Computer Organization and Architecture

Course Description

This course provides an over view of the action and organization of a computer, such as the CPU memory, I/O organization, and so on, From this course, you will learn the basics of computer architecture and low level programming.

i.e: assembly code and hardware manipulation. It will focus on the basic concepts of computer architecture and machine instruction; memory access and storage; instruction execution; assembly language and addressing methods; procedures and interrupts; conditional processing, and so on.

1) why we study hardware?

2) what is the first cpu of computer? (Vacuum Tube)

3) what is the first programing language of computer?

Technical Words: - Assembly language

* Machine language
* Programming Language differences?
* Computer language
* Translation
* Interpretation
* Compiler
* Assembler
* Linker
* Algorithm
* Program Execution
* Program translation

Computer Level Hierarchy

|  |  |  |
| --- | --- | --- |
| Level 6 | User | Executable Programs |
| Level 5 | High Level Language | C++,Java, FORTRAN, etc |
| Level 4 | Assembly Language | Assembly Code |
| Level 3 | System Software | Operating System Library Code |
| Level 2 | Machine | Instruction Set Arch |
| Level 1 | Control | Microcode or Hardwired |
| Level 0 | Digital Login | Circuits, Gates, etc |

What is Computer Organization?

* Computer Organization

Digital Systems Organization and Design

Computer organization and design

* Computer Architecture ?
* Definition of ISA? To facilitate implementation of software layers ( the hw/sw interface )
* Computer micro-architecture
* Design processor, memory, I/O to implement ISA
* Efficiently implementing the interface
* Design Goals and constraints

1 Functional (Support creativeness )

2 Reliable (work correctly )

3 High Performance (speed ability)

4 Low Cost ( cost manufacturing )

5 Low Power/Energy ( )

What is Computer Architecture ?

* Computer architecture is the science and art of selecting and interconnecting hardware components to create computers that meet functional, performance and cost goal.
* An analog to architecture of buildings………..

Buildings

* House
* Offices
* Apartments
* Stadiums
* Museums
* etce
* What is Architecture?

Materials

* Steel
* Concrete
* Brick
* Wood
* Glass

Constructions

design

Plans

Goals

* Function
* Cost
* Safely
* Ease of Constriction
* Energy Efficiency
* Fast Build Time
* Aesthetics

What is computer Architecture?

The role of a computer architecture

Computer

Technology

* Logic gate
* SRAM
* DRAM
* Circuit Technique
* Packaging
* Magnetic Storage
* Flash Memory

Manufacturing

design

Plans

Goals

* Function
* Performance
* Reliability
* Cost Manufacturability
* Energy Efficiency
* Time to market ( develop ទាន់តំរូវការ )

Computer Architecture is different

* Are of discipline

Technology

* Role of change applications

goals

* Automated mass production ()
* Boot strapping effect