Computer Organization and Architecture Tutorials

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Recent Articles on Computer Organisation

Topics :

- Basic Computer Instructions
- Instruction Design and Format
- Computer Arithmetic
- Microprogrammed Control
- Memory Organization

- Input and Output Systems
- Pipelining
- Miscellaneous
- Programs
- Quick Links

Basic Computer Instructions :

1. A simple understanding of Computer
2. Issues in Computer Design
3. Computer System Level Hierarchy
4. Computer Architecture and Computer Organization
5. Basic Computer Instructions
6. Timing diagram of MOV Instruction in Microprocessor
7. Assembly language and High level language
8. Addressing Modes
9. Memory based Vs Register based addressing modes
10. Von Neumann architecture
11. Harvard Architecture
12. Interaction of a Program with Hardware
13. Simplified Instructional Computer (SIC)
14. Instruction Set used in simplified instructional Computer (SIC)
15. Instruction Set used in SIC/XE
16. RISC and CISC

17. RISC and CISC | Set 2
18. Vector processor classification
19. Essential Registers for Instruction Execution
20. Single Accumulator based CPU organization
21. Stack based CPU Organization
22. General Register based CPU Organization
23. Data Transfer instructions in AVR microcontroller
24. Arithmetic instructions in AVR microcontroller
25. Conditional Branch Instructions in AVR Microcontroller
26. CALL Instructions and Stack in AVR Microcontroller
27. Branch Instructions in AVR Microcontroller
28. Logical Instructions in AVR Microcontroller
29. Data Manipulation Instructions
30. Machine Control Instruction
31. Very Long Instruction Word (VLIW) Architecture

Instruction Design and Format :

1. Different Instruction Cycles
2. Essential Registers for Instruction Execution
3. Machine Instructions
4. Instruction Formats (Zero, One, Two and Three Address Instruction)
5. 2-address instruction and 1-address instructions
6. 3-address instruction and 0-address instruction
7. 3-address instruction and 2-address instructions
8. Register content and Flag status after Instructions
9. Debugging a machine level program
10. Vector Instruction Format
11. Vector instruction types
12. Branch Prediction in Pentium
13. Instruction Word Size
14. >> Problem Solving on Instruction Format

Computer Arithmetic :

1. Computer Arithmetic | ALU and Data Path
2. Computer Arithmetic | Set 1
3. Computer Arithmetic | Set 2
4. Difference between 1’s complement and 2’s complement
5. Restoring Division Algorithm For Unsigned Integer
6. Non-Restoring Division For Unsigned Integer
7. Booth’s Algorithm

8. Overflow in Arithmetic Addition
9. How the negative numbers are stored in memory?
10. Conventional Computing vs Quantum Computing

>> Quiz on Number Representation

Microprogrammed Control :

1. Micro-Operation
2. Microarchitecture and Instruction Set Architecture

   Types of Program Control Instructions

3. Difference between CALL and JUMP instructions
4. Hardwired v/s Micro-programmed Control Unit
5. Implementation of Micro Instructions Sequencer
6. Performance of Computer
7. Control Unit and design
8. Horizontal micro-programmed Vs Vertical micro-programmed control unit
9. Camparisons between Hardwired Vs Micro-programmed Control unit
10. Computer Organization | Subprogram and its characteristics

Memory Organization :

1. Introduction to memory and memory units
2. Memory Hierarchy Design and its Characteristics
3. Difference between Byte Addressable Memory and Word Addressable Memory
4. Difference between Simultaneous and Hierarchical Access Memory Organisations
5. Register Allocation
6. Cache Memory
7. Cache Organization | Set 1 (Introduction)
8. Multilevel Cache Organisation
9. Locality and Cache friendly code
10. Locality of Reference and Cache Operation
11. Amdahl's law and its proof
12. Subroutine, Subroutine nesting and Stack memory
13. RAM vs ROM
14. What's difference between CPU Cache and TLB?

15. Different Types of RAM
16. Types of computer memory (RAM and ROM)
17. Secondary memory – Hard disk drive
18. Introduction to solid-state drive (SSD)
19. Read and Write operations in memory
20. 2D and 2.5D Memory organization

Input and Output Systems :

1. Priority Interrupts | (S/W Polling and Daisy Chaining)
2. I/O Interface (Interrupt and DMA Mode)
3. Direct memory access with DMA controller 8257/8237
4. Asynchronous input output synchronization
5. Programmable peripheral interface 8255
6. Interface 8255 with 8085 microprocessor for 1's and 2's complement of a number
7. 8255 (programmable peripheral interface)
8. Microcomputer system
9. Working of 8085-based Single board microcomputer
10. Interface 8254 PIT with 8085 microprocessor
11. Synchronous Data Transfer
12. Input-Output Processor
13. MPU Communication
14. Memory mapped I/O and Isolated I/O
15. BUS Arbitration

Pipelining :

1. Instruction Level Parallelism
2. Execution, Stages and Throughput
3. Types and Stalling
4. Dependencies and Data Hazard

IEEE Number Statndards

1. IEEE Standard 754 Floating Point Numbers

Miscellaneous :

1. Microprocessor
2. Microprocessor | Externally Initiated Operations
3. Bus organization of 8085 microprocessor

Comparch GFG

4. Generations of computer
5. Intel x86 evolution and main features
6. Memory Banking
7. Introduction to quantum computing
8. Conventional Computing vs Quantum Computing
9. Rethinking binary with Quantum computers
10. Flynn's taxonomy
11. Clusters In Computer Organisation
12. Parallel processing – systolic arrays
13. 8259 PIC Microprocessor
14. Block Diagram of 8259 Microprocessor
15. Microprocessor | 8251 USART
16. Evolution of Microprocessors
17. Human – Computer interaction through the ages
18. Computer Ports
19. Introduction to Parallel Computing
20. Hardware architecture (parallel computing)
21. Computer Architecture | Multiprocessor and Multicomputer
22. Timing diagram of INR M