



Deep Dive in Linux



Objective

Validate the skills and knowledge of IT professionals with experience in Red Hat Enterprise Linux (RHEL) systems.

Administration Tasks



- Configuring local storage using partitions and logical volumes.
- Creating and configuring file systems, including permissions and ownership.
- Managing user accounts, including password aging and authentication.
- Configuring system security, including basic firewall and SELinux configuration.
- Managing processes and services.
- Installing and configuring software packages.
- Configuring basic networking, including IP addressing and network services.

RHEL8 and RHEL9

- Kernel version: RHEL 8 uses the 4.18 kernel, while RHEL 9 uses the 5.4 kernel. The newer kernel in RHEL 9 includes enhancements in security, performance, and virtualization capabilities.
- Software updates: RHEL 8 uses the traditional YUM package manager for software updates, while RHEL 9 has switched to the newer DNF package manager, which offers improved performance and stability.
- System roles: RHEL 9 introduces new system roles that allow for easier configuration of specific server functions, such as DNS, file sharing, and web serving. These roles are designed to simplify the process of deploying and configuring servers for specific purposes.
- Containerization: RHEL 9 includes updates to its containerization tools, including support for Podman, a container engine that does not require a daemon to run, and Buildah, a tool for building container images.
- Systemd version: RHEL 9 includes the latest version of the systemd init system, which provides improved management of system processes and services.
- Security features: RHEL 9 includes several new security features, including support for encrypted network connections by default, improved support for secure boot, and enhanced container security features.

Unix History



Unix is a family of multitasking, multiuser computer operating systems that were originally developed in the 1960s and 1970s at Bell Labs. Here is a brief history of Unix:

Unix History



- 1969: Unix was initially developed by a team of programmers at Bell Labs, including Ken Thompson and Dennis Ritchie, as a simpler alternative to the Multics operating system.
- 1971: Unix was rewritten in the C programming language, making it more portable and easier to maintain.
- 1973: Unix was rewritten again, this time by Ken Thompson and Dennis Ritchie, to support multiple users and multitasking.
- 1974: The first version of Unix was released commercially by AT&T as Unix Version 5.
- 1978: The first version of the Unix operating system that was specifically designed for microcomputers, called 32V, was released.
- 1983: AT&T released Unix System V, which became one of the most widely used versions of Unix.
- 1984: The University of California, Berkeley released its own version of Unix, called Berkeley Software Distribution (BSD).

Unix History



- 1985: Sun Microsystems released SunOS, a Unix-based operating system for its Sun workstations.
- 1991: Linus Torvalds released the first version of Linux, an open-source Unix-like operating system.
- 1993: AT&T sold its Unix System V code base to Novell, which eventually sold it to The SCO Group.
- 1994: The Open Group released the Single Unix Specification, which standardized the Unix operating system and its components.
- 2005: Sun Microsystems released OpenSolaris, an open-source version of its Solaris operating system.
- 2010: Oracle Corporation acquired Sun Microsystems and became the owner of Solaris and other Unix-related products.
- 2021: The latest version of Unix, called Unix V7, is still in use today, although it has been largely superseded by other Unix-like operating systems such as Linux and macOS.

Linux History



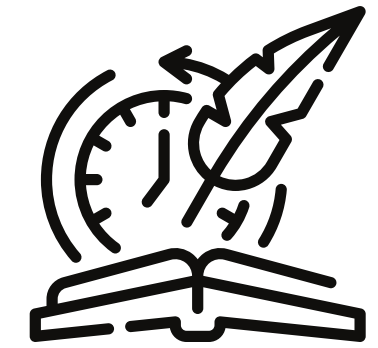
Linux is a free and open-source operating system that was first released in 1991. Here is a brief history of Linux:

Linux History



- 1983: Richard Stallman launched the GNU Project, which aimed to create a free and open-source operating system.
- 1991: Linus Torvalds, a Finnish computer science student, started work on a new operating system kernel as a hobby project. He named it Linux, a combination of his first name and the word Unix.
- 1992: The first version of the Linux kernel, version 0.12, was released under the GNU General Public License.
- 1993: The first Linux distribution, called Slackware, was released. It included the Linux kernel, GNU utilities, and other software.
- 1994: Red Hat, one of the first commercial Linux distributions, was released.
- 1996: The Linux Standard Base was created to standardize the software system structure, including file system hierarchy, and APIs for Linux distributions.

Linux History



- 1998: The Open Source Initiative was founded to promote the use and development of open-source software, including Linux.
- 2000: The first version of the popular Debian Linux distribution, which emphasizes stability and security, was released.
- 2003: The first version of the Ubuntu Linux distribution, which aims to be user-friendly and easy to use, was released.
- 2011: The first version of the Linux-based Android operating system, designed for mobile devices, was released.
- 2015: Microsoft announced that it would release a version of its .NET programming framework for Linux.
- 2021: Linux is widely used in servers, supercomputers, and embedded devices, as well as in personal computers. It has become an important part of the technology landscape, powering much of the internet and a variety of other applications.

Linux is same as Unix

Linux and Unix share many similarities, but they are distinct operating systems with their own unique features and characteristics. Linux has become a popular alternative to Unix, especially for organizations and individuals who value the flexibility, openness, and community support that Linux offers.

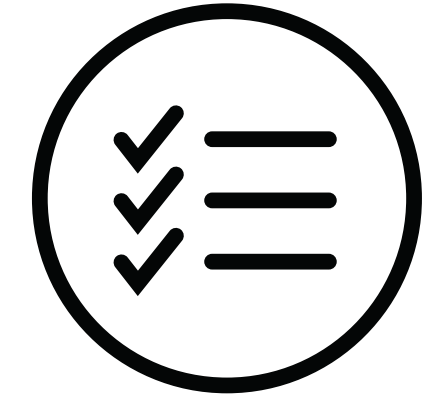
Unix flavor



Linux flavor

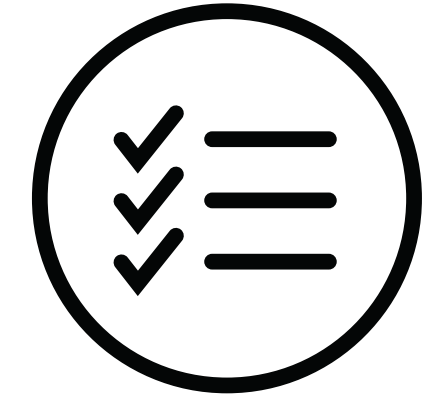


Features of Linux



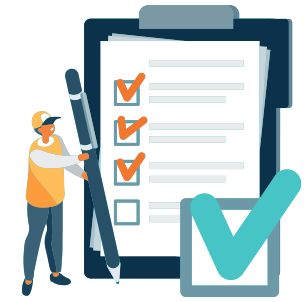
1. Open-source: Linux is free and open-source software, which means that anyone can access and modify the source code. This allows for greater flexibility, security, and customization.
2. Security: Linux is known for its security features, including built-in firewalls, user account controls, and file permissions.
3. Stability: Linux is known for its stability and reliability, and is often used for mission-critical systems that require high uptime and availability.
4. Compatibility: Linux is compatible with a wide range of hardware platforms and software applications, making it a flexible choice for many different types of systems.
5. Command-line interface: Linux includes a powerful command-line interface that allows users to execute commands, run scripts, and automate tasks.

Features of Linux

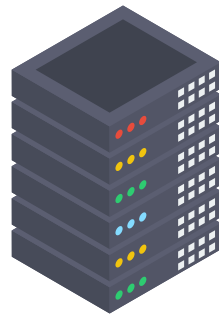


1. Package management: Linux includes package management tools that allow users to easily install, update, and remove software packages.
2. Customization: Linux allows for extensive customization and configuration, including the ability to modify the user interface, system settings, and system behavior.
3. Multi-user support: Linux is designed to support multiple users simultaneously, with built-in user account controls and permissions.
4. Portability: Linux can be easily ported to different hardware architectures and platforms, making it a versatile choice for many different types of systems.
5. Community support: Linux has a large and active community of developers and users who provide support, documentation, and resources for users at all levels of expertise.

Where we use it



Desktop systems



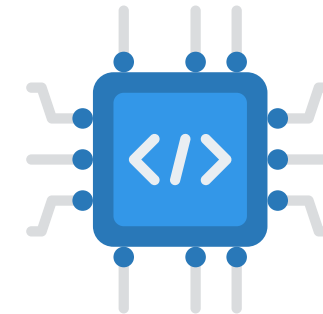
Servers



Web Hosting



Cloud computing



Embadded devices



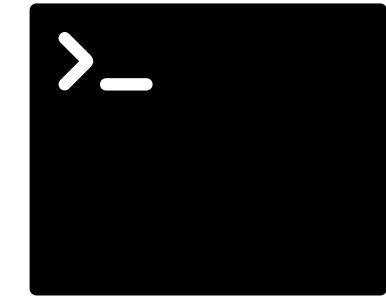
Education

Kernel



kernel is the core component of an operating system that controls the computer's hardware and provides a bridge between the computer's hardware and software applications. The Linux kernel is a free and open-source software component that provides many features and capabilities and can be customized to support a wide range of hardware architectures and configurations.

Shell

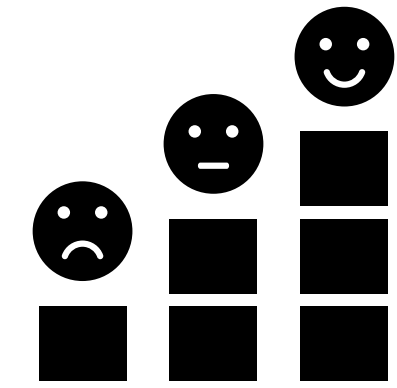


shell is a program that provides a command-line interface for interacting with an operating system. Shells provide a set of commands and utilities that allow users to perform a wide range of tasks, and they are commonly used by system administrators, developers, and power users. Shells also provide features such as command history, tab completion, and shell scripting to enhance productivity and efficiency.

Linux booting Process

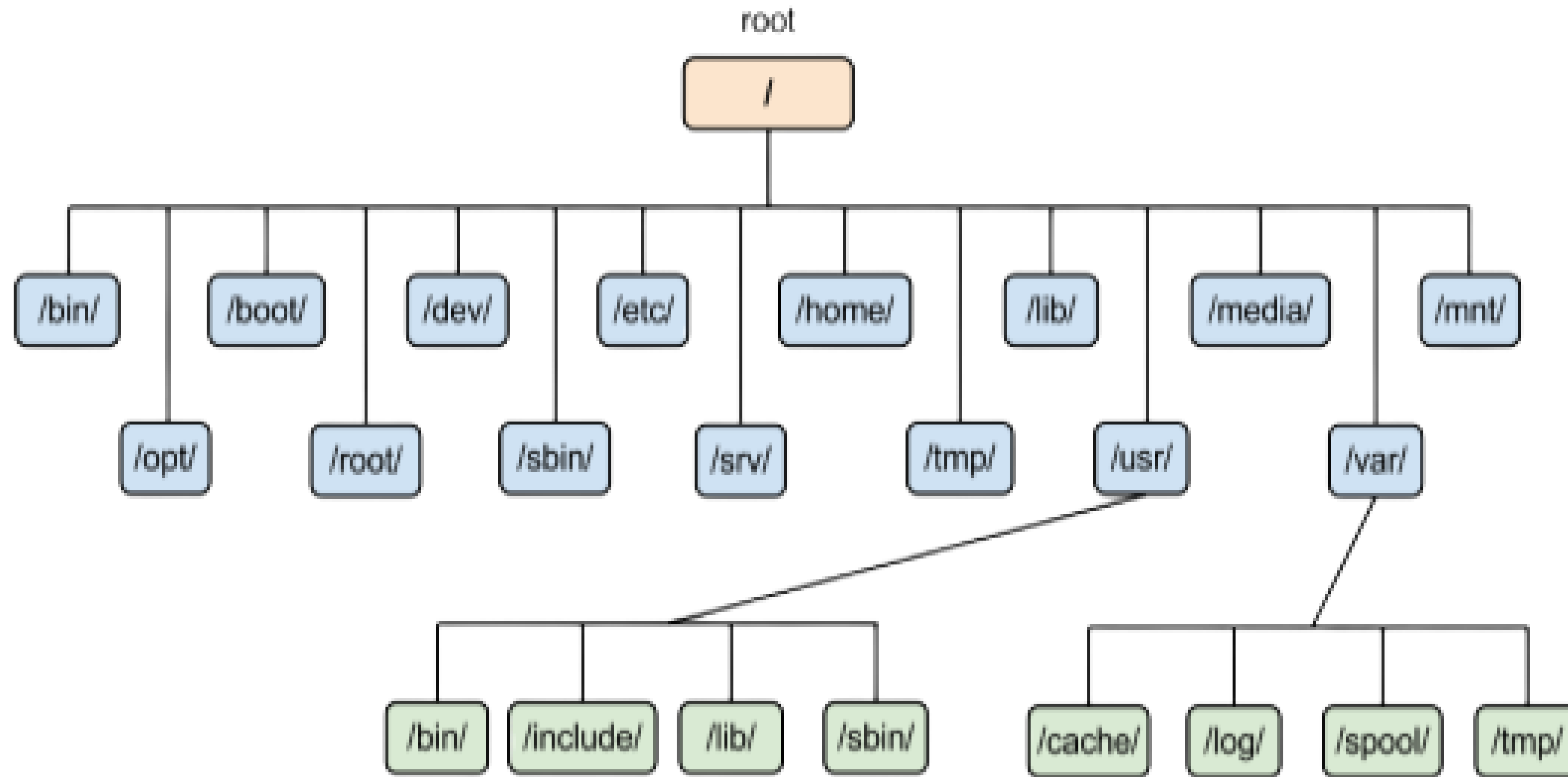
- BIOS/UEFI
- Boot loader
- Kernel
- Init process
- System services
- Login

Linux run levels



1. Halt: This run level shuts down the system and halts all processes.
2. Single user mode: This run level starts the system in a single user mode, with only the essential system services running. This mode is used for system maintenance and troubleshooting.
3. Multi-user mode with no network services: This run level starts the system in a multi-user mode with no network services running. This mode is used for running applications and services locally on the system.
4. Multi-user mode with networking: This run level starts the system in a multi-user mode with network services running. This mode is used for running applications and services that require network connectivity.
5. Not used: This run level is not used by default but can be customized for specific purposes.
6. Graphical user interface (GUI): This run level starts the system in a graphical user interface mode, allowing users to interact with the system through a graphical desktop environment.
7. Reboot: This run level restarts the system and brings it back to the default run level.

Filesystem Hierarchy



File system hierarchy of Linux

