

Draw and explain the memory hierarchy in a digital computer. What are advantages of cache memory over main memory?

The memory hierarchy in a digital computer refers to the different types of memory that are used to store data and instructions. The memory hierarchy is organized in a hierarchical manner, with each level of memory providing faster access but lower capacity than the level below it.

The memory hierarchy typically includes the following levels:

1. **Registers:** These are small, high-speed memory cells that are part of the CPU. Registers are used to hold data that is being processed by the CPU. Registers have the fastest access time but the smallest capacity.
2. **Cache memory:** Cache memory is a type of memory that is used to store frequently accessed data and instructions. Cache memory is located between the CPU and main memory and is designed to provide faster access to frequently used data. Cache memory has a larger capacity than registers but a slower access time than registers.
3. **Main memory:** Main memory is the primary memory in a computer system. It is used to store data and instructions that are currently being used by the CPU. Main memory has a larger capacity than cache memory but a slower access time.
4. **Secondary storage:** Secondary storage devices, such as hard disk drives and solid-state drives, are used to store data and instructions that are not currently being used by the CPU. Secondary storage has the largest capacity but the slowest access time.

The advantages of cache memory over main memory are as follows:

1. **Speed:** Cache memory has a faster access time than main memory. This is because cache memory is located closer to the CPU than main memory, which means that data can be accessed more quickly.

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2. Efficiency: Cache memory is designed to store frequently used data and instructions. This means that the CPU can access the data it needs more quickly, which can improve overall system performance.
3. Cost: Cache memory is more expensive than main memory, but it is less expensive than registers. This means that cache memory provides a good balance between speed and cost.
4. Power consumption: Cache memory consumes less power than main memory. This is because cache memory is smaller than main memory, which means that it requires less power to operate.

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17. PCI Bus
18. Booths Algorithm
19. Write a short note on design of arithmetic unit ?
20. Write a short note on Array processors ?
21. Write a short note on LRU algorithm ?
22. What is the format of Micro Instruction in Computer Architecture explain ?
23. What is the layout of pipelined instruction in Computer Architecture ?
24. Explain the following interfaces in Detail:PCI Bus, SCSI Bus, USB Bus
25. What is Memory Organization ? Discuss different types of Memory Organization in Computer System.
26. Computer Organization Q and A
27. Write short note on improving cache performance methods in detail ?
28. What is Multiprocessor ? Explain inter process communication in detail ?
29. Briefly explain the concept of pipelining in detail ?
30. Discuss the following in detail: RISC architecture, Vector processing ?
31. Define the instruction format ? Explain I/O System in detail ?
32. Explain the design of arithmetic and logic unit by taking on example ?
33. Explain how addition and subtraction are performed in fixed point number ?
34. Explain different modes of data transfer between the central computer and I/O device ?
35. Differentiate between Serial and parallel data transfer ?
36. Explain signed magnitude, signed 1's complement and signed 2's complement representation of numbers. Find the range of numbers in all three representations for 8 bit register.
37. If cache access time is 100ns, main memory access time is 1000 ns and the hit ratio is 0.9. Find the average access time and also define hit ratio.
38. Explain hardwired microprogrammed control unit ? What is address sequencer circuit ?

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39. Explain how a stack organized computer executes instructions? What is Stack?
40. What is Associative memory? Explain the concept of address space and memory space in Virtual memory.
41. What is Paging? Explain how paging can be implemented in CPU to access virtual memory.
42. Explain SIMD array processor along with its architectural diagram ?
43. Write short notes on
44. Draw the functional and structural views of a computer system and explain in detail ?
45. Explain general register organization.
46. Compare and contrast DMA and I/O processors ?
47. Define the following: a) Flynn's taxonomy b) Replacement algorithm
48. Explain the various pipeline vector processing methods ?
49. Describe the language features for parallelism ?
50. What are different addressing modes? Explain them.
51. Explain any page replacement algorithm with the help of example ?
52. What is mapping? Name all the types of cache mapping and explain anyone in detail.
53. Explain arithmetic pipeline ?
54. Write short notes on, a) SIMD, b) Matrix multiplication c) Instruction format
55. Differentiate: a) Maskable and non-maskable interrupt b) RISC and CISC
56. Computer Organization Previous Years Solved Questions
57. Booths algorithm to multiply +5 and -15