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Department of Computer Science and Engineering

UNIT-V

MEMORY SYSTEM MEMORY AND I/O SYSTEMS

1. Give the classification of the Optical Media

Optical media can be classified as

CD-ROM – Compact Disk Read Only Memory

WORM – Write Once Read Many

Rewriteable - Erasable

Multifunction – WORM and Erasable

2. What is a Mini Disk?

Minidisk for data (MD-Data) is the data version of the new rewriteable storage format developed by Sony Corporation for both business and entertainment as a convenient medium for carrying music, video and data. MD can be used in three formats to support all potential uses as follows:

--A premastered optical disk

--A recordable magneto-optical disk

--A hybrid that is partially mastered and partially recordable

3. List some applications for WORM.

--Some of the application or WORM devices are

--On-Line catalogs such as automobile party's dealer

--Large Volume Distribution

--Transaction logging such as stock trading company

--Multimedia Archival

4. What are multifunctional drives

A multifunctional drive is a single unit which is capable of reading and writing a variety of disk media. This type of drive provides the permanence of a read-only device as well as full flexibility of a rewriteable device along with the powerful intermediate write once capability

5. What are types of technology used in s multifunctional drive?

Three types of technologies utilized for multifunctional drives are

- *Magneto – Optical Disk for both rewriteable and WORM capability
- *Magneto- Optical disk for rewriteable and dye polymer disk for WORM capability
- *Phase change technology for both rewriteable and WORM capability

6. What is Migration and Archiving?

The process of moving an object from one level in the storage hierarchy to another level in that hierarchy is called migration. Migration of Objects to off-line media and removal of these objects from on-line media is called archiving.

7. What is the use of High water marks in a cache?

Cache design use a high-water mark and a low water mark to trigger cache management operations. When the cache storage fills up to the high – water mark , the cache manager starts creating more space in cache storage. Space is created by discarding objects that have not been modified and writing back those object that have been modified.

8. What are the various cache usage in a LAN –based system?

In a LAN – based system there can be as many as three stages of caches as follows

1. Disk Cache or System memory cache
2. Hard Disk cache for each object server
3. Shared network cache for all object servers

9. What are the multimedia applications which use caches?

Some Multimedia application areas where cache is extensively used are

- *Multimedia Entertainment
- *Education
- *Office Systems
- *Audio and video Mail
- *Computer Architecture - Set 6

10. Explain virtual memory technique.

Techniques that automatically move program and data blocks into the physical memory when they are required for execution are called virtual memory technique

11. What are virtual and logical addresses?

The binary addresses that the processor issues for either instruction or data are called virtual or logical addresses.

12. Define translation buffer.

Most commercial virtual memory systems incorporate a mechanism that can avoid the bulk of the main memory access called for by the virtual to physical addresses translation buffer. This may be done with a cache memory called a translation buffer.

13. What is branch delay slot?

The location containing an instruction that may be fetched and then discarded because of the branch is called branch delay slot.

14. What is optical memory?

Optical or light based techniques for data storage, such memories usually employ optical disk which resemble magnetic disk in that they store binary information in concentric tracks on an electromechanically rotated disks. The information is read as or written optically, however with a laser replacing the read write arm of a magnetic disk drive. Optical memory offer high storage capacities but their access rate is are generally less than those of magnetic disk.

15. What are static and dynamic memories?

Static memory are memories which require periodic no refreshing. Dynamic memories are memories, which require periodic refreshing.

18. What are the components of memory management unit?

A facility for dynamic storage relocation that maps logical memory references into physical memory addresses.

A provision for sharing common programs stored in memory by different users .

19. Distinguish Between Static RAM and Dynamic RAM?

Static RAM are fast, but they come at high cost because their cells require several transistors. Less expensive RAM can be implemented if simpler cells are used. However such

cells do not retain their state indefinitely; Hence they are called Dynamic RAM.

20. Distinguish between asynchronous DRAM and synchronous RAM.

The specialized memory controller circuit provides the necessary control signals, RAS And CAS ,that govern the timing. The processor must take into account the delay in the response of the memory. Such memories are referred to as asynchronous DRAMS. The DRAM whose operations is directly synchronized with a clock signal. Such Memories are known as synchronous DRAM.

21. What do you mean associative mapping technique?

The tag of an address received from the CPU is compared to the tag bits of each block of the cache to see if the desired block is present. This is called associative mapping technique.

22. What is SCSI?

Small computer system interface can be used for all kinds of devices including RAID storage subsystems and optical disks for large- volume storage applications.

23. What are the two types of latencies associated with storage?

The latency associated with storage is divided into 2 categories

1. Seek Latencies which can be classified into Overlapped seek, Mid transfer seek and Elevator seek
2. Rotational Latencies which can be reduced either by Zero latency read or Write and Interleave factor.

24. What are the data management activities involved in a storage?

a. **Command queuing** : allows execution of multiple sequential commands with system CPU intervention. It helps in minimizing head switching and disk rotational latency

b. **Scatter – gather** : Scatter is a process whereby data is set for best fit in available block of memory or disk. Gather reassembles data into contiguous blocks on disk or in memory

25. What do you mean by Disk Spanning?

Disk spanning is a method of attaching drives to a single host uadapter. All drives appear as a single contiguous logical unit. Data is written to the first drive first and when the drive is full, the controller switches to the second drive, then the second drive writes until its full.

26. List some objectives for using RAID Systems

- RAID systems are used to meet the following objectives
- Hot backup of disk systems

- Large volume storage at lower cost
- Higher performance at lower cost
- Ease of data recovery
- High MTBF

27. What are the different levels RAID?

There are six discrete levels of RAID functionality. They are

- Level 0 – Disk Striping
- Level 1 – Disk Mirroring
- Level 2 – Bit Interleaving of Data
- Level 3 – Bit Interleaving with dedicated parity drives
- Level 4 – Sector interleaving of data with dedicated parity drive
- Level 5 – Block interleaving of data.

28. Two Types of storage devices.

1. Primary Memory
2. Secondary Memory

29. Explain very briefly about ESDI Hard Drive

ESDI stands for enhanced small device interface was developed by a consortium of several manufacturers. ESDI converts the data into serial bit streams and uses the RLL encoding scheme to pack more bits per sector. ESDI drives store a defect map containing the locations of bad and defective sectors on the drive.

30. Explain in brief about IDE

Integrated device electronics contains an integrated controller with the drive as a single unit. Interface is a simple 16-bit parallel data interface and requires the data to be written and does not need to be told where and how to write the data on the disk. IDE Interface supports 2 drives – one drive has to be configured as the master and the second as the slave.

31. What is SCSI?

Small computer system interface can be used for all kinds of devices including RAID storage subsystems and optical disks for large- volume storage applications.

32. Define the term RELIABILITY

“Means feature that help to avoid and detect such faults. A reliable system does not silently continue and delivery result that include interrelated and corrupted data, instead it corrects the corruption when possible or else stops

33. Define the term AVAILABILITY:

“Means features that follow the system to stay operational even often faults do occur. A highly available system could disable the main functioning portion and continue operating at the reduced capacity”

34. How the interrupt is handled during exception?

- * cpu identifies source of interrupt
- * cpu obtains memory address of interrupt handles
- * pc and other cpu status information are saved
- * Pc is loaded with address of interrupt handler and handling program to handle it

35. What is IO mapped input output?

A memory reference instruction activated the READ M (or) WRITE M control line and does not affect the IO device. Separate IO instructions are required to activate the READ IO and WRITE IO lines, which cause a word to be transferred between the address bus port and the CPU. The memory and IO address space are kept separate.

36. Specify the three types of the DMA transfer techniques?

- Single transfer mode(cyclestealing mode)
- Block Transfer Mode(Burst Mode)
- Demand Transfer Mode
- Cascade Mode

37. What is an interrupt?

An interrupt is an event that causes the execution of one program to be suspended and another program to be executed.

38. What are the uses of interrupts?

- *Recovery from errors
- *Debugging
- *Communication between programs
- *Use of interrupts in operating system

39. Define vectored interrupts.

In order to reduce the overhead involved in the polling process, a device requesting an interrupt may identify itself directly to the CPU. Then, the CPU can immediately start executing the corresponding interrupt-service routine. The term vectored interrupts refers to all interrupt-handling schemes based on this approach.

40. Name any three of the standard I/O interfaces.

- *SCSI (small computer system interface), bus standards
- *Back plane bus standards
- *IEEE 796 bus (multibus signals)
- *NUBUS & IEEE 488 bus standard

41. What is an I/O channel?

An I/O channel is actually a special purpose processor, also called peripheral processor. The main processor initiates a transfer by passing the required information in the input output channel. The channel then takes over and controls the actual transfer of data.

42. Why program controlled I/O is unsuitable for high-speed data transfer?

In program controlled I/O considerable overhead is incurred because several program instructions have to be executed for each data word transferred between the external devices and MM. Many high speed peripheral devices have a synchronous mode of operation. That is data transfer is controlled by a clock of fixed frequency, independent of the CPU.

47. What is the function of I/O interface?

The function is to coordinate the transfer of data between the CPU and external devices.

48. Name some of the I/O devices.

- *Video terminals
- *Video displays
- *Alphanumeric displays
- *Graphics displays
- * Flat panel displays
- *Printers
- *Plotters

49. What are the steps taken when an interrupt occurs?

- *Source of the interrupt

- *The memory address of the required ISP
- * The program counter &cpu information saved in subroutine
- *Transfer control back to the interrupted program

50. Define interface.

The word interface refers to the boundary between two circuits or devices

51. What is programmed I/O?

Data transfer to and from peripherals may be handled using this mode. Programmed I/O operations are the result of I/O instructions written in the computer program.

52. What is DMA?

A special control unit may be provided to enable transfer a block of data directly between an external device and memory without contiguous intervention by the CPU. This approach is called DMA.

PART B

1. Define cache memory. Explain the mapping process followed in cache memory. Also discuss
2. the relative advantages and disadvantages of the mapping techniques used.
3. What is virtual memory? Why is it necessary to implement virtual memory? Explain the virtual
4. memory address translation.
5. Draw and explain the various types of secondary storage devices.
6. .List the different types of interrupts. Explain briefly about mask able interrupt.
7. What is DMA? Explain the block diagram of DMA .Also describe how DMA is used to
8. transfer data from peripherals.
9. Expalin input/output processors