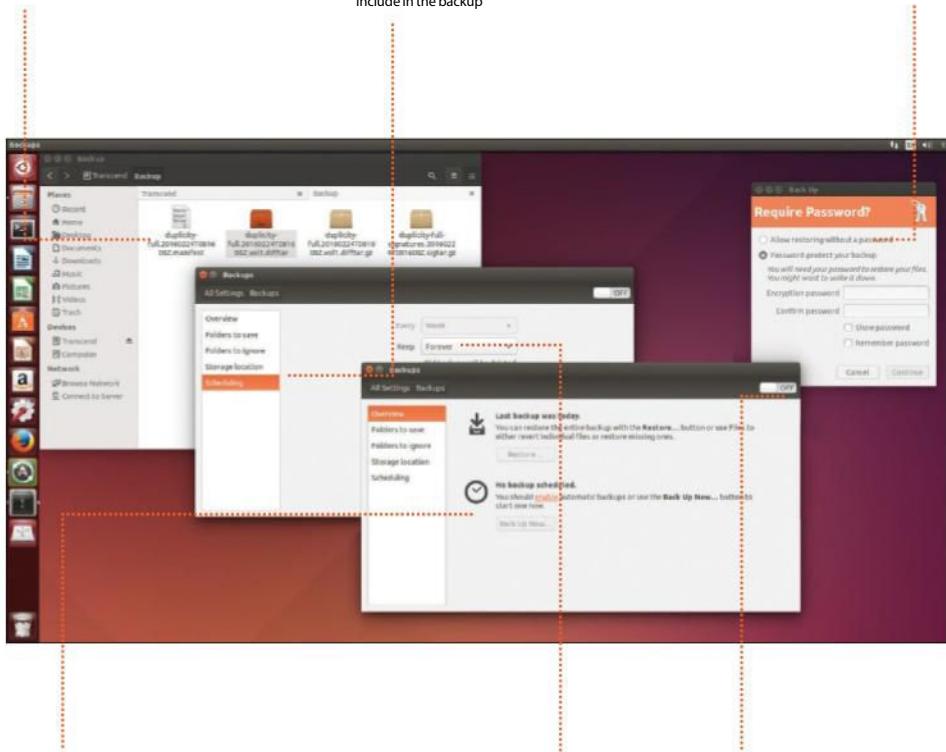
Déjà Dup stores backed up files in the form of archived files that can be handled with the Duplicity utility. You can't extract the files with a regular unarchiver

Proceed with important routines

Choose where you want to store a backup copy and optionally define what directories you want to ignore and not include in the backup

Decide to go more secured

When a backup process starts, the wizard prompts you to set a password. You may choose to protect your backup copy with it, or opt to go without any passwords



Overview your backup

The starting screen in Déjà Dup shows when the last backup copy was made and when the nearest next backup will take place. There's also a link that triggers the automatic backups switch

Set up scheduling

Here you can select the frequency of regular automatic backups. Depending on your workflow, choose daily or weekly backups and also set the time for keeping older backup copies

Choose manual or auto mode

By default, Déjà Dup doesn't enable automatic backups right away, but you can trigger this switch and if you set the rest of the routine correctly, you'll get unattended backups

"There's no excuse not to do it, since Ubuntu includes a great tool for automatic and hassle-free backups called Déjà Dup – also known by the simpler name, Backups"

Set up your backup correctly with Déjà Dup

Get the settings right to secure your data

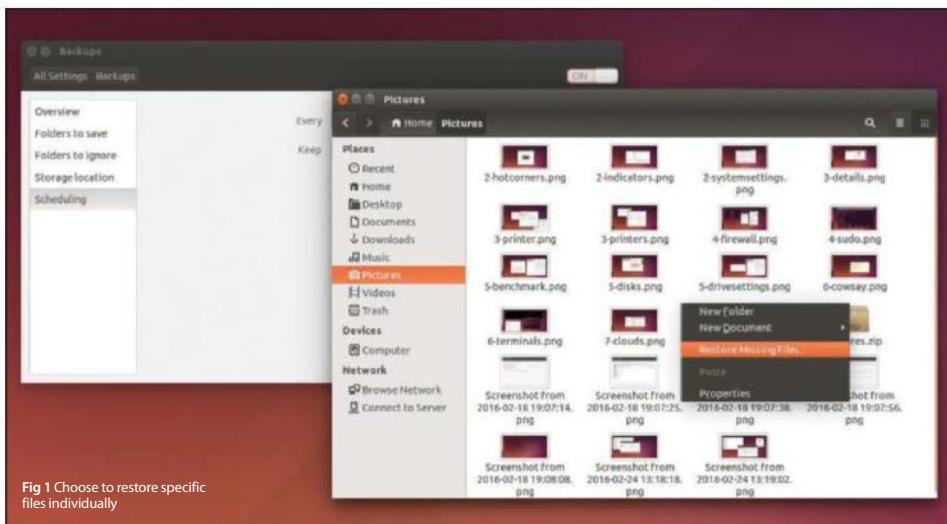


Fig 1 Choose to restore specific files individually

Select what to backup

01 We most commonly seek to back up photos, videos, office documents and application settings. While this is true for home computers, let us also complement this with targets that are more relevant to production servers and corporate usage in general, such as databases, dumps, collected data files and so on. Always evaluate the size of the proposed backup beforehand and make sure it fits the target storage. You'll definitely need extra space if you do incremental backups, or decide to include directories like `~/Downloads` that usually get populated with lots of large files.

Choose a destination

02 If you store a backup copy on the same drive with the original files, it can only save you from accidental deletion. It is therefore highly recommended to save backups to another physical drive or disk to protect yourself from main hard drive failure. For frequent incremental backups, external hard drives are known to work better compared to flash drives – the latter have a limited lifetime and don't like too many overwrites. You can also use a remote destination via SSH, WebDAV or Windows shared folder. You can choose the right place via the Storage Location menu.

Make a test restore

03 If we had a crystal ball, we'd use it. But the fact is that nobody knows when things will go wrong. To protect yourself from experiencing that sinking feeling when you discover your backups are broken, go for a test restore at the very beginning. It's a good idea to set up a small backup task and run it. After that, go to the Overview section and press the Restore button. Déjà Dup will guide you with a simple wizard, where you'll be able to choose the location of a backup and then select a date, from which a copy will be derived. Go ahead with a real-world backup if everything restores fine.

"If we had a crystal ball, we'd use it. But the fact is that nobody knows when things will go wrong"

Access a backup copy

04 Déjà Dup has a limitation: it is an 'all or nothing' tool, meaning that you can't extract selected files and directories. Instead you are forced to copy or download the entire backup snapshot. To solve this issue, use the 'Restore missing files' item in the Nautilus context menu (Fig 1). This works for directories included in the backup and lets you restore individual files. Déjà Dup is a front-end to the Duplicity utility, and this lets you extract your backup snapshot without launching Déjà Dup at all. It can be useful for scripting, or maybe when you access your backup location remotely via SSH. The syntax for extracting is as follows:

```
$ duplicity restore
--no-encryption "file:///path/to/
snapshot" "/where/
to/extract"
```

The Duplicity syntax also can extract individual backed up items (see \$ duplicity --help).

Back up to the cloud

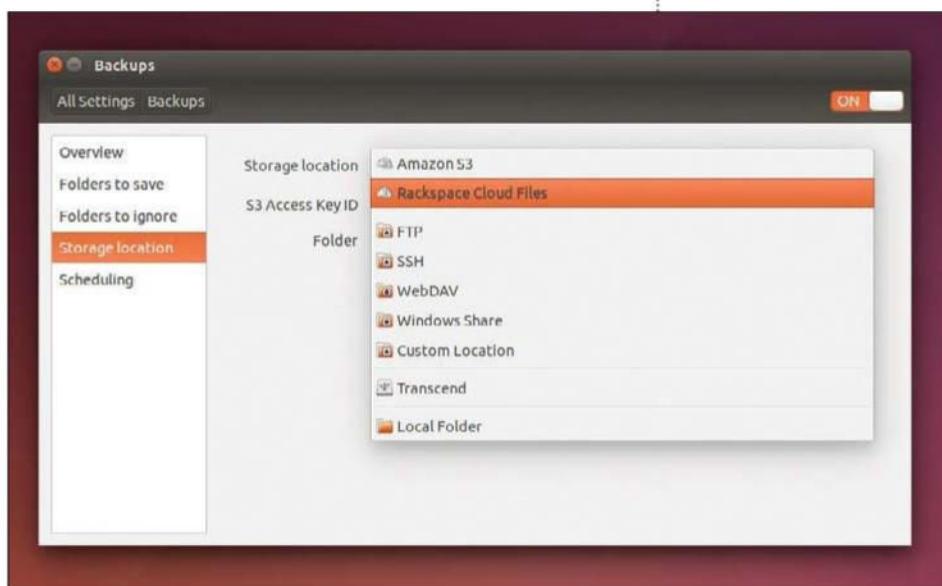
05 The simplest way is to use your Dropbox, MEGASync or other cloud-synced directory as the backup location. This way, your data will be uploaded to the cloud once Déjà Dup finishes its job. However, let's do direct online backups, such as to the Amazon S3 cloud (Fig 2). To make it happen, you only need a proper account at Amazon and a few extra packages. The command is as follows:

```
$ sudo apt-get install
python-boto python-
cloudfiles
```

After that, the list of available storage locations will be complemented by Amazon S3 and Rackspace cloud.

"Déjà Dup has a limitation: it is an 'all or nothing' tool"

Fig 2 (below) Manage your backup location easily



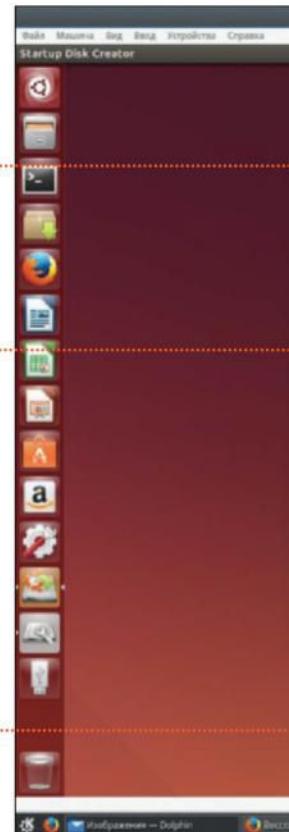
Use Startup Disk Creator

Create a bootable USB with Ubuntu or virtually any other Linux

The first question that would most likely emerge here is 'what on Earth would you need a startup disk for?' Historically, Linux distributions were distributed as CD discs, from which you were supposed to install them. Later on, the age of recordable CD/DVD discs came in and, together with broadband Internet access, this led Linux enthusiasts to download ISO images of their favourite Linux distributions and burn them to blank discs. However, such optical discs are already out of trend, with USB thumb drives now being the sanest media. You can use USB sticks hundreds of times with strong reliability.

In Linux you can transfer an installable ISO file to a USB drive by the 'dd' command. It's quite easy, but the whole procedure isn't very conclusive for regular users, so that's why Ubuntu offers the handy and convenient Startup Disk Creator utility. Its features slightly intersect with those found in Disks, but Startup Disk Creator focuses on turning CD/DVD discs or downloaded ISO files of installable Ubuntu-compatible Linux distributions to bootable USB media, that is it helps you move from legacy media to more contemporary and efficient USB disks.

Startup Disk Creator also has the ability to use a newly created USB disk as a working environment in live mode, consequently saving all your data persistently on a disk.



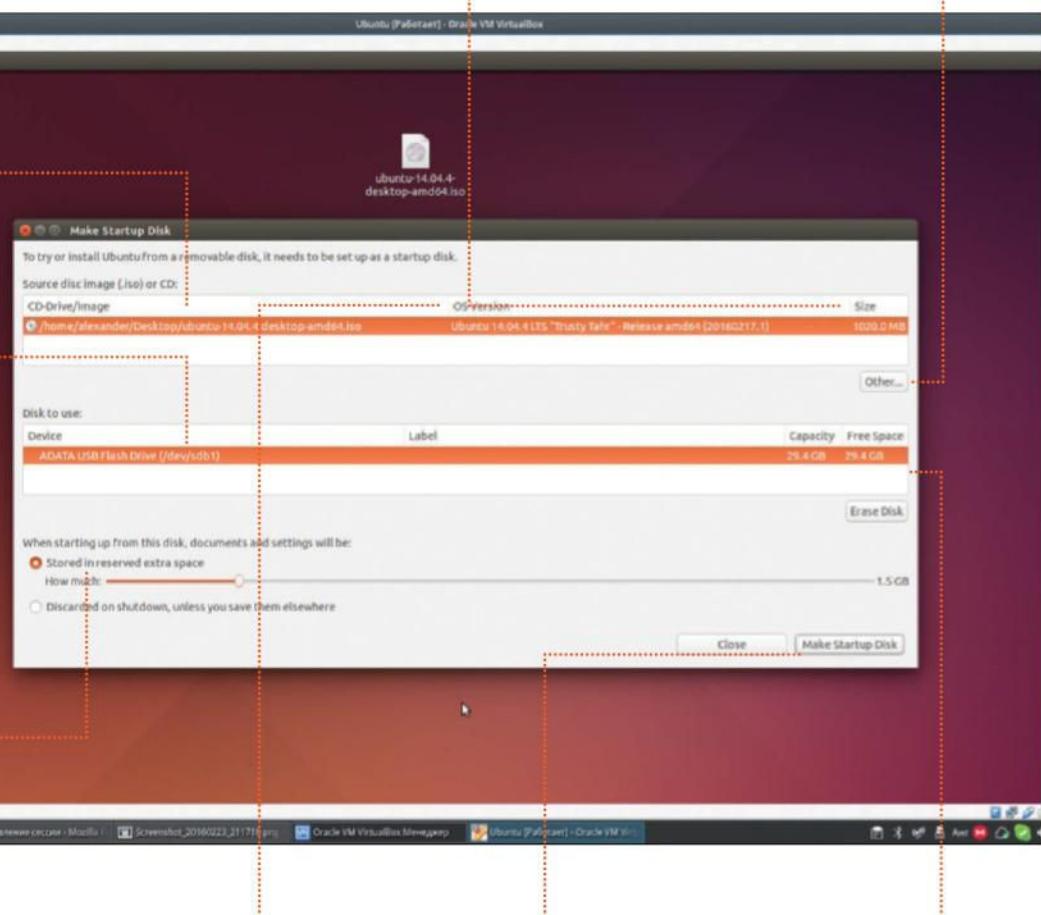
Get a live Ubuntu system Use a regular USB flash drive or any mass-storage device

Mind the size

The last column here indicates the size of the source media. It shows the exact weight of the ISO file, but defaults to the total capacity of CDs and DVDs no matter how many megabytes are actually there.

Choose an image file

If you want your ISO image to appear in the list, click the Other button and select the image file. By the way, it also supports disk images (.img)



Operating system version

Sometimes it's not clear exactly which version of a system is inside an ISO, or what is on that unlabelled optical disc. The column entitled OS Version extracts necessary details

Copy the files

Check everything one more time and press the Make Startup Disk button. The application will show a progress dialog and copy the files onto the target USB medium

Capacity and free space

You can find the total size of the media as well as the amount of free space on it. This feature is designed for USB sticks that are formatted to FAT16 or FAT32 file systems and may contain user data

Create a bootable USB stick Utilise Startup Disk Creator

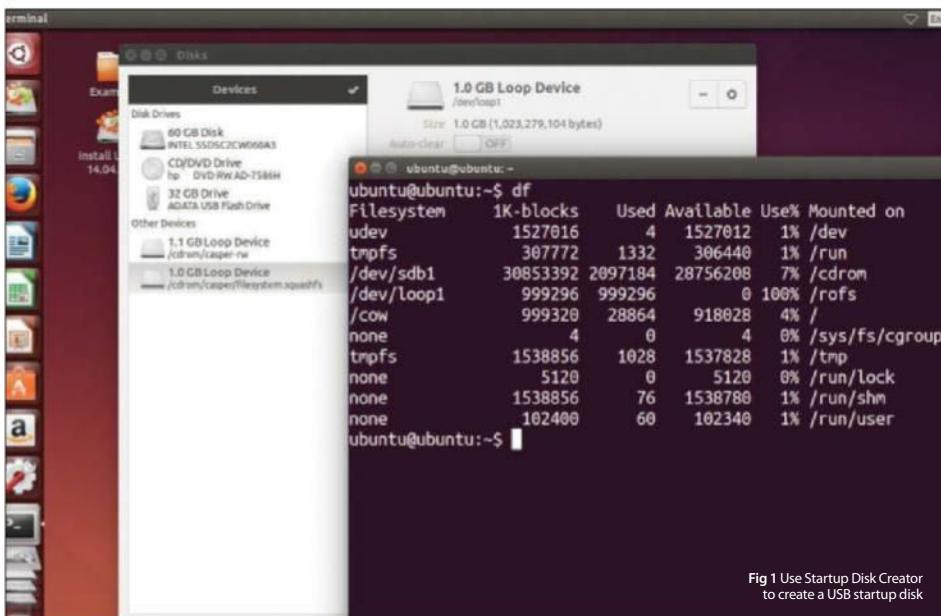


Fig 1 Use Startup Disk Creator to create a USB startup disk

Select the proper source

01 Startup Disk Creator is designed to work with Ubuntu and other systems derived from it. Here is a short and incomplete list: Kubuntu, Linux Mint, Xubuntu, Lubuntu, Ultimate-Edition, elementaryOS, Peppermint One, Peppermint Ice, Deepin and Zorin OS. Other flavours of Linux, especially those non-Debian based, might not work with Startup Disk Creator. If you have a free target USB medium, testing other Linux OSs and

sharing the results will be welcome. If you have an Ubuntu-compatible system on CD or DVD, it will be a good idea to transfer it to USB and benefit from higher boot speed, better compatibility and persistent storage.

Prepare the target

02 Common target devices are flash drive – also known as a USB stick or thumb drive – an external USB hard drive, an SD card or any other memory card connected through a

USB card reader. Virtually everything that can be connected as a USB mass-storage device in Linux will work fine (Fig 1), including odd things like your smartphone's internal storage. Startup Disk Creator doesn't wipe any data from FAT32 volumes once there is enough space there for a source image. Although, it is recommended to use a clean flash drive or at least format it to avoid issues resulting from heavy use of that flash drive (for instance, a flash drive might suffer from fragmentation).

"It is recommended to use a clean flash drive or at least format it to avoid issues resulting from heavy use of that flash drive (for instance, a flash drive might suffer from fragmentation)"

Create a persistence file

03 Drag the respective slider and define how much persistent storage you need for your files and settings. Startup Disk Creator will create a persistent storage file of an appropriate size and merge it with the root file system in the live system. Changes in the /home directory, downloads and other files added or removed from within the live system will be preserved after reboot. The same works for system-wide components, for example you

can install extra software or remove something unnecessary and keep it after shutting down or rebooting the live OS. This makes your live USB stick a fully fledged portable OS. At the same time, the device will still be readable and accessible from Windows or other non-Linux OSs.

Go for a test drive

04 When you are done with setting things up, and the file copying dialog finishes successfully (Fig 2), reboot and select your USB medium as a boot device. Startup

Disk Creator adds the Ubuntu bootloader to the FAT32 volume of your USB medium, so that it can boot Ubuntu. The experience doesn't vary much between an OS written with Startup Disk Creator and with a classic live mode achieved with the 'dd' command. The only visible difference is that you can have persistent storage, even though it is limited with 4GB – this is a maximum file size in FAT32. You can write some files or folders on your USB medium in Windows (or elsewhere), then boot from it and find your files there, safe and intact.

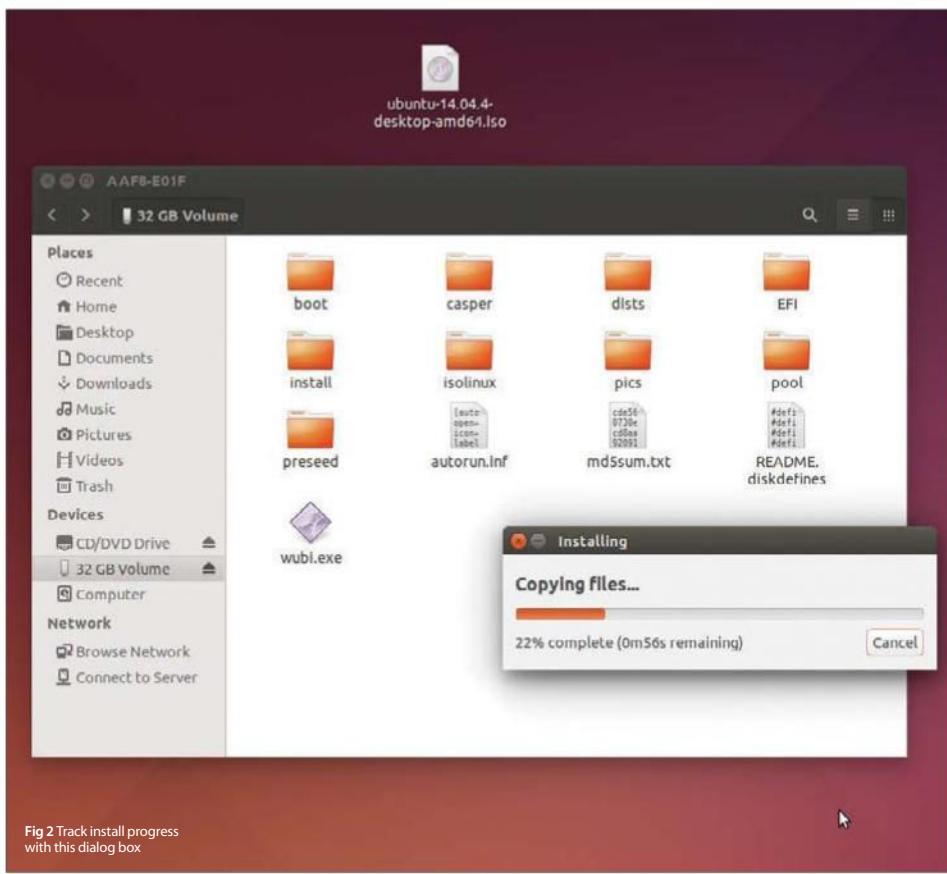


Fig 2 Track install progress with this dialog box



Unleash the Archive Manager

Make use of this small accessory that sits inside your Ubuntu system

Archive Manager is a small tool for opening compressed files and creating your own archives. Years ago, when people had small hard drives, Archive Manager was king of the hill. It's still an important part of the standard desktop experience, as it is the easiest way to unpack downloaded archives or combine many files into one (Fig 1).

The standard Ubuntu Archive Manager follows the generic naming policy and therefore doesn't have any special name (together with Disks, Backups and so on). However, Ubuntu had taken it from the GNOME desktop, where the archive manager is called File Roller. You can check it out by launching the `$ file-roller` command in the terminal in Ubuntu. When launched separately, the File Roller interface looks quite empty as because it is designed to show .contents in the largest area of its window.

"It's still an important part of the standard desktop experience"

Make use of extra features

File Roller has some extra features and boasts fine integration with the Ubuntu file manager, Nautilus. This means that you can extract any supported archive simply by right-clicking it and selecting Extract Here from the menu. You can also drag-and-drop files and directories from Nautilus to the File Roller window in order to add them to an archive. The application will prompt you for an archive name and offer advanced options that include password protection (ZIP and CBZ only). You can protect just the files and directories, so it will be possible to view the list of files inside an archive, but in order to open or extract anything from such archive, one must provide a proper password (Fig 2). You can also protect the list of the archive's files and directories, or split an archive into parts of fixed size.



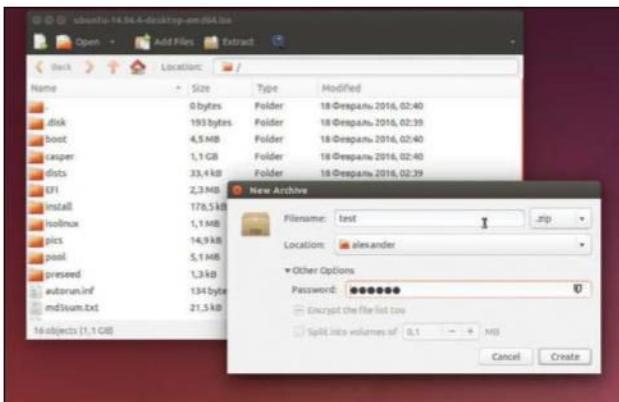
Fig 1 Compress files with the archive manager



Fig 2 Protect files with a password

Open or view an archive

Opening an archive is simple: just double-click it or use the 'Open with Archive Manager' item in the right-click menu of an archive. If its icon looks like a box, it means that most probably such an archive will be supported. File Roller supports ZIP, RAR, GZIP, BZIP, 7Z, JAR, XZ and many other formats, for both opening and compressing, and also AR and ISO formats in read-only mode. You can also go the other way around: open the empty File Roller window and use its Open button to browse and select an archive. There is a difference between opening and viewing an archive. While it is clear what the first one means, the second lets you look through the entire list of files and see the whole archive's content in a single view. For instance, if there are many subdirectories in your archive, you may want to select View>View All Files and see everything as a single list. File Roller adds the extra Location column to help you see which file is where.



Create an archive

The reason why you may need to create an archive can vary. Firstly, an archived file is always smaller than the original one, so the simplest goal is to save some disk space. This doesn't help much with photos and videos, because they are already compressed and so adding them to an archive doesn't save much space. However, office documents or uncompressed media files (DOC, XLS, WAV, TIFF and so on) show a splendid compression ratio, up to 90-95 per cent. Secondly, archiving merges many files into one archive, which is very convenient. For instance, copying a thousand of small files can take a long time (it drives most file systems crazy), but when compressed into an archive, you will wait for just a couple of seconds. To transfer files with symlinks and UNIX-specific attributes (like permissions and extra flags) to a FAT32 or NTFS volume, you should also archive such files first. Compress any file or directory using the Compress item in the right-click menu of an item, or use the respective feature inside File Roller.



Use the Disk Usage Analyzer

Use the Disk Usage Analyzer

Find out where your free disk space went with a specialised accessory

Files and directories tend to grow and occupy a large amount of disk space. These days even a couple of terabytes will run low when you decide to keep your movie collection there. Sometimes you don't pay enough attention to how much you are actually downloading, copying or storing, meaning that your hard drive gets cluttered with lots of files, draining your free space. Disk Usage Analyzer, also known as Baobab, is a tool that comes within a standard Ubuntu desktop. It analyses any directory you throw at it and shows a colourful ring chart, where the size of each slice corresponds to a size of the respective subdirectory (Fig 1). This is a beautiful graphical representation with instant usefulness, letting you know what on your drive is using the most space. Sometimes it can be as simple as an overfilled temporary directory, or a giant log file, or just your media library that grew too fast.

"This is a beautiful graphical representation with instant usefulness"

Get instant results

Launch Disk Usage Analyzer by searching for this name or 'Baobab' in Ubuntu Dash. After it launches, you will be presented with a list of devices and locations. If a drive is mounted, it will be included in the statistics of your root partition. For example, if you mount a 4TB drive within a relatively small root partition (say, 20GB), the resulting ring chart will show your system directories within a hair-thin slice. For that reason, you will need to unmount any external media if you want to analyse what Ubuntu itself consists of. To get a structure of your home directory simply click its icon and wait until Disk Usage Analyzer completes its job – this can take some time depending on how many files there are.

Dive into statistics

There are no limitations with which directory you want to analyse. Disk Usage Analyzer lets you open any directory, be it a local or remote one. Click the small 'gear' icon in the top-right corner to open the desired location. If it is a remote one, please use the 'Scan Remote Folder' option and provide the correct address, for example Samba share addresses start with smb://.

When you see the resulting ring chart, hover your mouse over a slice to see the details. Click a slice to dive in and set it as a top directory. The chart will adjust automatically and you will see more details about what content inputs to overall directory weight. The left part of the screen compliments the chart with a tree view, with extra columns for usage percentage, size and number of items.

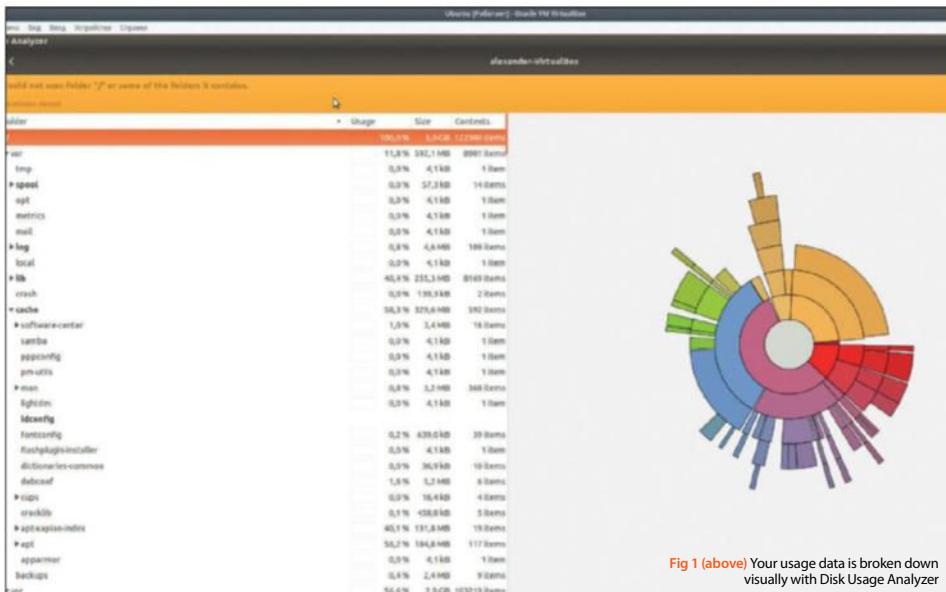


Fig 1 (above) Your usage data is broken down visually with Disk Usage Analyzer

Switch between graphical views

This ring chart isn't the only way you can get a graphical representation of data. In the lower right-hand corner of the application you'll notice two buttons that let you switch between ring chart and treemap modes. Treemap is an alternative method of data visualisation with a strong focus on the size of units.

The main difference between a ring chart and a treemap is that the latter shows all units together along with subdirectories and large files. This

actually works better when you need to estimate the relative sizes of different units. A treemap may be hard to understand when you first look at it, but it does help when you know how it's built. Disk Usage Analyzer first draws the largest rectangle for your top-level drive or directory and then recursively subdivides it into smaller rectangles according to the size of the content inside. Larger rectangles display their names instantly, others will give more information once hovered with a mouse.



Monitor Software & Updates

Add more application sources and keep your system up to date

Ubuntu comes with pre-installed applications and accessories for basic computing tasks and activities. Software & Updates lets you customise the standard set of software sources, configure updates and manage additional drivers. A software source is a general term that includes both online repositories and local media. You can turn standard Ubuntu software source on and off, manage third-party source and authenticate them with signing keys. With Nvidia or AMD graphics, you can install a proprietary driver, but it cannot be included in Ubuntu right away due to license restrictions.

Install additional drivers

A common case when Ubuntu users turn to the Additional Drivers tab in Software & Updates is graphics drivers. Computers with Nvidia and AMD video chips are supported in Ubuntu out of the box, but the system utilises open source drivers ('nouveau' and 'radeon' respectively), that still lag behind a proprietary driver for 3D performance and gaming. To replace an open source driver with a proprietary one, go to the Additional Drivers tab and wait for a while before Ubuntu discovers if there is a proprietary driver for your hardware. It will not necessarily be a video card: dozens of drivers for wireless networks and various firmware bits that improve system performance cannot be shipped directly because of their licenses. When you decide to go with one or several non-free drivers, simply select them and press the Apply Changes button. Ubuntu will download all required files in the background and install drivers automatically. You will then need to logout and log back in, or better, restart the system.

Add or remove software sources

Standard Ubuntu repositories can be managed on the Ubuntu Software tab in Software & Updates. It lists the Main repository, for which Canonical (the Ubuntu maker) provides official support; the Universe repository, which is maintained by Ubuntu community; the Multiverse repository with proprietary software; and the Restricted one with closed-source device drivers. If you somehow need to develop software in Ubuntu yourself, you can enable the Source repository. Below are other helpful controls for selecting the nearest mirror (this can boost a package's download speed) and the optional switch for Ubuntu CD/DVD with standard delivery of packages. The 'Other software' tab lets you add third-party repositories and by default lists entries within the Canonical Partners repository and the extra Independent repository for even more software (Fig 1). Press the 'Add' button to add a new repository, 'Edit' to change details and 'Remove' to delete a repository. There are many additional repositories on the Internet, but always approach with caution.

"Standard Ubuntu repositories can be managed on the Ubuntu Software tab"

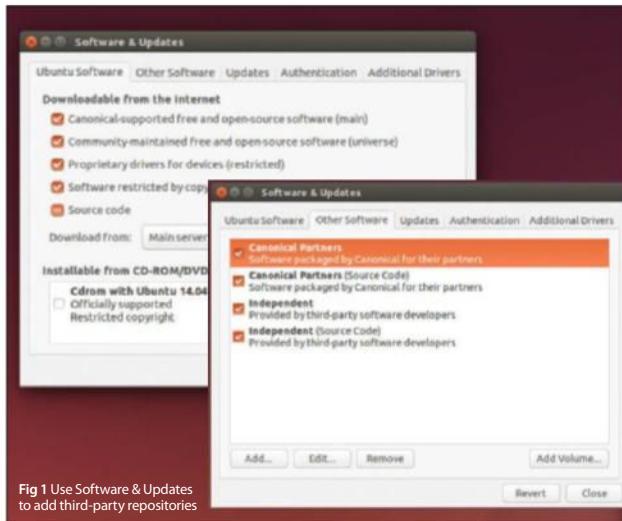
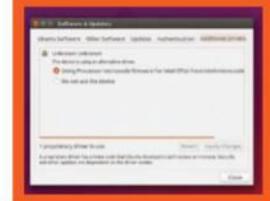


Fig 1 Use Software & Updates to add third-party repositories

Ubuntu essentials

Set up updates

Ubuntu periodically checks for its updates online and if it finds a newer version for at least one package, a special notification pops up. In the Software & Updates application, you can choose what updates the system looks for and how frequently checks should be carried out. To do this, go to the Updates tab and review the list of ticked boxes. By default, Ubuntu looks for security updates, recommended updates for regular packages and also for backported software that is not supported by Canonical, but contributes to the Ubuntu experience. The next four drop down menus control the updates frequency and behaviour. For instance, here you can program Software & Updates to download and install all or particular updates automatically, without disturbing the user. This can be helpful for unattended Ubuntu installation with a stable Internet connection. The last drop down menu lets you choose whether Ubuntu should notify about any new version of the OS itself or about long-term support version (LTS) only. If don't like to hop to newer versions too often, stick to LTS releases.





Type the way you need to

The Typing tab in Universal Access houses a list of options that help input data using a keyboard for those who are unable to type and need assistance (Fig 2). The most noticeable option here is the on-screen keyboard switch that enables text input using mouse clicks. The on-screen keyboard will appear after you re-log in to a session. It looks like a desktop widget that flows at the top of any windows. There are various keyboard tweaks that can ease input in some cases, such as sticky keys (treats a sequence of modifier keys as a key combination), slow keys (puts a delay between when a key is pressed and when it is accepted) and bounce keys (ignores double pressing a key in a short period). This can be complemented with extra audible notifications, such as beeping when certain keys are pressed. The on-screen keyboard in Ubuntu can also be used for extra security if you feel like the use of a physical keyboard can compromise your privacy.

Work with Universal Access

Configure accessibility settings to make Ubuntu more user friendly

Ubuntu is a friendly place for everyone, including people with reduced capabilities or disabilities. If you need to use special settings for a more comfortable user experience in Ubuntu, there is a dedicated subsection called Universal Access inside System Settings. If you want to, you can also launch it separately by searching its name in the Dash or by using the `$ unity-control-center universal-access` command in the terminal. Universal Access consists of a large number of settings divided into four individual categories: seeing, hearing, typing, and pointing and clicking. Each category has switches that improve usability and make the most out of Ubuntu. Ubuntu ships with a high-contrast icon theme and the Large Text switcher, both of which help visually impaired people see more on their screens. There is also a screen reader (Fig 1), which pronounces window titles and messages, an on-screen keyboard, advanced sound notifications and more.

Using the keyboard as a cursor

If moving a mouse in a regular manner is uncomfortable, you can control the mouse cursor from a keyboard using the arrows. This accessibility feature can be enabled by going to the Pointing & Clicking tab and putting the Mouse Clicks switcher on. There are also two ways to trigger a mouse click without clicking its buttons. The first tweak is to simulate secondary click in double-clicking by holding the left mouse button down for some time. Second, you can simulate a click by hovering a mouse cursor over an item and waiting longer. For either, there are helpful sliders that let us adjust a delay. Regular mouse settings in the Mouse & Touchpad subsection also contribute to a more flexible mouse performance. There you can lower the double-click delay, change cursor speed and switch buttons arrangement if you need a mouse for left-handed use.



Fig 1 Tweak screen settings for better usability

Adopting Orca screen reader

The default screen reader in Ubuntu is called Orca. It can be enabled in the Seeing tab of Universal Access, or it can also be launched from command line (`$ orca`). Orca pronounces titles and text corresponding to the controls in use. To access Orca preferences after enabling it for the first time, press ‘Ins + Space’ on a desktop keyboard or ‘Caps lock + Space’ on a laptop. A new window will open, and Orca will announce “Screen reader preferences. General page tab.” You can now configure Orca to your liking, change voice type and speed, redefine key bindings, turn Braille support on or off and change lots of other tunables. Orca also lets you customise its verbosity and define the categories of text that will be spoken. It also has a built-in help system in audible mode. Press ‘Ins + H’ or ‘Capslock + H’ to hear instructions and references to other important key bindings.

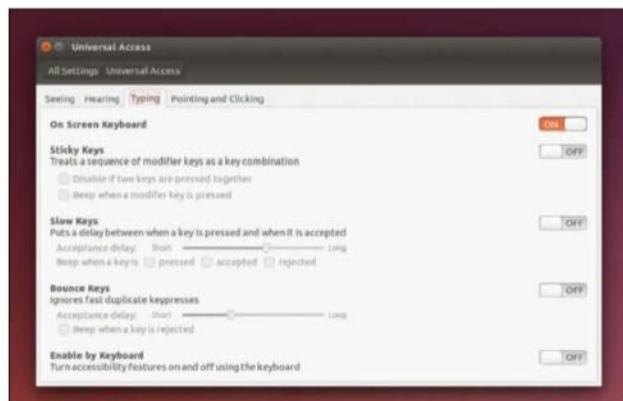


Fig 2 (above) Customise your computing experience with typing options

"If you need to use special settings for a more comfortable user experience in Ubuntu, there is a dedicated subsection called Universal Access"



Configure network connections

Setting up a network connection in Ubuntu is easy

Those who only need to plug their Ethernet cable into their computer's network port in order to have an instant access to the Internet can skip this section (perhaps those running Ubuntu inside a virtual environment can do that too). The majority of Linux newbies, however, often need assistance in connecting to the Internet or changing their network parameters. During the last decade, almost every Linux distribution has relied on NetworkManager – a stable, feature-rich and intuitive network handler for Linux. The Unity desktop in Ubuntu has a tight integration with NetworkManager by offering a network indicator on the top bar and a standalone graphical utility called Network (Fig 1). You can search for it in Dash, open it as a subsection in System Settings or launch from command line (`$ unity-control-center network`). Both wired and wireless network connections can be added and modified or even removed here.

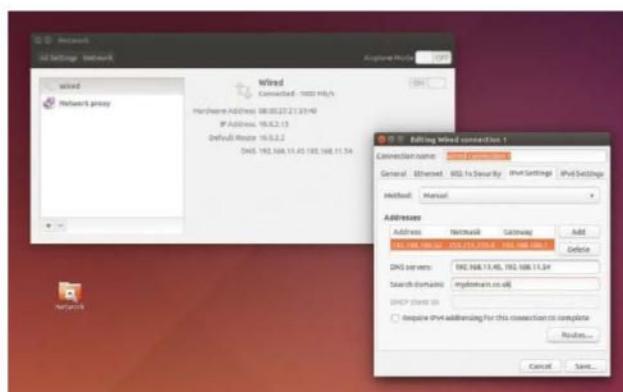


Fig 1 (right) Configure wired and non-wired network connections

Connect to a wireless or wired network

If you want to use a wireless connection and if you have a Wi-Fi network card or chip, things are quite easy: notice the ‘radar’ sign at the far-right position on Unity top bar and click it to see a list of available networks. Select your network and once you provide the correct authentication password, you are mostly done. With wired network connection, for which you are given an IP address, network mask and a gateway address, you’ll need to enter the Network configuration dialogue and add your connection manually. To do so, first check that the global switch for wired networks is in the On mode and then press the ‘Options’ button in the lower-right corner of the window. This will bring up the connection editor (Fig 2), in which the most common place to go is the IPv4 Settings tab. In the Method drop-down menu, select Manual and then provide your connection details in fields below.

View connection settings

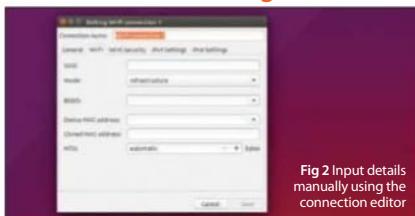


Fig 2 Input details manually using the connection editor

When you are online, you still may want to use NetworkManager to find out certain details about your current connection.

The quickest way to find out such details will be to click on the network indicator on the Unity top bar and go to the Connection Information item. You will see a separate window with lots of details about your connection, including general settings (your network card MAC address, declared speed, interface name), and IP connection details for both IPv4 and IPv6 (if it is relevant for you). The main window of the Network application also displays network settings and includes a briefer list with Hardware Address (MAC), IP Address, Default Route and the list of DNS servers. If you cannot run NetworkManager in graphical mode for some reason, use the ‘`$ ifconfig`’ command to view settings and ‘`$ nmcli`’ to manage various connections. For instance, let us bring up a known Wi-Fi connection from within a broken Ubuntu system that cannot boot into any desktop:

```
$ nmcli dev wifi con "Network_Name" password "your_password"
```

Set up a network proxy

Sitting behind a proxy adds a little complexity. Usually you have to declare your proxy settings several times: separately for a web browser, in the Bash environment, for Apt package manager, for Wget downloader and so on. However, Ubuntu makes things a little easier on this front. Click the ‘Network Proxy’ item in the list on the left and choose what kind of proxy setup works for you. If you have been given a URL, select the Automatic method and provide that URL in the field below. Proxy with personal authentication usually requires manual setup. Select the Manual method and provide at least the HTTP proxy, using the following syntax:

`username:password@server-name.domain`

Provide a proper port and finally hit the ‘Apply system wide’ button to finish with setup and get going.

Connect with Online Accounts

Enjoy a more convenient integration with online services in Ubuntu

Online social services are already a part of everyday life for an average user. Most of us use these services for connecting with friends and relatives, for sharing photos, videos and other files. Almost every online service requires authentication, which is commonly about registering an account and using it later for accessing the personal part of a service. Ubuntu simplifies the general experience with online services by eliminating the need to sign into one account several times in different applications. It also makes using local applications easier because it is much more convenient to provide your username and password on a classic login web page than to have the hassle of local application settings. A good example is the Evolution email client. Years ago people had to remember incoming and outgoing server addresses, ports, security settings and the authentication method. Now all you have to do is provide your username and password for your email service in Ubuntu's Online Accounts – when you log in there Evolution will already be configured and automatically display your inbox.

Set up instant messaging

Empathy is the default app for instant messaging. Open Online Accounts (Fig 1) either by searching for it in Dash or as a subsection in System Settings. You can even go from the command line (`$ unity-control-center credentials`). The list of online services, for which Ubuntu offers desktop integration, has grown recently so you may want to filter the list by applications. In the 'Show accounts that integrate with' drop-down menu select Empathy. Select the desired service and provide credentials

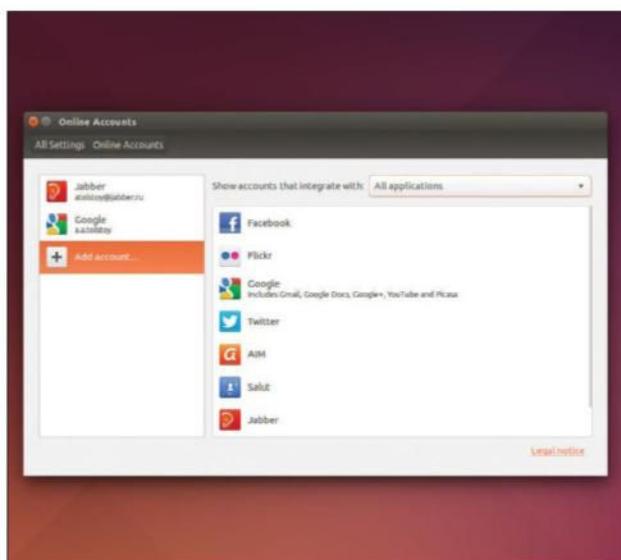


Fig 1 (above) Connect to your accounts quickly using Online Accounts

in a built-in browser window, right there in Online Accounts. You can even add more than one account of the same service, or add accounts from various different services to one application.

Online Accounts lets you enable, disable and change options of added entries at any time. After you are done, you can launch Empathy and start chatting immediately.

"Ubuntu simplifies the general experience with online services by eliminating the need to sign into one account several times"

Connect to your Google account

Online Accounts offers the most comprehensive integration with Google services. If you have a Google account (using Gmail for example), you can benefit from a wide list of desktop applications that Ubuntu can integrate with. It includes Evolution Data Server, Shotwell photo manager, Google Drive and Picasa lenses for Unity Dash and Empathy instant messaging.

Once you've logged in to your Google account it will prompt you to allow it access to manage your emails, calendar, photos and videos, contacts, view your data and so on. You have to grant this access in order to proceed. After that your list of connected services will be populated with everything Ubuntu supports for Google and you can start using your favourite applications and enjoy them working without your Google account without any extra movements. Your search results can now include files found on your Google Drive and Picasa web albums. You can also start using Gmail directly from your Evolution client and do much more.

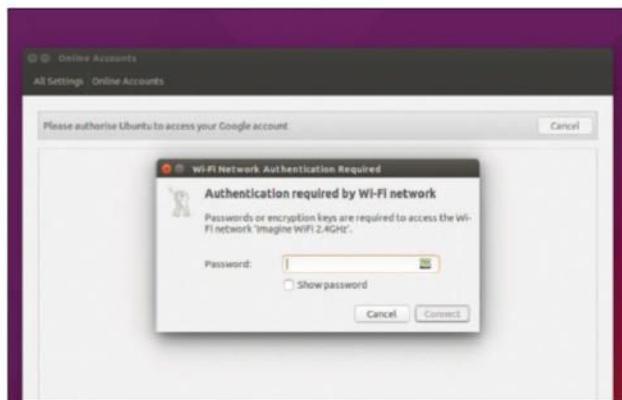


Fig 2 (above) Input your password and connect

Upload photos to a cloud-based account

Ubuntu ships with Shotwell, a photo manager, viewer and simple editor. Not only can you sort and tag images, but also import them from external sources and export to a cloud account – the latter requires integration with Online Accounts. Shotwell can publish your photos to Facebook, Flickr, Picasa Web Albums and Piwigo CMS. You can configure one of these, all, or any combination of services by adding respective entries in Online Accounts. As with Google, in most cases you are required to pass an authentication routine and grant access to your data (Fig 2). After that you can launch Shotwell and select one or several photos you'd like to publish. Notice the toolbar along the bottom of the window and press the Publish button there. Select a cloud service from the drop-down list and choose publishing options. Shotwell can create new albums in an account or commit to existing ones. It also supports tags and photo metadata in its publishing module.



Find out details about file systems

The File Systems tab displays a table of all file systems that are currently mounted in Ubuntu. You can find out the device name, file system type, mount point, total capacity and available disk space. Of course, you can find out a similar set of information in Ubuntu's disk utility (Disks, p.50), but System Monitor offers a more comfortable view, which lets you quickly analyse how much space is left on your device and sort them by various criteria. The Used column doubles the information about free disk space, but shows it in the form of a percentage bar. When the bar fills up to approximately 90 per cent or more, it means that you are running low on free disk space, which can be troublesome for certain workflow scenarios. Ubuntu cannot work properly if the root partition (/) gets 100 per cent full. You can also check for free disk space in terminal by using the '\$ df' command (disk free), although it doesn't let you sort or reorder any of the lines.

Use System Monitor

Use System Monitor

View and manage system resources using the System Monitor app

System Monitor is a tool for managing running processes and monitoring system resources. It is one of many accessories borrowed from the Gnome desktop. You can run from Dash or from command line (`$ gnome-system-monitor`). The application looks and works similarly to its analogues in Windows and OS X, and contains three logical tabs: Processes, Resources and File systems.

Launch the application with a specific tab showing by using command line parameters '-p' for processes, '-r' for resources and '-f' for file systems. Launching with the File Systems tab shown can be done with the `'$ gnome-system-monitor -f'` command line. System Monitor is used to tackle system sluggishness. You could also use the CPU load graph to find out if hardware-accelerated video output really works.

Manage system processes

Each application in Linux creates at least one process. Some processes refer to graphical applications, others run in the background and provide service functionality. With the help of System Monitor you can view the list of all processes, know their names, find out which process belongs to which users, detect processes that devour too much CPU cycles or draw high levels of RAM, associate processes with their low-level IDs and manage process priority. Normally you'll see a list of processes sorted by name. Note that you can click the name of a column to sort processes by it. It is very helpful to sort them by CPU percentage or memory usage. If a process belongs to you (or if you have the permissions), you can kill it or lower its priority. Select the process you want to get rid of and press the End Process button in the lower right corner of the window. Right-click the process and select the Change Priority menu to alter its priority.

Control resources usage

The Resources tab offers effective graphs that get updated in real time (Fig 1). The first graph shows CPU History in live mode (there is no delay in data update by default), showing CPU cores in different colours. When you launch a heavyweight application you'll notice peaks on that graph. You can also figure out whether an application can use several CPU cores at once, or if pushes all of the load on one core. The middle graph is for Memory and Swap Usage. On modern systems, swapping to a file or to a separate Swap partition is rarely used in everyday tasks, simply because there is already sufficient RAM. However, processing large files (like retouching a giant poster in GIMP) may require swapping, which only takes place when your system is running low on

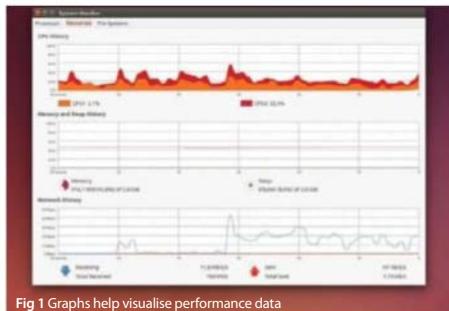
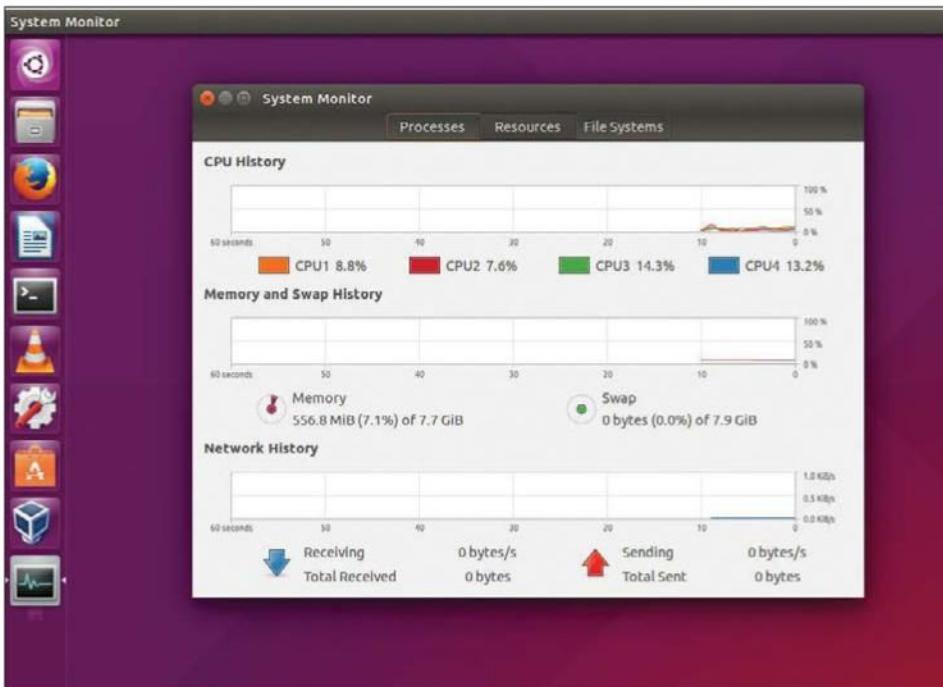


Fig 1 Graphs help visualise performance data

available RAM. The final graph, Network History, shows the network speeds for both downloading and uploading. This graph can be particularly helpful for network troubleshooting and low Internet speed diagnostics. Both memory and network history graphs help you monitor your system's performance.





Explore the Ubuntu Software Centre

Navigate your one-stop shop for purchasing, installing and removing apps

Ubuntu Software Centre, aka USC, is a package management portal – that is, a consolidated platform where you can search for, install or purchase software, and even remove apps from the list of installed software. Initially released on 29 October 2009, Ubuntu Software Centre is developed in Python and contains more than 53,000 apps. Previously, Ubuntu programs were downloaded from the repository as tar files, unzipped and then installed, by manually running the commands in the console. Even the previous versions of Ubuntu had many graphical utilities for adding/removing software, which

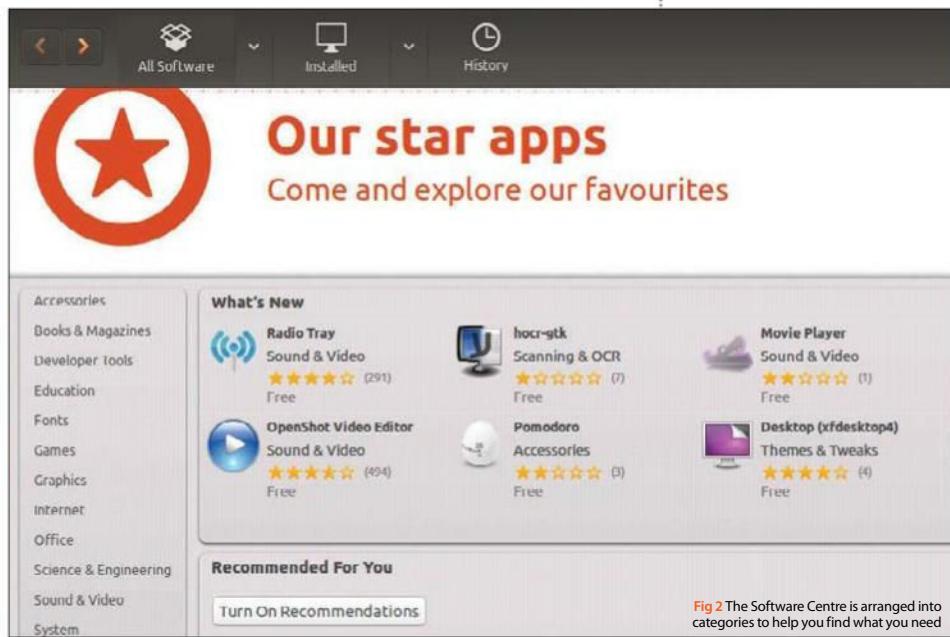
The screenshot shows the Ubuntu Software Centre window. At the top, there are navigation buttons for back, forward, search, and history, along with dropdown menus for 'All Software', 'Installed', and 'History'. Below this is a sidebar with icons for different categories like 'Text Editors' and 'Code Editors'. The main area displays a list of software packages with their names, descriptions, ratings (using yellow stars), and download counts. The packages listed include NEdit, Juffed text editor, TEA Text Editor, SciTE Text Editor, Text Editor, gprompter, GNU Emacs 24 (emacs24), GVim, and GNU TeXmacs Editor. At the bottom of the list, there is a link to 'Show 247 technical items'.

All Software

- NEdit "Nirvana Text Editor" ★★★★☆ (5)
Text Editor
- Juffed text editor ★★★☆☆ (24)
Advanced text editor
- TEA Text Editor ★★★★☆ (14)
Text editor with hundreds of functions
- SciTE Text Editor ★★★★☆ (39)
Edit your source files
- Text Editor ★★★★☆ (214)
Edit text files
- gprompter ★★★★☆ (1)
Predictive text editor powered by presage
- GNU Emacs 24 (emacs24) ★★★★☆ (11)
View and edit files
- GVim ★★★★☆ (76)
Edit text files
- GNU TeXmacs Editor ★★★★☆ (12)
A structured wysiwyg scientific text editor
- Mousepad ★★★★☆ (13)
Simple Text Editor

Show 247 technical items

Fig 1 Sub-sections for All Software and Installed help you navigate



"Initially released on 29 October 2009, Ubuntu Software Centre is developed in Python and contains more than 53,000 apps"

ultimately led to redundancy and fragmented development effort. To ease this cumbersome process, USC came with a worthwhile approach where all the software is installed with the click of a few buttons. The search for specific software ends here as USC has name/description-based search functionality, with multiple options to choose from. The rating and users' review helps you to find the best software. USC also provides Ubuntu application developers a prominent way to offer their software to potential users.

The latest version of Ubuntu comes with some preconfigured tools and software like the LibreOffice suite, Mozilla Firefox, text editors,

Software Centre etc, which are displayed vertically in the left sidebar. To get started, search for the shopping bag icon in the display and click it to launch Ubuntu Software Centre.

Upon the launch of USC, the home screen appears, which contains different categories of software, recommended software, newly added software (Fig 2), top rated software and many more. For instance, if you're looking for a text editor, you can type the keyword in the search bar, which shows the different text editors present in USC in a list view. You can just select any one of them and click the Install button to start download the program.

Get to know Software Centre Start installing the software you need

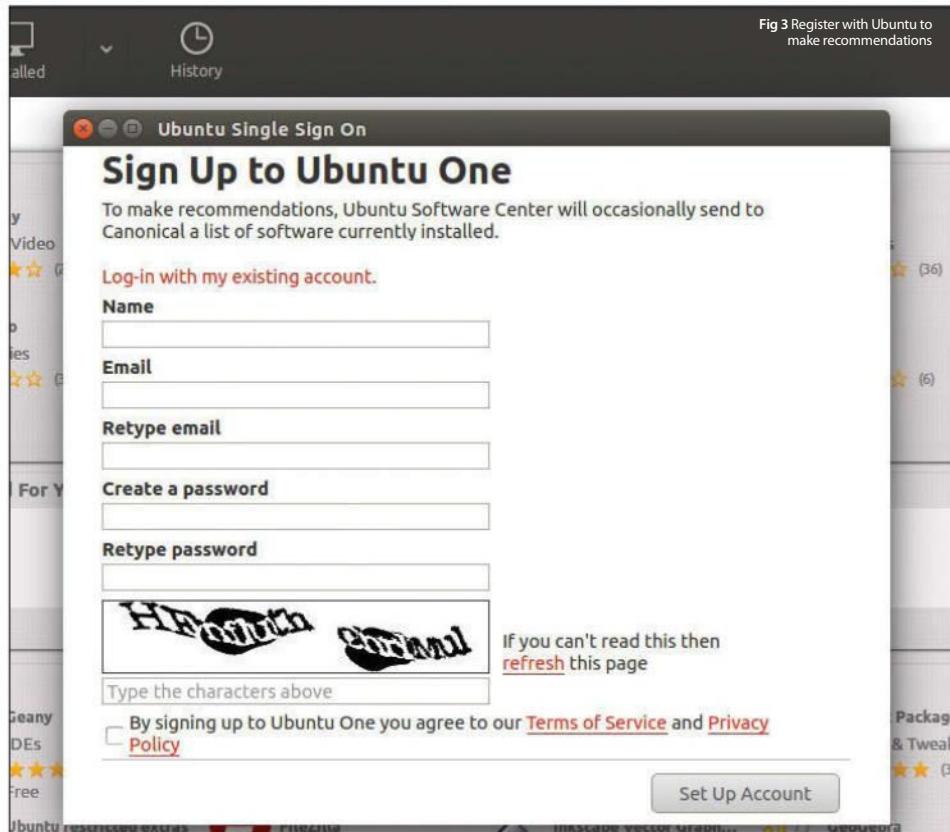


Fig 3 Register with Ubuntu to make recommendations

On the top of the home screen you will find the section navigation commands: All Software and Installed (Fig 1, page 88). The Back and Forward buttons – displayed as '<' and '>' respectively – help you navigate the different pages. USC keeps the visited pages in memory so that by clicking

the Back button once, you'll reach the page you just left. The Back command is unavailable whenever no previous screens exist in the history, and the Forward command whenever no later screens exist in the history. The All Software section presents all the programs available, be

"In the Installed section you will find the list of programs that are installed on your Ubuntu machine"

they already installed on the computer or not. In the Installed section you will find the list of programs that are installed on your Ubuntu machine, with the date of installation specified. When a software item is selected, if the item is not currently installed in your system, you will see an Install button. Click to install the software on your machine. If the software is already installed, a Remove button is available; clicking it will uninstall the software.

On the home screen itself, you will find the section 'Recommended For You'. In order to make use of the recommendation facility, you have to register yourself in Ubuntu by providing the

details in the form with a valid email ID (Fig 3). You will receive the verification code at the email address provided (Fig 4). Once that process is complete, you will receive a success message and Ubuntu starts recommending useful software to you, which you can select and install on your machine with ease.



Fig 4 (above) A verification email will confirm the process

Navigate via categories

The various ways to navigate the Software Centre

The USC segregates software into different categories, such as accessories, developer tools, books and magazines, games, education, office and many more. Upon clicking the Accessories tab, for instance, a list of accessories is displayed, including Speed Crunch (precision calculator), 7zip (compression/uncompression tool), PuTTY (SSH/Telnet client) and Shutter (Screenshot utility). The software listed in the Accessories tab is by default sorted by rating; the other sorting criteria are name and release date.

"The software listed in the Accessories tab is by default sorted by rating"

Moving on to the Developer Tools page, you will find many open source tools which are subcategorised into version control, IDEs (integrated development environments), web development and so on. The version control subcategory has many flavours of versioning software, prominent ones being Git-Cola, qgit and ggit. The IDEs tab has Netbeans, Ninja, Spyder and Eclipse, which can be installed and used for software development. There are also other subcategories named after software languages – like Java, Python and Perl – that contain the different versions and tools related to the specific language.

Top Rated

In terms of display, if the category is set to 'Show non-applications by default', then results are displayed in a list view; otherwise tile view is used, and non-application items are hidden by default. The top rated applications are also displayed on the home screen using tile view in descending order of DR (dampened rating), regardless of whether they are installed or not. Applications with seven five-star ratings and one four-star will be displayed before other applications having two five-star ratings. 12 items are displayed in the home screen under the Top Rated tab; when the More button is clicked, you land on a page where 60 items are displayed in decreasing order of DR using the list view.

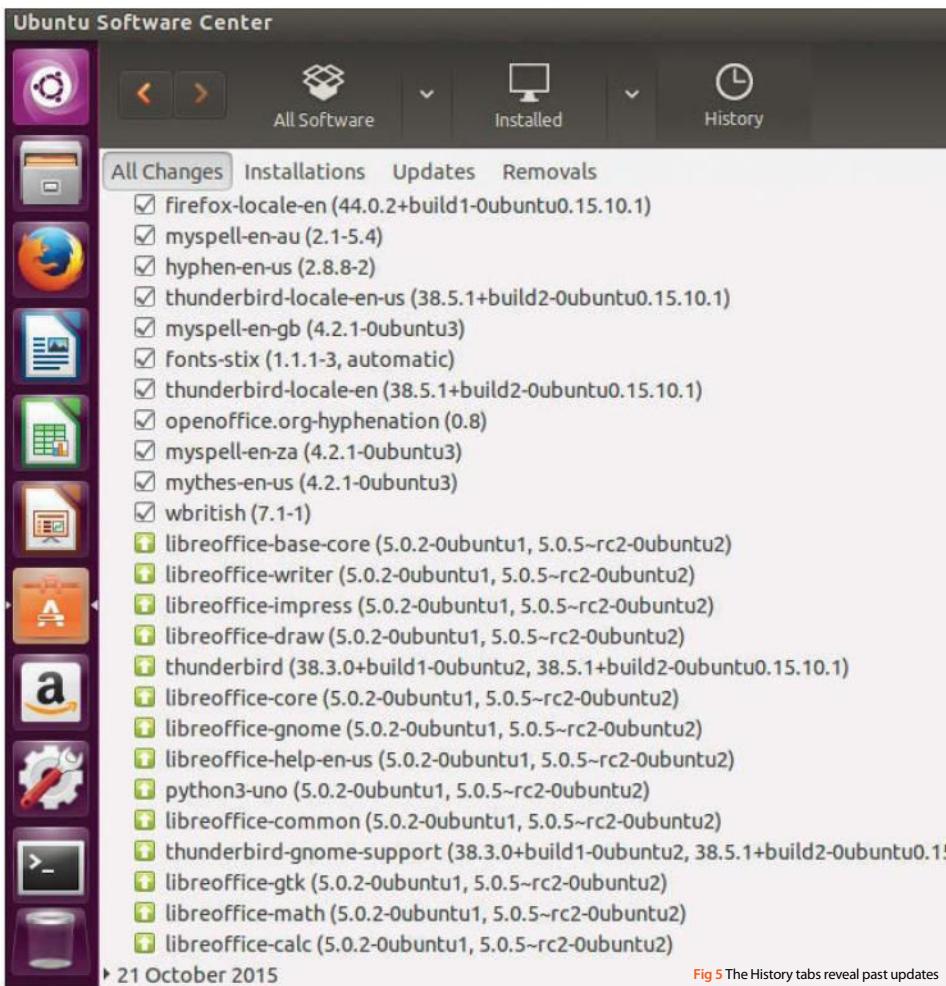
Updates and past downloads

Check out the History tabs

On the home screen of USC you will find the History tab; when clicked, this shows the 'All Changes' page by default. Under the navigation bar are tabs for All Changes, Installations, Updates and Removals (Fig 5). The entries are grouped in branches and labelled by the day in reverse

chronological order; (newest on top). Clicking anywhere on a branch (or pressing the space-bar when it is selected) should expand it if it is collapsed, and collapse it if it is expanded.

The branch on which the recent activity has occurred is opened by default in the USC history



Explore the Ubuntu Software Centre

screen. The items displayed in the History tab contain the icon of the software, name, plus the date and time of installation. Under the Installation tab, you will find all the installed applications grouped by their installation dates. The Updates tab, on the other hand, lists all the updated applications along with their update dates. Finally, the Removal tab displays the list of applications which have been uninstalled from the system.

In the History tab, the search bar present on the top right can search for applications which are already installed or have been removed from the system. Whenever the Back ports channel contains a version of any application which is newer than the one installed, an Updates item appears in the last navigation bar. The Updates section displays the number of application updates available, along with an Update All button. The list contains the icon, title, the newer version of the application and an Update button at the far right end.

When an item is selected, pressing the Enter key should activate its Update button; when an update is installed or waiting to be installed, its Update button should be inactive.

"The Software Centre contains a list of programs provided by Ubuntu itself"

Installing programs Get your hands on brand new programs

Now we've covered navigation and layout, let's move on to installation. In this example, we'll install OpenJDK Java 7 and the Eclipse IDE. Select the Developer Tools category from the home screen of USC. This will take you to the Developer Tools page, which is further subcategorised. Click on Java (cup of coffee icon), which takes you to the page where Java-related items are

Ubuntu apps

One-stop shop for Ubuntu

As well as offering a vast selection of free software to download, the Ubuntu Software Centre provides the option to purchase and install commercial software. The Software Centre contains a list of programs which are provided by Ubuntu itself, along with software offered by Canonical's partners (those programs which abide by the software rules of Ubuntu). The number of programs available in the Software Centre continues to grow rapidly, so there's a lot of choice. In simple terms, the Ubuntu Software Centre is the equivalent of the Google Play Store (or Apple App Store) for Ubuntu, where you can find thousands of programs, tools and applications which can be installed with just a few clicks.





Fig 6 Java install options are listed on this page

displayed in a list view (Fig 6). Now select the item Open JDK Java 7 Runtime and on the right side you will find the Install button; click it to install the packages. You'll then be prompted to enter your administrator password; type the correct password and hit Enter to start the installation. During installation, you will find the progress icon

graphically displaying the status of the installation. Once it's complete, you will be redirected to the success page, which also contains the Remove button in order to uninstall the program.

Click the Back button to search for the IDEs section; now click the IDEs icon to see the list of IDEs present in USC. Type 'Eclipse' in the search

"There are many programs to install, such as chat apps, file sharing and more"

bar to search for the Eclipse IDE. Select the Eclipse IDE (blue ball icon) and then click the Install button; enter the administrator password to start installation. Once Eclipse has successfully installed, open it by double-clicking.

Advanced software suggestions

Look at some of the advanced tools available in the Ubuntu Software Centre and see how they can help you in your activities

Switching from Developer Tools to Internet in the category section of USC, you will find many program to install, such as chat applications, file sharing tools, email clients and web browsers. By clicking the File Sharing tab, you will see many tools, FileZilla being the highest rated one (Fig 7). FileZilla uses FTP, SFTP and FTPS mechanisms to share and upload files to different systems. Just click on the Install button and start sharing your files within different systems.

In order to use your Ubuntu computer for office work and view different formats of files, you will find the Kile application under the Office category. The source editor is a multi-document editor designed for .tex and .bib files. Menus, wizards and auto-completion are provided to assist with tag insertion and code generation.

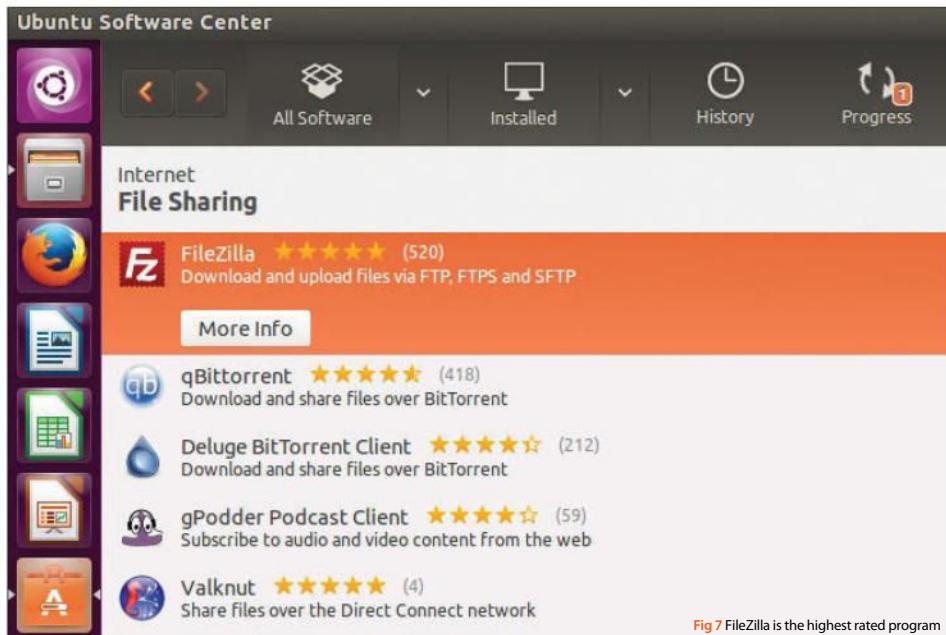


Fig 7 FileZilla is the highest rated program



Browse the Internet with Firefox

One of Ubuntu's default browsers, explore the hidden features of Mozilla Firefox

Internet browsing is one of the most common activities of the average computer user. People use the Internet for almost everything, from online shopping and reading to gaming and more. Almost all Internet access is via an Internet browser, and a significant amount of time spent on a computer is often on a browser. So it is very important that you understand your Internet's interface extremely well.

Ubuntu ships with Mozilla Firefox as a default browser. You'll find the browser icon on the left bar on the Ubuntu Home page. When you launch Firefox, you will see the Google search page as the Home page. Note that the default search engine is Google, but you are able to change it to other search engines, such as Yahoo!, Bing or DuckDuckGo, for example. To change the default Home page, go to Menu>Preferences>Home page and enter the URL you would like to set as the Home page (Fig 1, page 98).

You can also drag and drop an open tab on to the Home icon on the right icon bar. This will automatically set the Home page. To bookmark a web page, click on the star icon of the right icon bar while the page is open. The address bar automatically shows a list of pages from your browsing history and bookmarks when you start typing in the address bar.

"Ubuntu ships with Mozilla Firefox as a default browser. You'll find the browser icon on the left bar on the Ubuntu Home"

Discover Firefox

Learn various Firefox settings to speed up your browsing

Address and search bar

Enter the website address here to browse the Internet. The address bar is smart, as it automatically suggests websites based on your history and bookmarks. You can enter search queries in the search bar

Add and view bookmarks

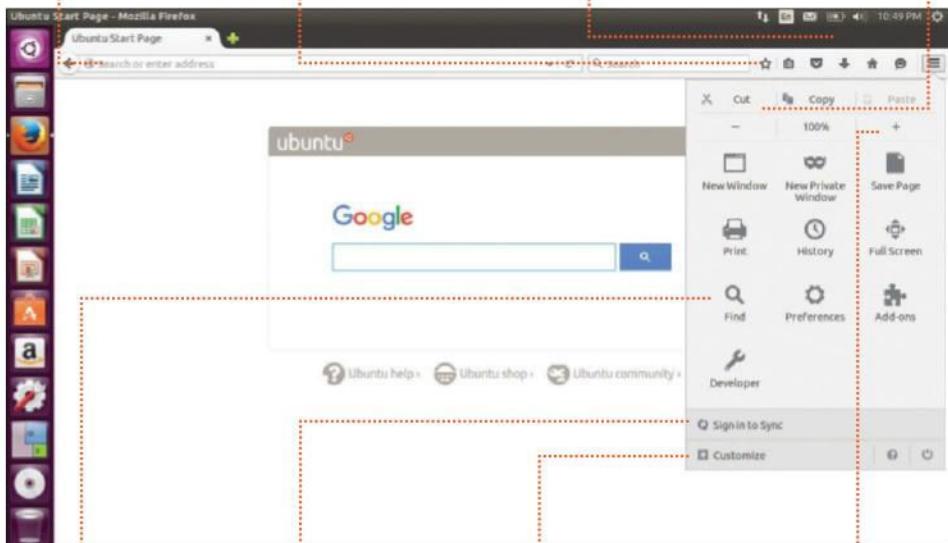
You can add a bookmark with the star icon and view all the saved bookmarks by clicking on the next icon

Icon bar

This bar holds icons for other services like Pockets (to save reading lists), Downloads, Home and Chat. The last icon opens up the Settings menu

Editing buttons

You can edit website URLs or text that you enter in websites using this buttons



General options

This area holds all the major options that Firefox has to offer. You can open new windows, print, view history, edit settings and more

Sync

This is where you can log in to enable syncing of your browsing data across all your devices

Customise

You can configure the button positions, themes and overall look and feel of your Firefox installation using the Customize option here

Zoom

Click on the '-' sign to zoom out or the '+' sign to zoom in to the web page. The middle area here shows the current zoom percentage

"The address bar automatically shows a list of pages from your browsing history and bookmarks when you start typing in the address bar"

Improve your browsing experience

Important aspects of web browsing with Firefox

Search website from the address bar

01 There are steps that you will repeat several times a day without realising how much time they take, for example, searching specific websites. Instead of going to the search engine, finding the search box, entering the keyword and executing the search, you can directly search the Internet using Firefox, while you are on any website.

To set this up on your browser, visit the page on the target website that has the search field you would normally use to search the site. Hold down the Ctrl key and click on the

search field. Select 'Add a Keyword' for this search. The 'Add Bookmark' dialog appears. Enter an appropriate name for the bookmark (for example: 'Wikipedia search'). Create a keyword (like 'wikipedia'). Select the bookmark folder to contain the smart keyword. Click OK. To use the created smart bookmark, enter the keyword and search string in the Location bar then press Return.

Sync information across devices

02 People now use multiple devices to access the Internet. Firefox helps to make sure all your

bookmarks, links and other things are synced across devices seamlessly. Firefox does this with a feature called Sync. It lets you share your data and preferences (such as your bookmarks, history, passwords, open tabs, Reading List and installed add-ons) across all your devices.

Let us see how to set up and sync an account in Firefox. First, click on the menu button and click 'Sign in to Sync'. The sign-in page will open in a new tab. Click the 'Get Started' button. Fill out the form to create an account and click 'Next'. Take note of the email address and password you used; you'll need it later to log in. Check your emails for the verification link and click on it to confirm your email address.

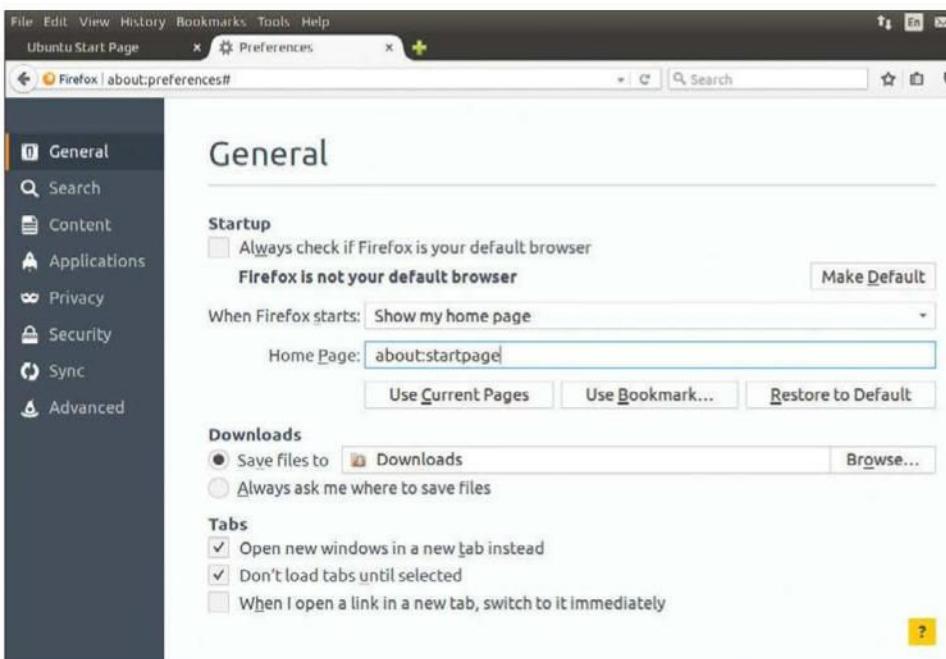


Fig 1 (above) It takes a few simple steps to change our default home page

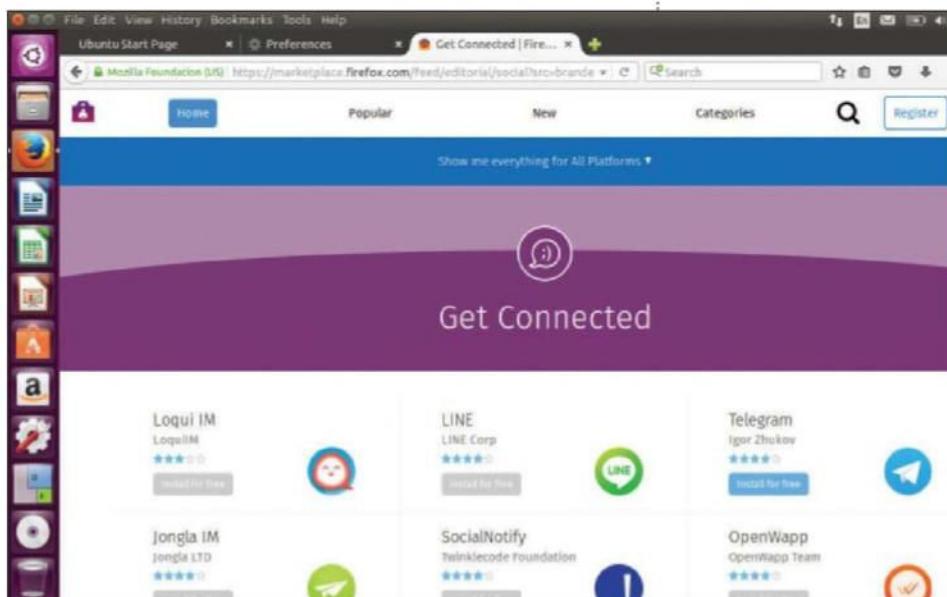


Fig 2 (above) Go to the Mozilla marketplace to download apps

You're ready to go! Now you just need to log in to Sync on all your other devices and let it do the rest.

Protect your privacy while browsing

03 As you browse the web, Firefox remembers lots of information, for example the sites you've visited and your passwords. There may be times, however, when you don't want people with access to your computer to see this information. Private Browsing allows you to browse the Internet without saving any information about which sites and

pages you've previously visited. Private Browsing also includes Tracking Protection, which prevents companies from tracking your browsing history across multiple sites. To open a private browsing session, click on the menu button and then click 'New Private Window'. If you want to directly open a link in a new private window, hold down the Ctrl key while you click on this link and choose the option to 'Open Link in New Private Window' from the context menu.

Install an app

04 Mozilla offers the browser platform to developers as well.

This paves the way for thousands of interesting and useful apps in the Mozilla marketplace (Fig 2). With a wide selection of games, music and productivity apps, Firefox Marketplace has something for everybody. To install an app, open Firefox, click on the 'Tools' menu and select 'Apps'. This will open up the marketplace. Now, type a search query in the search box to look for a specific app or choose a category for the type of app you are looking for. You can also choose the screen type from the drop-down menu to see apps optimised for that size. Click on an app to view its details. Finally, if you're ready to install an app, click the blue install button.

"Private Browsing allows you to browse the Internet without saving any information about which sites and pages you've previously visited"



Manage your emails with Thunderbird

Work remotely and learn to manage all your email accounts using Thunderbird

Part of the Mozilla suite, Thunderbird is a lightweight mail client. It supports different account protocols like POP, IMAP, Gmail etc. It also has an integrated learning spam filter that offers easy organisation of mails with tagging and virtual folders. More features can be added by simply installing extensions. If you're an avid reader, Thunderbird acts as news and RSS client as well. So you can get all your information at a single point of contact.

Tabbed email lets you load messages in separate tabs so you can quickly jump between conversations. A quick filter toolbar helps you filter messages by tags, contacts, keywords etc. Other features include message archiving, customisable themes and personas, smart folders, and even chat integration. You can also add social media accounts, like Twitter and Facebook, directly to Thunderbird and chat with your contacts with accounts on these platforms.

Thunderbird is installed by default on Ubuntu 16.04, so just fire up Dash and search for it. Click on the icon in the results to launch Thunderbird. You can now add your email accounts to get started here. Note that Thunderbird, in association with some service providers, offers email servers as well. So, you can avail a new email ID right from the Thunderbird GUI. If you don't want a new email address, however, just select 'Skip this and use my existing email'.

"You can also add social media accounts, like Twitter and Facebook, directly to Thunderbird"

Manage your emails with Thunderbird

Ubuntu apps

Explore Thunderbird Discover key features of the Thunderbird UI

Get messages

You can use this button to force sync with the email servers and fetch all the new messages for all your email accounts

Write

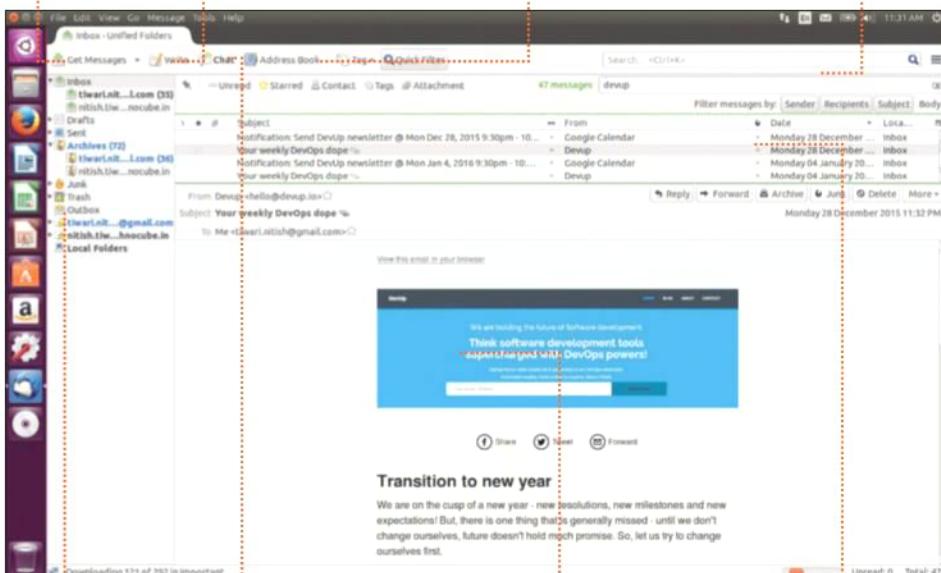
Click here to open the Mail Compose dialog and write a message

Address book

This holds all your contact details from different mailbox accounts in a single place

Search and filter

You can search your mailbox for specific keywords or filter the mail based on sender, recipient, subject etc from this section



Mail folder list

This section holds all the mail folders from all your mailboxes. If you have enabled the unified mailbox, you'll see each mailbox as a child inside the generic mail folders

Chat

All the social platform profiles such as Facebook, Twitter etc (if linked to Thunderbird) are visible inside this chat box

Mail display

This section displays a detailed view of the mail selected in the pane above. You'll see the reply, forward and delete buttons here

Mail list

This is the section that shows a list of all your mail in a chronological order. Just click on the column header to sort them based on different criteria

Manage your emails with Thunderbird

Use Thunderbird as your mail client

Setting up a new account with Thunderbird is easy. Start by clicking on the 'Email' link on its launch page. You then need to provide your username and password for your email provider and your email address (Fig 1). Thunderbird determines connection details (such as ports, server names, security protocols, etc) by looking up your email provider and can usually provide the account details.

You need to configure your account manually if your email provider is not listed in Thunderbird's database, or if you have a non-standard email configuration. To configure an account manually, you need the following details: incoming mail server and port (eg 'pop.example.com' and port 110), outgoing mail server and port (eg 'smtp.example.com' and port 25), and the security setting for the connection with the server (eg 'SSL/TLS' and whether or not to use secure authentication). Fill in these details and you are good to go.

"Setting up a new account with Thunderbird is easy. Start by clicking on the 'Email' link on its launch page"

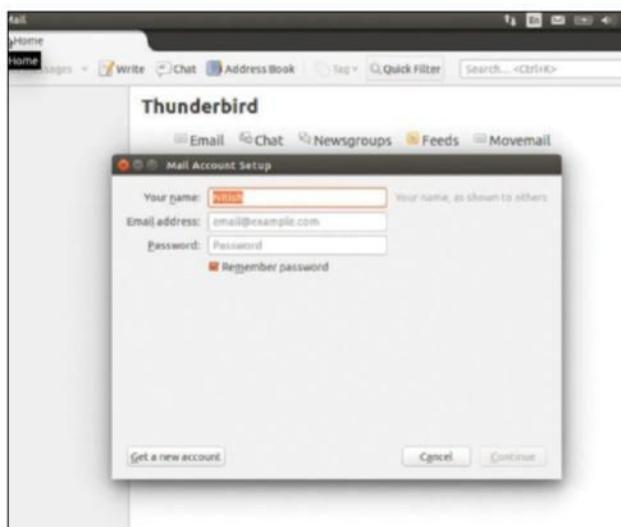


Fig 1 (above) Input your name, address and password details to link a new account

Social chat with Thunderbird

To add chat accounts to Thunderbird, click on the Chat button next to the Email button on Thunderbird's launch page. After you click the link, you'll see a pop-up with supported services. Facebook, Twitter, Google Talk, IRC and Yahoo are all supported. Select the account to add and click Next. On the next page, enter the username and then on the next page, select the alias. Finally, click the Finish button. You will then be taken to the website of the account you chose to authenticate access to your account. Once authenticated, you can view all your social conversations in a new tab. Another aspect of Thunderbird chat is that all the chat conversations are included in search. So, if you are looking for a keyword, just type it and the results you get will include results from your past chat conversation history.

Manage your emails with Thunderbird

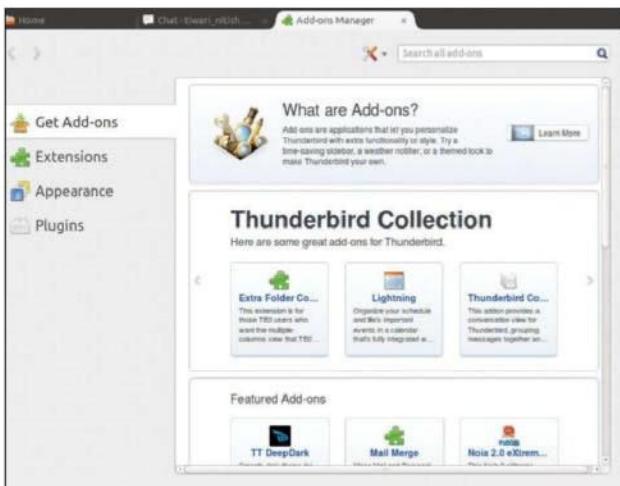


Fig 2 (above) Head to the Mozilla add-ons site to improve your Thunderbird features

Extend Thunderbird features

Thunderbird has an open, extensible design and program architecture. This enables people to create add-ons for it. Most of these are distributed via the Mozilla add-ons site, but authors can do so any way they choose. Let's see how to install an add-on...

To start, go to Tools>Add-ons. Click on Get Add-ons (Fig 2). Type the name or keywords of the add-on you want in the search field and click the magnifier icon. Then select the add-on from the list and click 'Add to Thunderbird'.

Click on Install Now once the button is available. Note that the add-ons from the official site (addons.mozilla.org) are reviewed by Mozilla and are relatively safe to install. Also, if the author is verified, the author name will be displayed. Finally, restart Thunderbird to complete your changes.

To remove an add-on, go to Tools>Add-ons and select the add-on to be removed from the Extensions, Themes or Plugins panel. Then click Disable to prevent it from loading; you can also click Uninstall to completely remove it.

"Thunderbird has an open, extensible design and program architecture"

Ubuntu apps

Multiple mail accounts with unified folders

Unified folders is a folder pane view which resembles a global inbox account: it merges the contents of all inbox folders (both POP, IMAP and local folders) from all accounts. It also shows the inbox of each account as a child folder of the unified Inbox account. Any message in an inbox shows up in both the root of the unified Inbox, plus the child folder of the unified Inbox. Each account displays any child folders of the inbox, only its inbox folder has been 'moved' away from the account. This does not change where and how messages are stored. Unified is just another way to view your folders at a single point. To enable unified folders, go to View> Folders>Unified Folders and select it. Alternately, if you don't want to use the feature, use View> Folders>All Folders to select a more traditional display.



Communicate with Empathy

Learn how to set up and utilise Empathy text messenger to the full

Instant messaging, also abbreviated to IM, is a text-based means to communicate instantly over the Internet and the local network. While some IM applications need you to create a new account, others provide IM facilities by using accounts from different service providers like Google, Yahoo, etc. IM applications can also be used to connect to chat rooms. For the uninitiated, chat rooms are online places where like-minded people meet to talk.

In this feature, we are going to explore Empathy. It is a messaging program that supports text, voice, video chat, and file transfers over many different protocols. Empathy also lets you add accounts from different services and uses them to chat with your contacts. Based on Telepathy for protocol support and a UI based on Gossip, Empathy is the default chat client in current versions of GNOME, (and hence Ubuntu).

To get started with Empathy simply type 'Empathy' in Dash. Then click on the Empathy icon to launch the application. When you launch it for the first time, you'll be asked to link your online accounts. Just link your accounts and you can then easily talk to all your contacts. Using Empathy, you can also group all the conversations in a single window, have multiple windows for different kinds of conversations, easily search through your previous conversations, and share your desktop in just two clicks. Now let's learn about Empathy in more detail.

"When you launch it for the first time, you'll be asked to link your online accounts. Just link your accounts and you can then easily talk to all your contacts"

The Empathy interface

Understand how Empathy works and what you can change

Application settings

When you open Empathy, these settings are available automatically on the top status bar. You can find various settings related to conversations, contacts and so on here

Online accounts

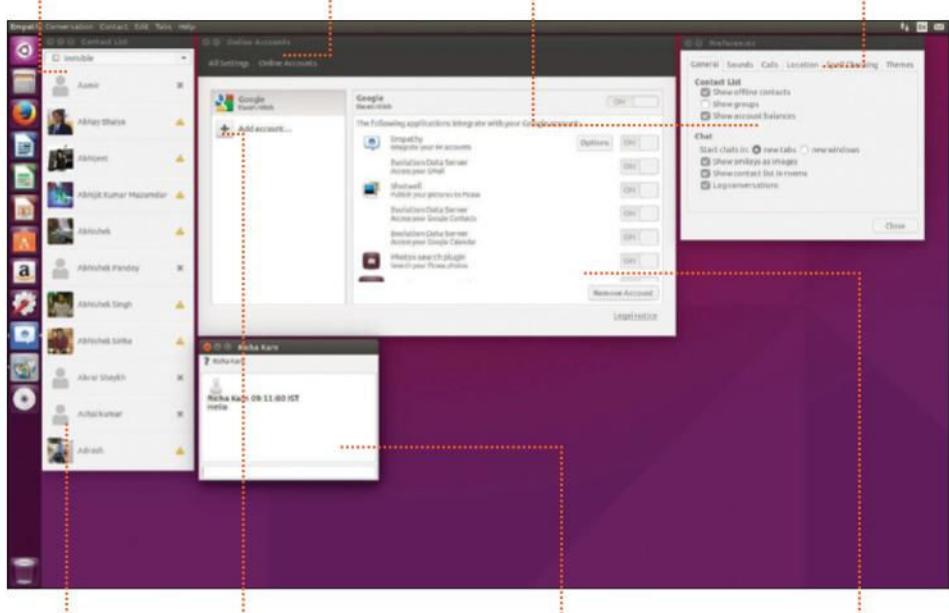
If you select Add Accounts in the status bar, you'll see this open up. If you click All Settings here, you'll be taken to the System settings page

General settings

You can find these under Empathy>Preferences. Under the General settings you can set what contacts will be visible by default and also select the chat settings

Other settings

You can see several other settings like sounds, calls, location, spell check, themes and so on as different tabs under Empathy>Preferences



Contacts list

This window displays a list of all the contacts and their current status. To chat with anyone from this list, right-click on the contact, and select chat

Accounts list

You'll see a list of accounts added to the system here. Click 'Add account' to add a new online account here

Chat window

This is the actual chat window where you can converse with your contacts. Based on the system capabilities, you can also chat in audio and video mode

Account details

Once you've selected an already added account on the left window, you'll see all the related options here. You can choose to enable or disable related services from here

First steps with Empathy

Get started with Empathy messenger

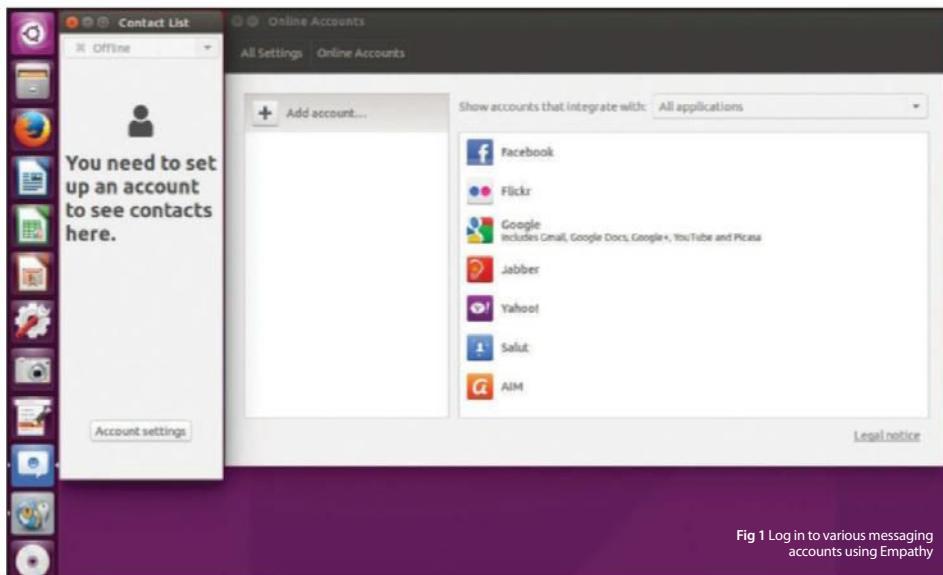


Fig 1 Log in to various messaging accounts using Empathy

Add a new account

01 You can add instant messaging accounts from several supported services (Fig 1). For some account providers, these steps will also allow you to register for a new account. To add an account, click Empathy>Accounts and then press +. From the 'What kind of chat account do you have?' drop-down list, select the type of account you wish to add. Enter the required information. For most accounts, you will only need a login ID and a password. Some accounts may require additional

information though. Finally click Add to confirm the process and save the account details.

Manage contacts

02 After you have your accounts added to Empathy, the next step is to add your contacts and manage them. To add contacts, click Chat>Add Contact. Then from the accounts drop-down list select the account you wish to use to connect to your contact. Note that your contact should be using the same service as the account you select. In

the Identifier field, enter your contact's login ID, username, screen name, or other appropriate identifier for the service type. In the Alias field, type your contact's name as you would like it to appear in your contact list. Finally, click Add to add the person to your list of contacts.

If one or more of your contacts has multiple accounts with different messaging services, you can combine these accounts into a single contact. The resulting contact is called a meta-contact: a contact composed from different single contacts. To link accounts press the tick button to

"For most accounts, you will only need a login ID and a password. Some accounts may require additional information though. Finally click Add to confirm"

select entries you want to link. This will enable selection mode and you can see a checkbox for each entry. Tick the checkboxes that correspond to a single person's contact entries. Finally, press Link.

Audio and video communication

03 Empathy supports audio and video communication using the default GUI, however it is still dependent on the account you use to communicate. This is because only a certain set of services support audio and video communication. Right now only Google, Jabber and SIP accounts are supported. Considering you are using one of the supported accounts, let's see how to initiate audio and video calls.

To initiate a call, right-click on the contact you want to talk to and select Audio Call or Video Call. In the next window that opens, you'll see the connection getting established. When the connection is established, you will see the total conversation time at the bottom of the window. Once you are done, end the conversation by clicking the hand up button.

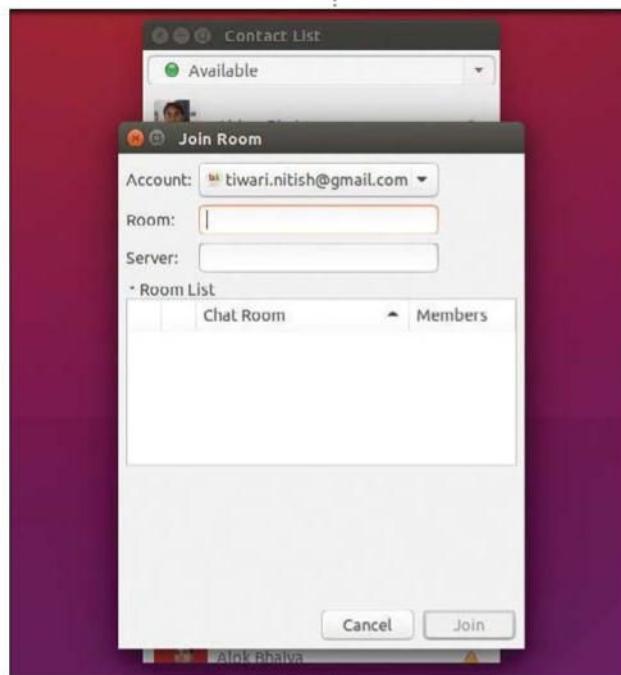
IRC with Empathy

04 To use IRC with Empathy, make sure you have at least one account added to Empathy already. You can then select Rooms>Join Rooms, which will open the IRC pop-up. You can simply select your account name from the drop-down and then fill in the room name and the server name (Fig 2). You should now be able to chat with people in the room you joined. Note that an IRC network may have many servers you can connect to. When you are connected to a server on a particular network, you can communicate

with all users on all other servers on that network. You can also add and remove servers for this network using the Add and Remove buttons. When a server is selected, click the field under Server or Port to edit it. Alternatively, use the left and right arrow keys to focus the field, and press the space bar to begin editing.

"Empathy supports audio and video communication using the default GUI, but it is still dependent on the account you use"

Fig 2 (below) Enter your details to enter an IRC chatroom





20 LibreOffice essentials

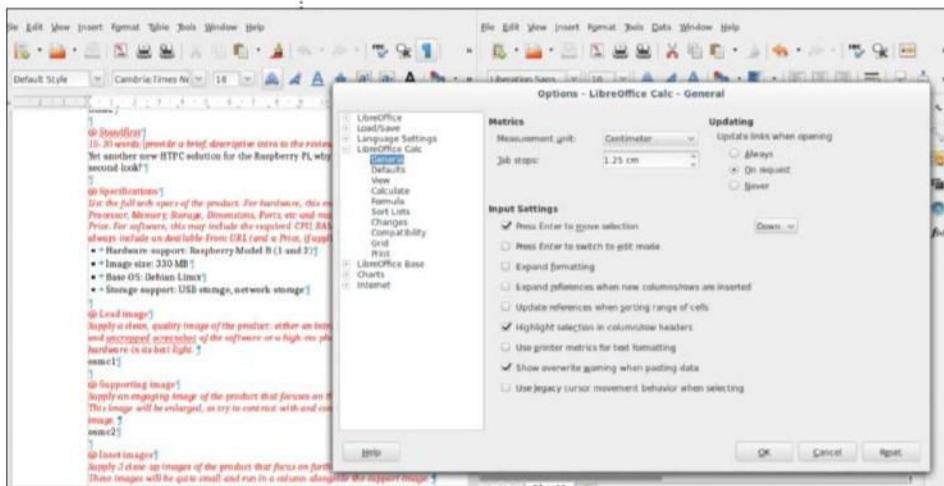
Make your working day more productive with these indispensable tips for the LibreOffice suite

As its name indicates, LibreOffice is the open-source equivalent of Microsoft Office. Complete with programs for word processing, creating databases, designing slideshows and more, it is the default office suite for most popular Linux distributions.

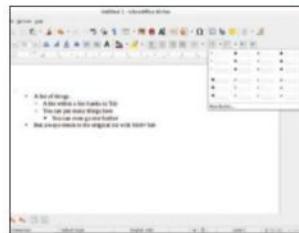
For regular users and novices, it can be difficult to comprehend just how powerful LibreOffice can be. It can be easy to get stuck in a rut and not make the most of what it has to offer. For example, on a day-to-day basis, you may have no call to use macros, creating indexes or doing a mail merge with Writer. But these features can vastly improve your productivity and efficiency (Fig 1).

Over the next few pages, we are going to highlight some of the best ways you can improve your experience – particularly in the core Writer and Calc programs. You'll optimise the way you work and start making the most of this feature-full office software.

Fig 1 (below) Use the LibreOffice apps more productively



Writer



Bring up formatting options

01 Perhaps you are looking to introduce greater readability or to make sure your document prints exactly how you want it to. Either way, the way forward is in formatting the text. At first it can be a tricky to figure out why certain sections of text look how they do, so head to the formatting section to figure it out and make changes. On the toolbar is a symbol that looks like a backwards P – click that to reveal live formatting symbols, such as rogue paragraph breaks.

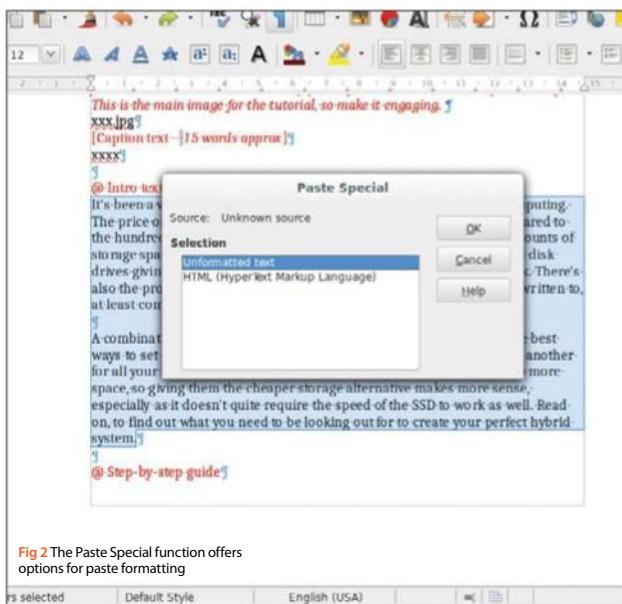


Fig 2 The Paste Special function offers options for paste formatting

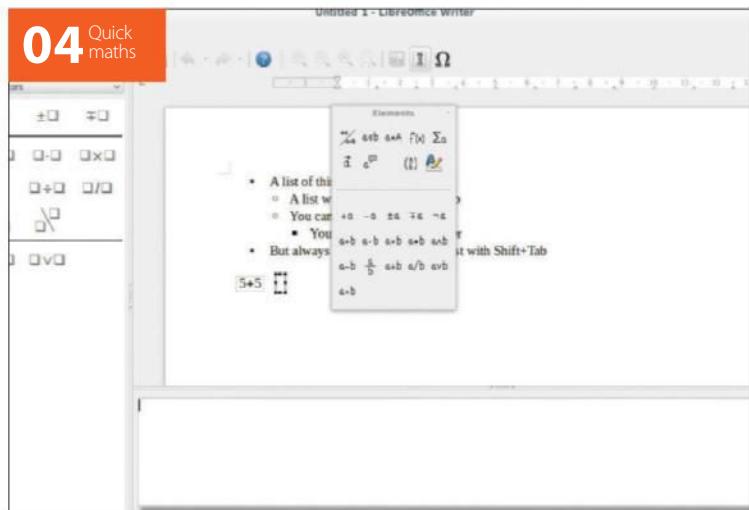
Better bullet points

02 Creating a list of bullet points is fairly easy; click the type with dots or numbers and go. You can change the formatting of these bullet points to be different symbols or letters instead of numbers. You can, however, also create nested lists by using the Tab key to create sub lists, and then press Shift+Tab to go back to the standard list.

Paste unformatted text

03 Generally in Linux, you can use Ctrl+Shift+V to paste text and remove its formatting at the same time. If you use this in Writer, or find Paste Special in the Edit menu, you then have several options of how to paste the text (Fig 2). One of these is unformatted, but it also allows for other methods, such as using LibreOffice formatting.

"For regular users and novices, it can be difficult to comprehend just how powerful LibreOffice can be"

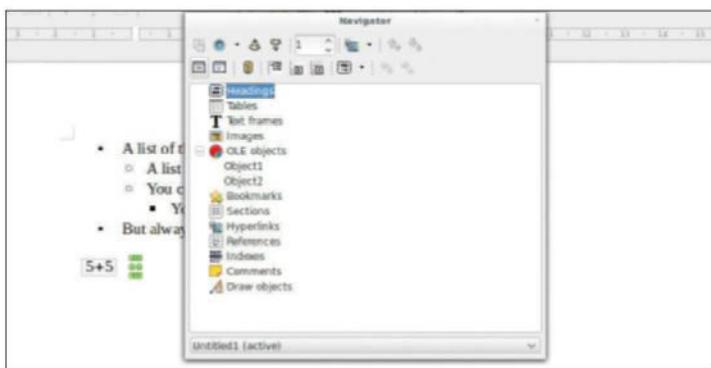


Quick maths

04 Even when you're writing, you might need to do a quick bit of maths. Instead of switching to Google or a calculator app, you can use the formula bar. Go to Insert, Object, Formula and write out the calculation you want. Once you have confirmed it, the outcome of the formula appears where your cursor was placed.

Quick navigation

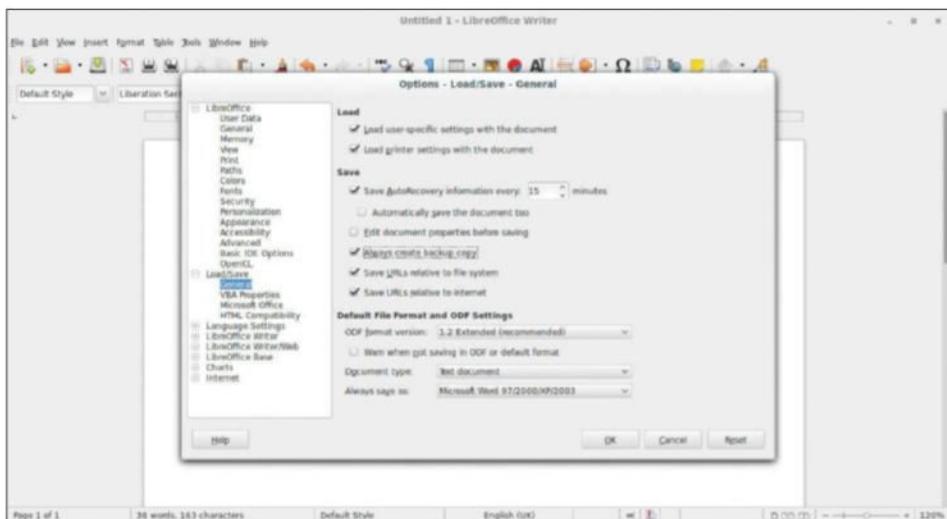
05 Pressing F5 or going to the View menu will allow you to use the Navigator function. You can use it in large documents to quickly move between different headings, tables, graphics, bookmarks and many more objects in the document. It's not a proper dock, so you can move it around to see what you want at any given time.



“Even when you’re writing, you might need to do a quick bit of maths. Instead of switching to Google or a calculator app, you can use the formula bar”

Set default document format

06 By default, Writer will save new files as ODTs, the open document format. This works in most other word processors, but if you’re regularly working with files that need to work on Microsoft Office, you can change the default file format to be .doc or .docx. Go to Tools, Options and find the General settings under Load/Save to change the default.



Create a backup system in Writer

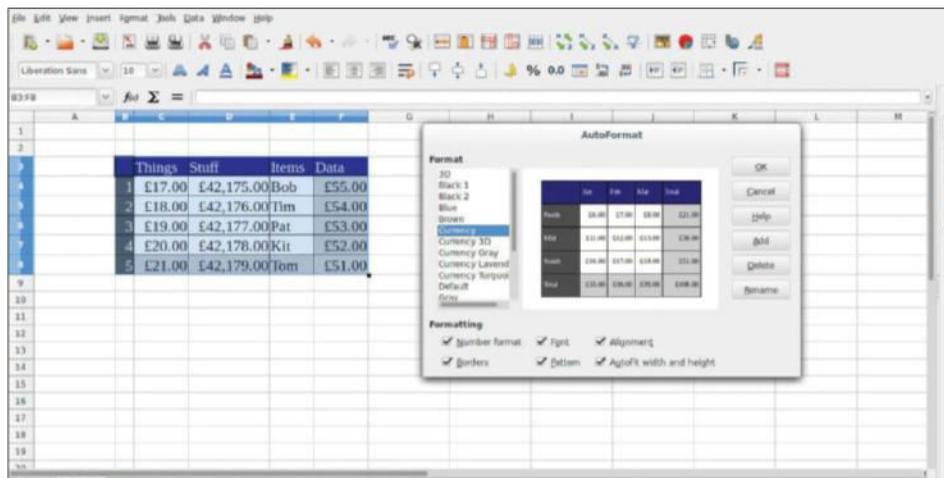
07 Writer has a recovery tool for when unexpected shutdowns happen, but that relies on temporary files and other related files that aren't always there when you really need them. Writer does have a backup system that it can make use of though; enable 'Always create backup copy' in the Load/Save General options to cover this.

n a list thanks to Tab
t many things here
even go one further
urn to the original list with Shift+I

Change case

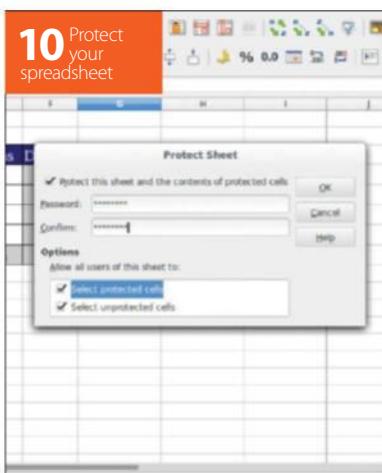
08 Got a word and it's not quite capitalised correctly? Pasted some text and it's all randomly capitalised. You can change the case of specific sections of text without re-writing. Simply select what you want to change, right click and select the Change Case option to tweak.

Calc



AutoFormat tables

09 If you've created a table, you may need to add a touch of colour in order to make it more readable. You can do this manually, however Calc has a built-in format option under Format>AutoFormat. From here you can give a colour scheme to a table that you've selected and even customise what is taken into account for formatting.



Protect your spreadsheet

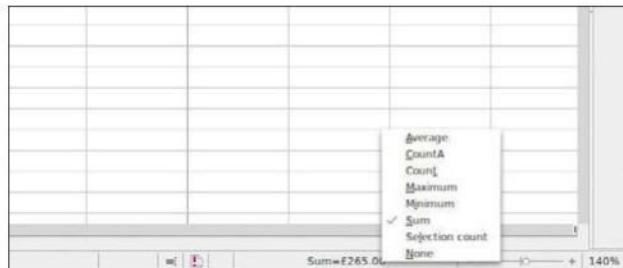
10 Shared spreadsheets are good for productivity, but the more complicated they become, the more difficult it can be to track down an accidental change made by one of the users. You can protect the spreadsheet by using Tools>Protect Document>Sheet in order to give it a password so that only certain people can make changes.

Learn more!

There are many more functions to learn that can help you do more with LibreOffice and the first step is to have a look through some of the documentation for the software, or just have a quick browse through all of the options and the available menus.

Change status bar preview

11 When you select some cells with a numerical value inside, you get a handy prompt on the status bar that tells you the value they add up to. That might not be what you want all the time, though. Click on that area of the status bar to bring up a menu and change it to average, maximum or minimum numbers in the selection.



"Filtering rows helps to organise data, but if you're not sure how exactly to go about doing that, Calc has an automatic filtering tool you can use"

AutoFilter rows

12 Filtering rows helps to organise data, but if you're not sure how exactly to go about doing that, Calc has an automatic filtering tool you can use. Select a row, then go to Data>Filter>Auto for it to create an automatic filtering system based on that row. You can also modify it a bit once it's in place.

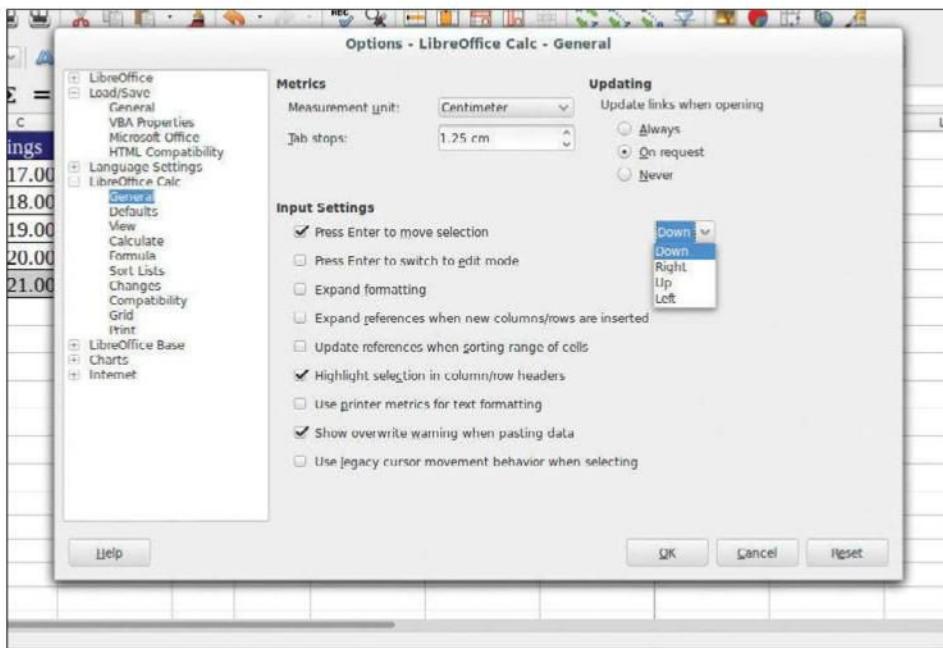
Grouped cells

13 Sometimes you don't need to see specific chunks of data all the time, and collapsing it like in a piece of code will add a bit more space to the viewable page. Using the Outline function under Data>Group and Outline>AutoOutline, you can create these collapsible groups, which use a thick outline to indicate themselves.

Untitled 4 - LibreOffice Calc								
Things								
G13	A	B	C	D	E	F	G	H
1	Things	Stuff		Items	Data			
2	1	£17.00	£42,175.00	Bob	£55.00	£55.00		
3	2	£18.00	£42,176.00	Tim	£54.00	£55.00		
4	3	£19.00	£42,177.00	Pat	£53.00	£55.00		
5	4	£20.00	£42,178.00	Kit	£52.00	£55.00		
6	5	£21.00	£42,179.00	Tom	£51.00	£55.00		
7					£50.00	£55.00		
8					£49.00	£55.00		
9					£48.00	£55.00		
10					£47.00	£55.00		
11					£46.00	£55.00		
12					£45.00	£55.00		
13					£44.00	£55.00		
14								
15								

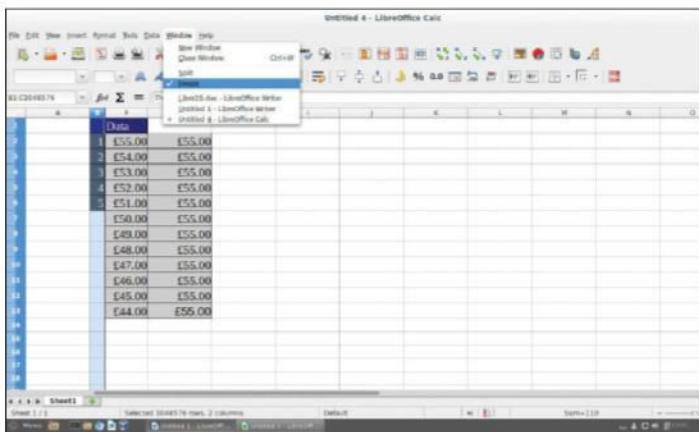
Auto-increment or copy cells

14 If you've never stumbled across it, Calc is very smart when it comes to replicating cells. If you write down two or three numbers or even dates, selecting one and dragging the black square down to copy will automatically fill in the cells with numbers or dates in the correct sequence. If you don't want it to do that, press and hold Control when copying the cell for regular duplication.



Change Enter key

15 It seems fairly natural for the Enter key to move you down a row of cells and that's what Calc does by default. However, you can actually change the behaviour of the Enter key by going to Tools>Options>LibreOffice Calc, then General to have it move along a row instead.



Freeze columns in place

16 If you have a lot of data, rows or columns you can sometimes find yourself not always able to remember or divine what cell is for what. By selecting a row or column you always want to be visible, go to Window then Freeze to keep it always on the top or on the left as you browse the spreadsheet.

Miscellaneous

Current Slide (6 of 34) Next Slide

How is it going ...

- Extremely well / as of now:
 - 50 entirely new code contributors with included patches, 27 translators
 - another 10+ arriving each week
 - 100's of KLOC of real patch (3+ million line diff to branch point) (meaningless?)
 - But – Oracle won't join us in name (yet) ... though they contribute indirectly.

What are we doing ?

- Pay down the vast technical debt we inherited
 - an ancient and sprawling, 20year old forest
 - organic growth, without rebasing, a lack of code review etc
- e.g. the open approach to lifecycle management:
 - dozens of branches on vcs
 - Data from Git of 20+ developer teams at Google & Facebook

Presenter mode

17 When using Impress for presenting slides, you will often be hooked up to a projector or television that either mirrors or acts as an extension to your laptop. Impress has a neat feature where the actual presentation will be shown on the big screen, while you can turn on a presenter console just for your laptop display that shows you what's coming up in your presentation, along with notes.

Switch between languages
in spell-check on the fly

18 Perhaps you need to paste into a document a paragraph from another language. The rest of the document is in English, so the spell check flips out at unfamiliar words. Highlight the paragraph, click Tools>Languages and then select a language for this section of the document, and only this section.

Insert readable formulae

19 There is a completely separate application for LibreOffice called Math that is not, in fact, database software, but actually a way to draw up mathematical equations that can then be inserted into other LibreOffice software. This is good if you're writing an academic paper with ridiculous maths that needs to be readable.

Using PDFs

20 PDFs can be edited in LibreOffice. Simply import them using something like Writer and it will dump the PDF into the Draw application. You can edit text, change pictures and even the general formatting of the PDF. Once it's done, Draw allows you to export the working file as a PDF for everyone to use.



Text editing with gedit

Understand its features and learn about its many purposes

Text Editor (aka gedit) is the default GUI text editor in the Ubuntu OS and the GNOME desktop environment. It is UTF-8 compatible and supports most standard text editor functions as well as many advanced features like multilingual spell-checking, extensive support of syntax highlighting, and a large number of official and third-party plug-ins. With multiple character sets, Text Editor can play a versatile role – you can use it to prepare simple notes and documents, or create source code using its advanced features just like an integrated development environment. gedit is installed by default on Ubuntu 16.04 and can be launched via Dash or an application shortcut. If you prefer the command line, you can use the gedit command to directly interact with the tool.

To open a specific file with gedit, type `gedit <filename>` at the command prompt. To open multiple files, type `gedit <filename1> <filename2>` and so on. You can also open a file at a specific line number by including `+<line number>` in the file path, like this: `gksudo gedit +21 /etc/apt/sources.list`.

gedit offers several helpful options, under Edit>Preferences, that you may want to review. For example, gedit automatically creates a backup copy of files you edit. If you are running low on space, however, you can disable this: just go to Edit>Preferences>Editor tab and deselect 'Create a backup copy'.

"Advanced features include multilingual spell-checking, extensive support of syntax highlighting, and a large number of official and third-party plug-ins"

Discover gedit Understanding the user interface

New file

This button lets you create a new file in gedit. As you click this, new tabs will be created with new files. You'll be asked for a location when saving files

Save file

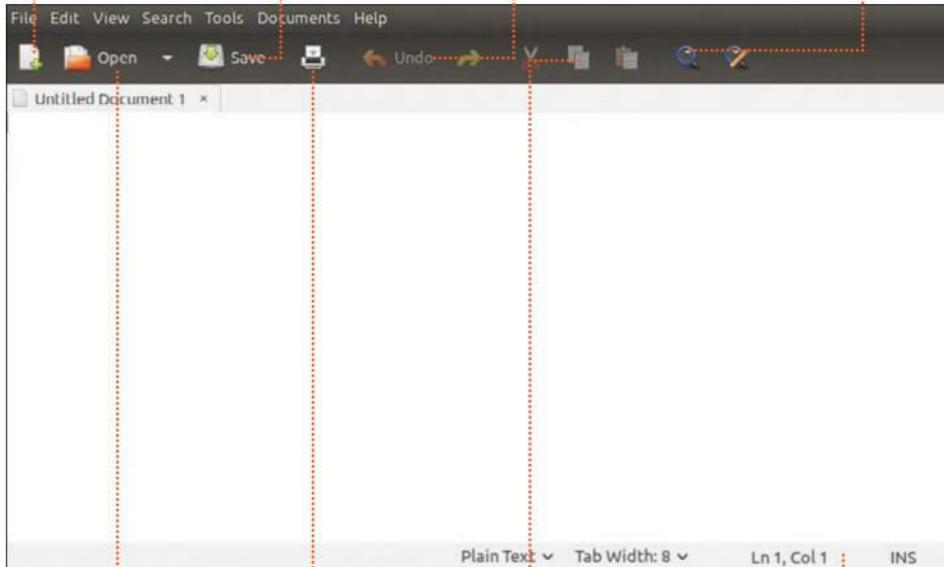
After you are done with editing the file, click this button to save your work. If it is a brand new file, you'll also be asked to enter the save location

Undo/redo buttons

You can undo your actions in the file or choose to redo them using these buttons

Search file

The magnifying glass icon lets you search a file, and the next icon with a pencil on top lets you replace the searched term with an alternative one



Open file

You can open existing files from here. Just click on the button and select the file(s) you want to open

Print file

This button lets you print the file directly from the application. You'll be prompted to add a printer if you haven't already

Edit buttons

You'll find the edit options (Cut, Copy and Paste) here. You can also use the common keyboard shortcuts (Ctrl+X, Ctrl+C and Ctrl+V) to accomplish these actions

Status bar

This bar shows the file details, such as encoding, current cursor position, tab width etc, in real time

Uncover key features

Dive deeper into gedit's capabilities

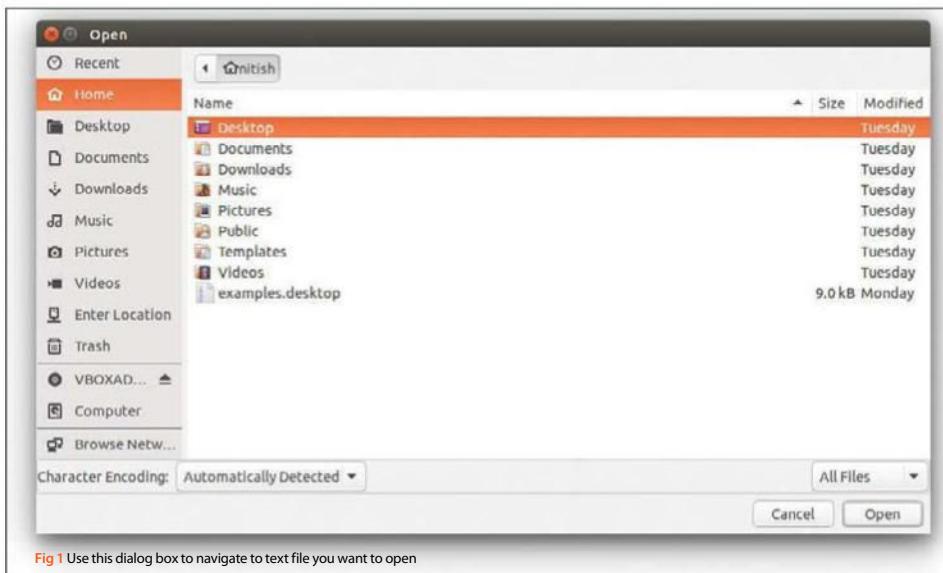


Fig 1 Use this dialog box to navigate to text file you want to open

Handling files with gedit

01 We've already seen how to open files in gedit via the command line. So let's understand how to manage files in gedit. To open a file or set of files in the gedit GUI, click the open button or press **Ctrl+O**. In the dialog, select all the files you want to open and click Open (Fig 1). By default, gedit provides easy access to five of your most recently used files. To open one, click the downward-facing arrow to the right of the open button. Once you have selected the desired file, it will open up in a brand new

tab. You can also open files that are located on other machines with gedit. However, prior to opening a file on a server from within gedit, you need to know some technical information about the server. For example, you'll need the IP address or URL of the server, and may need to know what kind of server it is (HTTP, FTP etc). Once you have all the necessary information, go to the Open dialog and click the pencil icon to enter the IP address/ URL of the server. Select the file and click Open. If you have the required privileges, the file should open up right away.

Handling text

02 The Find tool can help you locate specific sequences of text within your file. To open the search window, click **Menu>Find**, or press **Ctrl+F**. This will move your cursor to the start of the search window. Type the text you wish to search for in the search window. As you type, gedit will begin highlighting text that matches what you have entered. You can scroll through the search results using the up/down arrow keys or by pressing **Ctrl+G**. You can also highlight a portion of text

"By default, gedit provides easy access to five of your most recently used files. To open one, click the downward-facing arrow to the right of the open button"

with your mouse and press Ctrl+F. The text you've highlighted will automatically appear in the search window. For more search options, click on the magnifying glass icon in the search window. You can select one or more of the following search options: select Match Case to make the search case-sensitive; select Match Entire Word Only to search only complete words; select Wrap Around to search text from top to bottom and cycle back again.

"Locate specific sequences of text within in your file"

Syntax highlighting

03 If you would like to use gedit for text editing, you have the option to highlight the lines of code you write. gedit uses the GtkSourceView for syntax highlighting. It uses .lang files to define the highlighting schemes. The .lang file for a specific programming language is located in the /usr/share/gtksourceview-3.0/language-specs/folder.

You can enable code highlighting via the menu by going to View>Highlight Mode, or via the lower status bar. The status bar, enabled via the View menu, displays programming language options for many types of sources, scripts, markup and scientific formats.

Plug-ins

04 Plug-ins greatly enhance the power of gedit and are accessed via Edit>Preferences>Plugins (Fig 2). More than a dozen plug-ins are pre-installed and can be enabled/disabled here. Extra plug-ins are available via the Internet. Here are just two of the plug-ins that can help you with your day-to-day activities...

Tag List – Displays common tags in a side pane and allows for easy insertion into the file.

External Tools – This allows the user to run external commands on the file being edited from within gedit itself. Once this plug-in is enabled, the user can select custom tools from the Tools menu. Note that this is not enabled by default.

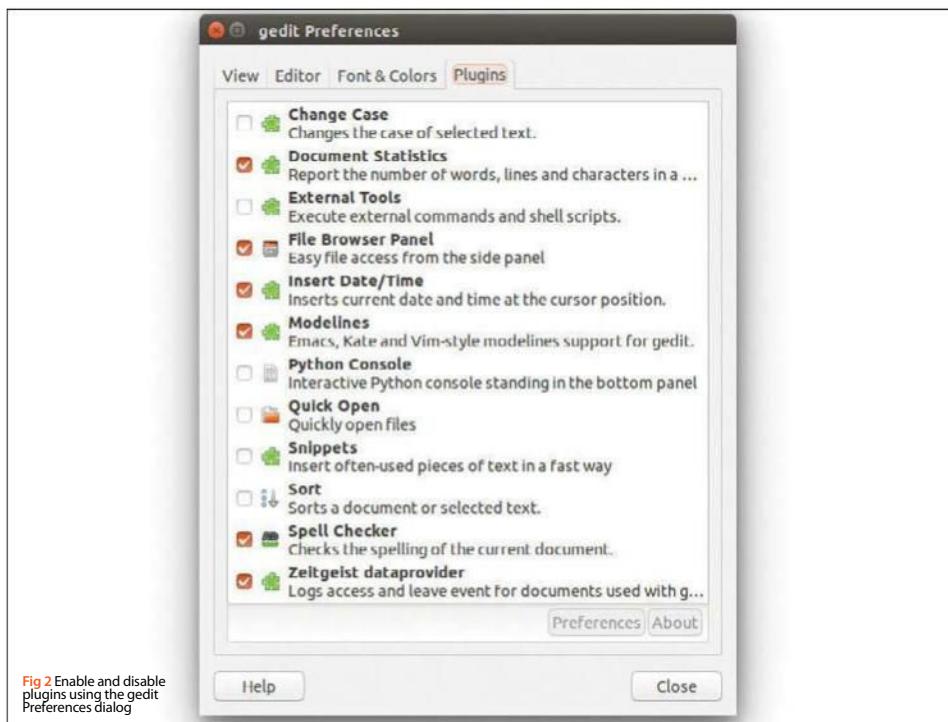


Fig 2 Enable and disable plugins using the gedit Preferences dialog



Manage images with Shotwell

Keep tabs on large numbers of photographs with ease using the Shotwell app

Most users treat Shotwell as a simple image viewer: a picture is double-clicked in Nautilus and pops up in Shotwell.

But using the product as a simple picture viewer means users are losing out on a set of valuable helper features. Shotwell comes with a relatively sophisticated database based on SQL technology, so that pictures can be stored and retrieved with blazing speed. Various advanced options let you tailor the display list to your needs; if Shotwell is set up correctly, it will significantly reduce the time required to find specific images in your (ever-growing) collection of files. What's more, if your digital camera is set up correctly, Shotwell will analyse the EXIF data in order to find out the date it was captured and other information automatically. Therefore, compiling all the photos taken at a single event into one location becomes a matter of one click.

The tutorial on the adjacent side of the screen assumes that you already passed through the initial configuration of the product. If this is not the case, enter Shotwell into the dash. Click 'Shotwell Photo Manager' to start the application, and click the OK button when confronted with the 'Welcome to Shotwell' dialog. Its default settings can be accepted without any further ado, but be prepared to wait a few minutes as the database gets populated with the images and screenshots found in your profile's Pictures folder.

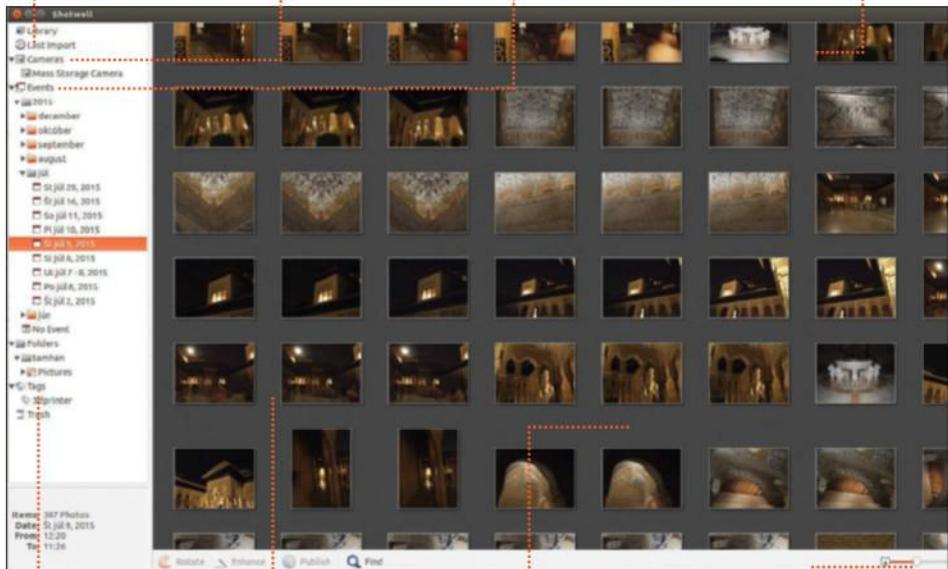
"Most users treat Shotwell as a simple image viewer. But using it this way means users are losing out on a set of valuable helper features"

Organise your shots

Store and retrieve your pictures in no time at all

Last Import view

Click this part of your image library to put focus on the latest addition. This can be helpful if you want to see what items were added to the collection last – especially handy if you’re a lazy tagger



Tag list

What the Events list is to events, the Tags list is to tags: a really helpful tool for singling down on interesting image material

Camera list

This part of the main list provides an overview of all external storage media currently connected to your workstation. It is a prime destination for starting import operations

Events list

Images get catalogued according to the date when they were taken. Click any of them in order to limit the content shown in the picture area

Border indicator

Images can be selected for bulk processing. Shotwell displays selected pictures with a blue frame – using an overlay would affect the originality of the pictures at hand

Image display

Shotwell displays the contents of the currently selected section on a grey background. Double-click any of the pictures in order to open them for full-screen viewing

SQLite powered

Shotwell stores its data in a SQLite database. This leads to significant performance increases over traditional flat file storage – and might even permit networking to be added one day

Zoom lever

The size of the image elements in the display area can be adjusted to your needs. Simply drag the lever to the left or right in order to find the correct balance between information density and picture quality

Organise your photos Handling images with Shotwell

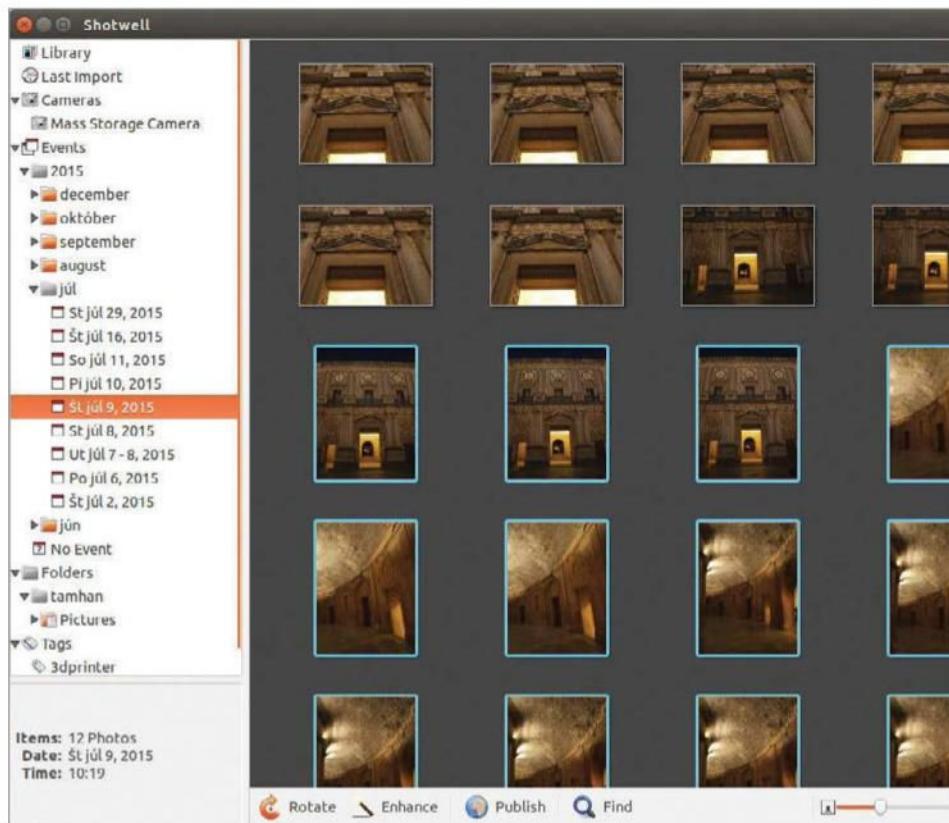


Fig 1 (above) Images are archived by date

Import the images

01 After coming home from an event, start Shotwell and insert the memory card of your digital camera into an internal or external card reader. Shotwell will grasp the storage medium automatically, and display it as an item in the Cameras section of the tree. Wait while the progress bar at the bottom is populated – the app must read each of the images in order to obtain further information about it. Next, click

the 'Import all' button at the bottom-right corner of the screen. Shotwell will start to copy the images to your

workstation's Pictures folder. This process can take quite a bit of time if the files involved are large. When this

"After coming home from an event, start Shotwell and insert the memory card of your digital camera into an internal or external card reader"

process is complete, a message titled 'Keep or Delete' will be displayed. It permits you to decide whether the images should stay on the memory card – picking yes is not an issue, as they will not be imported again.

See what happened

02 When the import process is over, your hard drive will lack quite a bit of free space. The tree view on the left-hand side of the screen will show a group of new folders that correlate with the dates of when the imported pictures were taken.

It's important that you do not touch the sub folders in the Pictures directory of your profile. Shotwell creates an elaborate folder structure that simplifies correlation with the database – moving files around can have disastrous consequences.

Name events and add tags

03 If Shotwell is left to its own devices, the pictures will be grouped by the day they were taken (Fig 1). Since dates, on their own, are not particularly informative, assigning helpful names is sensible.

Right-click any of the date entries and select Rename Event in order to make the default name editable. Enter a new name and press return to commit your changes.

Tags provide a 'second level' of context, which is overlaid above the date information. Tagging images is quite easy; select one or more, right-click the group and proceed to the 'Add tags' option in the resulting context menu. Shotwell responds by displaying a pop-up where one or more tag strings can be entered. Once tags are added, they show up in the tree view automatically. Simply click a tag to show all images bearing it.

Share RAW files

04 Be it fast-moving objects or the darkness of the Albaycin in Grenada, when the imaging situation gets tough, shooting in RAW helps you to make the most of your images. Sadly, the resulting files are not well-suited for sharing because most people don't have the necessary viewer on their machine.

Shotwell provides a RAW exporter which can be used to transform most wide-spread camera files into their JPEG equivalents (Fig 2). Get started by double-clicking the image in order to open it in full-screen mode, and right-click it. Next, select 'Send to'. The pop-up window allows you to select the format – picking JPG ensures that Shotwell generates an

industry-standard picture file. After clicking OK, the program displays a dialog permitting you to select the target. Then images can be sent via Bluetooth or email.

Share in Bulk

05 Sending images out one by one is a painstaking task to complete. Fortunately Shotwell can also convert groups of pictures in one go. Start out by selecting them in Overview mode (Shift/Ctrl+click) and proceed to selecting File>Export. Shotwell will start out by displaying the format selection dialog from step four, which will be followed by a common dialog that will permit you to select a storage destination from the options.

"If Shotwell is left to its own devices, the pictures will be grouped by the day they were taken. Assigning helpful names to events is sensible"



Fig 2 (above) Files are easily reformatted to jpeg equivalents



Listen to songs with Rhythmbox

Use your workstation to listen to music while you work

High-quality headphones are a great help for dealing with background noise – and thanks to multi-core CPUs, playing music in the background is simple.

Sadly, obtaining media files is but part of the challenge; once a few thousand MP3 files populate your storage, music management becomes a severe and annoying problem of its own. Ubuntu addresses this problem via the Rhythmbox media player. It is a combination of a media database, an online radio player and a classic, low-resource-consumption media playback utility.

Getting started with Rhythmbox is easy: click a media file in Nautilus, and the player will appear on-screen. Minimise it to protect from background playback – the music keeps on running even if you close the application.

Sadly, using Rhythmbox in this fashion means ignoring most of the interesting features of the product. Advanced users can create custom playlists containing favourite hits – some obscure Falco tracks provide a sure-fire way to distract yourself from your work!

In addition to that, the program can also be used as a crossfade engine. This means that the annoying gaps between normal MP3 files get “bridged over” by superimposing the songs onto one another – it might not be able to imitate a DJ’s handywork, but it is definitely better than nothing.

“Rhythmbox is a combination of a media database, an online radio player and a classic, low-resource-consumption media playback utility”

Play tunes with Ubuntu

Use Rhythmbox to play music unnoticed

Playback controls

If it worked for Apple's iPod, it also works for Rhythmbox. These three buttons control the playback of the currently selected file. This mini-controller is handy for changing what's playing quickly.

Shuffle and Repeat

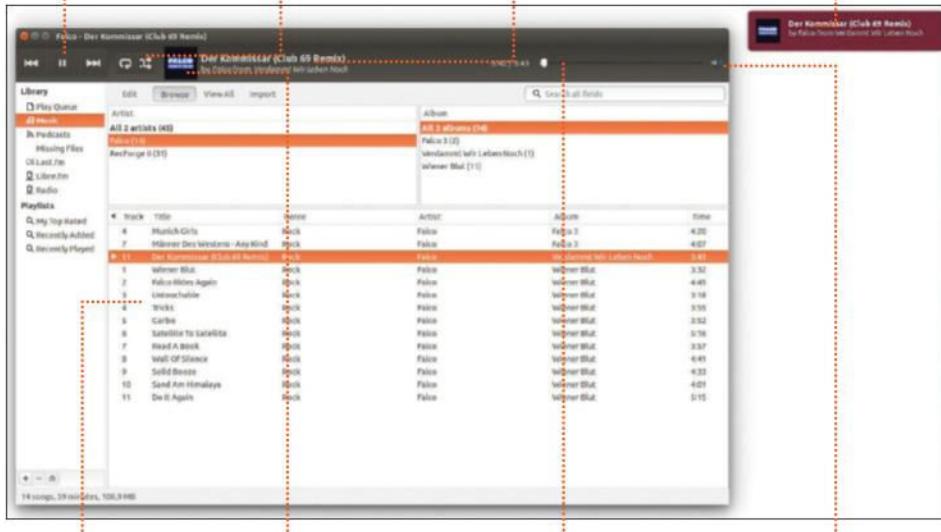
No matter how long your playlist is, it eventually reaches its end. Enabling the loop mode makes short work of this problem, as Rhythmbox simply starts again from the beginning.

Track information

Music takes centre stage in Rhythmbox. The two labels next to the album cover swatch provide information about the currently playing track, along with the album and the artist.

dbus callout

Rhythmbox integrates itself into the dbus event system of Ubuntu. This means that the currently playing track gets displayed in an annunciator display even if Rhythmbox is not actually in the foreground at that time.



Media storage list

The big table below the playback controls provides you with an overview of the media currently scheduled for playback. Double-click an item to start playing it.

Album cover preview

Even though music is an aural experience, adding some visual spruce is totally worth it. Double-click the small icon to open a pop-up with a bigger version of the image.

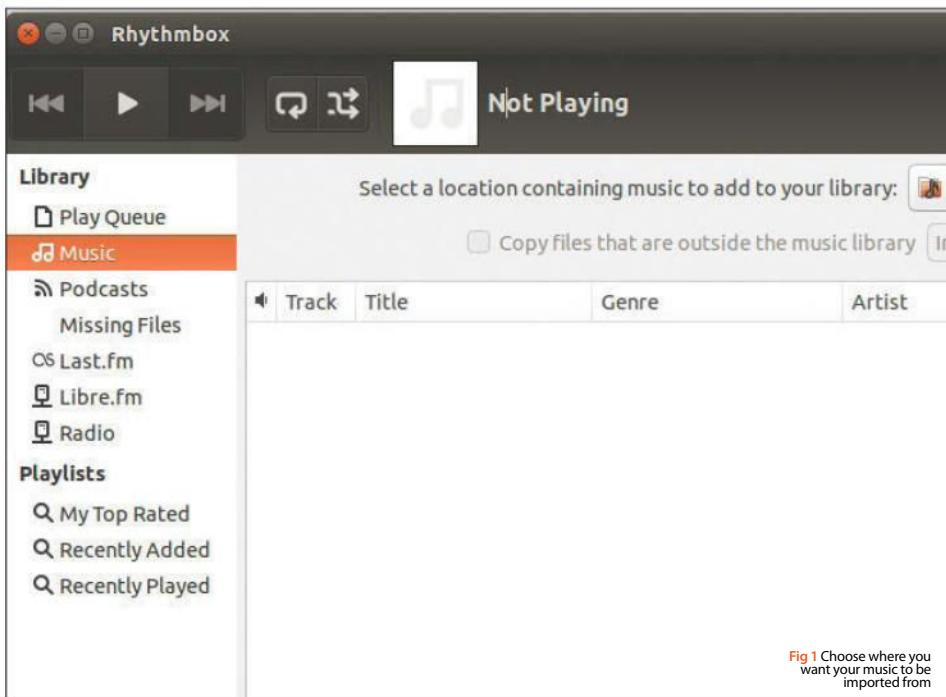
Seek bar

Ever feel like skipping over boring interludes and intros? Grab the seek bar and drag it to the right. The playback position will be adjusted automatically.

Volume toggle

Reducing Rhythmbox's volume independently from the rest of the system can be helpful. Click the speaker symbol and then peruse the controls in the flyout to suit your preferences.

Manage your tunes Organise large volumes of media



Import the tracks

01 This tutorial starts out with a scenario to think about: a friend provides you with a Gigabyte worth of Falco tracks. Let's assume that the USB stick containing the files has already been returned and the music currently sits in a subfolder of a hard disk on your machine. Start out by clicking File>Add Music. Next, click the arrow next to the combobox and choose Other to open a file selection dialog. Then proceed to navigate to the folder containing the subfolders with the albums. Finally, click Open to close the common dialog.

Set importing options

02 Rhythmbox will proceed to scan the contents of the folder. This process can take up to one second per file, which means that patience is a virtue here.

When the analysis is done, the list below the import controls will populate itself with further information about the tracks found.

Click the Import button to add them to the media catalogue of the Rhythmbox application. Ticking the 'Copy files that are outside the music library' checkbox instructs Rhythmbox to copy the media files into the Music folder of your profile (Fig 1). This is recommended if it resides on a removable device that has to be returned to its owner, but should be left disabled otherwise.

"When the analysis is done, the list below the import controls will populate itself with further information"

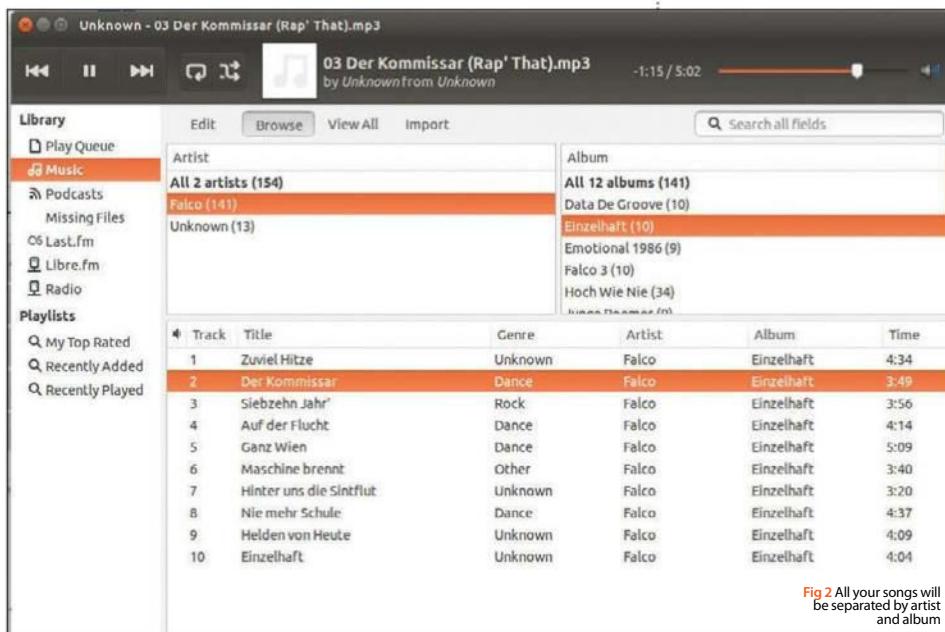


Fig 2 All your songs will be separated by artist and album

View your imports

03 Return to the main interface of Rhythmbox and click the Music tab; the imported tracks will present themselves in all their glory. If the metadata of the files was not perfect, a part of the files will be booked in the Unknown category. Most files should, however, be catalogued according to their artist (Fig 2). Double-click a song in the bottom table to start the playback process.

Search for tracks

04 Even though Rhythmbox's file list definitely represents progress over Nautilus, scrolling across thousands of files is not everyone's cup of tea.

The text field below the seek bar is intended to accept query strings. Entering 'Fal' would limit the contents of the Artist, Album and Track fields

to songs which match Fal in any of its metadata fields. Entering a longer string reduces the amount of data shown – if you know the title of a song, simply enter it to show all mixes and versions.

Alternatively, right-click an interesting song to open up a context menu. By default, it will offer you three choices: Genre, Artist and Album can be used as base for further queries. The results will, of course, be shown in the file list.

Create a playlist

05 Favourite tracks should be collected in a playlist. Create a new one by clicking the little '+' symbol at the bottom-left corner of the Rhythmbox window. Then, click 'New Playlist' and proceed to enter the name of the new playlist. Finally, press return and Rhythmbox will commit the entered text into its memory.

"Double-click a song to start the playback process"

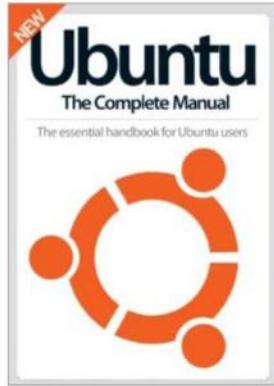
Populate the playlist

06 An empty playlist is not worth much. Add tracks to its content list by dragging and dropping; select the file in the Music view, and drag it to the playlist. Should your screen be too small to display all playlists in memory, right-click the desired file. The pop-up menu will contain an item called 'Add to playlist', which comes with a handy second list of all playlists known to Rhythmbox.

When done, select the playlist in the list on the left-hand side of the screen. Click any of the tracks in order to start playback – now just lean back and enjoy the show!

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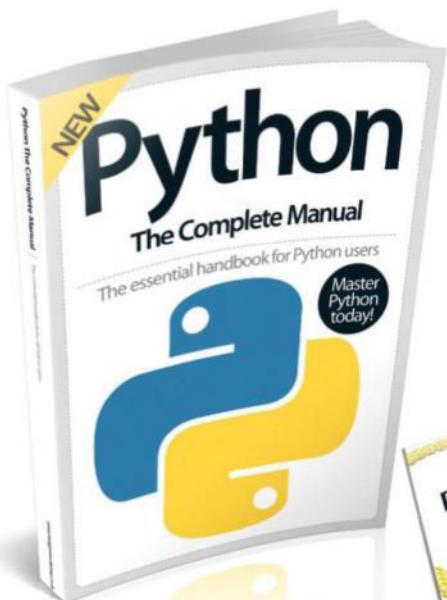
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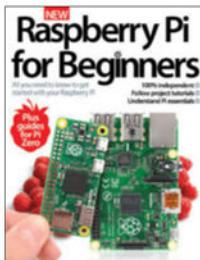
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Get to know the Unity workspace and personalise your desktop to suit your requirements

✓ Command line basics

Get to grips with the command line and gain more control over your computing experience

✓ Tour the Software Centre

Discover your one-stop shop for installing, purchasing and removing Ubuntu applications

✓ Create with Ubuntu

Explore essential built-in and third-party apps, from the LibreOffice suite to Rhythmbox