Cal State Fullerton

CPSC 254 – Introduction

Software Development With Open Source Systems

Instructor: Tejaas Mukunda Reddy

Introduction

- All texts can be downloaded free – none to buy
  - Reference for required texts can be found in the word document named Lecture 1 – Introduction on portal

- Recommended:
  - A laptop that you can use to install, remove, and practice various OS's – Less than 10 years old, 4G of RAM is plenty
  - New Egg has refurbished laptops https://www.newegg.com/notebooks/RefurbishedStore/ID-64?Tpk=refurbished%20laptop
  - Goodwill in Santa Ana has refurbished laptops: 2722 W. 5th
  - At least 1 thumb drive 4G or greater

What is Unix?

- UNIX: Pioneering operating system
- Often referred to as the "mother" of many Oss

- Key Principles of Unix Philosophy
  - Text-based Data Storage: Uses plain text for storing data
  - Hierarchical File System: Organizes files in a tree-like structure
  - Device Handling as Files: Treats devices and IPC as files
  - Abundance of Software Tools: Offers a wide range of software tools
  - Modular Program Design: Comprises small, modular programs
  - Command-Line Interaction: Programs linked via command-line interpreter and pipes

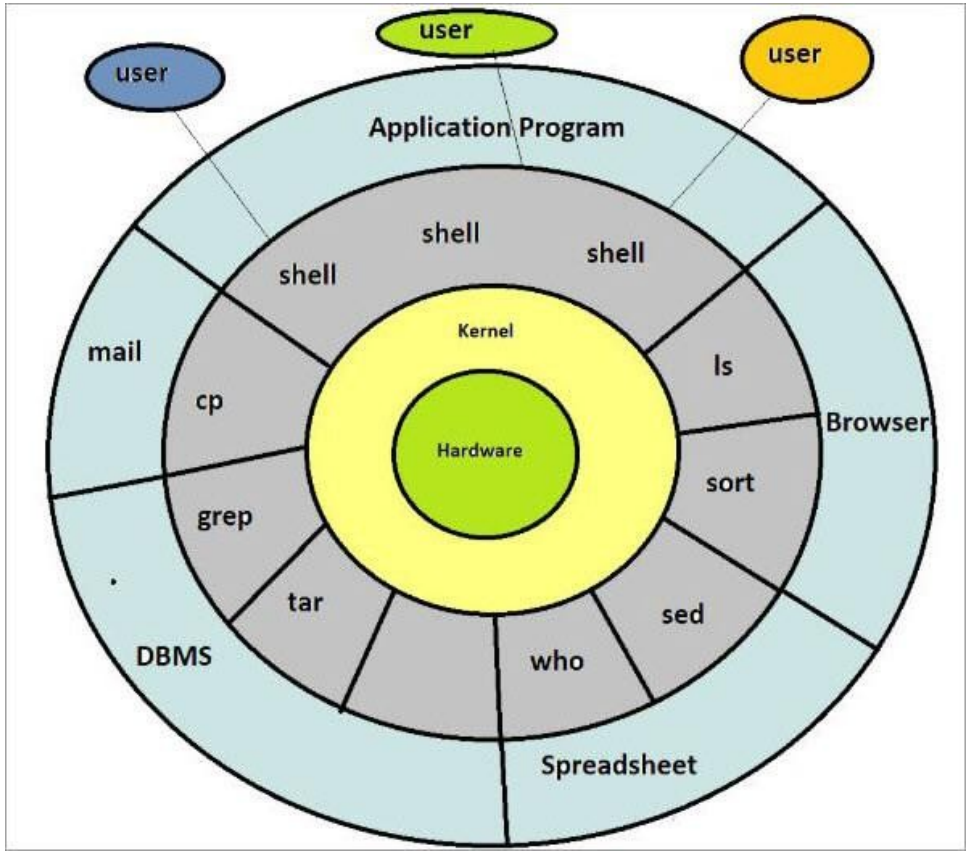
- It’s worth mentioning here the below quote about Unix Philosophy:

“Although that philosophy can’t be written down in a single sentence, as its heart is the idea that the power of a system comes more from the relationships among programs than from the programs themselves. Many UNIX programs do quite trivial things in isolation, but, combined with other programs, become general and useful tools.” – Brian Kernighan & Rob Pike

Prepared By: Tejaas Mukunda Reddy, Shivansh Vijay Nathan

Reference Prof. David Heckathorn

Unix Architecture



- Hardware refers to the physical components of a computer system, including the central processing unit (CPU), memory, storage devices, input/output devices, and network interfaces, which collectively enable the execution of software and the functioning of the operating system.
- The Unix Kernel is the system's master control program, overseeing all operations. It manages subsystems like file handling, resources, memory, and program control. Serving as the interface between users and hardware, it's complemented by the shell for user-command interaction and program execution
- In Unix, the shell is a command-line interface that allows users to interact with the operating system by entering commands, interpreting them, and executing corresponding computer programs.
- Application programs are software tools or programs developed by users or developers to perform specific tasks or functions, extending the system's capabilities beyond its core functionalities.

Prepared By: Tejaas Mukunda Reddy, Shivansh Vijay Nathan

Reference Prof. David Heckathorn

What is Linux?

- “Is Unix Different from Linux?” / “Are Linux and Unix the same thing?” / “Is Linux like Unix?”/ “Is Linux built on Unix?”
  - Here is the answer to all such questions. First, let me clear your confusion in a one-liner. Linux and Unix are different but they do have a relationship with each other as Linux is derived from Unix
  - Linux system is derived from Unix and it is a continuation of the basis of Unix design. Linux distributions are the most famous and healthiest example of the direct Unix derivatives. BSD (Berkley Software Distribution) is also an example of a Unix derivative.

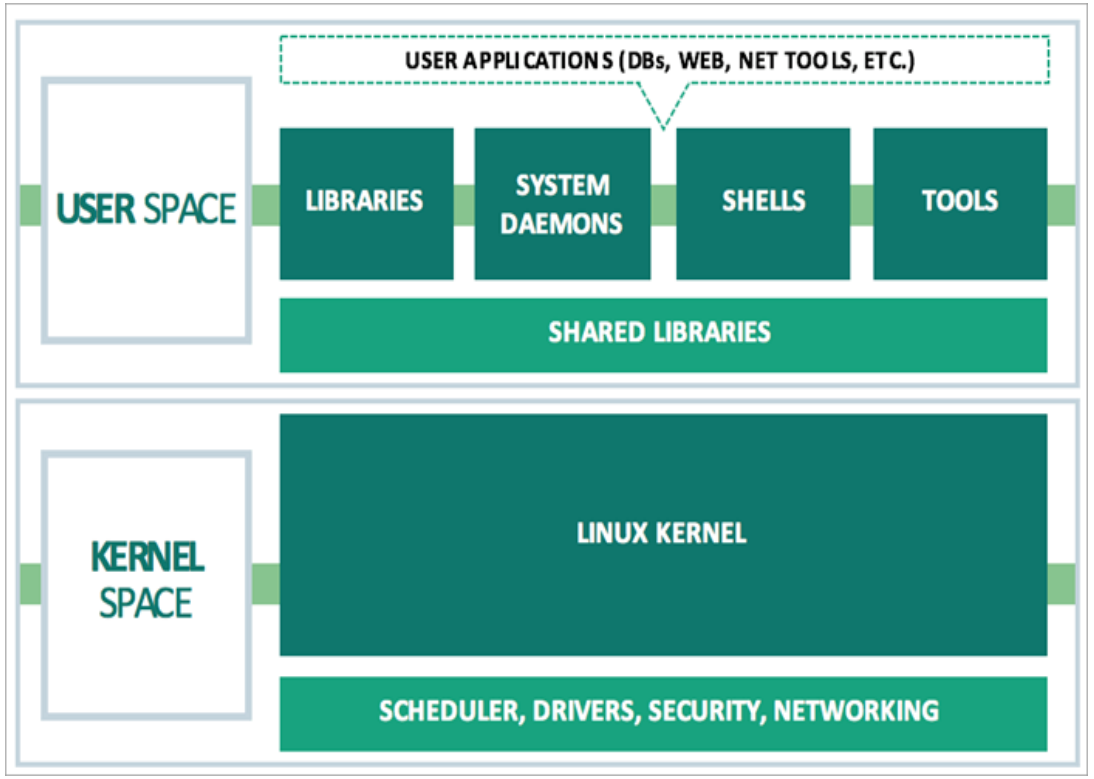
- At this juncture, it is important for us to make you clear about what is Unix-like?
  - A Unix-like OS (also called as UN*X or *nix) is the one that works in a way similar to Unix systems, however, it is not necessary that they conform to Single UNIX Specification (SUS) or similar POSIX (Portable Operating System Interface) standard.
  - SUS is a standard which is required to be met for any OS to qualify for using ‘UNIX’ trademark. This trademark is granted by ‘The Open Group’.

- Linux is only the Kernel, while Linux distributions can be treated as the OS. On the other hand, UNIX in itself is a complete OS as everything (all required application tied together) comes from a single vendor

Prepared By: Tejaas Mukunda Reddy, Shivansh Vijay Nathan

Reference Prof. David Heckathorn

Linux Architecture



- The operating system's memory is divided into two main spaces: user space and kernel space.
- User space is where applications and user-level processes run
- Kernel space is reserved for the core operating system and privileged operations.
- User space programs interact with the kernel through system calls, maintaining a separation that enhances stability and security.

Prepared By: Tejaas Mukunda Reddy, Shivansh Vijay Nathan

Reference Prof. David Heckathorn

History of Open Source

- Ken Thompson and Dennis Ritchie presented the first Unix paper at the
- Symposium on Operating Systems Principles at Purdue University in November 1973
- UC Berkeley was one of the very early adopters of Unix, and began distributing Unix tools called Berkeley Software Distribution, BSD, to other universities.
- TCP/IP was added to BSD in 1981 then broken out separate from BSD later.
- BSD fought lawsuits, and finally was allowed to freely distribute code in 1994. Much of what we now know as Unix comes from BSD.
- IETF (Internet Engineering Task Force) – Open meetings, open standards- anyone may comment, or contribute. Standards and RFC's are freely available for downloading from IETF.
- GNU GNU's Not Unix – Richard Stallman – Began with a compiler, now known as GCC (GNU C Compiler) part of every Linux OS.
- Copyleft – the basic license philosophy - The central idea of copyleft is that we give everyone permission to run the program, copy the program, modify the program, and distribute modified versions--but not permission to add restrictions of their own
- Anything added to or combined with a copylefted program must be such that the larger combined version is also free and copylefted.
- Linux – A Unix-like kernel developed by Linus Torvalds in 1991. In 1992 it was combined with the GNU system to make a complete OS. In the years since then, several versions of Linux have evolved. Features have been added, and most are competitive with MS Windows.

Prepared By: Tejaas Mukunda Reddy, Shivansh Vijay Nathan

Reference Prof. David Heckathorn