Operating System

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1.what are the attributes of a file or directory?
Name – only information kept in human-readable form
Identifier – unique tag (number) identifies file within file system
Type – needed for systems that support different types
Location – pointer to file location on device
Size – current file size
Protection – controls who can do reading, writing, executing
Time, date, and user identification – data for protection, security, and usage monitoring

1.What are the four components of a process?
1. Stack (contains temporary data such as local variables, return addresses, and function parameters)
2. Heap (memory that is dynamically allocated during process runtime)
3. Data Section (contains global variables)
4. Text Section (program code)

2. what are the the strategies of disk scheduling?

1. **First-Come, First-Served (FCFS):**
   - **Description:** The requests are serviced in the order they arrive in the queue.
2. **Shortest Seek Time First (SSTF):**
   - **Description:** The request with the shortest seek time (distance between the current head position and the track containing the request) is serviced first.
3. **SCAN (Elevator) Algorithm:**
   - **Description:** The disk arm moves in one direction (e.g., from the outermost track to the innermost track) and services

requests along the way. When it reaches the end, it reverses direction.

4. **C-SCAN (Circular SCAN) Algorithm:**
   - **Description:** Similar to SCAN, but the arm moves only in one direction. Once it reaches the end, it jumps to the beginning of the disk.
5. **C-LOOK Algorithm:**
   - **Description:** Similar to C-SCAN, but the arm only reverses direction when there are no more requests in the current direction.

2.List the three general disk scheduling algorithms 1. FCFS (first come first serve) 2. SSTF (shortest seek time first) 3. SCAN (starts at one end and moves to the other, reversing back when it gets to each end) *4. C-SCAN (Circular SCAN; instead of reversing it moves from one end to the other, then immediately proceeds back to the end it started scanning from) *5. LOOK (Works like SCAN, but does not traverse the entire disk; LOOK only goes as far as the farthest request)

2.what are the three strategies for selecting a hole from a set of holes?
First-fit: Allocate the first hole that is big enough
Best-fit: Allocate the smallest hole that is big enough; must search entire list, unless ordered by size
Produces the smallest leftover hole
Worst-fit: Allocate the largest hole; must also search entire list
Produces the largest leftover hole

2.what are the preemptive and non preemptive strategies for process scheduling?
Non preemptive:

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First-Come, First-Served (FCFS):

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Description: The process that arrives first is scheduled first. Non-preemptive because once a process starts executing, it continues until it completes.

Shortest Job Next (SJN) or Shortest Job First (SJF):

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Description: The process with the shortest burst time is scheduled first. Non-preemptive because once a process starts executing, it continues until it completes.

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Priority Scheduling:

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Description: Similar to preemptive priority scheduling, but preemption does not occur. The process with the highest priority runs until it completes or is blocked.

Preemptive:

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Round Robin (RR):

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Description: Each process is assigned a fixed time slot or quantum. If a process does not complete within its time quantum, it is moved to the back of the queue, and the next process in the queue is given the CPU.

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Priority Scheduling:

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Description: Each process is assigned a priority, and the process with the highest priority is scheduled first. Preemption can occur when a higher-priority process arrives.

Multilevel Queue Scheduling:

Description: Processes are divided into priority levels, and each level has its own scheduling algorithm. Preemption can occur when a higher-priority process arrives or based on the time quantum.

3.what are two fundamental models of inter-process communications?
Shared Memory:

An area of memory shared among the processes that wish to communicate
The communication is under the control of the users processes not the operating system.
Major issues is to provide mechanism that will allow the user processes to synchronize their actions when they access shared memory.
Message Passing:
Mechanism for processes to communicate and to synchronize their actions
Message system – processes communicate with each other without resorting to shared variables
IPC facility provides two operations:
send(message)
receive(message)
The message size is either fixed or variable

4. what is a system call?
Programming interface to the services provided by the OS
Typically written in a high-level language (C or C++)
Mostly accessed by programs via a high-level Application Programming Interface (API) rather than direct system call use

5.what is segmentation?
Memory-management scheme that supports user view of memory
A program is a collection of segments
A segment is a logical unit such as:

main program
procedure
function
method
object
local variables, global variables
common block
stack
symbol table
arrays

5. what is paging?

Physical address space of a process can be noncontiguous; process is allocated physical memory whenever the latter is available
Avoids external fragmentation
Avoids problem of varying sized memory chunks
Divide physical memory into fixed-sized blocks called frames
Size is power of 2, between 512 bytes and 16 Mbytes
Divide logical memory into blocks of same size called pages
Keep track of all free frames
To run a program of size N pages, need to find N free frames and load program
Set up a page table to translate logical to physical addresses .
Backing store likewise split into pages
Still have Internal fragmentation

5.external fragmentation as processes are loaded and removed from memory, the free memory space is broken into little pieces

5.What is internal fragmentation and where it could happen?

Internal Fragmentation
unused memory that is internal to a partition breaks the physical memory into fixed-size blocks (usually of base 2) and allocate memory in units based on block size. The memory allocated to a process may be slightly larger than the requested memory

allocated memory may be slightly larger than requested memory; this size difference is memory internal to a partition, but not being used

6. what is reader-writer problem?
First variation – no reader kept waiting unless writer has permission to use shared object
Second variation – once writer is ready, it performs the write ASAP
Both may have starvation leading to even more variations
Problem is solved on some systems by kernel providing reader-writer locks

6a.What is the problem if all philosophers simultaneously pick up their left chopstick? If all philosophers pick up the left chopstick, it will leave

no right chopstick for them to pickup, creating a deadlock while they all indefinitely wait for a right chopstick to become available

7. What kernel data structure can be used for one technique of passing parameters to system calls? Stack

7a.CPU–I/O Burst Cycle – Process execution consists of a cycle of CPU execution and I/O wait

8a.A program that has been loaded and executing is called a _____Process.

8b.Divide logical memory into blocks of same size called..... pages
Divide physical memory into fixed-sized blocks called... frames

8c.just as file must be opened before it is used, a file system must be ..... before it can be be available to process on the system (mounted)

8. what are the three requirement a solution to the critical section problem must satisfy?

1. Mutual Exclusion - If process Pi is executing in its critical section, then no other processes can be executing in their critical sections

2. Progress - If no process is executing in its critical section and there exist some processes that wish to enter their critical section, then the selection of the processes that will enter the critical section next cannot be postponed indefinitely

3. Bounded Waiting - A bound must exist on the number of times that other processes are allowed to enter their critical sections after a process has made a request to enter its critical section and before that request is granted

10a.What is the term for describing the situation where shared data may be manipulated concurrently and the outcome of the execution depends upon the order of access? race condition

10.what is the term for describing the situation where a waiting process is never again able to change state,because the resources it has requested are held by other waiting processes?Deadlock

10b.what is the term for describing the situation where a process can be temporarily out of memory to a backing store and then brought back into memory for continued execution?swapping

10c.What is the term used to describe the segment of code where shared data is accessed and possibly manipulated? critical section

MCQ - Operating System

https://www.mcqscenter.com/computer-science/operating-system-processes

Upto processes and only the first pages……..