**Operating Systems (CS8493)**

**UNIT I INTRODUCTION**

**1. List and briefly define the four main elements of a computer? [R]**

 Processor – Controls the operation of the computer & performs its data

processing functions

 Main memory – Stores data & programs.it is volatile.

 I/O modules – Move data between the computer & its external environment

such as disks, communication equipment & terminals.

 System Bus – Provides for communication among processors, main memory &

I/O modules.

**2. Define the two main categories of processor register? [R]**

Two categories are

User- visible registers: - It Enable the machine or assembly language

programmer to minimize main memory references by optimizing register use.

Control & Status registers: - Registers used by the processor to control the

operation of the processor.

**3. In general terms, what are the four distinct actions that machine instruction can**

**specify? [An]**

 Processor – Memory

 Processor –I/O

 Data Processing

 Control

4. What is an Interrupt? [R]

 Interrupt are provided primarily as way to improve processor utilization.

 It is a mechanism by which other modules( I/O, Memory) may interrupt the

normal sequencing of the processor.

Classes of interrupts:-

 Program

 Timer

 I/O

 Hardware failure

**5. How are multiple interrupt dealt with? [An]**

Two approaches can be taken to dealing with interrupts

 Disabled Interrupt – Processor ignores any new interrupt request signal.

 Define Priority for interrupt – It allows an interrupt of higher priority.

**6. What characteristics distinguish the various elements of a memory hierarchy?**

**[R]**

Characteristics are

1.Cost Per bit

2.Capacity

3. Access Time

4. Frequency of access to the memory by the processo

7. What is Cache Memory? [R]

1. Cache memory is invisible to the OS

2. It interacts with other memory management hardware

3. Cache contains a copy of a portion of main memory .

**8. List and briefly define 3 Techniques of I/O operation? [R]** Programmed I/O

 Interrupt Driven I/O

 Direct memory access

**9. Do timesharing differ from Multiprogramming? If so, How?(APR/MAY 2015)**

[An]

Time Sharing: here, OS assigns some time slots to each job. Here, each job is

executed according to the allotted time slots.

Job1: 0 to 5 Job2: 5 to 10 Job3: 10 to 15

Multi-Tasking: in this operating system, jobs are executed in parallel by the

operating system. But, we can achieve this multi-tasking through multiple

processors (or) multicore CPU only.

CPU1: Job1 CPU2: Job2 CPU3: Job3

**10.Why API s need to be used rather than system calls?(APR/MAY 2015) [An]**

System calls are much slower than APIs (library calls) since for each system call, a

context switch has to occur to load the OS (which then serves the system call).Most

details of OS interface hidden from programmer by API Managed by run-time support

library (Set of functions built into libraries included with compiler.)

**UNIT II PROCESS MANAGEMENT**

**1. Define Process?[R]**

A Process can be thought of as a program in execution. A process will need certain resources such as CPU time, memory, files & I/O devices to accomplish its task

**2. What is process control block? List out the data field associated with PCB.**

**(APR/MAY2015)[R]**

Each process is represented in the operating system by a process control block also called a task control block. (PCB) also called a task control block.

Process state

Process number

Program counter

CPU registers

Memory limits

List of open files

CPU scheduling information

Memory management information

Accounting information

I/O status information

**3. What is meant by context switching?[R]**

Switching the CPU to another process requires saving the state of the old process and loading the savetthe state for the new process. This task is known as context switch.

**4. Define co- operating process and independent process.[R]**

Independent process:

o A process is independent if it cannot affect or be affected by the other processes

executing in the system.

o A process that does not share data with any other process is independent.

Cooperating process:

o A process is co-operating if it can affect or be affected by other processes

executing in the system.

o Any process that shares data with any other process is cooperating.

**5. What are the benefits of multithreaded programming? [R]**

The benefits of multithreaded programming can be broken down into four major categ

ories

 Responsiveness

 Resource sharing

 Economy scalability

 Utilization of multiprocessor architectures.

**6. Write down the definition of TestAndSet() Instruction.[R]**

boolean TestAndSet (boolean &target)

{

boolean rv = \*target;

\*target = true;

return rv;

}

**7.Define mutual exclusion. (MAY/JUNE 2013)[R]**

Mutual exclusion refers to the requirement of ensuring that no two process or threads are in their critical section at the same time.

i.e. If process Pi is executing in its critical section, then no other processes can be

executing in their critical sections.

**8.What are the requirements that a solution to the critical section problem must satisfy?[R]**

The three requirements are

 Mutual exclusion

 Progress & Bounded waiting

**9.What is preemptive and non-preemptive scheduling? [An] (NOV/DEC 2008,APRIL/MAY2010, MAY /JUNE 2012)**

Under non preemptive scheduling once the CPU has been allocated to a process, the process keeps the CPU until it releases the CPU either by terminating or switching to the waiting state. Preemptive scheduling can preempt a process which is utilizing the CPU in between its execution and give the CPU to another process.

**10.What is a Dispatcher?[R]**

The dispatcher is the module that gives control of the CPU to the process selected by the short-term scheduler. This function involves:

 Switching context.

 Switching to user mode.

 Jumping to the proper location in the user program to restart that program.

**UNIT III MEMORY MANAGEMENT**

**7. Define dynamic loading. [R]**

To obtain better memory-space utilization dynamic loading is used. With dynamic loading, a routine is not loaded until it is called. All routines are kept on disk in are locatable load format. The main program is loaded into memory and executed. The calling routine checks whether the routine has been loaded. If not, there locatable linking loader is called to load the desired program into memory**.**

**8. Define dynamic linking. [R]**

Dynamic linking is similar to dynamic loading, rather that loading being postponed until execution time, linking is postponed. This feature is usually used with system libraries, such as language subroutine libraries

**9. What are overlays? Compare swapping and overlays [An]**

To enable a process to be larger than the amount of memory allocated to it, overlays are used. The idea of overlays is to keep in memory only those instructions and data that are needed at a given time. When other instructions are needed, they are loaded into space occupied previously by instructions that are no longer needed.

**10. What is the various page replacement algorithms used for page replacement?[R]**

 FIFO page replacement

 Optimal page replacement

 LRU page replacement

 LRU approximation page replacement

 Counting based page replacement

 Page buffering algorithm

**UNIT IV STORAGE MANAGEMENT**

**1)What is a file? [R]**

A file is a named collection of related information that is recorded on secondary storage. A file contains either programs or data. A file has certain "structure" based on its type.

**2)List the various file attributes. (APRIL/MAY 2011, NOV/DEC 2012)(MAY/JUNE 2014)(APRIL/MAY 2015) [R]**

A file has certain other attributes, which vary from one operating system to another, but typically consist of these:

 Identifier

 Name

 Type

 Location

 Size

 Protection

 Time

 Date

 User identification

**4)What are all the information‟s associated with an open file? [R]**

Several pieces of information are associated with an open file which may be:

 File pointer

 File open count

 Disk location of the file

 Access rights

**5)What are the different accessing methods of a file? (APRIL/MAY 2010) [R]**

The different types of accessing a file are:

Sequential access: Information in the file is accessed sequentially

Direct access: Information in the file can be accessed without any particular order.

Other access methods: Creating index for the file, indexed sequential access

method (ISAM),etc

**6)What are the most common schemes for defining the logical structure of a**

**directory? [R] (MAY/JUNE 2012)**

The most common schemes for defining the logical structure of directory

 Single-Level Directory

 Two-level Directory

 Tree-Structured Directories

 Acyclic-Graph Directories

 General Graph Directory

**7) Define caching. [R]**

A cache is a region of fast memory that holds copies of data. Access to the cached copy is more efficient than access to the original. Caching and buffering are distinct functions, but sometimes a region of memory can be used for both purposes.

**8) Define spooling. [R]**

A spool is a buffer that holds output for a device, such as printer, that cannot accept interleaved data streams. When an application finishes printing, the spooling system queues the corresponding spool file for output to the printer. The spooling system copies the queued spool files to the printer one at a time.

**9) What are storage area networks? (April/May 2011) [R]**

A storage area network (SAN) is a dedicated network that provides access to consolidated, block level data storage. SANs are primarily used to make storage devices,such as disk arrays, tape libraries, and optical jukeboxes, accessible to servers so that the devices appear like locally attached devices to the operating system.

**10) Write a brief note on RAID. (MAY/JUNE 2013) [R]**

RAID (redundant array of independent disks; originally redundant array of inexpensive disks) is a way of storing the same data in different places (thus, redundantly) on multiple hard disks. By placing data on multiple disks, I/O (input/output) operations can overlap in a balanced way, improving performance. Since multiple disks increase the mean time between failures (MTBF), storing data redundantly also increases fault tolerance

**UNIT V VIRTUAL MACHINES AND MOBILE OS**

**1) What is Linux distribution?[R]**

A Linux distribution includes all the standard components of the Linux system,

plus a set of administrative tools to simplify the initial installation and subsequent

upgrading of Linux and manage installation and removal of other packages on the system.

**2) What is the use of User mode? [R]**

Under Linux, no user code is built into the kernel. Any operating-system-support

code that does not need to run in kernel mode is placed into the system libraries and runs in user mode.

**3) What are the components of kernel mode[R]**

The module support under Linux has four components:

1. The module-management system allows modules to be loaded into memory

and to communicate with the rest of the kernel.

2. The module loader and unloader, which are user-mode utilities, work with the

module-management system to load a module into memory.

3. The driver-registration system allows modules to tell the rest of the kernel that

a new driver has become available.

4. A conflict-resolution mechanism allows different device drivers to reserve

hardware resources and to protect those resources from accidental use by another driver.

**4) State the components of a Linux System? (May/Jun 2016)[R]**

 Kernel: The kernel is responsible for maintaining all the important abstractions of the

operating system, including such things as virtual memory and processes.

 System libraries: The system libraries define a standard set of functions through

which applications can interact with the kernel. These functions implement much of the

operating-system functionality that does not need the full privileges of kernel code.

 System utilities: The system utilities are programs that perform individual,

specialized management tasks. Some system utilities are invoked just once to initialize

and configure some aspect of the system.

**5) Define the function of Caching-only servers. (May/Jun 2016)[R]**

All DNS servers cache answers to queries they receive from outside their own

zone of authority. A cache-only DNS server is not authoritative for any zone. Related

Topics: DNS root servers: Root servers are critical to the function of a DNS server that is

directly connected to the Internet.

**6) What is virtualization? (NOV/DEC 2016)[R]**

In computing, virtualization refers to the act of creating a virtual (rather than

actual) version of something, including virtual computer hardware platforms, storage

devices, and computer network resources.

**7) List the advantages of Linux OS.[U] (NOV/DEC 2017)**

Advantages of Linux OS:

Low cost

Stability

Performance

Security, Flexibility, Compatibility

**8) Write the purpose of using virtualization.[R] (NOV/DEC 2017)**

Operating system virtualization provides application-transparent virtualization to users by decoupling applications from the OS. The OS virtualization technique offers granular control at the application level by facilitating the transparent migration of individual applications. OS virtualization can also be used to migrate critical applications to another running operating system instance.

**9. Write short notes on driver registration in Linux. (APR/MAY 2019)**

The driver registration allows modules to tell the rest of the kernel that a new driver has become available.

**10. List out the methods used to recover from the deadlock. (APR/MAY 2019)**

We can use a protocol to prevent or avoid deadlocks, ensuring that the system will never

enter a deadlocked state.

• We can allow the system to enter a deadlocked state, detect it, and recover.

• We can ignore the problem altogether and pretend that deadlocks never occur in the

system.