**The History of Linux**

Linux has its roots in Unix and Multics, two projects that shared the goal of developing a robust multi-user operating system. Unix developed out of the Multics project iteration at the Bell Laboratories’ Computer Sciences Research Center. Bell Labs stopped funding the Multics project in 1969, but a group of researchers, including Ken Thompson and Dennis Ritchie, continued working with the project’s core principles. In 1972-3 they made the decision to rewrite the system in C, which made Unix uniquely portable: unlike other contemporary operating systems, it could both move from and outlive its hardware.

Research and development at Bell Labs (later AT&T) continued, with Unix System Laboratories developing versions of Unix, in partnership with Sun Microsystems, that would be widely adopted by commercial Unix vendors. Meanwhile, research continued in academic circles, most notably the Computer Systems Research Group at the University of California Berkeley. This group produced the Berkeley Software Distribution (BSD), which inspired a range of operating systems, many of which are still in use today.

Unix raised important questions for developers, but it also remained proprietary in its earliest iterations. Richard Stallman was a central figure among the developers who were inspired to create non-proprietary alternatives to Unix. While working at MIT’s Artificial Intelligence Laboratory, he initiated work on the GNU project (recursive for “GNU’s not Unix!”), eventually leaving the Lab in 1984 so he could distribute GNU components as free software.

Meanwhile, another developer was at work on a free alternative to Unix: Finnish undergraduate Linus Torvalds. After becoming frustrated with licensure for MINIX, Torvalds announced to a MINIX user group on August 25, 1991 that he was developing his own operating system, which resembled MINIX. Though initially developed on MINIX using the GNU C compiler, the Linux kernel quickly became a unique project with a core of developers who released version 1.0 of the kernel with Torvalds in 1994.

Linux is not a UNIX-derivative. It was written from scratch. However, many of the commands that are found in Linux are also found in UNIX. If you have any experience on UNIX systems, you’re going to feel right at home on a Linux system.

Further Reading:

[A Brief History of Linux](https://www.digitalocean.com/community/tutorials/brief-history-of-linux), DigitalOcean

[History of Linux](http://ragibhasan.com/linux/), Ragib Hasan

**Key Features of Linux**

Though the Linux kernel inherited many goals and properties from Unix, it differs from the earlier system in the following ways:

* Its core component is the kernel, which is developed independently from other operating system components. This means that Linux borrows elements from a variety of sources (such as GNU) to comprise an entire operating system.
* It is free and open-source. Maintained by a community of developers, the kernel is licensed under the [GNU General Public License](https://www.gnu.org/licenses/gpl-3.0.en.html) (an offshoot of the FSF’s work on the GNU Project), and available for download and modification. The GPL stipulates that derivative work must maintain the licensing terms of the original software.
* It has a monolithic kernel, similar to Unix, but it can dynamically load and unload kernel code on demand.
* It has symmetrical multiprocessor (SMP) support, unlike traditional Unix implementations. This means that a single operating system can have access to multiple processors, which share a main memory and access to all I/O devices.
* Its kernel is preemptive, another difference from Unix. This means that the scheduler can force a context switch on a driver or another part of the kernel while it is executing.
* Its kernel does not differentiate between threads and normal processes.
* It includes a Command Line Interface (CLI) and can also include a Graphic User Interface (GUI).

**What is the Linux Kernel**

First and foremost, Linux is an operating system. An operating system is simply a collection of software that manages hardware resources and provides an environment where applications can run. The operating system allows applications to store information, send documents to printers, interact with users and other things.

Linux is also a kernel. A kernel is the lowest level of easily replaceable software that interfaces with the hardware in your computer. It is responsible for interfacing all of your applications that are running in “user mode” down to the physical hardware, and allowing processes, known as servers, to get information from each other using inter-process communication (IPC).

Typically, when the term “Linux” is used, it refers to the Linux operating system as a whole. However, it can refer to just the Linux kernel as well.  The Linux kernel is the core or the heart of the operating system. It’s the layer that sits between the hardware and applications. Said another way, it’s the intermediary between software and hardware. However, to have a useful operating system, you need other components in addition to the kernel. These components can include system libraries, graphical user interfaces, email utilities, web browsers and other programs.

Linux distributions take the Linux kernel and combine it with other free software to create complete packages. There are many different Linux distributions out there.

Further Reading:

[What is the Linux Kernel and What Does It Do?](https://www.howtogeek.com/howto/31632/what-is-the-linux-kernel-and-what-does-it-do/) How-To Geek

[What is Linux?](https://www.linuxtrainingacademy.com/what-is-linux/) Linux Training Academy

**Linux Distributions**

A Linux distribution is the Linux kernel and a collection of software that together, create an operating system. Each distribution has its own goals and areas of focus. Your choice of distribution will depend on what you’re trying to accomplish.  There are distributions that are commercial. These commercial Linux distributions are backed by corporations and you can buy support from them. There are non-commercial Linux distributions. These are maintained by a community of volunteers. You have Linux distributions that are designed for server use, others that are designed for desktop use, some that are focus on research and science. There are others that are focused on multimedia production. There are literally hundreds of Linux distributions.

Linux isn’t a complete operating system — it’s just a kernel. Linux distributions take the Linux kernel and combine it with other free software to create complete packages. There are many different Linux distributions out there. If you want to “install Linux,” you’ll need to choose a distribution. You could also use Linux from scratch to compile and assemble your own Linux system from the ground up, but that’s a huge amount of work.

**Ubuntu** is the most user-friendly Linux distribution, offering strong community-based support and a consistent release cycle. It has also a reputation for security. Ubuntu updates the latest software versions on a regular schedule. The disadvantage of frequent updates is that it's hard to keep bugs from slipping into the system. In fact, Ubuntu is not intended to be updated with all the latest software as time goes on. It is designed for the opposite, to be stocked with long-tested software and only upgrading them with critical and security-related fixes. Ubuntu is the best choice for newbies.

**CentOS** is perfect for those looking for a highly stable version of Linux that offers enterprise-level reliability. The price of stability is that the software versions included with CentOS are rarely the latest. It comes with the same set of well-tested and stable Linux kernel and software packages that form the basis of its parent, Red Hat Enterprise Linux. CentOS is supported with a minimum of 5 years of security updates. Security features include an excellent firewall and SELinux, a policy enforcement mechanism that prevents wayward applications from ever causing security problems.

**Fedora** focuses on including cutting-edge software. They continually update to newer software packages. Since Fedora's priorities tend to lean towards enterprise features, rather than server usability; some bleeding edge features occasionally alienate some users. On the other hand, since Fedora is not as popular as Ubuntu and CentOS, it may sometimes be harder to find the app users are looking for. They will be stuck building from source instead of just installing it from the repositories. Building from source isn't all that hard, but it won't allow users to automatically update that program. Fedora is recommended for advanced Linux administrators.

**Debian** is a "rolling" distribution which doesn't jump from release to release and its packages are continuously updated. With a moving base of packages, each new change can potentially introduce some problems. Some users consider Debian as one of the stable distributions, as users are quick to report broken features and developers are quick to fix them. Overall, it provides an "unstable" repository. Debian is a usable and responsive distribution, but it isn’t one we’d recommend for complete beginners.

**Mint** is light and faster than other Linux distributions. It is a Linux distribution for desktop computers, based on either Ubuntu or Debian. New versions of Mint are released every six months. There are two releases per year, generally timed one month after Ubuntu releases.

**openSUSE** package management is slower than Debian-based APT. It is rather bug-free and comes with a rich selection of programs. openSUSE is a little more difficult to setup by newbies.

**Red Hat** can be the best choice when a user needs the maximum level of enterprise software compatibility, but it costs an additional license fee. Red Hat Enterprise Linux (RHEL) is for enterprise-level servers. RHEL requires an extra license fee to Red Hat to access their non-free software components. RHEL is stable and handles heavy loads well. The main reason to use RHEL would be if a user is running a software that has RHEL in its list of supported operating systems. This means it aims at larger businesses. If a user is not running software that requires RHEL but want to take advantage of its reliability they can choose Ubuntu or CentOS instead.

Further Reading:

[The Many Flavors of Linux](https://beginlinux.wordpress.com/2009/05/13/the-many-flavors-of-linux/), BeginLinux

[10 of the Most Popular Linux Distributions Compared](https://www.howtogeek.com/191207/10-of-the-most-popular-linux-distributions-compared/), How-To Geek

[Linux Training](http://beginlinux.com/), BeginLinux.com

**Linux vs Windows**

### Windows vs Linux: Distributions

Before we begin, we need to address one of the more confusing aspects to the Linux platform. While Windows has maintained a fairly standard version structure, with updates and versions split into tiers, Linux is far more complex.

Originally designed by Finnish student Linus Torvalds, the Linux Kernel today underpins all Linux operating systems. However, as it remains open source, the system can be tweaked and modified by anyone for their own purposes.

What we have as a result are hundreds of bespoke Linux-based operating systems known as distributions, or 'distros'. This makes it incredibly difficult to choose between them, far more complicated than simply picking Windows 7, Windows 8 or Windows 10.

**Windows vs Linux: Installation**

A common feature of Linux OS’ is the ability to ‘live’ boot them – that is, booting from a DVD or USB image without having to actually install the OS on your machine. This can be a great way to quickly test out if you like a distro without having to commit to it.

The distro can then be installed from within the live-booted OS, or simply run live for as long as you need. However, while more polished distros such as Ubuntu are a doddle to set up, some of the less user-friendly examples require a great deal more technical know-how to get up and running.

Windows installations, by contrast, while more lengthy and time consuming, are a lot simpler, requiring a minimum of user input compared to many distros.

**Windows vs Linux: Software and compatibility**

Most applications are tailored to be written for Windows. You will find some Linux-compatible versions, but only for very popular software. The truth, though, is that most Windows programs aren't available for Linux.

A lot of people who have a Linux system instead install a free, open source alternative. There are applications for almost every program you can think of. If this isn't the case, then programs such as WINE or a VM can run Windows software in Linux instead.

Despite this, these alternatives are more likely to be amateur efforts compared to Windows. If your business requires a certain application then it's necessary to check if Linux runs a native version or if an acceptable replacement exists.

There are also differences in how Linux software installs programs compared with Windows. In Windows, you download and run an executable file (.exe). In Linux, programs are mostly installed from a software repository tied to a specific distro.

Installing on Linux is done by typing an apt-get command from the command line. A package manager handles this by layering a graphical user interface over the messy mechanics of typing in the right combination of words and commands. This is in many ways the precursor of a mobile device's app store.

Depending on the software, some won't be held in a repository and will have to be downloaded and installed from source, such as the non-open source variants of proprietary software like Skype or Steam.

In this case, the installation becomes more similar to that of Windows software. You simply download the relevant package for your distro from the company's website, and the inbuilt package installer will complete the rest.

Windows has a big advantage over Linux which is that in the software stakes, virtually every program is designed from the ground up with Windows support in mind. In general, Windows users aren't affected by compatibility worries. As mentioned previously, the set-up is also often a much simpler affair.

**Windows vs Linux: Support**

As it’s created and maintained by a community of passionate fans, Linux has a huge wealth of information to fall back on, in the form of tips, tricks, forums and tutorials from other users and developers.

However, it’s somewhat fragmented and disarrayed, with little in the way of a comprehensive, cohesive support structure for many distros. Instead, anyone with a problem often has to brave the wilderness of Google to find another user with the answer.

Microsoft is much better at collating its resources. Though it doesn’t have quite the amount of raw information that’s available regarding Linux, it’s made sure that the help documents it does have are relatively clear and easy to access.

There’s also a similar network of Windows forums and tutorials if the official assistance doesn't help you.

**Windows vs Linux: Security**

Security is a cornerstone of the Linux OS, and one of the principal reasons for its popularity among the IT community. This reputation is well deserved and stems from a number of contributing factors.

One of the most effective ways Linux secures its systems is through privileges. Linux does not grant full administrator – or ‘root’ – access to user accounts by default, whereas Windows does. Instead, accounts are usually lower-level and have no privileges within the wider system.

This means that when a virus gets in, the damage it can do is limited, and restricted mainly to files and folders on the individual machine. This can be incredibly beneficial from a damage control standpoint, since it’s far easier to simply replace one machine than scour the entire network for malware traces.

There’s also the fact that open source code, such as Linux software, is generally thought to be more secure and better maintained, due to the number of people scanning it for flaws. Similar to the ‘infinite monkeys’ principal, ‘Linus’ Law’ (named after Torvalds), states that “given enough eyeballs, all bugs are shallow”.

Possibly most important, however, is the issue of compatibility. As we mentioned earlier, virtually all software is written for Windows, and this also applies to malware.

Given that the number of Windows machines in the world vastly outnumbers the number of Linux ones, cyber attacks targeting Microsoft’s OS are much more likely to succeed, and therefore much more worthwhile prospects for threat actors.

This isn’t to say that Linux machines are totally immune from being targeted, of course, but statistically, you’re probably safer than with Windows, provided you stick to best practice.

**Windows vs Linux: Performance**

Microsoft’s ubiquitous OS can be called many things, but ‘lightweight and speedy’ is not one of them. Windows has an unfortunate tendency towards bloating and sluggishness, and can very quickly feel outdated if not properly maintained.

Linux is much quicker, on the whole. The OS itself is less demanding, and many distros sacrifice any visual bells and whistles to ensure that performance is the absolute best it can be. Opting for one of these builds can be an excellent way to bring an ailing older laptop back up to its former speed.

There are, of course, numerous ways to ensure that a Windows PC or laptop remains decently nippy over the course of its lifespan, but Linux computers will on average outperform them over a longer period.

**Windows vs Linux: User-friendliness**

When it comes to user-friendliness and how accessible an OS is to first-time users, Windows is a clear cut above the competition.

The fact that Microsoft has been producing its system software for nearly 30 years means that many aspects of it have become cultural touchstones. Accordingly, certain elements of the layout and navigation have been absorbed through osmosis, and a lot of users can essentially operate the system instinctively.

Linux does not have the luxury of being the most widely-used operating system in the world. As such, new users have to re-learn how to perform simple tasks on an unfamiliar and often complicated system, which can be offputting for the casual user.

However, Linux is an operating system that gets simpler to use the more you understand about it, while Windows can sometimes be the opposite. Digging down past the basic tasks into more complicated functions can leave some people baffled.

**Windows vs Linux: Verdict**

Given their different strengths and use cases, it’s difficult to definitively state whether Linux or Windows is the better OS. Whether or not each one will be a good fit for your business depends a lot on how your company operates, and what applications it uses.

If you’re a small firm that works primarily in software, Linux is likely to be a good fit, as the free availability will reduce overheads, and set-up won’t be too complicated to manage. It also has a reputation as a tool for coding.

code

However, larger deployments will be much more complicated. Replacing the computers of hundreds of employees is likely to cause chaos, particularly if they’re not familiar with Linux. It’s possible – especially if a simple, Windows-style distro is used – but without a very capable and well-integrated IT department, many companies will struggle.

Given the flexibility of multiple distros, the non-existent asking price and the heightened security, Linux is the overall favourite - assuming you’ve got the patience to adapt to a new system.

Windows, however, remains the winner in terms of pure convenience. It’s simple, familiar, and guaranteed to be compatible with virtually all software; for busy companies, that could well be more valuable in the long run.

Further Reading:

[Windows vs Linux in 2018,](https://www.datamation.com/open-source/windows-vs-linux-in-2018.html) Datamation

[Linux vs Windows 10 – Which is the best operating system?](https://www.techworld.com/picture-gallery/developers/linux-vs-windows-10-3670807/) techWorld

[Windows vs Linux: what’s the best operating system?](https://www.itpro.co.uk/operating-systems/24841/windows-vs-linux-whats-the-best-operating-system) ITPro

[Differences Between Linux Security and Windows Security](https://smallbusiness.chron.com/differences-between-linux-security-windows-security-79959.html), Chron