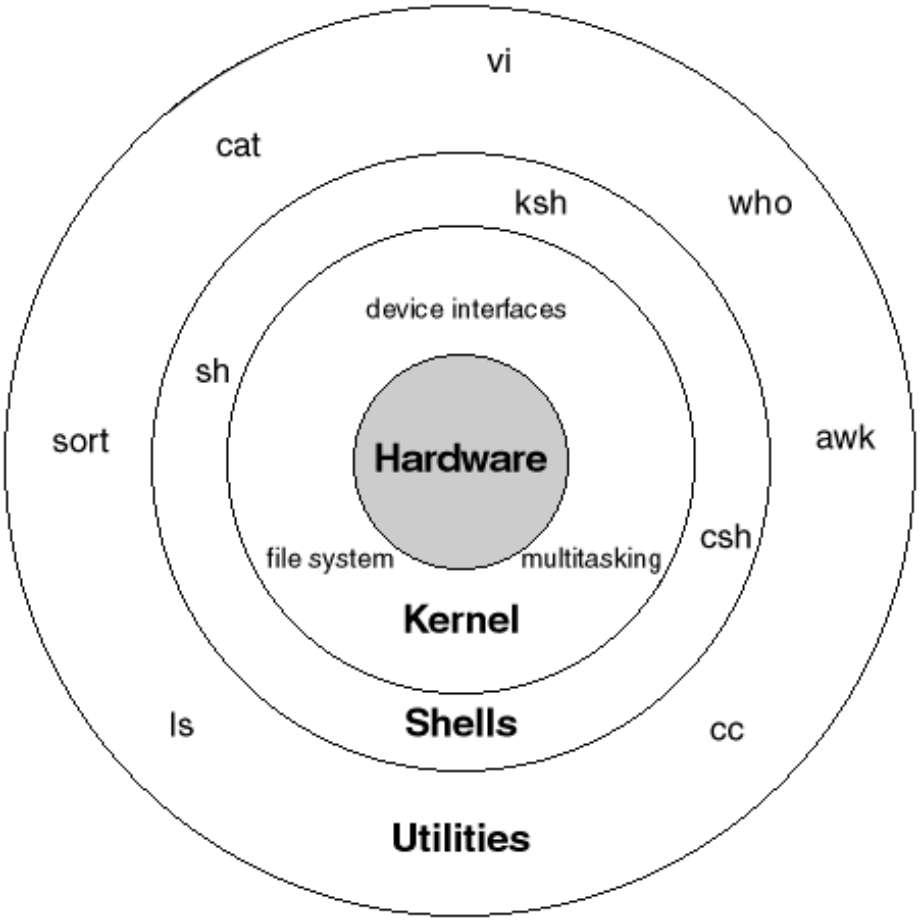

Figure 1: Computer Architecture

Software

Software is a set of instructional programs that tell a computer how to use and execute specific tasks.

Operating system (OS)

A operating system is a software system, meaning it sits between the software and hardware. The OS is in charge of controlling the hardware and software.

The OS controls the hardware by:

1. Managing CPU time.

2. Allocating memory to programs.
3. Controlling inputs/outputs like the keyboard etc.

The OS controls the software by:

1. Running applications.
2. File and storage managment.
3. Customize system preferences

Hardware

Hardware is the physical components that make up a computer, such as the CPU, RAM, hard drive and motherboard.

Kernel*

The kernel is the core component of a operating system because it acts as a bridge between the software and hardware of a computer. In simple terms, the kernel allows the OS to control the sofware and hardware.

For example,

- The text editor (software) ask the OS to execute a file.
- The OS passess that request to the kernel.
- The kernel tells the hardware (memory allocation) to execute the file.

Here is a metaphor for describing a kernel, OS, software, and hardware.

1.Cars/city = Software / Applications

```
-Programs like browsers, games, or text editors.

-They want to "travel" and use the hardware.

-They cannot touch hardware directly.
```

2.Bridge = Kernel

```
-The part that physically connects software to hardware.

-Handles the actual communication with hardware.
```

3.Traffic system (lights, signs, rules) = OS components outside the kernel

```
-Manages how software moves across the bridge.

-Allocates resources, enforces permissions, schedules tasks.
```

4.Hardware = the ground / destination

```
-CPU, RAM, storage, devices that actually perform the work.
```

Shell

Shell is a computer program that provides direct communication to the operating system via shell program like Bash, Zsh and Ksh. The shell is the the thin layer after the kernel.

Terminal

The terminal is a command-line interface window. The shell is the program running inside the command line interface (aka terminal), it reads your commands, executes them and prints out the results.