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Course Code : CSI-231

"Final Exam"

Ans to the Q No 1

(a)

Valid bit: A bit of information that indicates whether the data in a particular block is valid or not.

invalid bit: Invalid bit indicates that the page is not in the process logical address space.

(b)

Segment architecture is a detailed, formal description of areas within an enterprise, used at the program or portfolio level to organize and align change activity. It defines a single roadmap for a core mission area, business service, or enterprise service.

(c)

In computing a physical address refers to either a memory location, identified in the form of a binary number, or a media access control address.

Ans to the Q No 3

(a)

Deadlock can arise if four conditions hold simultaneously.

a) Mutual exclusion: Only one process at a time can use a resource.

b) Hold and wait: A process holding at least one resource is waiting to acquire additional resources held by other processes.

c) No preemption: A resource can be released only voluntarily by the process holding it, after that process has completed its task.

d) Circular wait: there exists a set of waiting processes such that P_0 is waiting for a resource that is held by P_1, P_1 is waiting for a resource that is held by P_2, ..., P_{n-1} is waiting for a resource that is held by P_n and P_0 is waiting for a resource that is held by P_0.

(b)

Restrain the ways request can be made

(a) Mutual Exclusion: not required for shareable resources, must hold for nonshareable resources.

(b) Hold and wait: Must guarantee that whenever a process requests a resource, it does not hold any other resources.

(c) No preemption: If a process that is holding some resources requests another resource that can't be immediately allocated to it, then all resources currently being held are released.

(d) Circular wait: impose a total ordering of

all resource types and require that each process requests resources in an increasing order of enumeration.

(c)

When a process requests an available resource, system must decide if immediate allocation leaves the system in a safe state.

Ans to the Q No 4

(a)

The structure of philosophers:-

```
do {
    wait (chopstick[i]);
    wait (chopstick[(i+1) % 5]);
```

// eat
signal (chopstick[i]);
signal (chopstick[(i+1) % 5]);
// think
} while (TRUE);

(b)

a) N buffers each can hold one item
b) Semaphore mutex initialized to the value 1.
c) Semaphore full initialized to the value 0.
d) Semaphore empty initialized to the value N.

The structure of the producer process -

do {
// produce an item in nextp

wait (empty);
wait (mutex);
// add the item to the buffer
signal (mutex);
signal (full);
} while (TRUE)

(e)

Starvation is a severe deficiency in calorie energy intake below the level needed to maintain an organism's life

Ans-to-the-Q.No.5

(a)

Below we have mentioned few issues related to multithreading. Well, it's an old saying, All good things come at a price.

(i) Thread Cancellation: Thread Cancellation means terminating a thread before it has finished working.

(ii) Signal Handling: Signals are used in UNIX systems to notify a process that a particular event has occured.

(c) Fork system call: Fork is a system call executed in a kernel through which a process creates a copy of itself.

d) Security issues: Yes, there can be security issues because of extensive sharing of resources between multiple threads.

(b)

Semaphore: Synchronization tool that does not require busy waiting.

Properties:

a) It's simple and always have a non-negative integer value.

b) Works with many processes.

c) Can have many different critical sections with different semaphores.

d) Each critical section has unique access semaphores.

e) Can permit multiple processes into the critical section at once, if desirable.

(6)

Worst fit is a method to map segments to holes in virtual memory