Chapter 1 : Introduction

18/08/19

OS
- allocates resources
- provides UI for interaction
- controls/manges execution of other programs

OS = Kernel + System Programs + Application Programs

Kernel ↑ runs all the time

System Programs ↑ not part of Kernel but associated with the OS

System Organisation:

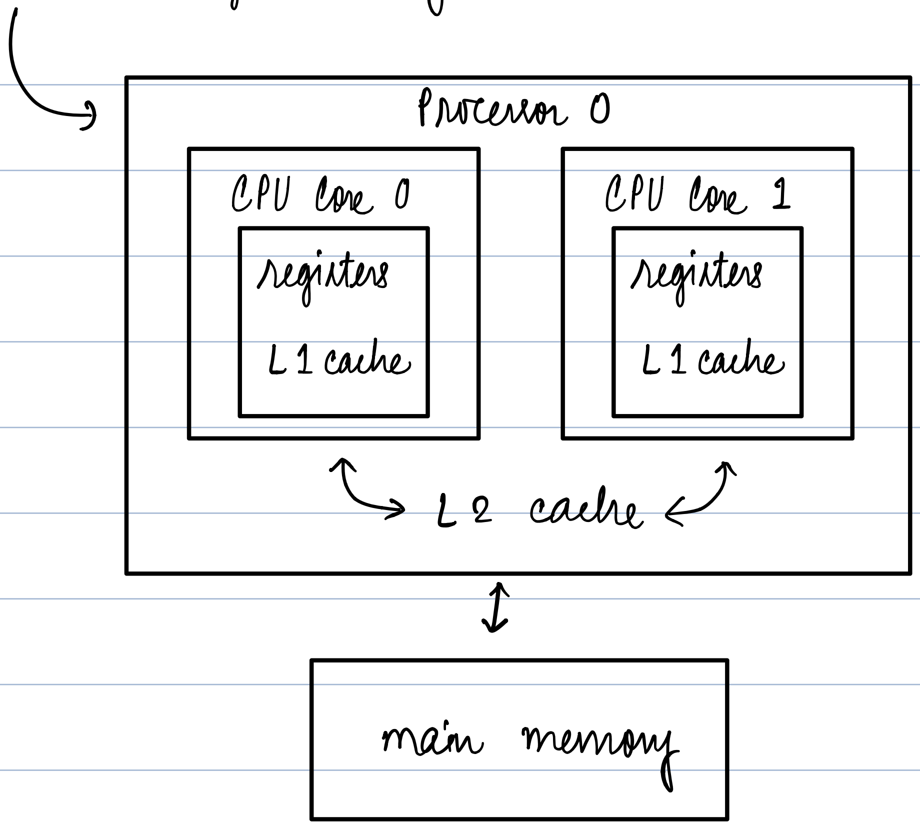
- shared bus-es for communication
- device drivers for device controllers
- interrupts
- storage hierarchy

System Architecture:

1. Single processor systems
    - single core to process instructions
    - may have other special purpose processors. eg - DSP, keyboard etc.
    - special purpose processor do not support the entire instruction set and thus can't function independently

2. Multi processor systems

- shared bus, clock, memory, peripherials
- increases throughput sub-linearly
- Symmetric Multiprocessing (SMP) – each peer CPU performs all tasks including OS functions, user processes
- multi core systems may have shared caches



- contention for system bus increase as # cores increases
- Non Uniform Memory Access (NUMA) – each CPU has small local memory with fast bus, connected to other CPUs by interconnects, same address space. This decreases contention. This has better scaling than without NUMA
- blade server : each processor boots separately, present in same chassis, each board has separate OS

3. Clustered systems

- each node is a multicore system
- connected with fast interconnects
- provide high availability (graceful degradation)
- symmetric and asymmetric clustering

  ↑ all work simultaneously ↑ standby machine

- DLM (distributed lock manager)

OS Operations:

- bootstrap program → load kernel to memory → then system daemons are loaded into memory
- multiprogramming ← have multiple processes running
- multi tasking ← executes multiple processes by switching between them — uses CPU scheduling, virtual memory
- multi-mode operation (user mode and kernel mode)
  - protection rings for Intel

Resource Mangement:

- process management
- memory management
- file system management
- cache management
- I/O management