Assignment 2

Tailang Cao

- **Hz:** Hertz, being the unit of frequency, implying the number of cycle per second.

- **Kilo-, Mega-, Giga-, Tera- (byte, Hz, etc)**
  Kilo: thousand
  Mega: million
  Giga: short-scale billion or long-scale milliard
  Tera: trillion

- **elf (in terms of Unix programs):** the short for Executable and Linkable Format or Extensible Linking Format. Elf is a flexible, extensible cross-platform file format for executable files, object code, shared libraries, and core dumps. Each elf file is made up of one elf header, followed by file data that can include program header data, section header table and data.

- **Thrashing:** A situation occurs when a computer's real storage resources are overcommitted, leading to a constant state of paging and page faults, slowing most application-level processing. It may continue until the user closes some running applications or the active processes free up additional virtual memory resources.

- **Virtual:** not physically existing but can produce functionality to a certain degree.

- **Memory:** the holding space for instructions and data in a computer.

- **Address Space:** The amount of memory allocated for all possible addresses for a computational entity.

- **Address:** An identifier or pointer assigned to a specific location in computer memory or network.

- **Machine:** a device capable of performing computational tasks or processing information according to a set of instructions.

- **Time Sharing:** a technique that allows multiple users or processes share the computing resources such as CPU time and memory of a single system concurrently.

- **Digital (Discrete) vs Analog:** two types of signals used in computing.
  Digital (Discrete): Digital signals are discrete, representing data as a sequence of distinct values, typically using binary digits (bits). Digital systems process information using discrete values, enabling precise representation and manipulation of data.
  Analog: Analog signals are continuous, representing data as a continuous wave or signal. Analog systems process information by measuring and representing values along a continuous scale, allowing for smooth and continuous variation.

- **Kernel vs OS:**
  Kernel: The core component of an operating system (OS), responsible for managing system resources, providing essential services, and facilitating communication between hardware and software components.
  OS: A software system that manages computer hardware and provides an environment for running applications.

- **Von Neumann:** a computing architecture design that describes a computer with a single processing unit capable of executing instructions stored in memory. Consists of a CPU, memory, input/output devices, and a bus system for data and instruction transfer.

- **Integrated Circuit (IC):** A miniature electronic circuit consisting of semiconductor devices, such as transistors, diodes, and resistors, fabricated on a single semiconductor substrate or chip.

- **State Machine (FSA):** Also known as the finite-state automaton (FSA). It is a mathematical model used to describe and analyze systems with a finite number of states and transitions between these states. It consists of a set of states, transitions between states triggered by inputs or events, and a set of rules defining the behavior of the machine.

- **Hardware (or program) privilege level:** The level of access or permissions granted to a program or process by the hardware or operating system. It determines the degree of control and access rights a program has over system resources and sensitive operations.

- **Context Switch:** The process of saving and restoring the state of a process or thread in a multitasking operating system.

- **Lazy loading (of program, of memory, etc):** A technique used in computer programming and system design to defer the loading or initialization of resources. lazy loading delays resource loading until the point of access, reducing startup time and memory usage.

- **PID - Process ID:** A unique numerical identifier assigned to each process running on a computer system. It is used by the operating system to manage and track processes, allowing it to distinguish between different processes and control their execution.

- **DMA - direct memory access:** A feature of computer systems that allows certain hardware devices to access system memory directly without involving the CPU.

- **MMU / TLB:**
  MMU: Short for memory management unit. A hardware component in computer systems responsible for managing virtual memory and translating virtual addresses to physical addresses. It handles tasks such as address translation, memory protection, and memory allocation, allowing the operating system to efficiently manage memory resources.
  TLB: Short for translation lookaside buffer. A cache memory used in conjunction with the MMU to speed up virtual-to-physical address translation. It stores recently accessed virtual-to-physical address mappings, allowing the MMU to quickly retrieve translations without accessing main memory.

- **Daemon:** A background process in a Unix-like operating system that runs continuously in the background, waiting for specific events or performing system tasks. Provide essential system services such as managing hardware devices, network services, and system maintenance tasks

- **Symbol (with respect to Code, object files, assembly):**
  Symbol in code: Refers to an identifier referensing variables, functions, classes, or other programming constructs.
  Symbol in object files: Represents named entities used for linking and resolving references between different modules or libraries.
  Symbol in assembly: Represent memory addresses or labels used to mark locations in the code or data.

- **Shared Library:** Also known as dynamic link library (DLL). Its a collection of precompiled code and data that can be loaded and shared by multiple executable programs simultaneously.