

1. Introduction

Objective: To build up foundation for the study of hardware organization of digital computers. To understand the structure, function and characteristics of computer systems including various building blocks of computers, without being specific to any particular architecture. Understand importance of interaction between hardware and system software

Credits: 4-0-0

2. Course Outline

UNIT - I: Computer Evolution & Arithmetic

A Brief History of computers, Designing for Performance, Von Neumann Architecture, Hardware architecture, Computer Components, Interconnection Structures, Bus Interconnection, Scalar Data Types, Fixed and Floating point numbers, Signed numbers, Integer Arithmetic, 2's Complement method for multiplication, Booths Algorithm, Hardware Implementation, Division, Restoring and Non Restoring algorithms, Floating point representations, IEEE standards, Floating point arithmetic

UNIT - II: The Central Processing Unit

Machine Instruction characteristics, types of operands, types of operations, Addressing modes, Instruction formats, Instruction types, Processor organization, Processor as running example, Programmers model of , max/min mode, Register Organization, Instruction cycles, Read Write cycles, assembly instruction examples to explain addressing modes

UNIT - III: The Control Unit

Single Bus Organization, Control Unit Operations: Instruction sequencing, Micro operations and Register Transfer. Hardwired Control: Design methods – State table and classical method, Design Examples - Multiplier CU. Micro-programmed Control: Basic concepts, Microinstructions and micro- program sequencing

UNIT - IV: Memory Organization

Characteristics of memory systems, Internal and External Memory, Types of memories: ROM: PROM, EPROM, EEPROM, RAM: SRAM, DRAM, SDRAM, RDRAM
High-Speed Memories: Cache Memory, Organization and Mapping Techniques, Replacement Algorithms, Cache Coherence, Virtual Memory: Main Memory allocation, Segmentation, Paging, Address Translation Virtual to Physical.
Secondary Storage: Magnetic Disk, Tape, DAT, RAID, Optical memory, CDROM, DVD

UNIT - V: I/O Organization

Input/Output Systems(features and principles), Programmed I/O, Interrupt Driven I/O, Interrupt structure, Direct Memory Access (DMA), features Buses and standard Interfaces: Synchronous, Asynchronous, Parallel I/O features, Serial I/O features, PCI, SCSI, USB Ports Working mechanisms of Peripherals: Keyboard, Mouse, Scanners, Video Displays, Touch Screen panel, Dot Matrix, Desk-jet and Laser Printers.

UNIT - VI: Case Studies

Concepts RISC: Instruction execution characteristics,, RISC architecture and pipelining. RISC Vs CISC. ARM and Embedded Systems PowerPC, Intel X86 Evolution from 32bit to 64bit architectures. AMD Opteron

3. Reading Material

Text Books

1. Patterson D.A. & Hennesy J.L., Computer Organisation & Design: The Hardware/Software Interface

Reference Books

1. Computer Organization and Architecture, 10/E William Stallings ISBN-10: 0134101618 • ISBN-13: 9780134101613
- See more at:
http://www.pearsonhighered.com/pearsonhigheredus/educator/product/products_detail.page?isbn=9780134101613&forced_logout=forced_logged_out#sthash.WVVJbZUb.dpuf