OS and Programming platforms – Basics

What is kernel and shell?

Both the Shell and the Kernel are the parts of this Operating System. These both parts are used for performing any operation on the System. When a user gives his command for performing any operation, then the Request will goes to the shell parts, the shell parts is also called as the Interpreter which translate the human program into the machine language and then the request will be transferred to the kernel. So that shell is just called as the interpreter of the commands which converts the request of the user into the machine language.

Kernel is the heart and core of an Operating System that manages operations of computer and hardware. It acts as a bridge between the user and the resources of the system by accessing various computer resources like the CPU, I/O devices and other resources.

A shell is an environment or a special user program which provide an interface to user to use operating system services. It executes programs based on the input provided by the user.

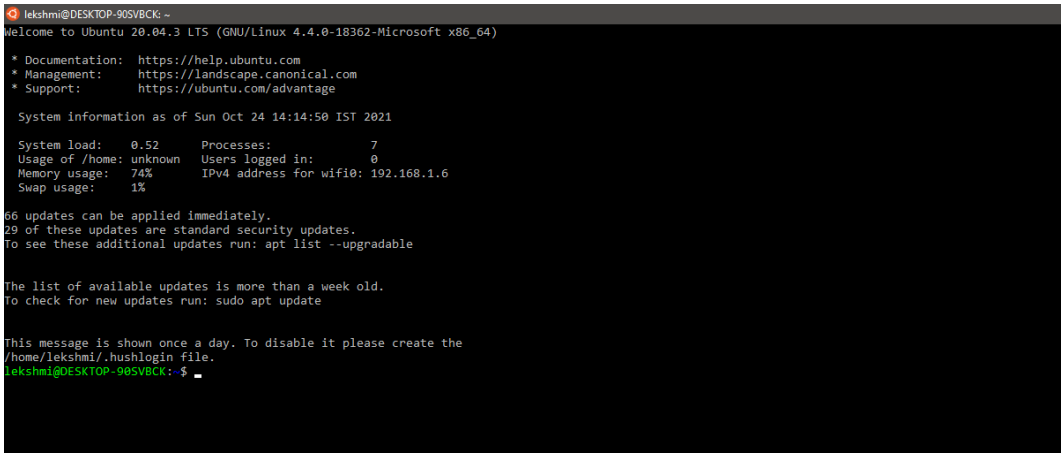
What OS means?

An operating system (OS) is system software that manages computer hardware, software resources, and provides common services for computer programs. An operating system is the program that, after being initially loaded into the computer by a boot program, manages all of the other application programs in a computer. The application programs make use of the operating system by making requests for services through a defined application program interface. In addition, users can interact directly with the operating system through a user interface, such as a command-line interface or a graphical UI.

What are the functions of kernel and shell?

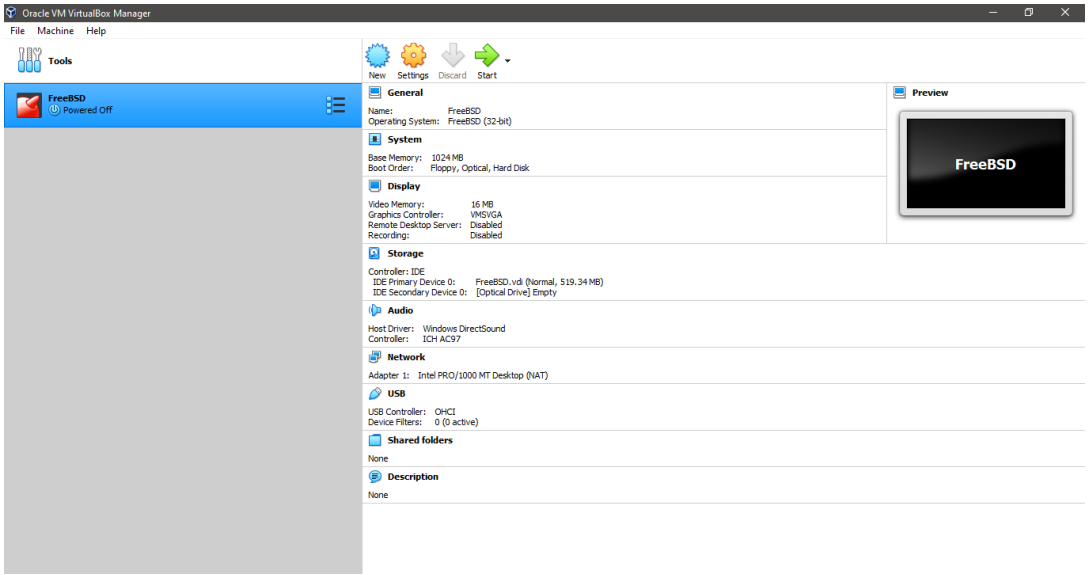
Shell	Kernel
Shell allows the users to communicate with the kernel.	Kernel controls all the tasks of the system.
It is the interface between kernel and user.	It is the core of the operating system.

It is a command line interpreter (CLI).	It's a low level program interfacing with the hardware (CPU, RAM, disks) on top of which applications are running.
Its types are – Bourne Shell, C shell, Korn Shell, etc.	Its types are – Monolithic Kernel, Micro kernel, Hybrid kernel, etc.
It carries out commands on a group of files by specifying a pattern to match	It performs memory management.
Shell commands like ls, mkdir and many more can be used to request to complete the specific operation to the OS.	It performs process management.
It is the outer layer of OS.	It is the inner layer of OS.
It interacts with user and interprets to machine understandable language.	Kernel directly interacts with the hardware by accepting machine understandable language from the shell.



Ubuntu 20.04 LTS is based on the long-term supported Linux release series 5.4. HWE stack updated to Linux release series 5.8.

GNU Bash is the shell used by default in terminals on Ubuntu.



FreeBSD's kernel provides support for some essential tasks such as managing processes, communication, booting and filesystems. FreeBSD has a monolithic kernel with a modular design. Different parts of the kernel, such as drivers, are designed as modules. The user can load and unload these modules at any time. ULE is the default scheduler in FreeBSD since version 7.1, it supports SMP and SMT. The FreeBSD kernel has also a scalable event notification interface, named kqueue. It has been ported to other BSD-derivatives such as OpenBSD and NetBSDD. Kernel threading was introduced in FreeBSD 5.0, using an M:N threading model. This model works well in theory, but it is hard to implement and few operating systems support it. Although FreeBSD's implementation of this model worked, it did not perform well, so from version 7.0 onward, FreeBSD started using a 1:1 threading model, called libthr.

The default FreeBSD shell is the tcsh shell for root, and the Almquist shell (sh) for regular users. The default scripting shell is the Almquist shell.