CS501
Advance Computer Architecture

Important mcqs

Lec 23 - I/O Subsystems

1. **What is the main purpose of an I/O subsystem in a computer system?**
   A) To manage the processing of data within the CPU
   B) To provide communication between the computer and external devices
   C) To handle memory allocation and management
   D) To execute system calls from user programs
   Solution: B

   Which component of the I/O subsystem is responsible for interfacing with external devices?
   A) Device drivers
   B) Buses
   C) Controllers
   D) Buffers
   Solution: C

   What is the role of a device driver in the I/O subsystem?
   A) To manage the transfer of data between devices and memory
   B) To control the flow of data between devices and the CPU
   C) To interface between the operating system and the device
   D) To store data temporarily during I/O operations
   Solution: C

   Which of the following is not a common type of I/O device?
   A) Keyboard
   B) Printer
   C) Processor
   D) Mouse
   Solution: C

   Which type of I/O operation is characterized by data being transferred from a device to memory?
   A) Input operation
   B) Output operation
   C) Interrupt operation
   D) DMA operation
   Solution: A

   What is the primary purpose of a buffer in the I/O subsystem?
   A) To hold data temporarily during I/O operations

B) To control the flow of data between devices and memory
C) To interface between the CPU and the device driver
D) To allocate and manage system memory
Solution: A

Which type of I/O device is capable of both input and output operations?
A) Monitor
B) Printer
C) Keyboard
D) Disk Drive
Solution: D

Which of the following is not a commonly used interface standard for I/O devices?
A) USB
B) Ethernet
C) PCI
D) ISA
Solution: B

Which of the following is not a function of the I/O controller?
A) To manage device-specific operations
B) To control the flow of data between devices and memory
C) To provide buffering and error detection
D) To interface between the device and the CPU
Solution: B

Which type of I/O operation is characterized by a device notifying the CPU of an event that requires attention?
A) Input operation
B) Output operation
C) Interrupt operation
D) DMA operation
Solution: C

Lec 24 - Designing Parallel Input and Output Ports

1. **Which of the following is NOT a factor to consider when designing parallel input and output ports?**
   A) Data transfer rates
   B) Hardware compatibility
   C) Operating system compatibility
   D) Bandwidth
   Answer: C) Operating system compatibility

   Which component is essential for parallel input and output ports?
   A) Processor
   B) Operating system
   C) Data cable
   D) None of the above
   Answer: C) Data cable

   What is the purpose of designing parallel input and output ports?
   A) To increase data transfer rates
   B) To improve efficiency
   C) To streamline communication between devices
   D) All of the above
   Answer: D) All of the above

   Which of the following is NOT a security concern when designing parallel input and output ports?
   A) Preventing unauthorized access
   B) Ensuring data privacy
   C) Ensuring hardware compatibility
   D) Preventing data theft
   Answer: C) Ensuring hardware compatibility

   Which of the following is NOT a hardware component required for designing parallel input and output ports?
   A) Data cable
   B) Input/output controller
   C) Processor
   D) None of the above
   Answer: C) Processor

   Which of the following is NOT a benefit of designing parallel input and output ports?
   A) Improved efficiency
   B) Increased data transfer rates
   C) Reduced hardware costs
   D) Increased hardware compatibility
   Answer: C) Reduced hardware costs

   Which of the following is a software component required for designing parallel input and output ports?
   A) Data cable

B) Input/output controller
C) Device driver
D) None of the above
Answer: C) Device driver

Which of the following factors should be considered when selecting appropriate hardware components for parallel input and output ports?
A) Bandwidth
B) Data transfer rates
C) Hardware compatibility
D) All of the above
Answer: D) All of the above

Which of the following is a type of parallel port?
A) USB
B) Ethernet
C) Serial
D) None of the above
Answer: D) None of the above

Which of the following is NOT a step in the design process for parallel input and output ports?
A) Selecting appropriate hardware components
B) Testing the system
C) Creating an operating system
D) Configuring input and output ports
Answer: C) Creating an operating system

Lec 25 - Input Output Interface

1. **What is an input-output interface?**
   A. A communication channel between a computer and its peripherals
   B. A program that manages data transfer between devices
   C. A type of keyboard for data input
   Answer: A

   Which of the following devices is an example of an input-output interface?
   A. Printer
   B. Hard drive
   C. Keyboard
   Answer: A

   Which type of input-output interface allows for the transfer of data one bit at a time?
   A. Serial
   B. Parallel
   C. USB
   Answer: A

   Which of the following is a disadvantage of a parallel input-output interface?
   A. Higher data transfer rates
   B. Requires fewer cables
   C. Limited cable length
   Answer: C

   Which of the following is not a factor to consider when designing an input-output interface?
   A. Data transfer rates
   B. Security concerns
   C. Processor speed
   Answer: C

   Which type of input-output interface uses multiple wires to transfer data simultaneously?
   A. Serial
   B. Parallel
   C. USB
   Answer: B

   Which of the following is an example of a wireless input-output interface?
   A. Bluetooth
   B. USB
   C. Ethernet
   Answer: A

   Which type of input-output interface is commonly used for high-speed data transfer in external storage devices?
   A. USB
   B. SCSI
   C. FireWire
   Answer: B

   Which of the following is an advantage of a serial input-output interface?

B. Simpler wiring
C. Longer cable length
Answer: C

Which type of input-output interface is commonly used in industrial automation applications?
A. USB
B. Ethernet
C. Profibus
Answer: C

Lec 26 - Programmed I/O

1. **What is Programmed I/O?**
   a) A method of data transfer between CPU and memory
   b) A method of data transfer between peripheral devices
   c) A method of data transfer using specialized hardware
   Answer: a

   What is the main advantage of Programmed I/O?
   a) It is faster than other input/output methods
   b) It is more reliable than other input/output methods
   c) It does not require specialized hardware
   Answer: c

   In Programmed I/O, who controls the data transfer?
   a) The peripheral device
   b) The CPU
   c) The specialized hardware
   Answer: b

   Which method of input/output transfer is faster than Programmed I/O?
   a) Direct Memory Access (DMA)
   b) Interrupt-driven I/O
   c) Both of the above
   Answer: a

   What type of data transfer is Programmed I/O commonly used for?
   a) Large data transfers
   b) Real-time data transfers
   c) Small data transfers
   Answer: c

   Which component is responsible for controlling the data transfer in Programmed I/O?
   a) The DMA controller
   b) The CPU
   c) The interrupt controller
   Answer: b

   Which of the following is a disadvantage of Programmed I/O?
   a) It requires specialized hardware
   b) It is slower than other input/output methods
   c) It cannot handle real-time data transfers
   Answer: b

   What is the main benefit of using Programmed I/O?
   a) It is more efficient than other input/output methods
   b) It is less expensive than other input/output methods
   c) It can be used with simple devices that do not require specialized hardware
   Answer: c

   Which type of device is commonly used with Programmed I/O?
   a) External storage devices

b) Printers
c) Network devices
Answer: b

Which of the following is an example of an input/output method that uses specialized hardware?
a) Interrupt-driven I/O
b) Direct Memory Access (DMA)
c) Programmed I/O
Answer: b

Lec 27 - Interrupt Driven I/O

1. **What is Interrupt Driven I/O?**
   A) A technique to prevent I/O operations from interfering with CPU
   B) A technique to improve system performance by allowing CPU to perform other tasks while waiting for I/O operations
   C) A technique to speed up I/O operations by reducing the overhead of context switching
   D) A technique to eliminate the need for interrupt signals
   Answer: B

   What happens when a device generates an interrupt signal in Interrupt Driven I/O?
   A) The device stops working
   B) The CPU stops its current task and starts executing the interrupt service routine
   C) The CPU continues its current task and ignores the interrupt signal
   D) The device's data is lost
   Answer: B

   What is the purpose of the interrupt service routine in Interrupt Driven I/O?
   A) To communicate with the device and transfer data between the device and CPU's memory
   B) To stop the CPU's current task and start executing the interrupt signal
   C) To ignore the interrupt signal and continue the CPU's current task
   D) To prevent I/O operations from interfering with CPU
   Answer: A

   Which of the following statements is true about Interrupt Driven I/O?
   A) It eliminates the overhead of context switching
   B) It reduces the need for interrupt signals
   C) It can improve system performance
   D) It slows down I/O operations
   Answer: C

   What is the disadvantage of Interrupt Driven I/O?
   A) It introduces overhead due to context switching and interrupt handling
   B) It cannot improve system performance
   C) It cannot prevent I/O operations from interfering with CPU
   D) It can only be used with certain types of devices
   Answer: A

   In Interrupt Driven I/O, what does the CPU do when it receives an interrupt signal?
   A) It stops its current task and starts executing the interrupt service routine
   B) It continues its current task and ignores the interrupt signal
   C) It stops working
   D) It sends an interrupt signal to the device
   Answer: A

   What is the role of the device in Interrupt Driven I/O?
   A) To generate an interrupt signal when it is ready to send or receive data
   B) To execute the interrupt service routine
   C) To prevent I/O operations from interfering with CPU
   D) To eliminate the overhead of context switching
   Answer: A

   Which of the following can Interrupt Driven I/O improve?
   A) Memory access time

B) Disk latency
C) Network bandwidth
D) CPU clock speed
Answer: B

How does Interrupt Driven I/O improve system performance?
A) By preventing I/O operations from interfering with CPU
B) By reducing the need for interrupt signals
C) By eliminating the overhead of context switching
D) By allowing CPU to perform other tasks while waiting for I/O operations
Answer: D

What is the benefit of using Interrupt Driven I/O?
A) It reduces the need for interrupt signals
B) It can prevent I/O operations from interfering with CPU
C) It eliminates the overhead of context switching
D) It improves system performance by allowing CPU to perform other tasks while waiting for I/O operations
Answer: D

Lec 28 - Interrupt Hardware and Software

1. **Which of the following is an example of a hardware interrupt?**
   a) System call
   b) Division by zero
   c) Keyboard press
   d) Memory access violation
   Answer: c) Keyboard press

   Which of the following is an example of a software interrupt?
   a) Disk read error
   b) Mouse click
   c) System call
   d) Power outage
   Answer: c) System call

   Which type of interrupt is triggered by a device?
   a) Hardware interrupt
   b) Software interrupt
   c) Both
   d) None
   Answer: a) Hardware interrupt

   Which type of interrupt is triggered by a program instruction?
   a) Hardware interrupt
   b) Software interrupt
   c) Both
   d) None
   Answer: b) Software interrupt

   Which of the following is an example of a hardware interrupt controller?
   a) BIOS
   b) DMA controller
   c) CPU
   d) Memory
   Answer: b) DMA controller

   Which of the following is an example of a software interrupt handler?
   a) Device driver
   b) Interrupt service routine (ISR)
   c) Interrupt vector table
   d) Interrupt request (IRQ)
   Answer: b) Interrupt service routine (ISR)

   Which type of interrupt has higher priority?
   a) Hardware interrupt
   b) Software interrupt
   c) Both have equal priority
   d) It depends on the system design
   Answer: a) Hardware interrupt

   Which of the following is responsible for managing the interrupt requests in a system?
   a) Interrupt service routine

b) Interrupt handler
c) Interrupt controller
d) Interrupt vector table
Answer: c) Interrupt controller

Which type of interrupt can be masked or disabled?
a) Hardware interrupt
b) Software interrupt
c) Both
d) None
Answer: a) Hardware interrupt

Which type of interrupt can be triggered by a user-level program?
a) Hardware interrupt
b) Software interrupt
c) Both
d) None
Answer: b) Software interrupt

Lec 29 - FALSIM

1. **What is FALSIM?**
   a) A programming language
   b) A software tool for simulating finite automata models
   c) A hardware device
   d) A database management system
   Answer: b) A software tool for simulating finite automata models

   What is the purpose of FALSIM?
   a) To design database systems
   b) To test computer networks
   c) To simulate and test the behavior of finite automata models
   d) To create web applications
   Answer: c) To simulate and test the behavior of finite automata models

   Which of the following is a feature of FALSIM?
   a) It provides a graphical user interface
   b) It is used for creating video games
   c) It is a high-level programming language
   d) It is used for data analysis
   Answer: a) It provides a graphical user interface

   Which of the following is not a type of finite automata?
   a) Deterministic finite automata (DFA)
   b) Nondeterministic finite automata (NFA)
   c) Pushdown automata (PDA)
   d) Recursive automata (RA)
   Answer: d) Recursive automata (RA)

   What is the input to a finite automata model?
   a) Regular expressions
   b) Programming code
   c) Finite sequences of symbols
   d) Natural language sentences
   Answer: c) Finite sequences of symbols

   Which of the following is not a component of a finite automata model?
   a) Input alphabet
   b) Transition function
   c) Output function
   d) States
   Answer: c) Output function

   Which of the following is true about a deterministic finite automata (DFA)?
   a) It can recognize context-free languages
   b) It can recognize regular languages
   c) It can recognize context-sensitive languages
   d) It can recognize recursive languages
   Answer: b) It can recognize regular languages

   Which of the following is true about a nondeterministic finite automata (NFA)?
   a) It can recognize context-free languages

b) It can recognize regular languages
c) It can recognize context-sensitive languages
d) It can recognize recursive languages
Answer: a) It can recognize context-free languages

Which of the following is not a step in simulating a finite automata model using FALSIM?
a) Design the model using a graphical user interface
b) Define the input alphabet and states of the model
c) Specify the output function of the model
d) Test the model with input sequences
Answer: c) Specify the output function of the model

Which of the following is an advantage of using FALSIM for simulating finite automata models?
a) It requires extensive programming knowledge
b) It provides a visual representation of the model
c) It is limited to deterministic finite automata
d) It is not compatible with other programming languages
Answer: b) It provides a visual representation of the model

Lec 30 - Interrupt Priority and Nested Interrupts

1. **What is interrupt priority?**
   a) The order in which interrupts are received
   b) The order in which interrupts are serviced
   c) The time it takes to service an interrupt
   d) The number of interrupts that can be handled at once
   Answer: b) The order in which interrupts are serviced

   What is the purpose of interrupt priority?
   a) To ensure that all interrupts are handled equally
   b) To reduce the number of interrupts
   c) To determine the order in which interrupts are serviced
   d) To prevent nested interrupts
   Answer: c) To determine the order in which interrupts are serviced

   What is a nested interrupt?
   a) An interrupt that occurs before the previous interrupt is serviced
   b) An interrupt that occurs after the previous interrupt is serviced
   c) An interrupt that occurs during the servicing of another interrupt
   d) An interrupt that occurs when no other interrupts are pending
   Answer: c) An interrupt that occurs during the servicing of another interrupt

   What happens when a nested interrupt occurs?
   a) The processor ignores the nested interrupt
   b) The processor services the nested interrupt immediately
   c) The processor completes the current interrupt before servicing the nested interrupt
   d) The processor reboots the system
   Answer: c) The processor completes the current interrupt before servicing the nested interrupt

   What is interrupt masking?
   a) Disabling interrupts temporarily
   b) Enabling interrupts temporarily
   c) Assigning priorities to interrupts
   d) Suspending the current interrupt
   Answer: a) Disabling interrupts temporarily

   Which of the following is true regarding interrupt priorities?
   a) Higher priority interrupts are always serviced first
   b) Lower priority interrupts are always serviced first
   c) Interrupts are serviced in a random order
   d) Interrupts are serviced in the order they are received
   Answer: a) Higher priority interrupts are always serviced first

   Which of the following is a disadvantage of nested interrupts?
   a) They can cause delays in the servicing of lower priority interrupts
   b) They can cause system crashes
   c) They can increase the processing time of interrupts
   d) They can decrease the system performance
   Answer: a) They can cause delays in the servicing of lower priority interrupts

   Which of the following is a technique used to handle interrupt priorities?
   a) Interrupt masking

b) Interrupt chaining
c) Interrupt queuing
d) Interrupt reordering
Answer: b) Interrupt chaining

What is the maximum number of interrupt levels supported by most processors?
a) 8
b) 16
c) 32
d) 64
Answer: c) 32

What is the purpose of an interrupt vector table?
a) To store the priority levels of interrupts
b) To store the addresses of interrupt service routines
c) To store the names of interrupts
d) To store the number of interrupts
Answer: b) To store the addresses of interrupt service routines

Lec 31 - Direct Memory Access (DMA)

1. **What is DMA?**
   a) A technique that allows data to be transferred between peripheral devices and memory without the intervention of the processor.
   b) A method to transfer data using the processor as an intermediary.
   c) A technique to improve the processing speed of the processor.
   d) None of the above.
   Answer: a

   What is the primary function of DMA?
   a) To reduce the load on the processor by allowing data transfers without its intervention.
   b) To increase the processing speed of the processor.
   c) To control the flow of data between the processor and peripherals.
   d) None of the above.
   Answer: a

   Which of the following devices can benefit from DMA?
   a) Keyboard
   b) Mouse
   c) Hard disk
   d) All of the above
   Answer: d

   Which of the following is not a benefit of using DMA?
   a) Reducing the load on the processor
   b) Faster data transfer rates
   c) Better control of data flow between peripherals and the processor
   d) None of the above
   Answer: c

   Which component is used to manage the transfer of data using DMA?
   a) Peripheral devices
   b) Memory
   c) DMA controller
   d) Processor
   Answer: c

   Which of the following is a disadvantage of using DMA?
   a) It can result in memory fragmentation.
   b) It can result in data corruption.
   c) It can result in slower data transfer rates.
   d) None of the above.
   Answer: b

   Which of the following is not a type of DMA transfer?
   a) Single
   b) Burst
   c) Cycle-stealing
   d) Multitasking
   Answer: d

   Which of the following is an example of a peripheral device that can initiate DMA

transfers?
a) Hard disk
b) Graphics card
c) Sound card
d) All of the above
Answer: d

Which of the following is a limitation of DMA?
a) It can only transfer data in one direction.
b) It can only transfer small amounts of data.
c) It requires a lot of processor resources to function.
d) None of the above.
Answer: a

Which of the following is an advantage of DMA over programmed I/O?
a) It reduces the load on the processor.
b) It allows for faster data transfer rates.
c) It improves the control of data flow between peripherals and the processor.
d) All of the above.
Answer: d

Lec 32 - Magnetic Disk Drives

1. **What is the capacity of a standard 3.5-inch floppy disk?**
   a) 1.44 MB
   b) 2.88 MB
   c) 720 KB
   d) 1.2 MB
   Answer: a) 1.44 MB

   Which type of magnetic disk is used in laptops and portable devices?
   a) Hard disk drive
   b) Floppy disk drive
   c) Zip disk drive
   d) Solid-state drive
   Answer: d) Solid-state drive

   What is the rotational speed of a standard desktop hard disk drive?
   a) 5400 RPM
   b) 7200 RPM
   c) 10,000 RPM
   d) 15,000 RPM
   Answer: b) 7200 RPM

   Which of the following is not a component of a magnetic disk drive?
   a) Disk platters
   b) Actuator arm
   c) CPU
   d) Read/write heads
   Answer: c) CPU

   What is the average seek time for a standard desktop hard disk drive?
   a) 5 ms
   b) 10 ms
   c) 15 ms
   d) 20 ms
   Answer: b) 10 ms

   Which type of magnetic disk drive has the highest storage capacity?
   a) Floppy disk drive
   b) Zip disk drive
   c) Hard disk drive
   d) Solid-state drive
   Answer: c) Hard disk drive

   Which of the following is not a disadvantage of magnetic disk drives?
   a) Prone to mechanical failure
   b) Sensitive to external factors like magnetic fields
   c) Slow access times
   d) High cost per GB of storage
   Answer: d) High cost per GB of storage

   Which technology is used to increase the storage capacity of magnetic disk drives?
   a) Disk compression

b) RAID
c) Disk partitioning
d) Disk spanning
Answer: b) RAID

What is the maximum transfer rate for a standard SATA hard disk drive?
a) 3 Gb/s
b) 6 Gb/s
c) 12 Gb/s
d) 24 Gb/s
Answer: b) 6 Gb/s

What is the main advantage of solid-state drives over magnetic disk drives?
a) Higher storage capacity
b) Lower cost
c) Faster access times
d) More durable
Answer: c) Faster access times

Lec 33 - Error Control

1. **Which of the following is a technique used for error detection?**
   A) Hamming codes
   B) Huffman codes
   C) Lempel-Ziv coding
   D) None of the above
   Answer: A) Hamming codes

   Which of the following is a technique used for error correction?
   A) Checksums
   B) CRC
   C) Reed-Solomon codes
   D) Both A and B
   Answer: C) Reed-Solomon codes

   Which of the following is not a type of error control technique?
   A) Data encryption
   B) Error detection codes
   C) Error correction codes
   D) None of the above
   Answer: A) Data encryption

   Which of the following is a commonly used error detection code?
   A) CRC
   B) RSA
   C) AES
   D) SHA
   Answer: A) CRC

   Which of the following is a commonly used error correction code?
   A) Parity bits
   B) Vigenere cipher
   C) RSA
   D) None of the above
   Answer: A) Parity bits

   Which error control technique is based on adding extra bits to a message to detect errors?
   A) Checksums
   B) Hamming codes
   C) Reed-Solomon codes
   D) None of the above
   Answer: A) Checksums

   Which error control technique is based on adding redundant bits to a message to correct errors?
   A) Parity bits
   B) CRC
   C) Hamming codes

D) None of the above
Answer: C) Hamming codes

Which error control technique is commonly used in wireless communication systems?
A) Reed-Solomon codes
B) Parity bits
C) Checksums
D) None of the above
Answer: A) Reed-Solomon codes

Which of the following is a disadvantage of error control techniques?
A) Increased complexity
B) Reduced data throughput
C) Increased delay
D) All of the above
Answer: D) All of the above

Which error control technique is most commonly used for error detection in computer networking?
A) Parity bits
B) CRC
C) Hamming codes
D) Reed-Solomon codes
Answer: B) CRC

Lec 34 - Number Systems and Radix Conversion

1. **What is the base of the binary number system?**
   A. 8
   B. 10
   C. 2
   D. 16
   Answer: C

   What is the base of the octal number system?
   A. 2
   B. 8
   C. 10
   D. 16
   Answer: B

   What is the base of the hexadecimal number system?
   A. 2
   B. 8
   C. 10
   D. 16
   Answer: D

   What is the decimal equivalent of the binary number 1010?
   A. 8
   B. 10
   C. 12
   D. 16
   Answer: C

   What is the decimal equivalent of the octal number 63?
   A. 51
   B. 54
   C. 57
   D. 60
   Answer: D

   What is the binary equivalent of the decimal number 29?
   A. 11101
   B. 10111
   C. 10011
   D. 11001
   Answer: A

   What is the octal equivalent of the decimal number 95?
   A. 137
   B. 147
   C. 157
   D. 167
   Answer: B

   What is the hexadecimal equivalent of the binary number 1110101?
   A. 4D

B. 5D
C. 6D
D. 7D
Answer: A

What is the decimal equivalent of the hexadecimal number 2A?
A. 38
B. 40
C. 42
D. 44
Answer: C

What is the binary equivalent of the octal number 53?
A. 100101
B. 101010
C. 110001
D. 111000
Answer: C

Lec 35 - Multiplication and Division of Integers

1. **What is the result of multiplying -4 and 6?**
   a) -24
   b) 24
   c) -10
   d) 10
   Answer: a) -24

   What is the result of dividing 24 by -3?
   a) -8
   b) 8
   c) -6
   d) 6
   Answer: a) -8

   What is the product of -5 and -8?
   a) -40
   b) 40
   c) -13
   d) 13
   Answer: b) 40

   What is the quotient of 15 divided by -5?
   a) -3
   b) 3
   c) -2
   d) 2
   Answer: a) -3

   What is the product of -7 and 0?
   a) 7
   b) 0
   c) -7
   d) Undefined
   Answer: b) 0

   What is the quotient of 0 divided by 6?
   a) 0
   b) 1
   c) Undefined
   d) Infinity
   Answer: a) 0

   What is the result of multiplying -3 and -4 and then dividing the result by -6?
   a) 2
   b) -2
   c) 4
   d) -4
   Answer: a) 2

   What is the quotient of 25 divided by 4, rounded to the nearest whole number?
   a) 6

b) 7
c) 5
d) 8
Answer: b) 7

What is the product of -2 and the sum of 3 and 5?
a) -16
b) -6
c) -8
d) 16
Answer: c) -8

What is the quotient of -12 divided by -4?
a) -3
b) 3
c) -4
d) 4
Answer: b) 3

Lec 36 - Floating-Point Arithmetic

1. **What is the range of the exponent in single-precision floating-point format?**
   a. -126 to 127
   b. -127 to 127
   c. -128 to 127
   d. -129 to 128
   Answer: a

   What is the formula for converting a decimal number to single-precision floating-point format?
   a. Multiply the decimal number by 2^32
   b. Divide the decimal number by 2^32
   c. Multiply the decimal number by 2^-32
   d. Divide the decimal number by 2^-32
   Answer: c

   Which of the following is not a component of the IEEE 754 standard for floating-point arithmetic?
   a. Sign bit
   b. Exponent
   c. Mantissa
   d. Byte order
   Answer: d

   What is the smallest positive number that can be represented in single-precision floating-point format?
   a. 2^-127
   b. 2^-126
   c. 2^-149
   d. 2^-148
   Answer: b

   What is the largest number that can be represented in single-precision floating-point format?
   a. 3.4028235 x 10^38
   b. 1.7976931348623157 x 10^308
   c. 9.999999 x 10^999
   d. 2^127
   Answer: a

   What is the difference between normalized and denormalized floating-point numbers?
   a. Normalized numbers have a non-zero mantissa, while denormalized numbers have a zero mantissa
   b. Normalized numbers have a zero exponent, while denormalized numbers have a non-zero exponent
   c. Normalized numbers have a non-zero exponent, while denormalized numbers have a zero exponent
   d. Normalized numbers have a larger range of representable values than denormalized numbers
   Answer: a

   Which of the following operations is not commutative in floating-point arithmetic?

b. Multiplication
c. Division
d. Subtraction
Answer: d

Which of the following is a common method for handling floating-point exceptions?
a. Rounding
b. Truncation
c. Exception handling routines
d. None of the above
Answer: c

What is the main disadvantage of using floating-point arithmetic compared to integer arithmetic?
a. It is slower
b. It is less accurate
c. It requires more memory
d. It is more difficult to implement
Answer: a

Which of the following is an example of a floating-point representation system that does not use the IEEE 754 standard?
a. IBM floating-point format
b. VAX floating-point format
c. ARM floating-point format
d. All of the above use the IEEE 754 standard
Answer: b

Lec 37 - Components of Memory Systems

1. **Which of the following is a type of primary memory?**
   a) Hard disk drive
   b) Solid-state drive
   c) RAM
   d) DVD-ROM
   Answer: c) RAM

   Which of the following is an example of secondary memory?
   a) Cache memory
   b) RAM
   c) ROM
   d) Hard disk drive
   Answer: d) Hard disk drive

   What is the purpose of cache memory?
   a) To store data permanently
   b) To store frequently accessed data for faster retrieval
   c) To provide additional storage capacity
   d) To provide backup in case of system failure
   Answer: b) To store frequently accessed data for faster retrieval

   Which component is responsible for managing data transfer between the CPU and memory?
   a) Memory controller
   b) Cache memory
   c) Secondary memory
   d) I/O device
   Answer: a) Memory controller

   What is the function of virtual memory?
   a) To store data permanently
   b) To store frequently accessed data for faster retrieval
   c) To provide additional storage capacity
   d) To extend the available memory beyond the physical memory of the system
   Answer: d) To extend the available memory beyond the physical memory of the system

   Which type of memory is non-volatile and retains data even when the power is off?
   a) RAM
   b) Cache memory
   c) ROM
   d) Virtual memory
   Answer: c) ROM

   Which component is responsible for controlling the flow of data between the CPU and the memory?
   a) Memory controller
   b) Cache memory
   c) Secondary memory

d) I/O device
Answer: a) Memory controller

Which type of memory is typically the fastest but also the most expensive?
a) Secondary memory
b) Cache memory
c) Virtual memory
d) ROM
Answer: b) Cache memory

What is the function of an I/O device in a memory system?
a) To control data transfer between the CPU and memory
b) To provide backup in case of system failure
c) To store data permanently
d) To enable communication between the system and external devices
Answer: d) To enable communication between the system and external devices

Which component is responsible for managing the organization and allocation of memory in a system?
a) Memory controller
b) Cache memory
c) Secondary memory
d) Operating system
Answer: d) Operating system

Lec 38 - Memory Modules

1. **Which of the following is a type of memory module commonly used in laptops?**
   A) DIMM
   B) SODIMM
   C) RIMM
   D) SIMM
   Answer: B

   What is the full form of RIMM?
   A) Random In-line Memory Module
   B) Rambus In-line Memory Module
   C) Read-only In-line Memory Module
   D) Random-access In-line Memory Module
   Answer: B

   Which of the following memory modules is primarily used in older computers?
   A) DIMM
   B) SODIMM
   C) RIMM
   D) SIMM
   Answer: D

   Which type of memory module is commonly used in high-end gaming computers for better performance?
   A) DDR2
   B) DDR3
   C) DDR4
   D) DDR5
   Answer: C

   Which of the following is an advantage of using memory modules in a computer system?
   A) They are cheap
   B) They take up very little space
   C) They are easy to install and remove
   D) They provide faster processing speeds
   Answer: C

   Which type of memory module has a higher memory bandwidth?
   A) DIMM
   B) SODIMM
   C) RIMM
   D) None of the above
   Answer: D

   What is the maximum memory capacity of a single DDR4 DIMM module?
   A) 8GB
   B) 16GB
   C) 32GB
   D) 64GB
   Answer: B

   Which type of memory module uses a serial interface to transfer data?

B) DDR3
C) DDR4
D) DDR5
Answer: D

What is the main disadvantage of using RIMM memory modules?
A) They are expensive
B) They are slower than other types of memory modules
C) They are not compatible with all motherboards
D) They have a higher power consumption
Answer: C

What is the maximum clock speed supported by DDR4 memory modules?
A) 1600MHz
B) 2133MHz
C) 3200MHz
D) 4000MHz
Answer: D

Lec 39 - The Cache

1. **What is the purpose of a cache in a computer system?**
   A) To store infrequently accessed data
   B) To provide additional storage for the main memory
   C) To act as a buffer between the processor and main memory
   D) To speed up the processing of instructions
   Answer: C

   What principle does the cache operate on?
   A) Temporal and spatial locality
   B) Random access
   C) Sequential access
   D) LRU (Least Recently Used) replacement
   Answer: A

   Which of the following is a characteristic of a good cache design?
   A) Large capacity
   B) High access time
   C) High hit rate
   D) Low associativity
   Answer: C

   What is the purpose of a cache hit?
   A) To retrieve data from the main memory
   B) To store data in the main memory
   C) To retrieve data from the cache
   D) To store data in the cache
   Answer: C

   Which of the following is a disadvantage of a direct-mapped cache?
   A) Low hit rate
   B) High associativity
   C) High complexity
   D) Large size
   Answer: A

   What is the difference between a write-through and write-back cache?
   A) Write-through caches are slower than write-back caches
   B) Write-back caches are slower than write-through caches
   C) Write-through caches write data to both the cache and main memory, while write-back caches only write to the cache until it is full
   D) Write-back caches write data to both the cache and main memory, while write-through caches only write to the cache until it is full
   Answer: C

   Which cache replacement algorithm evicts the least recently used cache line?
   A) First-In-First-Out (FIFO)
   B) Least Frequently Used (LFU)
   C) Least Recently Used (LRU)

D) Random
Answer: C

What is cache coherence?
A) The process of updating the cache when the main memory is modified
B) The process of updating the main memory when the cache is modified
C) The process of ensuring that all caches have the same view of shared memory
D) The process of ensuring that all processors have the same view of shared memory
Answer: C

Which of the following is an example of a cache miss?
A) When data is successfully retrieved from the cache
B) When data is not found in the cache and must be retrieved from main memory
C) When data is overwritten in the cache
D) When data is stored in the cache
Answer: B

What is the difference between a fully associative and set-associative cache?
A) Fully associative caches have a higher hit rate than set-associative caches
B) Set-associative caches have a higher hit rate than fully associative caches
C) Fully associative caches are larger than set-associative caches
D) Set-associative caches are larger than fully associative caches
Answer: B

Lec 40 - Virtual Memory

1. **What is virtual memory?**
   a) Memory that is stored on virtual machines
   b) A technique used to increase the apparent size of a computer's main memory
   c) A type of memory that can only be accessed by virtual machines
   d) A type of memory that is used for temporary storage
   Answer: b

   What is the purpose of virtual memory?
   a) To increase the amount of physical memory available to the operating system
   b) To speed up the execution of programs
   c) To create a virtual machine environment
   d) To store data temporarily
   Answer: a

   Which of the following is not a benefit of virtual memory?
   a) Programs can execute even when there is insufficient physical memory available
   b) It improves overall system performance
   c) It allows for faster access to data
   d) It provides a larger memory space for programs
   Answer: c

   What is a page fault?
   a) A type of error that occurs when a program tries to access memory that is not available
   b) A technique used by virtual memory to transfer pages of data between physical memory and disk storage
   c) A type of virtual memory that is stored on a hard disk
   d) A type of memory that is only used for temporary storage
   Answer: a

   What is the role of the page table in virtual memory?
   a) To map virtual addresses to physical addresses
   b) To store data temporarily
   c) To manage the transfer of pages of data between physical memory and disk storage
   d) To create a virtual machine environment
   Answer: a

   What is thrashing?
   a) A situation in which the operating system spends too much time managing virtual memory
   b) A type of error that occurs when a program tries to access memory that is not available
   c) A situation in which the system spends too much time transferring pages between physical memory and disk storage
   d) A type of virtual memory that is stored on a hard disk
   Answer: c

   What is the size of a page in virtual memory typically?
   a) 2 KB
   b) 4 KB
   c) 8 KB

d) 16 KB
Answer: b

What is the purpose of a TLB in virtual memory?
a) To speed up the mapping of virtual addresses to physical addresses
b) To store data temporarily
c) To manage the transfer of pages of data between physical memory and disk storage
d) To create a virtual machine environment
Answer: a

What is the difference between demand paging and pre-paging?
a) Demand paging loads pages into physical memory only when they are needed, while pre-paging loads pages into physical memory before they are needed
b) Pre-paging loads pages into physical memory only when they are needed, while demand paging loads pages into physical memory before they are needed
c) Demand paging and pre-paging are the same thing
d) Neither demand paging nor pre-paging are used in virtual memory
Answer: a

Which of the following is an example of a virtual memory implementation?
a) RAID
b) SSD
c) Pagefile
d) BIOS
Answer: c

Lec 41 - Numerical Examples of DRAM and Cache

1. **What is the hit rate of a cache with 2000 cache lines, where 1500 references were made and 300 misses occurred?**
   a. 85%
   b. 80%
   c. 75%
   d. 70%
   Answer: a

   What is the miss rate of a cache with 512 cache lines, where 1000 references were made and 50 misses occurred?
   a. 5%
   b. 10%
   c. 15%
   d. 20%
   Answer: a

   If a cache access takes 5 ns and a DRAM access takes 50 ns, and the hit rate of the cache is 90%, what is the average memory access time?
   a. 5.5 ns
   b. 6.5 ns
   c. 7.5 ns
   d. 8.5 ns
   Answer: b

   A program has a total of 10,000 memory references, of which 1000 are cache misses. What is the hit rate of the cache?
   a. 90%
   b. 85%
   c. 80%
   d. 75%
   Answer: a

   A cache has 512 lines, each of which can hold 32 bytes. How many bits are required to address a byte in this cache?
   a. 7 bits
   b. 8 bits
   c. 9 bits
   d. 10 bits
   Answer: c

   If a cache has a hit rate of 95%, what is the miss rate?
   a. 5%
   b. 10%
   c. 15%
   d. 20%
   Answer: a

   If a cache has a hit rate of 80% and an access time of 5 ns, and a DRAM has an access

time of 50 ns, what is the average memory access time?
a. 9 ns
b. 10 ns
c. 11 ns
d. 12 ns
Answer: c

A cache has a hit rate of 90% and an access time of 5 ns. What is the effective access time if the cache is split into two levels, where the L1 cache has a hit rate of 95% and an access time of 2 ns, and the L2 cache has a hit rate of 80% and an access time of 10 ns?
a. 4.1 ns
b. 4.5 ns
c. 5.0 ns
d. 5.5 ns
Answer: b

A cache has 256 lines, each of which can hold 64 bytes. What is the total capacity of the cache in bytes?
a. 16384 bytes
b. 32768 bytes
c. 65536 bytes
d. 131072 bytes
Answer: b

If a cache has a hit rate of 80% and an access time of 5 ns, and a DRAM has an access time of 50 ns, what is the speedup achieved by the cache?
a. 4x
b. 5x
c. 6x
d. 7x
Answer: c

Lec 42 - Performance of I/O Subsystems

1. **Which of the following is NOT a factor that affects the performance of I/O subsystems?**
   a) Speed and capacity of devices
   b) Efficiency of the operating system's I/O handling mechanisms
   c) Workload characteristics of the applications
   d) Type of processor used
   Solution: d) Type of processor used

   Which of the following is a technique used to improve I/O performance?
   a) Virtual memory
   b) RAID
   c) Multi-core processing
   d) Pipelining
   Solution: b) RAID

   Which of the following is NOT an example of a peripheral device?
   a) Hard disk
   b) Keyboard
   c) Memory
   d) Printer
   Solution: c) Memory

   Which of the following is a metric used to measure I/O performance?
   a) Bandwidth
   b) Clock speed
   c) Cache size
   d) Instruction set
   Solution: a) Bandwidth

   Which of the following can improve I/O performance by reducing the number of I/O operations required?
   a) Virtual memory
   b) DMA
   c) Interrupts
   d) Polling
   Solution: b) DMA

   Which of the following is an I/O handling mechanism used by operating systems?
   a) Interrupts
   b) Bit manipulation
   c) Vectorization
   d) Load balancing
   Solution: a) Interrupts

   Which of the following is a technique used to reduce I/O latency?
   a) Caching
   b) Compression
   c) Encryption
   d) Hashing
   Solution: a) Caching

   Which of the following is NOT a type of RAID configuration?
   a) Mirroring

b) Striping
c) Parity
d) Compression
Solution: d) Compression

Which of the following is an I/O workload characteristic?
a) Memory usage
b) Processor utilization
c) Read/write ratio
d) Network bandwidth
Solution: c) Read/write ratio

Which of the following is an advantage of solid-state drives (SSDs) over hard disk drives (HDDs)?
a) Larger capacity
b) Higher latency
c) Lower power consumption
d) Lower cost per gigabyte
Solution: c) Lower power consumption

Lec 43 - Networks

1. **Which of the following is not a type of network topology?**
   a) Bus
   b) Star
   c) Mesh
   d) Program
   Answer: d) Program

   Which of the following protocols is used for sending email?
   a) FTP
   b) SMTP
   c) SNMP
   d) SSH
   Answer: b) SMTP

   Which of the following is not a type of wireless network?
   a) Wi-Fi
   b) Bluetooth
   c) Infrared
   d) Ethernet
   Answer: d) Ethernet

   Which of the following is not a layer of the OSI model?
   a) Application
   b) Physical
   c) Data
   d) Transport
   Answer: c) Data

   Which of the following devices is used to connect multiple network segments together?
   a) Router
   b) Switch
   c) Hub
   d) Modem
   Answer: a) Router

   Which of the following topologies has a central hub or switch to which all devices are connected?
   a) Ring
   b) Star
   c) Mesh
   d) Bus
   Answer: b) Star

   Which of the following is a unique identifier assigned to a network interface card (NIC)?
   a) IP address
   b) MAC address
   c) URL
   d) Domain name
   Answer: b) MAC address

   Which of the following protocols is used for secure remote access to a network?
   a) FTP

b) Telnet
c) SSH
d) POP
Answer: c) SSH

Which of the following devices is used to convert digital signals to analog signals for transmission over telephone lines?
a) Router
b) Switch
c) Modem
d) Hub
Answer: c) Modem

Which of the following is not a type of network cable?
a) Coaxial
b) Fiber optic
c) Twisted pair
d) Infrared
Answer: d) Infrared

Lec 44 - Communication Medium and Network Topologies

1. **Which of the following is not a communication medium?**
   a) Copper wires
   b) Fiber optics
   c) Wireless signals
   d) LAN
   Answer: d) LAN

   Which communication medium provides the highest transmission speeds?
   a) Copper wires
   b) Fiber optics
   c) Wireless signals
   d) Bluetooth
   Answer: b) Fiber optics

   Which network topology is most commonly used in home networks?
   a) Star
   b) Bus
   c) Ring
   d) Mesh
   Answer: a) Star

   In which network topology, each device is connected to a central hub or switch?
   a) Star
   b) Bus
   c) Ring
   d) Mesh
   Answer: a) Star

   In which network topology, a single break in the communication channel can bring down the entire network?
   a) Star
   b) Bus
   c) Ring
   d) Mesh
   Answer: c) Ring

   Which network topology is best suited for large networks with heavy traffic?
   a) Star
   b) Bus
   c) Ring
   d) Mesh
   Answer: d) Mesh

   Which communication medium is most immune to interference and noise?
   a) Copper wires
   b) Fiber optics
   c) Wireless signals
   d) Bluetooth
   Answer: b) Fiber optics

   In which network topology, data travels in a single direction only?
   a) Star

b) Bus
c) Ring
d) Mesh
Answer: b) Bus

Which network topology is most fault-tolerant?
a) Star
b) Bus
c) Ring
d) Mesh
Answer: d) Mesh

Which communication medium is most commonly used for wireless networks?
a) Copper wires
b) Fiber optics
c) Wireless signals
d) Bluetooth
Answer: c) Wireless signals

Lec 45 - Review

1. **What is a review?**
   a. A type of assessment tool used in education
   b. A type of essay that analyzes a literary work
   c. An evaluation of a product or service
   d. A type of scientific study
   Answer: c

   What is the purpose of a review?
   a. To promote a product or service
   b. To provide feedback to the creator or provider
   c. To manipulate public opinion
   d. To create controversy
   Answer: b

   Where are reviews commonly found?
   a. In textbooks and academic journals
   b. In political speeches and debates
   c. In e-commerce sites and online marketplaces
   d. In scientific research articles
   Answer: c

   Who conducts reviews?
   a. Only professional critics
   b. Only consumers
   c. Both professionals and consumers
   d. Only the creators or providers of the product or service
   Answer: c

   What is the role of reviews in shaping public opinion?
   a. They have no impact on public opinion
   b. They can positively or negatively influence public opinion
   c. They only influence the opinions of experts
   d. They are only important for marketing purposes
   Answer: b

   What is a rating in a review?
   a. A written evaluation of a product or service
   b. A numerical or symbolic representation of the overall evaluation
   c. A type of video review
   d. A summary of the pros and cons of a product or service
   Answer: b

   What is the difference between a positive and negative review? a. Positive reviews are longer than negative reviews
   b. Positive reviews focus on the product's benefits, while negative reviews focus on its drawbacks
   c. Positive reviews are more reliable than negative reviews
   d. Negative reviews are more common than positive reviews
   Answer: b

   What is a fake review?
   a. A review that is intentionally false or misleading

b. A review written by a professional critic
c. A review that focuses only on positive aspects of a product or service
d. A review that is too short or vague to be helpful
Answer: a

How can reviews benefit businesses?
a. By providing free advertising
b. By helping to identify areas for improvement
c. By improving customer satisfaction and loyalty
d. By generating revenue
Answer: c

What is the best way to evaluate the credibility of a review?
a. By only reading positive reviews
b. By looking at the reviewer's profile and history
c. By ignoring reviews altogether
d. By only reading reviews from professional critics
Answer: b