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TUTORIAL

Introduction to Linux

Topics

Introduction

Linux is an open-source computer operating system, initially developed on and for Intel x86-based personal computers. It is a free and open-source operating system and the source code can be modified and distributed to anyone commercially or noncommercially under the GNU General Public License. It has been subsequently ported to an astoundingly long list of other hardware platforms, from tiny, embedded appliances to the world's largest supercomputers.

Why are we learning Linux?

- Linux is Open-Source Operating System: Source code of Linux is freely available and can be easily customized, even a developer can customize Linux

and resale it further. Some customized open-source firewalls are IPCOP, Ipfire, pfsense etc.

- Linux borrows heavily from the well-established UNIX operating system. It was written to be a free and open-source system to be used in place of UNIX,

which at the time was designed for computers much more powerful than PCs and was quite expensive

- Linux is Multi-User, Multi-Programming, Multitasking Operating System

- Key For System Administrators & Server Admins: Most of the server's work on Linux

- Effective For Programming: Open Source, Built in Languages and Shell Script

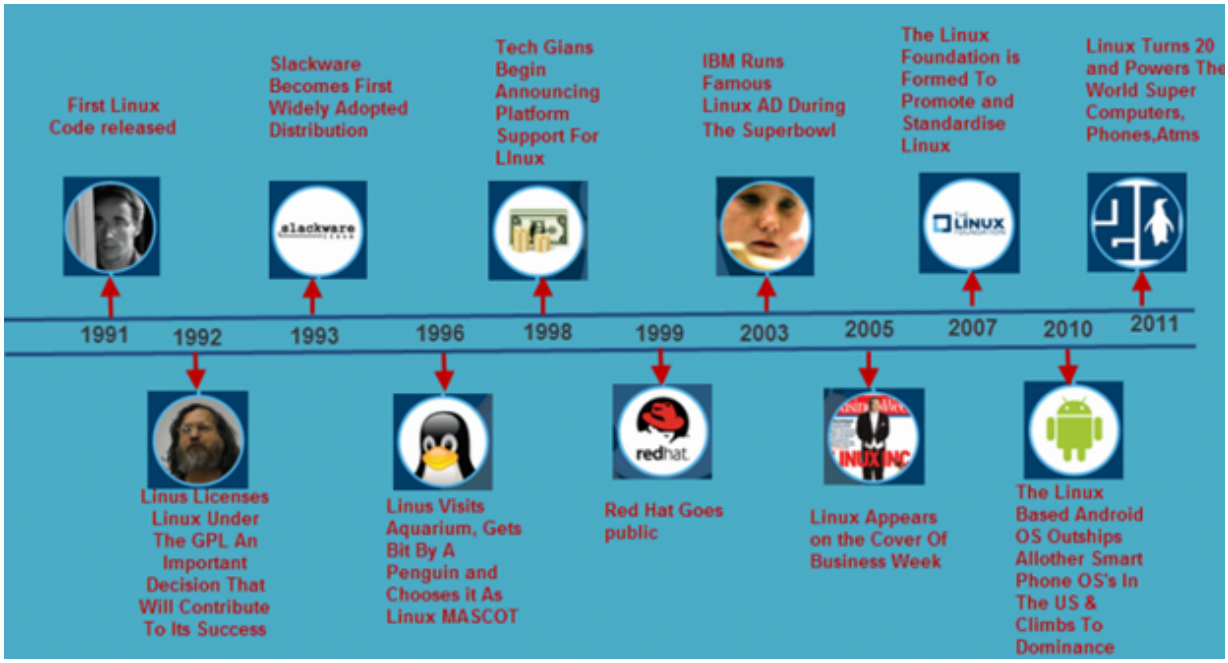
- World’s most popular Android OS also based on Linux

- Linux Prevents Your Privacy, Provides More Security and has Higher Stability.

History of Linux

Linus Torvalds was a student in Helsinki, Finland, in 1991, when he started a project: writing his own operating system kernel. He also collected and/or developed the other essential ingredients required to construct an entire operating system with his kernel at the center. It wasn't long before this became known as the Linux kernel. In 1992, Linux was re-licensed using the General Public License (GPL) by GNU (a project of the Free Software Foundation or FSF, which promotes freely available software), which made it possible to build a worldwide community of developers. By combining the kernel with other system components from the GNU project, numerous other developers created complete systems called Linux distributions in the mid-90’s. The Linux distributions created in the mid-90s provided the basis for fully free (in the sense of freedom, not zero cost) computing and became a driving force in the open-source software movement. In 1998, major companies like IBM and Oracle announced their support for the Linux platform and began major development efforts as well. Today, Linux powers more than half of the servers on the Internet, the

majority of smartphones (via the Android system, which is built on top of Linux), and all of the world's most powerful supercomputers.



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Linux Foundation

The Linux Foundation is the organization of choice for the world's top developers and companies to build ecosystems that accelerate open technology development and commercial adoption. Together with the worldwide open-source community, it is solving the hardest technology problems by creating the largest shared technology investment in history. Founded in 2000, The Linux Foundation today provides tools, training and events to scale any open-source project, which together deliver an economic impact not achievable by any one company.Various responsibilities of Linux foundation includes but not limited to:-

Promoting Linux and Providing Neutral Collaboration and Education

The Linux Foundation serves as a neutral spokesperson for Linux and generates original research and content that advances the

understanding of the Linux platform. Its web properties, including Linux.com, reach approximately two million people per month. It also fosters innovation by hosting collaboration events -- including LinuxCon -- for the Linux technical community, application developers, industry, and end users to solve pressing issues facing the Linux ecosystem. Through the Linux Foundation's collaboration programs, end users, developers and industry collaborate on technical, legal, and promotional issues.

Protecting and Supporting Linux Development

It's vitally important that Linux creator Linus Torvalds and other key kernel developers remain independent. The Linux Foundation sponsors them so they can work full time on improving Linux. The Linux Foundation also manages the Linux trademark, offers developers legal intellectual property protection and a legal defence fund and coordinates industry and community legal collaboration and education, including important work to defend Linux against legal threats.

Improving Linux as a Technical Platform

The Linux Foundation offers application developers standardization services and support, including the Linux Standard Base, that makes Linux an attractive target for their development efforts. The Linux Foundation also provides services to the Linux development community, including an open-source developer travel fund, legal support and other administrative assistance. Through its workgroups, members and developers can collaborate on key technical areas which can include everything from Cloud Computing to Printing in Linux. Finally, users can access Linux training through its technical training program.

Linux Requirements and usage in our Daily Life

Linux is used in our daily life also, like

• NASA runs on Linux: You might not be aware that Linux powers NASA. NASA's Pleiades supercomputer runs Linux. The International Space Station switched

from Windows to Linux due to the operating system's reliability. NASA even recently deployed three "Astrobee" robots—which run Linux—to the International Space

Station.

• e-Readers run on Linux: Amazon Kindle Paperwhite, which runs Linux. If you use any of Amazon's services—from Amazon Elastic Compute Cloud (Amazon

EC2) to Fire TV—you are running on Linux. When you ask Alexa what time it is, or for the score of your favorite sports team, you are also using Linux, since Alexa

is powered by Fire OS (an Android-based operating system). In fact, Android was developed by Google as Linux for mobile handsets, and powers 76% of

today's mobile phones

• Smart TV's runs on Linux

• Smartwatches and laptops run on Linux

• Cars run on Linux: The car you drive might well be running Linux. Automotive-Grade Linux has enlisted manufacturers like Toyota, Mazda, Mercedes-Benz, and

Volkswagen in a project that will see Linux as the standard code base for automobiles

• Gaming runs on Linux: If you are a gamer, then you might be using SteamOS, which is a Linux-based operating system.

• Social media runs on Linux: Instagram, Facebook, YouTube, and Twitter all run on Linux.

• Businesses and governments run on Linux: The New York Stock Exchange runs on Linux, as does the Pentagon.

- Apple runs on Linux: If you are an iOS user who uses iCloud, then you, too, are using a system that runs on Linux

- **Most of the Routers run on Linux**

Linux Distributions

Suppose you are building a product for a Linux platform. Project requirements include making sure the project works properly on the most widely used Linux distributions. To accomplish this, you need to learn about the different components, services, and configurations associated with each distribution. We are about to look at how you would go about doing exactly that. The Linux kernel is the core of the operating system. A full Linux distribution consists of the kernel plus a number of other software tools for file-related operations, user management, and software package management. Each of these tools provides a part of the complete system. Each tool is often its own separate project, with its own developers working to perfect that piece of the system.

While the most recent Linux kernel (and earlier versions) can always be found in The Linux Kernel Archives, Linux distributions may be based on different kernel versions. For example, the very popular RHEL 7 distribution is based on the 3.10 kernel, which is not new, but is extremely stable. Other distributions may move more quickly in adopting the latest kernel releases. It is important to note that the kernel is not an all or nothing proposition, for example, RHEL 7/CentOS 7 have incorporated many of the more recent kernel improvements into their older versions, as have Ubuntu, openSUSE, SLES, etc. Examples of other essential tools and ingredients provided by distributions include the C/C++ compiler, the gdb debugger, the core system libraries applications need to link with in order to run, the low-level interface for drawing graphics on the screen, as well as the higher-level desktop environment, and the system for installing and updating the various components, including the kernel itself. And all distributions come with a rather complete suite of applications already installed.

Some of the families and representative distributions of Linux are:

- Red Hat Family Systems (including CentOS and Fedora): Red Hat Enterprise Linux (RHEL) heads the family that includes CentOS, Scientific Linux, and Oracle Linux. Fedora has a close relationship with RHEL and contains significantly more software than Red Hat's enterprise version. One reason for this is that a diverse community is involved in building Fedora, with many contributors who do not work for Red Hat. Furthermore, it is used as a testing platform for future RHEL releases.
- SUSE Family Systems (including openSUSE): The relationship between SUSE, SUSE Linux Enterprise Server (SLES), and openSUSE is similar to the one described between Red Hat Enterprise Linux, CentOS, and Fedora.
- Debian Family Systems (including Ubuntu and Linux Mint): The Debian distribution is upstream for several other distributions, including Ubuntu. In turn, Ubuntu is upstream for Linux Mint and a number of other distributions. It is commonly used on both servers and desktop computers. Debian is a pure open source community project (not owned by any corporation) and has a strong focus on stability. Debian provides by far the largest and most complete software repository to its users of any Linux distribution. Ubuntu aims at providing a good compromise between long term stability and ease of use. Since Ubuntu gets most of its packages from Debian’s stable branch, Ubuntu also has access to a very large software repository. Ubuntu is a registered trademark of Canonical Ltd.

General choice for selection of a distribution for deploying applications is as below (but not limited to):

- **Server**: RHEL, CentOS, Ubuntu Server Edition, SLES
- **Desktop**: Ubuntu, Fedora, Linux Mint, Debian
- **Embedded**: Android, Yocto, Open Embedded

Some questions worth thinking about before deciding on a distribution include:

- What is the main function of the system (server or desktop)?

- What types of packages are important to the organization? For example, web server, word processing, etc.
- How much hard disk space is required and how much is available? For example, when installing Linux on an embedded device, space is usually constrained.
- How often are packages updated?
- How long is the support cycle for each release? For example, LTS releases have long-term support.
- Do you need kernel customization from the vendor or a third party?
- What hardware are you running on? For example, it might be X86, ARM, PPC, etc.
- Do you need long-term stability? Can you accept (or need) a more volatile cutting edge system running the latest software?
- Refer: https://en.wikipedia.org/wiki/List_of_Linux_distributions

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