Computer Science CSCI 251

Systems and Networks

Dr. Peter Walsh

Department of Computer Science

Vancouver Island University

peter.walsh@viu.ca

Overview

An introduction to operating systems and computer networks.

Prerequisite: CSCI 161 and CSCI 162. (The prerequisites may be taken concurrently with CSCI 251 with permission of the chair).

Software Types

○ Application Software

  • perform end-user related tasks

○ System Software

  • interface between application software
    and system hardware

System Software Spectrum

Operating System

⋮

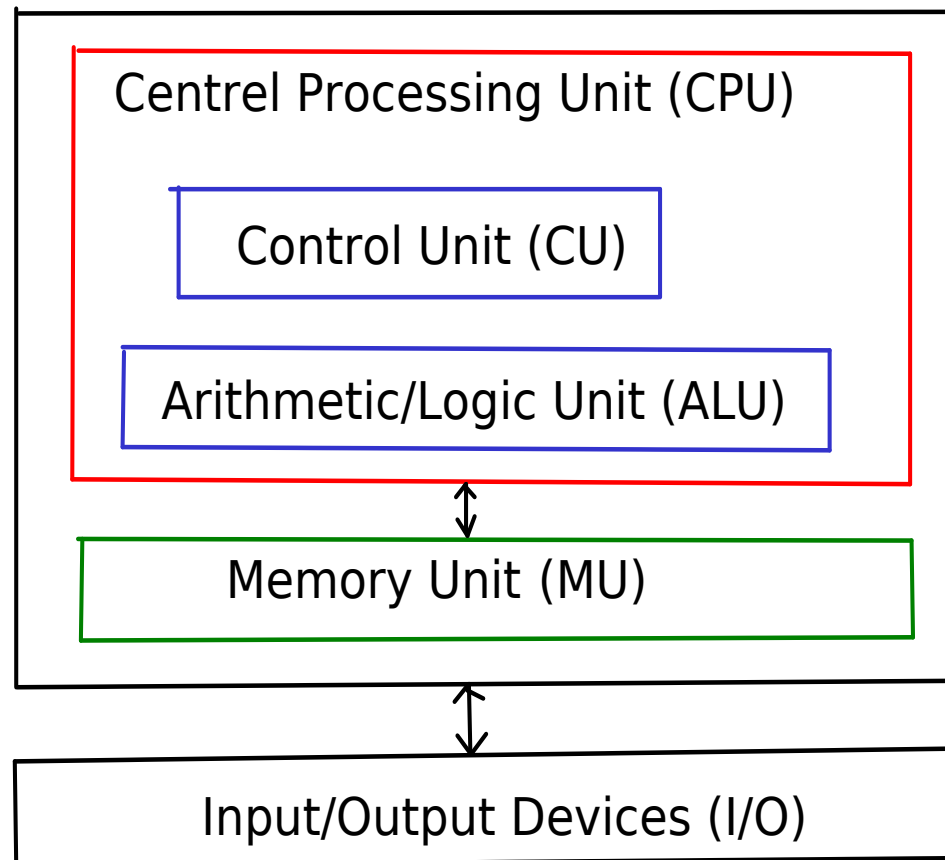Monitor

Starnard Library

Bare Metal

System Software cont.

An Operating System (OS) is system software charged with making sure the system operates correctly, efficiently and in an easy-to-use manner.

○ Examples
- bare metal: no OS support e.g., SSBC
- bare metal with a monitor (or standard library): e.g., m68hc11 with Buffalo Monitor
- full OS e.g., freeDOS, MS Windows, macOS, Linux, Android, freeRTOS

von Neumann Architecture

Centrel Processing Unit (CPU)

Control Unit (CU)

Arithmetic/Logic Unit (ALU)

Memory Unit (MU)

Input/Output Devices (I/O)

von Neumann Architecture cont.

Instruction fetch and a data operation cannot occur at the same time because they share a common bus.

○ Instruction Cycle (what happens when a program runs?)

- fetch
- decode (data fetch)
- execute

Virtualization

Technique for managing resources by abstracting a physical resource into a more powerful and easy-to-use virtual form of itself.

○ Virtualizable Physical Resources
- central processing unit
- memory unit
- input/output unit
- entire computing machine

Topics

○ Virtualization
- CPU, I/O, hypervisors, cloud computing

○ Concurrency
- co-operative and preemptive systems

○ Persistence
- files systems and backups

○ Networking
- packet switching, LANs, client server architectures,
- security, firewalls

○ Lectures
- cover OS and networking concepts

○ Labs
- cover OS and networking installation
  and maintenance