
Glossary

Absolute Pathname: A pathname that starts with the root directory.

Access Privileges: The type of operation that a user can perform on a file. In Linux, access rights for a file can be read, write, and execute.

Access Time: The time taken to access a main memory location for reading or writing.

ACE (Access Control Entries): Define access permissions for a particular class of user to objects such as files. The list of ACEs is numbered, starting from zero. The position of an ACE within an ACL is called an index.

ACL (Access Control List): A finer-grained discretionary permission control mechanism on objects such as files. Contrast to traditional Linux Permissions Model.

aclinherit: A ZFS command variable that controls the behavior of ACL inheritance, when used with the applicable modifying command, on a designated ZFS dataset.

aclmode: A ZFS command variable that controls the behavior of initial or modified ACL application to a designated ZFS dataset.

Active Socket: A socket that serves a client's request(s). For connected-oriented communication, it is created by the `accept()` system call. An active socket has the lifespan of a connection between a client and the server process. For this reason, an active socket is also known as an ephemeral socket.

Adaptive Lempel-Ziv Coding: The most widely used lossless compression scheme for encoding variable-length block of characters a fixed-length block of bits. In this compression scheme, we assume that characters occur independently and with known probabilities, and that the probabilities are the same for all positions.

Address Bus: A set of parallel wires that are used to carry the address of a storage location in the main memory that is to be read or written.

Address Space: See Process Address Space.

Alias: See Pseudonym.

Application Programmer's Interface (API): The language libraries and system call layer form the application programmer's interface.

Application Software: Programs that we use to perform various tasks on the computer system, such as word processing, graphing, picture processing, and Web browsing.

Application User's Interface (AUI): The application software that a user can use forms the application user's interface.

Archive: A collection of files contained in a single file in a certain format.

Array: A named collection of items of the same type stored in contiguous memory locations.

Array Indexing: The method used to refer to an array item by using its number. The items in an array are numbered, with the first item numbered 1 (in some languages such as C, the first item is numbered 0).

Assembler: A program that takes a program in assembly language and translates it into object code.

Assembly Language: See Low-Level Programming language.

Assignment Statement: A shell command that is used to assign values to one or more shell variables.

Asynchronous I/O: The I/O based on nonblocking I/O calls, e.g., through nonblocking `read()` and `write()` system calls. It may also be performed using the `select()` system call.

Atomic Write: The amount of data a writer process can write to a file, pipe, or bounded buffer without interruption

Attributes: The characteristics of a process (or file) such as the name of the owner of the process and process size.

Background Process: When a process executes such that its standard input is not connected to the keyboard, it is said to execute in background. The shell prompt is returned to the user before a background process starts execution, thus allowing the user to use the system (i.e., run commands) while the background processes execute.

Bash: The abbreviation for Bourne again shell.

Batch Operating System: An operating system that does not allow you to interact with your processes is known as a batch operating system. The historically important Digital Equipment Corp.'s VMS system has a batch interface. Linux allows programs to be executed in the batch mode, with programs executing in the background.

Big Endian Byte Order: A storage (or transmission) order in which the low byte of a multiple-byte data item (char, int, long, etc.) is stored in the high-byte of the memory and high byte of the data is stored in the low byte of memory.

BIOS (Basic Input/Output System): Usually resident in ROM hardware and deployed after POST performs some system hardware integrity checks, BIOS then searches, loads, and executes the boot loader program GRUB.

Bistate Devices: The devices, such as transistors, that operate in "on" or "off" mode.

Bit: Stands for binary digit, which can be 0 or 1. It is also the smallest unit of storage and transmission.

Bit Mask: A sequence of bits (usually a byte or multiple bytes) used to retain values of certain bits in another byte (or multiple bytes), or to set them to 0s or 1s, by using a logical operation such as AND or OR.

Blind Carbon Copying E-Mail: Sending a copy of an e-mail message composed by you to someone other than the intended recipient. Who received the carbon copy of a message is not known to the receiver because this information does not appear in the e-mail header.

Block Special Files: The Linux files that correspond to block-oriented devices (see Block-Oriented Devices). These files are located in the /dev directory.

Blocking Input: An input (i.e., read) operation that blocks if the file it is reading from is empty.

Blocking Output: An output (i.e., write) operation that blocks if the file it is writing to is full.

Block-Oriented Devices: The devices, such as a disk drive, that perform I/O in terms of blocks of data (e.g., in 512-byte chunks).

Blocks: See Disk Blocks.

Boot Environment: A boot environment is a bootable environment consisting of a root filesystem and, optionally, other filesystems mounted underneath it. Exactly one boot environment can be active at a time.

Bounded Buffer: A fixed-size buffer that is typically used as a circular buffer.

Bounded Buffer Readers Writers Problem: A synchronization problem in which the reader and writer processes run forever and communicate (i.e., read and write) through bounded buffer. See Bounded Buffer.

Break Point: A program statement where the execution of the program stops while using a symbolic debugger.

BSD Socket: See Socket.

bss: The uninitialized data area in the memory image of a Linux process

Byte: In contemporary literature, a byte refers to 8 bits. For example, 10101100 is a byte. In not so recent literature, the term byte also used to be referred to as 9 bits. Because of this, a byte is also called an octet. A storage location that can store 8 bits is also known as a byte.

C Preprocessor: A program that takes a C program as input and processes all the statements that start with the # sign. It produces output that is taken by the C compiler as input to produce the assembly code. A typical C compiler performs all the tasks necessary to produce the executable code for a C program. These tasks are preprocessing, compilation, assembly, and linking.

Carbon Copying E-Mail: Sending a copy of an e-mail message composed by you to someone other than the intended recipient. Who received the carbon copy of a message is known to the receiver because this information appears in the e-mail header.

Central Processing Unit (CPU): Also known as the brain of a computer system, the CPU executes a program by reading the program instruction from the main memory. It also interacts with the I/O devices in the computer system.

Cgroups: Control groups that allow selective limitations on system resource usage to be applied to system and user-defined collections of processes, and their children.

Character Special Files: The Linux files that correspond to character-oriented devices. These files are located in the /dev directory.

Character User Interface (CUI): See Commandline User Interface (CUI).

Character-Oriented Devices: The devices, such as a keyboard, that perform I/O in terms of one byte at a time.

Checksum: A 256-bit hash of the data in a filesystem block. The checksum capability can range from the simple and fast Fletcher4 (the default) to cryptographically strong hashes such as SHA256.

Child Process: A process created on behalf of another process. In Linux, the fork system call has to be used to create a child process. The child process is an exact copy of the process executing fork (see Parent Process).

chroot: An operation that changes the apparent root directory for the current running process and its children. A program that is run in such a modified environment cannot name (and therefore normally cannot access) files outside the designated directory tree. The term “chroot” may refer to the chroot system call or the chroot wrapper program. The modified environment is called a “chroot jail.” Only the root user can perform a chroot.

Class: A template for creating user-defined objects. Class definitions normally contain method definitions that operate on instances of the class.

Client Software: In the client–server software model, the client software, when executed, takes the user commands and sends them as requests to the server process. The server process computes the responses for requests and sends them to the client, who handles them according to the semantics of the command. All Internet applications are based on the client–server model of computing.

Clock Tick: A clock in a computer system ticks as frequently as dictated by the frequency of the clock (ticks per second). For system clocks that are dependent on the frequency of the power line signals (50 or 60 per second), it ticks every 1/50 (or 1/60) of a second.

Cluster: The minimum unit of disk storage, which is one or more sectors.

Coding Rules: A set of rules used by programmers for writing programs. Such rules are usually designed to enhance the readability of programs and to keep consistency in the “look” of the source programs produced by an organization or a coding team. The use of coding rules helps a great deal during the maintenance phase of a software product.

Colon Hexadecimal Notation: A notation used to write 128-bit IPv6 addresses in a compact notation in which each 16-bit chunk is represented in hexadecimal separated by colons, as in 76F4:9D5F:FFFF:FFFF:0:3276:70BD:FFFF.

Command Grouping: Specifying two or more commands in such a manner that the shell executes them all as one process.

Command Interpreter: A program that starts running after you log on to allow you to type commands that it tries to interpret and run. In Linux, the command interpreter is also known as a shell.

Command Line: A line that comprises a command with its arguments and is typed at a shell prompt. You must hit the <Enter> key before the command is executed by a shell.

Command Line Arguments: The arguments that a command needs for its proper execution, which are specified in the command line. For example, in the command cp f1 f2, f1 and f2 are command line arguments. Within a shell script, you can refer to these arguments by using positional parameters \$1–\$9.

Command Mode Operation: Operation that consists of key sequences that are commands to a text editor for taking a certain action.

Command Substitution: A shell feature that allows the substitution of a command by its output. To do so, you enclose a command in back quotes (grave accents). Thus, in the echo “date” command,

the output of the date command substitutes for the date command, which is then displayed on the display screen.

Commandline User Interface (CUI): If you use a keyboard to issue commands to a computer's operating system, the computer is said to have a command line user interface.

Comments: Short notes placed in program's source code that explain segments of the code. Comments must be distinguished so that they are not executed as program commands (statements). For shell scripts, a comment line must start with the # sign.

Commit (as a noun): A single point in the Git history; the entire history of a project is represented as a set of interrelated commits. The word "commit" is often used by Git in the same places other revision control systems use the words "revision" or "version." Also used as a short hand for a commit object.

Commit (as a verb): The action of storing a new snapshot of the project's state in the Git history, by creating a new commit representing the current state of the index and advancing HEAD to point at the new commit.

Compatibility Release: A release/version of a software that is meant to provide uniformity between any particular implementation and its perceived competitors.

Compiler: A program that takes a program written in a high-level language and translates it into the corresponding assembly program. Almost all C and C++ compilers also perform the tasks of preprocessing, assembly, and linking.

Completely Fair Scheduler: A process scheduler that relies on the red-black tree data structure in its algorithm to optimize CPU and interactive performance. See also Round Robin Scheduling Algorithm.

Compositor: Software designed and used for the Wayland protocol, basically the graphical server in an event/request model. Can best be understood by beginners as a traditional window manager. The reference example of one of these is known as Weston.

Computer Network: An interconnection of two or more computing devices. A device on a network is commonly called a host.

Concurrent Client: A client that handle multiple descriptors, such as an FTP or SSH client.

Concurrent Server: A server process that upon receiving a client request creates a child process, delegates the rest of communication with the client to that child process, and goes back to wait for another client request.

Configuration File: A file that contains the definitions of various environment variables to set up your environment while you use a shell. Every shell has a startup configuration file for every shell in your home directory that is executed when that shell starts running (e.g., cshrc for C shell).

Connection: A connection, without an explicit request from the client.

Control Bus: A set of parallel wires that are used to carry control information from the CPU to the main memory or an I/O device. For example, it carries the "read" or "write" instruction from the CPU to the main memory.

Control Unit: The part of a CPU that interacts with the devices in a computer system (memory, disk, display screen, etc.) via controllers (see Controllers) in these devices. It also fetches a program instruction from the main memory, decodes it to determine whether the instruction is valid, and then passes it on to the execution unit (see Execution Unit) for its execution.

Controllers: The electronic part of an I/O device, which communicates with the CPU or other devices.

CPU Scheduling: A mechanism that is used to multiplex the CPU among several processes. This results in all processes making progress in a fair manner and increased utilization of hardware resources in the computer system.

CPU State: The values of the CPU registers at any given time, including the value of the program counter.

CPU Usage: The percentage of the time the CPU in a computer system has been used since the system has been up.

Critical Section: A piece of code in a thread in a cooperating/concurrent process that accesses shared data.

Critical Section Problem: Writing code of cooperating concurrent processes to ensure serial execution of critical sections in these processes.

Cryptography: The science of transforming information so that it is unintelligible to the inexperienced and understandable to those who have some special knowledge, known as the decryption key.

Csh: The abbreviation of C shell.

CUPS Common UNIX Printing System: A modular printing system for NIX-like systems, where one computer on a network can be a print server for possibly multiple clients.

Current Directory: The directory that you are in at a given time while using a computer system. In Linux, the pwd command can be used to display the absolute pathname of your current directory.

Current Job: The job (process) that is presently being executed by the CPU.

Cursor: The point that tells you at which part of the screen you are located at a given time.

Daemon: A system process executing in the background to provide a service such as printing. For example, in a typical Linux system the lpd daemon offers the printing service and fingerd offers the finger service. Not connected to standard input or output.

DAG (Directed Acyclic Graph): Refers to commit objects that, in pictorial form, show parents/descendents (directed), and this picture of commit objects is acyclic (there is no chain which begins and ends with the same object).

Data Bus: A set of parallel wires that are used to carry data from the CPU to a subsystem (memory or I/O device), and vice versa.

Dataset: A generic name for the following ZFS components: clones, filesystems, snapshots, and volumes. Each data set is identified by a unique name in the ZFS name space. Datasets are identified using the following format: pool/path[@snapshot]

Decryption: The process of converting an encrypted file (see Encryption) to its original version.

Deduplication: Data deduplication is a method of reducing storage capacity needs by eliminating redundant data. Only one unique instance of the data is actually retained on storage media. Redundant data is replaced with a pointer to the unique data copy.

Descriptor Set: A bit mask in which a bit represents a descriptor and the value of a bit indicates the state of the corresponding descriptor, i.e., ready or not ready for an I/O operation or exception handling.

Desktop Manager: A software system that provides a graphical method of interacting with the operating system.

Disk Blocks: The unit of disk I/O. It is one or more sectors (512 bytes).

Disk Scheduling: In a time-sharing system, several requests can come to the operating system for reading or writing files on a disk. The disk scheduling code in the operating system decides which request should be served first.

Dispatcher: Operating system code that takes the CPU away from the current process and gives it to the newly scheduled process (i.e., it saves the state of the current process and loads the state of the newly scheduled process).

Domain Name System (DNS): A distributed database that can be used to convert the domain name of a host to its IP address.

Dot File: See Hidden File.

Dotted Decimal Notation (DDN): The 32-bit (4-byte) IP addresses are difficult to remember. This notation is used to express every byte of an IP address in equivalent decimal and place dots between them. Thus, the IP address 11000000100011000000101000000001 (in binary) is 192.140.10.1 in the dotted decimal notation.

Dynamic Analysis: The analysis of a program as it executes. The analysis comprises debugging, tracing, and performance monitoring of the program, including testing it against product requirements.

Dynamic Linking: Linking carried out at run time.

Editor Buffer: Usually, nonpersistent memory locations open during a text editor session that store information on the state of information being edited.

Encrypted File: A file that contains a file's contents after it has gone through the encryption process (see Encryption).

Encryption: The process of converting a file's contents to a completely different form by using a process that is reversible, thereby allowing recovery of the original file.

End-of-File (EOF) Marker: Every operating system puts a marker at the end of a file, called the end-of-file (EOF) marker.

Environment Variables: The shell variable (see Shell Variable) values control your environment while you use the system. For example, it dictates which shell process starts running and what directory you are put into when you log on.

Ephemeral Socket: See Active Socket.

Ethernet: The most famous protocol for physically connecting hosts on local area networks.

Ethernet Broadcast Address: The all 1's Ethernet address.

Execute Permission: A Linux access privilege that must be set for a file to be executed by using the file name as a command. When set for a directory, it allows the directory to be searched.

Execution Unit: Also called the arithmetic and logic unit (ALU), it executes instructions in a program delivered to it by the control unit.

Exit Status: A value returned by a process, indicating whether it exited successfully or unsuccessfully. In Linux, a process returns a status of 0 on success and a non-0 value on failure.

Expression: A piece of syntax that can be evaluated to some value. In other words, an expression is an accumulation of expression elements like literals, names, attribute access, operators or function calls which all return a value.

Ext4: The filesystem used in all major branches of Linux.

External Command: A shell command for which the service code is in a file and not part of the shell process. When a user runs an external command, the code in a corresponding file must be executed by the shell. The file may contain binary code or a shell script.

External Signal: A signal whose source is not the CPU. For example, pressing ^C on the keyboard sends an external signal, also called keyboard interrupt, to the process running in the foreground.

FCFS: See First-Come, First-Serve Mechanism.

Fibonacci Series: A series of positive integers with the first two number being 0 and 1, and the next number in the series is calculated by adding the previous two numbers. Thus, the first ten elements of the series are 0, 1, 1, 2, 3, 5, 8, 13, 21, and 34.

FIFO: First-in-first-out order.

File Compression: The process of shrinking the size of a file.

File Descriptor: A small positive integer associated with every open file in Linux. It is used by the kernel to access the inode for an open file and determine its attributes, such as the file's location on the disk.

File Descriptor: An object of type int returned when a file is opened using the system call interface. Subsequent I/O takes place using this int. Used as an index for the Per Process File Descriptor Table (PPFDT). See Per Process File Descriptor Table.

File Descriptor Table: A per-process table maintained by the Linux system that is indexed by using a file descriptor to access the file's inode.

File Handle: A term used for File Pointer or File Descriptor.

File Maintenance: The operation of organizing your files according to some logical scheme is known as file maintenance.

File Maintenance: The operation of organizing your files according to some logical scheme.

File Pointer: A pointer to an object FILE returned when a file is opened using the Standard I/O interface. Subsequent I/O takes place using this object.

File System Persistent Object: An object that remains in existence for the life of the file system under which it was created.

File System Structure: The structure that shows how files and directories in a computer system are organized. On most contemporary systems, the files and directories are organized in a hierarchical (tree-like) fashion.

File Table: A table maintained by the Linux operating system to keep track of all open files in the system.

File Table: Also known as the system-wide file table (SFT), it keeps track of all the files open in a Linux system at any given time and links the PPFDTs and the inode table.

File Transfer Protocol: An application-level protocol in the TCP/IP protocol suite that allows you to transfer file(s) from a remote host to your host or vice versa. The Linux ftp command can be used to access this Internet service.

Filesystem: A filesystem is a directory hierarchy with its own root stored on a disk or disk partition, mounted under (glued to) a directory. The files and directories in the filesystem are accessed through the directory under which they are mounted. (Also see Virtual Filesystem.)

Filter: A Linux term for a command that reads input from standard input, processes it in some fashion, and sends it to standard output. Examples of Linux filters are sort, pr, and tr.

Firewall: A security measure, instituted in PC-BSD and Solaris at the software level, to control access to the system from a network.

First-Come, First-Serve Mechanism: A scheme that allows the print requests (or any other kinds) on the basis of their arrival time, serving the first request first.

Folder: Also known as a directory, it is a place on the disk that contains files and other folders arranged in some organized and logical fashion.

Foreground Process: A process that keeps control of the keyboard when it executes, i.e., the process whose standard input is attached to the keyboard. Only one foreground process can run on a system at a given time.

Forwarding E-Mail: Sending a copy of an e-mail message received from someone to another e-mail address.

FTP: See File Transfer Protocol.

Full Association: A full association has been established between two sockets when they both have names bound to them and know the names of each other. Such sockets are known as fully connected.

Full Screen Display Editor: An editor that displays a portion of the file being edited in the console window or terminal screen.

Full Screen E-Mail Display Systems: E-mail systems that allow you to edit any text you see on a single screen display, as you would on a word processor.

Fully Parameterized Client: A client software that has the flexibility of allowing identification of a particular port number where a server runs. Telnet is an example of a fully parameterized client, because, although the telnet server normally runs on the well-known port 23, you can run a telnet server on another port and connect to it by specifying the port number as a command line parameter with the telnet command. For example, in the telnet foo.foobar.org 5045 command, the telnet client will try to connect to the server running on port 5045.

Fully Qualified Domain Name (FQDN): The name of a host that includes the host name and the network domain on which it is connected. For example, www.up.edu is FQDN for the host whose name is www.

Function: A series of commands that are given a name. The commands in a function are executed when the function is invoked (called).

Function Body: The series of commands in a function.

Gateway: See Router.

General Purpose Buffer: An area in the main memory maintained by an editor, it contains your most recent cut/copied text.

Generic Event/Request Model: A server is the hardware and/or software that actually takes input from and displays output to the user. A client is an application program that connects to the server and receives input events from the server and makes output requests to the server.

Getty Process: At the system bootup time, the Linux system starts running a process on each working terminal attached to the system. This process runs in the superuser mode and sets terminal attributes such as baud rate as specified in the /etc/termcap file. Finally, it displays the login: prompt and waits for a user to log on.

git: A Linux tool for version control and software development sharing, both command line, and web-based via Github.

Git Branch: A name for a line of commits, also called a reference. It shows the parents/descendants of a commit, and thus the typical notion of a “branch of project development.”

Git Staging Model: git has three main states that your files can be in: modified, staged, and committed. The files are either in the Working Directory, the Index, or the Object Store.

Global Variable: A variable that can be accessed by children of the process (executing shell script) in which it is defined.

Graphical User Interface (GUI): If you use a point-and-click device, such as a mouse, to issue commands to its operating system, a computer is said to have a graphical user interface.

Group: In Linux, every user of the computer system belongs to a collection of users known as the user’s group.

GRUB (Grand Unified Bootloader): A bootloader program that loads and executes the Kernel and initrd images.

Half Association: A socket is said to be half associated when a name has been bound to it. Such sockets are said to be half connected.

Hard Coding: Making a value part of a program as opposed to taking it from an outside source such as the keyboard or a file.

Hard Link: A mechanism that allows file sharing by creating a directory entry in a directory to allow access to a file (or directory) via the directory. Loosely applied, it is a “pointer” to the inode of a file to be accessed via multiple pathnames. The ln command is used to create a hard link to a file.

Header: See Program Header.

Header File: A file that contains definitions and/or declarations of various items (e.g., constants, variables, and function prototypes) to be used in the program in the C, C++, or Java programming language.

Heap: The area in the memory image of a Linux process used for dynamic memory allocation/deallocation.

Here Document: A Bourne and C shell feature that allows you to redirect standard input of a command in a script and attach it to data in the script.

Hidden File: A file whose name starts with a dot (.) is known as a hidden file. Such files are not listed when in the output of the ls command unless you use the ls -a command. Examples of hidden files are ~/.bashrc, ~/.cshrc, ~/.login, and ~/.profile.

High-Level Programming Languages: Programming languages such as C, C++, Python, Java, FORTRAN, and LISP that are closer to spoken languages and are independent of the CPU used in the computer system.

Hole: Unused area in a file, created with the file pointer is set and data is written beyond the current end-of-file.

Home Directory: See Login Directory.

Home Page: The contents of a file displayed on the screen (the actual contents can be multiple screens long) for an Internet site.

Host: A hardware resource, usually a computer system, on a network.

Huffman Coding: A lossless compression scheme for encoding fixed-length block of characters into a variable-length block of bits. In this compression scheme, we assume that characters occur independently and with known probabilities, and that the probabilities are the same for all positions. If statistics about fixed block of characters are known a priori, Huffman coding results in optimal codes.

Hypervisor: See Virtual Machine Monitor.

I/O Bound Process: A process that spends most of its time performing I/O operations, as opposed to performing some calculations by using the CPU.

I-list: A list (array) of inodes on the disk in a Linux system. See Inode.

Immutable: An object with a fixed value. Immutable objects include numbers, strings, and tuples. Such an object cannot be altered. A new object has to be created if a different value has to be stored. For example, a key in a dictionary.

Index Number: See Inode Number.

Index Screen: The user interface in full-screen-display e-mail systems. It usually consists of three areas: one that contains the message number, sender's e-mail address, date received, size of the message in bytes, and subject line; a second that contains a list of possible commands; and third, a command area where your typed commands are displayed. These screens vary from one system to another.

Indexed Buffer: A buffer used by a text editor that allows you to store more than one temporary string.

Infinite Loop: See Nonterminating Loop.

Information Hiding: A technique used to implement software when the internal structure of a data item is not important. What is important is the type of operation that can be performed on the data and the input/output characteristics of the operations.

init Process: The legacy first-user process that is created when you booted up the Linux system. The BSD-style init program brought up the system by running the /etc/rc script. The rc script is a very easy-to-understand manage facility. Replaced in all major branches of Linux by systemd.

initrd (Initial RAM Disk): Used by kernel as temporary root file system until kernel is booted and the real root file system is mounted. It also contains necessary drivers compiled inside, which helps it to access the hard drive partitions and other hardware.

Inode: An element of an array on disk (called i-list) allocated to every unique file at the time it is created. It contains file attributes such as file size (in bytes). When a file is opened for an operation (e.g., read), the file's inode is copied from disk to a slot in a table kept in the main memory, called the inode table (see Inode Table), so that the file's attributes can be accessed quickly.

Inode Number: A 2-byte index value for the i-list (or inode table) used to access the inode for a file.

Inode Table: A table (array) of inodes in the main memory that keeps inodes for all open files. The inode number for a file is used to index this array in order to access the attributes of an open file.

Insert Mode of Operation: Mode that allows you to input text to be inserted in the document being edited.

Instruction Set: The language that a CPU understands. A CPU can understand instructions only in its own instruction set, which is usually a superset of its predecessors made by the same company.

Interactive Operating System: An operating system that allows you to interact with your processes. Almost all contemporary operating systems, such as Linux, and Windows, are interactive.

Internal (Built-In) Command: A shell command for which the service code is part of the shell process.

Internal Signal (Trap): An interrupt generated by the CPU. This may be caused, for example, when a process tries to access a memory location that it is not allowed to access. (See Process Address Space.)

Internet: See Internetwork.

Internet Domain Name System: A distributed database of domain name and IP address mappings. It is maintained by hosts called name servers. Every site on the Internet must have at least one computer that acts as a name server.

Internet Domain Socket: A socket (an interprocess communication endpoint in the BSD-compliant Linux systems) that can be used for communication between processes on the same computer or between different computers on a network or an internet.

Internet Login: Logging on to a computer on the Internet.

Internet Message Access Protocol (IMAP): It is a method of accessing e-mail or bulletin-board messages at a mail server by using a client software, without transferring any files or messages between the two computers.

Internet Protocol (IP): The network layer protocol in the TCP/IP protocol suite that routes packets (known as datagrams in the TCP/IP terminology) from the source host to the destination host.

Internet Service Provider (ISP): A company that offers Internet services such as e-mail and Web browsing through dialup or cable connections.

Internetwork: A network of computer networks. The ubiquitous internet is called the Internet.

Internetworking: Making a network of networks. In terms of software, the term internetworking is usually used to refer to writing client-server programs that allow processes on various hosts on the Internet to communicate with each other.

Interpreted Program: A program that is executed one command (statement) at a time by the interpreter.

Interpreter: A program that executes statements (or commands) in a program one by one. An example of an interpreter is a Linux shell that reads commands from a keyboard or a shell script and executes them one by one.

Interprocess Communication (IPC) Mechanisms: Facilities (channels and operations on them) provided by an operating system that allow processes to communicate with each other. Linux has several channels for IPC, including pipes, FIFOs, and BSD sockets. These channels are created by using Linux systems called pipe, mkfifo (mknod in older systems), and socket.

Interrupt: A “signal” that a peripheral hardware device sends to the CPU in order to get its attention.

Interrupt Service Routine: The kernel code to service an interrupt.

Interrupt-Driven Interaction: A mechanism used in modern computer systems in which applications wait for a signal from a particular input device and then take an appropriate action.

Intranet: A network of computer networks in an organization that is accessible to people in the organization only.

Intranet Login: Logging on to a computer on an intranet.

IP Address: A 32-bit positive integer (on IPv4) to uniquely identify a host on the Internet. On IPv6, it is a 128-bit positive integer.

IP Broadcast Address: An IP broadcast address (also known as broadcast address) is used by the IP layer in a host to send a datagram to all the hosts on a subnet or to a remote network.

Iteration: A single execution of the piece of code in a loop. (See Loop.)

Iterative Server: A server process that on receiving a request from a client process prepares a response, sends the response to the client process, and waits for the next request.

Job: A job is a print request or a process running in the background.

Job ID: A number assigned to a print job. On some systems, it is preceded by the name of the printer.

Job Number: A small integer number assigned to a background process.

Kernel-Level Threads: The threads created by user programs using thread libraries implemented in the kernel. The kernel handles both processes and threads, including their scheduling.

Kernel on Intel/AMD Processor Platforms: The kernel file starts with a 512-byte boot block, then a secondary boot loader block, and then the compressed kernel image. The kernel does all the kernel-space work: interacting directly with hardware, managing running processes by allocating memory and CPU time, and enforcing access control through ownership and permissions.

Keyboard Interrupt: An event generated when you press <^C> that causes the termination of the foreground process.

Keyboard Macro: A collection of keystrokes that can be recorded and then accessed at any time. This capability allows you to define repetitive multiple keystroke operations as a single command and then executes that command at any time—as many times as you want.

Keystroke Command: A command that corresponds to pressing one or more keys.

Kill Ring: Text held in a buffer by killing it and then restored to the document at the desired position by yanking it.

Ksh: The abbreviation of Korn shell.

lambda: An anonymous inline function consisting of a single expression that is evaluated when the function is called. The Python syntax to create a lambda function is lambda [arguments]: expression.

Language Libraries: A set of prewritten and tested functions for various languages that can be used by application programmers instead of having to write their own.

Last Line Mode (Command Mode): A state that the vi and vim editors can be in that allows entry of editor commands, such as for saving files or quitting the editor.

Latency Time: The time taken by a disk to spin in order to bring the right sector under the read/write head is called the latency time for the disk. It is dictated by the rotation speed of the disk.

Lazy Locking: In version control systems that allow multiple users to check out a file for editing, lazy locking does not lock the file until the file contents are changed by a user.

Legacy Code: Program written long ago that has no written documentation describing the purpose of various parts of the program.

Librarian: A nickname commonly used for the Linux `ar` utility that allows you to archive your object files into a single library file and manipulate the archive file in various ways.

Library: See Language Libraries.

Lightweight Process: A kernel-visible or user thread of a Linux process.

Line Display E-Mail System: E-mail systems that allow you to edit one line at a time when you are composing an e-mail message. The UNIX mail utility is a prime example of such a system.

Link: A link is a way to connect a file (or directory) to a directory so that the file can be accessed as a child of the directory. The actual file may be in another directory.

Link File: A file in Linux that contains the pathname for a file (or directory). A link file, therefore, “points to” another file. The type of such a file is `link` (denoted by `l` in the output of the `ls -l` command). (See Symbolic Link.)

Literal Constants: Constant values such as digits, letters, and string. For example `103`, `“A,”` `“x,”` and `“Hello”`.

Little Endian Byte Order: A storage (or transmission) order in which the low byte of a multiple-byte data item (`char`, `int`, `long`, etc.) is stored in the low byte of the memory and high byte of the data is stored in the high byte of memory.

Loader Program: An operating system program that reads an application from the disk, loads it into the main memory, and sets the CPU state so that it knows the location, in the main memory, of the first program instruction in the main memory.

Local Area Network (LAN): Multiple computing devices interconnected form a LAN if the distance between these devices is small, usually less than 1 km.

Local Client: A client process that runs on the host that you are sitting in front of.

Local File System: File system used for organizing files and directories of a single computer system. By using a local file system on a computer system, you can access files and directories on that system only. (A remote file system allows you to access files on the remote computers on a local network.)

Local Host Computer System: The computer system that you are logged on to.

Local Variable: A variable that is not accessible outside the executing shell script in which it is defined.

Login Directory: The directory that you are placed in when you log on.

Login Name: See Username.

Login Process: A process created by the `getty` process that accepts your password, checks for its validity, and allows you to log on by running your login shell process.

Login Prompt: A character or a character string displayed by an operating system to inform you that you need to enter your login name and password in order to use the system. In a Linux system, the `getty` process displays the login prompt.

Login Shell: The shell process that starts execution when you log on.

Loop: A piece of code that is executed repeatedly.

Low-Level I/O: It is I/O done via the system call interface.

Low-Level Programming Language: A computer programming language that is closer to the language that a CPU speaks, called the CPU’s instruction set. When written in English-like words called mnemonics, this language is called the assembly language for the CPU.

Lpd: Short for line printer daemon. (See Printer Daemon.)

LWP: See Lightweight Process.

Machine Code: See Machine Programs.

Machine Cycle: A CPU continuously fetches the next program instruction from the main memory, decodes it to verify if the instruction is valid, and then executes it. This process of fetching, decoding, and executing instructions is known as the CPU cycle.

Machine Language: The instruction set of a CPU denoted in the form of 0s and 1s.

Machine Programs: The programs written in the instruction set of a CPU and expressed in 0s and 1s.

Magic Number: A number stored in the disk image of an executable file that describes the type of the executable code in the file.

Main Buffer: Also known as the editing buffer, or the work buffer, it is the main repository for the body of text that you are trying to create or modify from some previous permanently archived file on disk.

Main Thread: The thread caused by the execution of the main() function in a program.

Mainframe: See Mainframe Computer.

Mainframe Computer: A computer system that has powerful processing and input/output capabilities and allows hundreds of users to use the system simultaneously.

Make Rules: The rules that are used by the Linux make utility to compile and link various modules of a software product.

Master Server: The main server process in a concurrent server. See Concurrent Server.

Maximum Transmission Unit: The maximum size of an IP datagram (packet) and is dependent on the technology used at the data link layer for connection to other hosts.

MBR (Master Boot Record): In simple terms, MBR loads and executes the GRUB boot loader.

Menu Bar: A collection of menu choices, arranged in either a horizontal or vertical format, that appears onscreen either permanently or when activated using a mouse button.

Message Body: The message text of an e-mail message.

Message Header: An important structural part of an e-mail message that usually appears at the top of the message text. It normally contains information such as sender's and receiver's e-mail addresses, subject, date and time the message was sent, attachments, and e-mail addresses of the people who received carbon copies of the mail message.

Metacharacters: See Shell Metacharacters.

Method: A function that is defined inside a class body. If called as an attribute of an instance of that class, the method will get the instance object as its first argument (which is usually called self).

Millisecond: One thousandth (10^{-3}) of a second.

Minicomputer: A midrange computer that is more powerful than a PC but less powerful than mainframe computers. Like mainframe computers, the minicomputer also allows multiple users to access the system at the same time.

Mirror: A vdev that stores identical copies of data on two or more disks. If any disk in a mirror fails, any other disk in that mirror can provide the same data.

Mode Control Word: A string of characters used with the chmod command to specify file privileges.

Modeless Editor: A text editor such as emacs that does not have specific modes for entering text or executing commands that affect the state of the editor.

MTU: See Maximum Transmission Unit.

Multimedia Internet Mail Standard (MIME): An e-mail standard that defines various multimedia content types and subtypes for attachments. In particular, digital images, audio clips, and movie files can be transported via e-mail attachments, even on dissimilar e-mail systems, if the systems are MIME compliant.

Multiprot Router: A router that can interconnect more than two networks.

Multiprogramming: In a computer system, the mechanism that allows the execution of multiple processes by multiplexing the CPU. Under multiprogramming, when the process currently using the CPU needs to perform some I/O operation, the CPU is assigned to another process that is ready to execute.

Multiservice Server: A server that offers multiple services, such as the UNIX super server, inetd.

Multithreaded Kernel: An operating system kernel that offers multiple concurrent instantiation of kernel services, i.e., multithreaded services.

Mutable: Mutable objects can change their value but keep their class identity.

Name Server: A computer system on an Internet site that helps in mapping a domain name to an IP address, or vice versa. Name servers implement the DNS.

Namespace: A technique of isolating processes within the context of some global system resource, such as file system mount point, or user identification, to give them autonomy within that isolated domain. Not found in UNIX, namespaces are used to implement virtualized containers.

Named Pipe (FIFO): A file system persistent channel on Linux used for communication between related or unrelated processes on a system.

Named Pipes: Communication channels that can be used by unrelated Linux processes on the same computer to communicate with each other. The Linux system call mkfifo (mknod in older systems) is used to create a named pipe.

Nanosecond: One-billionth (10^{-9}) of a second.

Net Mask: The net mask is a bit mask used by the TCP/IP protocol to identify whether a host is on a remote network or on a local subnet.

Network Byte Order: Same as Big Endian Byte Order.

Network File System (NFS): Client-server software, commonly used on networked Linux machines, that allows you to access your files and directories from any computer transparently.

Network Interface Card: A circuit board in a computer system that has a link-level protocol implemented in it. For example, a network card with the Ethernet protocol implemented in it (also referred to as the Ethernet card).

Network Protocol: See Protocol.

NIC: See Network Interface Card.

Nice Value: A positive integer value used in calculating the priority number of a Linux process. The greater the nice value for a process, the higher its priority number, resulting in a lower priority.

Noclobber Option: A feature in the C and Bash shells that forces the shell to ask you to have the shell prompt before deleting a file when you execute the rm command.

Nonterminating Loop: A loop that does not have a proper termination condition, and therefore, does not terminate. This is usually caused by bad programming, but there are certain applications, such as Internet servers (e.g., Web servers), that must use infinite loops to offer the intended service.

Null Command: The Bourne shell command: It does not do anything except for returning true. When used in a C shell script, this command causes the C shell to execute the remaining script under the Bourne shell.

Null String: The string that contains no value. When displayed on the screen, it results in a blank line.

Object Code: A program generated by the assembler program. It is in the machine language of the CPU in the computer, but the library calls have not yet been resolved. The task of resolving library calls is performed by another program called linker (or linkage editor).

Open Software System: A software whose source code is freely available to the community of users so they can modify it as they wish. An example of such a system is the LINUX operating system.

Others: In Linux, when we talk about a user's access permissions for a file, "others" refers to everyone except the owner of the file and the users in the owner's group.

Package Management System: A program that installs new or improved applications or utilities on your Linux system, usually by compiling and linking program modules from packages.

Package Upgrades: On Debian-family and CentOS systems, using the apt or yum commands to maintain installed user application packages, apps, and programs at their latest release, delete them, or add new ones.

Packages: A collection of program components for an application that can be installed on your Linux system via the use of a Package Management System.

Packet: A term used for a fixed-size message (containing data and control information) in the networking terminology. A TCP packet is called a segment, and a UDP or IP packet is called a datagram.

Parallel Execution: Simultaneous execution of multiple commands with the help of CPU scheduling. The processes corresponding to all the commands in the command line are executed in the background.

Parent Process: A process that creates one or more children processes.

Passive Socket: A socket that listens for incoming connection requests from client processes. It is a socket on which listen() system call has been executed.

Password: A sequence of characters (letters, digits, punctuation marks, etc.) that every user of a time-sharing computer system must have in order for him/her to use the system. (See Username.)

path: Is a slash-delimited pathname for the dataset component.

Pathname: The specification of the location of a file (or directory) in a system with a hierarchical file system.

PCB: See Process Control Block.

Personal Computer (PC): A computer system that, typically, allows a single user to use the system at any one time, although some of the newer PCs allow multiple users to use the system

simultaneously. Examples of such systems are Macintosh and home computers running under DOS, Windows 9X, and LINUX.

PF: A kernel-level software system that screens network packets by checking the properties of individual packets and the network connections built from those packets against the filtering rules defined in its rule configuration files. The packet filter arbitrates the disposition of those packets. This could mean passing them through or rejecting them, or it could trigger events that parts of the operating system or external applications work on to dispose the packets.

Physical Communication Medium: The medium used to connect the hardware resources (computers, printers, etc.) on a network. It includes telephone lines, coaxial cable, glass fiber, a microwave link, and a satellite link.

Pipe: A process-persistent channel on Linux used for communication between related processes on a system.

Pipe Character (|): The symbol used to connect the standard output of a command to the standard input of another command in a shell script or while using a shell interactively.

Point-and-Click Device: Under a graphical user interface, a device is needed to point to an icon, button, window, or any other part of a window and press (click) a button on the device to perform an operation such as executing a program. Joysticks and mouses are examples of point-and-click devices.

Pool: Identifies the name of the storage pool that contains the dataset.

Port Number: A 16-bit integer number associated with every Internet service, such as telnet. Port numbers are maintained by TCP and UDP. Well-known services such as ftp, http, and telnet have well-known ports associated with them. The port numbers for some well-known services are: 21 for ftp, 80 for http, and 23 for telnet.

Port Number: A port number is a positive integer in the range 0 to 65535 used to distinguish different services offered on a host.

Portability: The ability to move the source code (see Source Code) for a system easily and without major modifications from one hardware platform to another.

Positional Parameters: Shell environment variables \$1–\$9 can be used to refer to the command line arguments with which a shell script is executed.

POSIX (Portable Operating System Interface): A family of standards specified by the IEEE Computer Society for maintaining compatibility between operating systems. POSIX defines the application programming interface (API), along with command line shells and utility interfaces, for software compatibility with variants of Unix and other operating systems.

POST: After the power to an x86 system is turned on, the firmware executes a power-on self-test (POST), locates and installs firmware extensions from peripheral board ROMS, and then begins the boot process through a firmware-specific mechanism.

Post Office Protocol (POP): It is a method of accessing e-mail messages at a mail server by using a client software by “downloading” the messages to the client machine for offline reading.

PPFDT: See Per Process File Descriptor Table.

Present Working Directory: Also known as the current directory, it is the directory that you are in at a given time. You can use the pwd command to display the full pathname of this directory.

Print Queue: A queue associated with every printer where incoming print requests are queued if the printer is busy printing and is printed one by one as the printer becomes available.

Printer Daemon: See Printer Spooler.

Printer Spooler: A system process running in the background that receives print requests and sends them to the appropriate printer for printing. If the printer is busy, its request is put in printer’s print queue.

Proc Filesystem: A virtual filesystem created by the kernel that does not exist on a hard disk, for example, and that gives the kernel information about processes on the system. (See Virtual Filesystem.)

Proc Structure: Part of a Linux process’s PCB that contains the scheduling-related information for the process. It always remains in memory regardless of the state of the process.

Process: An executing program.

Process Address Space: Dictated by the memory image of a process, it is the region of main memory that a process may access legally.

Process Address Space: The main memory space allocated to a process for its execution. When a process tries to access (read or write) any location outside its address space, the operating system takes over the control, terminates the process, and displays an error message that informs the user of the problem.

Process Control Block: A kernel data structure that keeps track of the run-time attributes of the process.

Process Persistent Object: An object that remains in existence for the life of the process that created it.

Processor Scheduler: A piece of code in an operating system that implements a CPU scheduling algorithm.

Program Control Flow Commands: See Program Control Flow Statements.

Program Control Flow Statements: The shell commands (statements) that allow the control of a shell script to go from one place in the program to another. Examples of these statements are if-then-else-fi and case.

Program Generation Tools: Software tools and utilities that can be used by application programmers to generate program and executable files. Examples of such tools are editors and compilers.

Program Header: Important notes at the top of a program file that include information like file name, date the program was written and last modified, author's name, purpose of the program, and a very brief description of the main algorithm used in the program.

Protocol: A set of rules used by computer-network protocols in the operating system software or network applications to communicate with each other. Some of the commonly used protocols in the networking world are ATM, Ethernet, FTP, HTTP, IP, SMTP, TCP, Telnet, and UDP.

Protocol Port Number: See Port Number.

Pseudodevices: Special devices in the /dev directory that simulate physical devices.

Pseudonym: Also known as an alias, a nickname given to a command or e-mail address.

Public-Key Cryptography: An encryption technique that uses two keys: a public key and a private key. The private key is kept on your computer and is used to decode encrypted messages. The public key is made available to anyone who wants to decrypt your messages.

Python Iterable: An object capable of returning its members one at a time. Examples of iterables include all sequence types (such as a list, string, and tuple) and some nonsequence types like dict and file and objects of any classes you define with an `__iter__()` or `__getitem__()` method.

Pythonic: An idea or piece of code that closely follows the most common usages of the Python language, rather than implementing code using structures common to other languages.

Quantum: See Time Slice.

Queue: An arrangement of items/requests/messages for serving them on first-come-first-serve (FCFS) basis.

Race Condition: A condition under which threads in concurrent cooperating processes do not access data mutually exclusively, the final result produced by a process is dependent on the order in which instructions in different threads access the shared data, and the results may or may not be correct.

RAID-Z: A virtual device that stores data and parity on multiple disks.

Random Access Memory (RAM): A storage place inside a computer system that is divided into fixed size locations where each location is identified by a unique integer address and any location can be accessed by specifying its address. Although there are RAMs in various I/O devices, RAM is normally used for the main memory in a computer system, which is also a read-write memory.

Read Permission: The read permission on a Linux file allows a user to read the file. The read permission on a directory allows us to read the names of files and directories in the directory.

Real-Time Computer System: A real-time computer system is one that must generate output for a command within a specified interval of time, else the output is useless.

Redirection Operator: An operator used in a Linux shell for attaching standard input, standard out, and standard error of a process to a desired file. (See Standard Files.)

Registers: Temporary storage locations inside a CPU that are used by it as scratch pads.

Regular Expression: A set of rules that can be used to specify one or more items in a single character string (sequence of characters). Many Linux tools such as awk, egrep, fgrep, grep, sed, and vi support regular expressions.

Relocatable Code: An executable code that would run regardless of where it is loaded into the memory.

Remote Client: A client process running on a host connected to your server via a network connection.

Request for Comments (RFCs): Technical documents describing the Internet architecture, TCP/IP protocol suite, new protocols, revised protocols, and other Internet-related information items are known as Request for Comments (RFCs). Initial versions of RFCs are called Internet Drafts.

Resilvering: The process of copying data from one device to another device is known as resilvering. For example, if a mirror device is replaced or taken offline, the data from an up-to date mirror device is copied to the newly restored mirror device. This process is referred to as mirror resynchronization in traditional volume management.

Resource Manager: The operating system is also known as the resource manager because it allocates and deallocates the computer resources in an efficient, fair, orderly, and secure manner.

Resource Utilization: The resource utilization of a resource (usually a hardware resource, such as the CPU) is the percentage of time it has been in use since the computer system has been running.

Rlogin: A Linux network protocol that allows you to log on to another host on a local area network.

Root: The login name of the superuser (see Superuser) in a Linux system.

Root Directory: The directory under which hang all the files and directories in a computer system with a hierarchical file system. Thus, it is the granddaddy of all the files and directories.

Root Window: The window under which all other windows are opened as its children.

Round Robin Scheduling Algorithm: A CPU scheduling algorithm in which a process gets to use the CPU for one quantum and then the CPU is given to another process. This algorithm is commonly used in time-sharing systems, such as Linux, for scheduling multiple processes on a single CPU. See also Completely Fair Scheduler.

Route: The sequence of routers that a packet goes through before it reaches its destination.

Router: A special host on an internet that interconnects two or more networks and performs routing of packets (called datagrams in the TCP/IP terminology) from the sender host to the receiver host. Routers are also called gateways.

Rsh: A Linux network protocol that allows you to execute a command on another computer on a local area network.

Run-Time Performance: The time and space taken by a program to finish its execution.

Search Path: A list of directories that your shell searches to find the location of the executable file (binary or shell script) to be executed when you type an external command at the shell prompt and hit the <Enter> key.

Sector: Disks are read and written in terms of blocks of data, known as sectors. Typical sector size is 512 bytes.

Seek Time: The time taken by the read/write disk head to move laterally to the desired track (cylinder) before a read or write operation can take place.

Sequential Execution: One-by-one execution of commands; one command finishes its execution and only then does the execution of the second command start.

Server Software: In the client–server software model, the server process computes the response for a client request and sends it to the client, who handles it according to the semantics of the command. All Internet services are implemented on the basis of a client–server software model. An example of a server software is a Web server.

Session Leader: The login shell process.

Set-Group-ID (SGID) Bit: A special file protection bit which, when set for an executable file, allows you to execute the file on the behalf of the file's group. Thus, you execute the file with group privileges.

Set-User-ID (SUID) Bit: A special file protection bit which, when set for an executable file, allows you to execute the file on the behalf of the file's owner. Thus, you execute the file with the owner's privileges.

Sh: The abbreviation of Bourne shell.

Shell: A computer program that starts execution when the computer system is turned on or a user logs on. Its purpose is to capture user commands (via the keyboard under a CUI and via a point-and-click device under a GUD) and execute them.

Shell Environment Variables: Shell variables used to customize the environment in which your shell runs and for proper execution of shell commands.

Shell Metacharacters: Most of the characters other than letters and digits have special meaning to a shell and are known as shell metacharacters. They are treated specially, and therefore cannot be used in shell commands as literal characters without specifying them in a particular way.

Shell Prompt: A character or character string displayed by a shell process to inform you that it is ready to accept your command. The default shell prompt for Bourne shell is \$ and for C it is %. You can change a shell prompt to any character or character string.

Shell Script: A program consisting of shell commands.

Shell Variable: A memory location that is given a name that can then be used to read or write the memory location.

Signal: In Linux jargon, it is a mechanism that allows interruption of a process. It is also known as software interrupt in computer science literature.

Signal: See Software Interrupt.

Simple Mail Transfer Protocol: See SMTP.

Single Stepping: A feature in symbolic debuggers that allows you to stop program execution after every instruction execution. The next instruction is executed by using a command. This is also sometimes called tracing program execution.

Single UNIX Specification (SUS): A family of standards for computer operating systems, compliance with which is required to qualify for the name “Unix.” The core specifications of the SUS are developed and maintained by the Austin Group, which is a joint working group of IEEE, ISO JTC 1 SC22, and The Open Group.

Single-Threaded Process: A process that only has the main thread.

Slave Process: A child process created by the master process to handle a client request. See Master Server.

Slice: A disk partition created with partitioning software.

SMTP: It stands for Simple Mail Transfer Protocol, which is the protocol used in all e-mail systems (e.g., elm, mail, and pine) running on the Internet.

Snapshot: Is an optional component that identifies a snapshot of a dataset.

Sniffing: Also known as “packet sniffing,” it is the equivalent of wire tapping a telephone conversation for Internet traffic.

Socket: A process-persistent endpoint of communication on Linux used for communication between related or unrelated processes on a system or on different systems on a network.

Socket Address: The address of a UNIX domain socket is a pathname and that of an Internet domain socket is IP address of the host on which the socket resides and a protocol port number.

Socket Descriptor: A descriptor for a socket that is used as index into the Per Process File Descriptor Table. See Per Process File Descriptor Table.

Socket Name: See Socket Address.

Soft Link: See Symbolic Link.

Software Cost Model: A model used to estimate the cost of a software product.

Software Interrupt: A mechanism used in Linux to inform a process of some event, such as the user pressing ^C or logging out.

Software Life Cycle: A sequence of phases used to develop a software product. These phases normally consist of analysis of the problem, specification of the product, design of the product, coding of the product, testing of the software, installation of the product, and maintenance of the product.

Sort Key: A field, or a portion of an item, used to arrange items in sorted order (see Sorting). For example, the social security number can be used as the sort key for sorting employee records in an organization.

Sorting: Arranging a set of items in ascending or descending order by using some sort key.

Source Code: A computer program written in a programming language to implement the solution for a problem.

Special Character: A character that when used in a command is not treated literally by the command. An example of such a character is `\c` in the System V compliant `echo` command that forces the command to keep the cursor on the same line.

Special File: The Linux files that correspond to devices (see Block Special Files and Character Special Files). These files are located in the `/dev` directory.

Spoofing: It means creating the TCP/IP packets using some other machine's IP address. This is also known as "IP Spoofing." The term "Web Spoofing" is used to describe a situation where an attacker creates a shadow "copy" of the entire World Wide Web.

ssh: Secure Shell Protocol used to send/receive information using highly secure encryption between local or remote users.

Standard Error: See Standard Files.

Standard Files: The files where the input of a process comes from and its output and error messages go to. The standard file where a process reads its input is called standard input. The process output goes to standard output, and the error messages generated by a process go to standard error. By default, the standard input comes from your keyboard, and standard output and standard error are sent to the display screen.

Standard Input: See Standard Files.

Standard Output: See Standard Files.

Start-up File: A file that is executed when you log on or when you start a new shell process. These files belong to a class of files, called dot or hidden files, as their names start with a dot (`.`) and they are not listed when you list the contents of a directory by using the `ls` command. Some commonly used startup files are `.bashrc` (start-up file for Bash), `.cshrc` (start-up file for C shell), `.profile`, and `.login`. All of these files can reside in your home directory.

States: The states (conditions) a process can be in, such as running, waiting, ready, and swapped.

Static Analysis: The static analysis of a program involves analyzing the structure and properties of your program without executing it.

Static Linking: Linking carried out at compile time.

Sticky Bit: When an executable file with sticky bit on is executed, the Linux kernel keeps it in the memory for as long as it can so that the time taken to load it from the disk can be saved when the file is executed the next time. When such a file has to be taken out of the main memory, it is saved on the swap space (see Swap Space), thus resulting in less time to load it into the memory again.

Strong Cryptography: An encryption method that cannot be penetrated by anyone except those who have the decryption key.

Subnet Mask: See Net Mask.

Subshell: A child shell executed under another shell.

sudo: A command that allows a permitted user to execute a command as the superuser, or to assume the role of another user, as specified by security policy in a special file.

Supercomputer: The name used for most powerful computers that typically have many CPUs in them and are used to solve scientific problems that would take a long time to complete on smaller computers. Supercomputers are used in organizations such as NASA and various US national laboratories.

Superuser: There is a special user in every Linux system who can access any file (or directory) on the system. This user is the system administrator, commonly known as the superuser on the system.

Sure Kill: Sending signal number 9 to a process. This signal cannot be intercepted by the process receiving the signal and the process is terminated for sure.

Swap Space: An area set aside on the disk at the system boot time where processes can be saved temporarily to be reloaded into the memory at a later time. The activity of saving processes on the swap space is called swap out, and of bringing them back into the main memory is known as swap in. The time taken to load a process from the swap space into main memory is less than the time taken to load a file from the disk when it is stored in the normal fashion.

Swapper Process: A process that swaps in a process from the swap space into the main memory or swaps out a process from the main memory to the swap space. See Swap Space.

Symbolic Constant: A constant value that is given to a name so that the name can be used to refer to the value.

Symbolic Debugger: A software tool that allows you to debug your program as the program runs.

Symbolic Link: When a symbolic link to a shared file (or directory) is created in a directory, a link file is created that contains the pathname of the shared file. The link file, therefore, “points to” the shared file. The `ln -s` command is used to create a symbolic link.

Synchronous I/O: The I/O based on blocking calls and signals.

syslogd: Legacy logging, and log file maintenance daemon, that refers to the recording of general and specific actions and events on a Linux system. A system program generates a call to write to a specific log file, either locally or across the network. The `syslogd` daemon handles that write call and is guided by entries in `/etc/syslog.conf`.

Systemd: On the surface, a system boot/shutdown and service control program. More extensively, the Linux “superkernel” that controls every resource, process, and user, for use by not only the system administrator but also the ordinary user.

Systemd-journald: A `systemd`-controlled service that collects and stores system logging data. Replaces legacy `syslogd`.

System Administration: For Linux systems, generally composed of installing the system and configuring it, arranging boot management and maintenance, maintaining the user base, adding postinstall hardware, backing up system and user files, updating the operating system, and upgrading and maintaining installed software, monitoring and tuning system performance, and making the system secure on a network.

System Bus: A set of parallel wires used to take bits from the CPU to a device, or vice versa.

System Call: A mechanism that allows a process to perform such privileged tasks that it is not allowed to perform by directly accessing (reading or writing) an I/O device or executing a piece of kernel code.

System Call: A system call is an entry point into the operating system kernel code. System calls can be used by application programmers to have the kernel perform the tasks that need access to a hardware resource, such as reading a file on a hard disk.

System Mailbox File: A file that contains all of the e-mail messages that the system has received for you. It is usually under the `/usr/spool/mail` directory in a file with your login name.

System Programming: The ability of writing the kernel code to manage system hardware including main memory and disk space management, disk formatting and defragmentation, CPU scheduling, and management of I/O devices through device drivers.

System Updates: Maintaining the operating system itself so that it is at the latest available stable release.

TCP/IP: See TCP/IP Protocol Suite.

TCP/IP Protocol Suite: See Transport Control Protocol/Internet Protocol.

Telnet: An application-level Internet protocol that allows you to log on to a remote host on the Internet.

Text Editor: A text editor allows you to view and edit (add or delete text in) text files. In spite of all that jazz created by word processors and desktop publishing systems, text files remain the most critical part of computing. They are needed to store source programs written in any type of language (e.g., C, C++, Java, Assembly, and Perl), e-mail messages, test data, and program outputs.

Text-Driven Operating System: An operating system that takes commands to be executed from the keyboard.

Theme: In a Window Manager, the style and appearance of windows and their accompanying components.

Thread: A flow of control in an executing program.

Thread-Safe Function: A function that can be called simultaneously from multiple threads, even when the invocations use shared data, because all references to the shared data are serialized.

Threshold Priority: A positive integer number used in the expression for calculating the priority number of a process in the Linux process scheduler. It is the smallest priority number for a user-level process. All system processes have priority numbers less than the threshold priority.

Throughput: The number of processes finished in a computer system in unit time.

Tiled Display: A technique to arrange windows on the display screen so that they are opened next to each other, just like the tiles on a floor.

Time Slice: In a time-sharing system, a time slice, also known as a quantum, is the amount of time a process uses the CPU before it is given to another process.

Time-Sharing System: A multiuser, multiprocess, and interactive operating system is known as a time-sharing system. Linux and UNIX are the prime examples of time-sharing systems.

TLD: See Top-Level Domain

Top-Level Domain: The rightmost string in a domain name is called the top-level domain.

Topology: The physical arrangement of hosts in a network. Some commonly used topologies are bus, ring, mesh, and general graph.

Transparent Encryption: Encryption/decryption automatically done by Secure Shell (SSH) without the knowledge of the sender and receiver processes.

Transport Control Protocol/Internet Protocol: The suite of communication and routing protocols that are the basis of the Internet. They include many protocols such as FTP, ICMP, IP, TCP, Telnet, and UDP.

Transport Layer Interface (TLI): Equivalent of BSD sockets in System V-compliant UNIX systems, it allows processes on the Internet to communicate with each other.

Trap: See Internal Signal.

Trap: The CPU-generated “signal” to handle an exception in the code being executed.

Trusted Host: Some remote login protocols allow login from a set of hosts without verifying passwords. Such hosts are known as trusted hosts.

u Area: Part of a Linux processes’ PCB that contains information about signal handling, resources allocation, and a reference to the proc structure.

UEFI (Unified Extensible Firmware Interface): A specification that defines a software interface between an operating system and platform firmware. UEFI replaces the Basic Input/Output System (BIOS) firmware interface.

Universal Resource Locator: Protocol://IP_address/pathname or protocol://FQDN/pathname. The “protocol” field is usually http, but can be ftp or telnet as well. The “pathname” field is used to identify the location of a file on the host. URLs are commonly used to identify the location of a Web page to be displayed on your screen. An example of a URL is `http://www.up.edu/index.html`. In this example, the protocol is http, the FQDN is `www.up.edu`, and the pathname is `~/index.html`.

UNIX Domain Socket: A socket (an interprocess communication endpoint in the BSD-compliant UNIX systems) that can be used for communication between processes on the same computer system.

upstream branch: The default branch that is merged into the branch in question (or the branch in question is rebased onto). In terms of data, your repo is “downstream” of data coming from upstream repos that you “pull from,” and going back to upstream repos that you “push to.”

URL: See Universal Resource Locator.

User: In Linux jargon, this term is used for the owner of a file when we talk about file access privileges.

User-Level Thread: A thread created by a user program using these libraries that is not known to the kernel and is managed solely by the user-level threads libraries.

User-Defined Macros: In context with the make utility, a user-defined macro is usually a collection of files, compiler options, or compiler names that is given a name. This allows users to access these macros by using `$(macro_name)` syntax. This capability enhances the readability of the makefile and allows you to use the named items at any time—as many times as you want. A collection of keystrokes that can be recorded and then accessed at any time. This capability allows you to define repetitive multiple keystroke operations as a single command and then execute that command at any time—as many times as you want.

User-Defined Variables: These shell variables are used within shell scripts as temporary storage places, whose values can be changed when the script executes.

UserID: Every user in a time-sharing system, such as Linux, is assigned an integer number called his/her `userid`.

Username: A name by which a user of a multiuser computer system is known to it. Before you can use the computer system, you must enter your username at the login prompt and hit the <Enter> key, followed by entering your password and hitting the <Enter> key.

Vdev (Virtual device): A whole disk, a disk partition, a file, or a collection of the previous, usually all of the same type. Using files as vdevs is discouraged, except for testing purposes. A collection of vdevs, grouped together as two to four vdevs in a RAID configuration, is a mirror.

Version Control: In general, it is the task of managing revisions to any soft product such as documentation for a product; but in particular, it means the task to manage revisions to a software product.

Virtual Connection: A virtual connection is established between two STREAM sockets when they have rendezvous using the connect() and accept() system calls.

Virtual Connection: A virtual connection is said to be established between client and server processes when the two have made an initial contact to exchange each other's location (usually IP address and protocol port number). The connection request is almost always initiated by the client process. After the virtual connection has been established, the server process understands that it will receive service requests(s) from the client process. The virtual connection is broken when the client process has received the response to its last request and initiates a request for closing the virtual connection.

Virtual Filesystem: An intermediary layer between the kernel and a physical filesystem maps between the two (using a "contract") and supplies support for different kinds of filesystems between applications and hardware.

Virtual Machine: The operating system software isolates you from the complications of the hardware resources, such as a disk drive, and is said to provide you a virtual machine that is much easier to use than the real machine.

Virtual Machine (VM): An instance of a complete, encapsulated operating system, including kernel, that can run as a guest under another operating system.

Virtual Machine Guest: The operating system that is accommodated by a host.

Virtual Machine Host: The operating system that accommodates a guest operating system in a virtual environment.

Virtual Machine Monitor (VMM): The operating system supervisory or management software that mediates between virtual machine host and guests. Sometimes called a hypervisor.

Volume: A dataset that represents a block device. For example, you can create a ZFS volume as a swap device.

Wayland: A GUI communications protocol that replaces legacy systems and works with the reference compositor Weston.

Web Browser: An Internet application that allows you to surf the Web by allowing users to, among other things, view Web pages.

Well-Known Application: An application that is built around a communication protocol described in a Request for Comments (RFC) such as Hypertext Transfer Protocol (also called HTTP and WWW), File Transfer Protocol (FTP), Simple Mail Transfer Protocol (SMTP), and Secure Shell (SSH).

Well-Known Port: A port on which a well-known service runs.

Well-Known Service: A service that runs on a well-known port. See Well-known Application.

Weston: The Wayland protocol reference Compositor.

Wide Area Network (WAN): Also known as a long haul network, it is a network that connects computing resources that are thousands of kilometers apart, typically spanning over several states, countries, or continents.

Widowed Pipe: A pipe that has one end closed. See Pipe.

Window Manager: The graphical management interface, which controls the display of and organizes all client windows on the X server.

Window System: A graphical system that provides the generic features of a GUI.

Write Permission: The write permission on a Linux file allows a user to write to the file, thus allowing the insertion or deletion of its contents and its removal from the system. The write permission on a directory allows us to create a new file (or directory) under it.

Yank: Marking/saving one or more lines of text in a file under the vi editor to be pasted elsewhere in the file.

ZFS Clone: A filesystem whose initial contents are identical to the contents of a snapshot.

ZFS Filesystem: A ZFS dataset of type filesystem that is mounted within the standard system namespace and behaves like other filesystems.

ZFS Pool: A logical group of devices describing the layout and physical characteristics of the available storage. Diskspace for datasets is allocated from a pool.

ZFS Snapshot: A read-only copy of a filesystem or volume at a given point in time.

Zombie: See Zombie Process.

Zombie Process: A process, whose parent is not waiting (i.e., is sleeping or has finished execution) when it terminates, and it cannot report its termination status to its parent.

Zombie Process: A Linux process that has terminated but still has some system resources allocated to it. Thus, a zombie process results in wastage of system resources. It is usually created when its parent process terminates before it finishes execution.