SANFOUNDARY BITS
Basics

1. What is an operating system? [d]
a) collection of programs that manages hardware resources
b) system service provider to the application programs
c) interface between the hardware and application programs
d) all of the mentioned

Explanation: An Operating System acts as an intermediary between user/user applications/application programs and hardware. It is a program that manages hardware resources. It provides services to application programs.

2. To access the services of operating system, the interface is provided by the _____ [a]
a) System calls b) API c) Library d) Assembly instructions

Explanation: To access services of the Operating System an interface is provided by the System Calls. Generally, these are functions written in C and C++. Open, Close, Read, Write are some of most prominently used system calls.

3. Which one of the following is not true? [c]
a) kernel is the program that constitutes the central core of the operating system
b) kernel is the first part of operating system to load into memory during booting
c) kernel is made of various modules which can not be loaded in running operating system
d) kernel remains in the memory during the entire computer session

Explanation: Kernel is the first program which is loaded in memory when OS is loading as well as it remains in memory till OS is running. Kernel is the core part of the OS which is responsible for managing resources, allowing multiple processes to use the resources and provide services to various processes. Kernel modules can be loaded and unloaded in run-time i.e. in running OS.

4. Which one of the following error will be handle by the operating system? [d]
a) power failure b) lack of paper in printer
c) connection failure in the network d) all of the mentioned

Explanation: All the mentioned errors are handled by OS. The OS is continuously monitoring all of its resources. Also, the OS is constantly detecting and correcting errors.

5. What is the main function of the command interpreter? [a]
a) to get and execute the next user-specified command
b) to provide the interface between the API and application program
c) to handle the files in operating system d) none of the mentioned

Explanation: The main function of command interpreter is to get and execute the next user-specified command. Command Interpreter checks for valid command and then runs that command else it will throw an error.

6. In Operating Systems, which of the following is/are CPU scheduling algorithms? [d]
a) Round Robin b) Shortest Job First c) Priority d) All of the mentioned

Explanation: In Operating Systems, CPU scheduling algorithms are:
i) First Come First Served scheduling
ii) Shortest Job First scheduling
iii) Priority scheduling
iv) Round Robin scheduling

v) Multilevel Queue scheduling
vi) Multilevel Feedback Queue scheduling
All of these scheduling algorithms have their own advantages and disadvantages.

7. If a process fails, most operating system write the error information to a ____ [a]
a) log file b) another running process c) new file d) none of the mentioned

Explanation: If a process fails, most operating systems write the error information to a log file. Log file is examined by the debugger, to find out what is the actual cause of that particular problem. Log file is useful for system programmers for correcting errors.

8. Which facility dynamically adds probes to a running system, both in user processes and in the kernel? [a]
a) DTrace b) DLocate c) DMap d) DAdd

Explanation: A facility that dynamically adds probes to a running system, both in user process and in the kernel is called DTrace. This is very much useful in troubleshooting kernels in real-time.

9. Which one of the following is not a real time operating system? [d]
a) VxWorks b) QNX c) RTLinux d) Palm OS

Explanation: VxWorks, QNX & RTLinux are real-time operating systems. Palm OS is a mobile operating system. Palm OS is developed for Personal Digital Assistants (PDAs).

10. The OS X has _____ [b]
a) monolithic kernel b) hybrid kernel
c) microkernel d) monolithic kernel with modules

Explanation: OS X has a hybrid kernel. Hybrid kernel is a combination of two different kernels. OS X is developed by Apple and originally it is known as Mac OS X.

Processes

11.The systems which allow only one process execution at a time, are called [b]
a) uniprogramming systems b) uniprocessing systems
c) unitasking systems d) none of the mentioned

Explanation: Those systems which allows more than one process execution at a time, are called multiprogramming systems. Uniprocessing means only one processor.

12. In operating system, each process has its own _____ [d]
a) address space and global variables b) open files
c) pending alarms, signals and signal handlers d) all of the mentioned

Explanation: In Operating Systems, each process has its own address space which contains code, data, stack and heap segments or sections. Each process also has a list of files which is opened by the process as well as all pending alarms, signals and various signal handlers.

13.In Unix, Which system call creates the new process? [a]
a) fork b) create c) new d) none of the mentioned

Explanation: In UNIX, a new process is created by fork() system call. fork() system call returns a process ID which is generally the process id of the child process created.

14. A process can be terminated due to _____ [d]
a) normal exit b) fatal error c) killed by another process d) all of the mentioned

Explanation: A process can be terminated normally by completing its task or because of fatal error or killed by another process or forcefully killed by a user. When the process completes its task without any error then it exits normally. The process may exit abnormally because of the occurrence of fatal error while it is running. The process can be killed or terminated forcefully by another process.

15. What is the ready state of a process? [a]
a) when process is scheduled to run after some execution
b) when process is unable to run until some task has been completed
c) when process is using the CPU d) none of the mentioned

Explanation: Ready state of the process means process has all necessary resources which are required for execution of that process when CPU is allocated. Process is ready for execution but waiting for the CPU to be allocated.

16.What is interprocess communication? [b]
a) communication within the process b) communication between two process
c) communication between two threads of same process d) none of the mentioned

Explanation: Interprocess Communication (IPC) is a communication mechanism that allows processes to communicate with each other and synchronise their actions without using the same address space. IPC can be achieved using shared memory and message passing.

17. A set of processes is deadlock if _____ [a]
a) each process is blocked and will remain so forever b) each process is terminated
c) all processes are trying to kill each other d) none of the mentioned

Explanation: Deadlock is a situation which occurs because process A is waiting for one resource and holds another resource (blocking resource). At the same time another process B demands blocking a resource as it is already held by a process A, process B is waiting state unless and until process A releases occupied resource.

18.A process stack does not contain _____ [d]
a) Function parameters b) Local variables c) Return addresses d) PID of child process

Explanation: Process stack contains Function parameters, Local variables and Return address. It does not contain the PID of child process.

19. Which system call can be used by a parent process to determine the termination of child process? [a]
a) wait b) exit c) fork d) get

Explanation: wait() system call is used by the parent process to determine termination of child process. The parent process uses wait() system call and gets the exit status of the child process as well as the pid of the child process which is terminated.

20.The address of the next instruction to be executed by the current process is provided by the _____ [b]
a) CPU registers b) Program counter c) Process stack d) Pipe

Explanation: The address of the next instruction to be executed by the current process is provided by the Program Counter. After every instruction is executed, the Program Counter is incremented by 1 i.e. address of the next instruction to be executed. CPU fetches instruction from the address denoted by Program Counter and execute it.

Process Control Block

21. A Process Control Block(PCB) does not contain which of the following? [c]

a) Code b) Stack c) Bootstrap program d) Data

Explanation: Process Control Block (PCB) contains information related to a process such as Process State, Program Counter, CPU Register, etc. Process Control Block is also known as Task Control Block. Bootstrap program is a program which runs initially when the system or computer is booted or rebooted.

22. The number of processes completed per unit time is known as _____ [b]

a) Output b) Throughput c) Efficiency d) Capacity

Explanation: The number of processes completed per unit time is known as Throughput. Suppose there are 4 processes A, B, C & D they are taking 1, 3, 4 & 7 units of time respectively for their executions. For 10 units of time, throughput is high if process A, B & C are running first as 3 processes can execute. If process C runs first then throughput is low as maximum only 2 processes can execute. Throughput is low for processes which take a long time for execution. Throughput is high for processes which take a short time for execution.

23. The state of a process is defined by _____ [d]

a) the final activity of the process b) the activity just executed by the process

c) the activity to next be executed by the process d) the current activity of the process

Explanation: The state of a process is defined by the current activity of the process. A process state changes when the process executes. The process states are as New, Ready, Running, Wait, Terminated.

24. Which of the following is not the state of a process? [b]

a) New b) Old c) Waiting d) Running

Explanation: There is no process state such as old. When a process is created then the process is in New state. When the process gets the CPU for its execution then the process is in Running state. When the process is waiting for an external event then the process is in a Waiting state.

25. What is a Process Control Block? [b]

a) Process type variable b) Data Structure

c) A secondary storage section d) A Block in memory

Explanation: A Process Control Block (PCB) is a data structure. It contains information related to a process such as Process State, Program Counter, CPU Register, etc. Process Control Block is also known as Task Control Block.

26. The entry of all the PCBs of the current processes is in _____ [c]

a) Process Register b) Program Counter c) Process Table d) Process Unit

Explanation: The entry of all the PCBs of the current processes is in Process Table. The Process Table has the status of each and every process that is created in OS along with their PIDs.

27.What is the degree of multiprogramming? [d]

a) the number of processes executed per unit time

b) the number of processes in the ready queue

c) the number of processes in the I/O queue

d) the number of processes in memory

Explanation: Multiprogramming means the number of processes are in the ready states. To increase utilization of CPU, Multiprogramming is one of the most important abilities of OS. Generally, a single process cannot use CPU or I/O at all time, whenever CPU or I/O is available another process can use it. By doing this CPU utilization is increased.

28. A single thread of control allows the process to perform _____ [a]

a) only one task at a time b) multiple tasks at a time

c) only two tasks at a time d) all of the mentioned

Explanation: A single thread of control allows the process to perform only one task at a time. In the case of multi-core, multiple threads can be run simultaneously and can perform multiple tasks at a time.

29. What is the objective of multiprogramming? [c]

a) Have a process running at all time b) Have multiple programs waiting in a queue ready to run

c) To increase CPU utilization d) None of the mentioned

Explanation: The objective of multiprogramming is to increase CPU utilization. Generally, a single process cannot use CPU or I/O at all time, whenever CPU or I/O is available another process can use it. Multiprogramming offers this ability to OS by keeping multiple programs in a ready queue.

Process Scheduling Queues

30. Which of the following do not belong to queues for processes? [b]

a) Job Queue b) PCB queue c) Device Queue d) Ready Queue

Explanation: PCB queue does not belong to queues for processes. PCB is a process control block which contains information related to process. Each process is represented by PCB.

31. When the process issues an I/O request _____ [a]

a) It is placed in an I/O queue b) It is placed in a waiting queue

c) It is placed in the ready queue d) It is placed in the Job queue

Explanation: When the process issues an I/O request it is placed in an I/O queue. I/O is a resource and it should be used effectively and every process should get access to it. There might be multiple processes which requested for I/O. Depending on scheduling algorithm I/O is allocated to any particular process and after completing I/O operation, I/O access is returned to the OS.

32. What will happen when a process terminates? [a]

a) It is removed from all queues b) It is removed from all, but the job queue

c) Its process control block is de-allocated d) Its process control block is never de-allocated

Explanation: When a process terminates, it removes from all queues. All allocated resources to that particular process are deallocated and all those resources are returned back to OS.

33. What is a long-term scheduler? [a]

a) It selects processes which have to be brought into the ready queue

b) It selects processes which have to be executed next and allocates CPU

c) It selects processes which heave to remove from memory by swapping

d) None of the mentioned

Explanation: A long-term scheduler selects processes which have to be brought into the ready queue. When processes enter the system, they are put in the job queue. Long-term scheduler selects processes from the job queue and puts them in the ready queue. It is also known as Job Scheduler.

34. If all processes I/O bound, the ready queue will almost always be _____ and the Short term Scheduler will have a _____ to do. [c]

a) full, little b) full, lot c) empty, little d) empty, lot

Explanation: If all processes are I/O bound, the ready queue will almost empty and the short-term scheduler will have a little to do. I/O bound processes spend more time doing I/O than computation.

35. What is a medium-term scheduler? [c]

a) It selects which process has to be brought into the ready queue

b) It selects which process has to be executed next and allocates CPU

c) It selects which process to remove from memory by swapping

d) None of the mentioned

Explanation: A medium-term scheduler selects which process to remove from memory by swapping. The medium-term scheduler swapped out the process and later swapped in. Swapping helps to free up memory.

36. What is a short-term scheduler? [b]

a) It selects which process has to be brought into the ready queue

b) It selects which process has to be executed next and allocates CPU

c) It selects which process to remove from memory by swapping

d) None of the mentioned

Explanation: A short-term scheduler selects a process which has to be executed next and allocates CPU. Short-term scheduler selects a process from the ready queue. It selects processes frequently.

37. The primary distinction between the short term scheduler and the long term scheduler is [c]

a) The length of their queues b) The type of processes they schedule

c) The frequency of their execution d) None of the mentioned

Explanation: The primary distinction between the short-term scheduler and long-term scheduler is the frequency of their execution. Short-term scheduler executes frequently while long-term scheduler executes much less frequently.

38. The only state transition that is initiated by the user process itself is _____ [a]

a) block b) wakeup c) dispatch d) none of the mentioned

Explanation: The only state transition that is initiated by the user process itself is block. Whenever a user process initiates an I/O request it goes into block state unless and until the I/O request is not completed.

39. In a time-sharing operating system, when the time slot given to a process is completed, the process goes from the running state to the _____ [b]

a) Blocked state b) Ready state c) Suspended state d) Terminated state

Explanation: In a time-sharing operating system, when the time slot given to a process is completed, the process goes from the running state to the Ready State. In a time-sharing operating system unit time is defined for sharing CPU, it is called a time quantum or time slice. If a process takes less than 1 time quantum, then the process itself releases the CPU.

40. In a multiprogramming environment _____ [c]

a) the processor executes more than one process at a time

b) the programs are developed by more than one person

c) more than one process resides in the memory

d) a single user can execute many programs at the same time

Explanation: In a multiprogramming environment more than one process resides in the memory. Whenever a CPU is available, one process amongst all present in memory gets the CPU for execution. Multiprogramming increases CPU utilization.

41. Suppose that a process is in "Blocked" state waiting for some I/O service. When the service is completed, it goes to the _____ [b]

a) Running state b) Ready state c) Suspended state d) Terminated state

Explanation: Suppose that a process is in "Blocked" state waiting for some I/O service. When the service is completed, it goes to the ready state. Process never goes directly to the running state from the waiting state. Only processes which are in ready state go to the running state whenever CPU allocated by operating system.

42. The context of a process in the PCB of a process does not contain _____ [d]

a) the value of the CPU registers b) the process state

c) memory-management information d) context switch time

Explanation: The context of a process in the PCB of a process does not contain context switch time. When switching CPU from one process to another, the current context of the process needs to be saved. It includes values of the CPU registers, process states, memory-management information.

43. Which of the following need not necessarily be saved on a context switch between processes? [b]

a) General purpose registers b) Translation lookaside buffer

c) Program counter d) All of the mentioned

Explanation: Translation Look-aside Buffer (TLB) need not necessarily be saved on a context switch between processes. A special, small, fast-lookup hardware cache is called Translation Look-aside Buffer. TLB used to reduce memory access time.

44. Which of the following does not interrupt a running process? [c]

a) A device b) Timer c) Scheduler process d) Power failure

Explanation: Scheduler process does not interrupt a running process. Scheduler process selects an available process from a pool of available processes and allocates CPU to it.

Process Synchronization

45. Which process can be affected by other processes executing in the system? [a]

a) cooperating process b) child process c) parent process d) init process

Explanation: A cooperating process can be affected by other processes executing in the system. Also it can affect other processes executing in the system. A process shares data with other processes, such a process is known as a cooperating process.

46. When several processes access the same data concurrently and the outcome of the execution depends on the particular order in which the access takes place is called [b]

a) dynamic condition b) race condition c) essential condition d) critical condition

Explanation: When several processes access the same data concurrently and the outcome of the execution depends on the particular order in which access takes place is called race condition.

47. If a process is executing in its critical section, then no other processes can be executing in their critical section. What is this condition called? [a]

a) mutual exclusion b) critical exclusion c) synchronous exclusion d) asynchronous exclusion

Explanation: If a process is executing in its critical section, then no other processes can be executed in their critical section. This condition is called Mutual Exclusion. Critical section of the process is shared between multiple processes. If this section is executed by more than one or all of them concurrently then the outcome of this is not as per desired outcome. For this reason the critical section of the process should not be executed concurrently.

48. Which one of the following is a synchronization tool? [c]

a) thread b) pipe c) semaphore d) socket

Explanation: Semaphore is a synchronization tool. Semaphore is a mechanism which synchronizes or controls access of threads on critical resources. There are two types of semaphores i) Binary Semaphore ii) Counting Semaphore.

49. A semaphore is a shared integer variable _____ [a]

a) that can not drop below zero b) that can not be more than zero

c) that can not drop below one d) that can not be more than one

Explanation: A semaphore is a shared integer variable that can not drop below zero. In binary semaphore, if the value of the semaphore variable is zero that means there is a process that uses a critical resource and no other

process can access the same critical resource until it is released. In Counting semaphore, if the value of the semaphore variable is zero that means there is no resource available.

50. Mutual exclusion can be provided by the _____ [c]

a) mutex locks b) binary semaphores

c) both mutex locks and binary semaphores d) none of the mentioned

Explanation: Mutual exclusion can be provided by both mutex locks and binary semaphore. Mutex is a short form of Mutual Exclusion. Binary semaphore also provides a mechanism for mutual exclusion. Binary semaphore behaves similar to mutex locks.

51. When high priority task is indirectly preempted by medium priority task effectively inverting the relative priority of the two tasks, the scenario is called _____ [a]

a) priority inversion b) priority removal c) priority exchange d) priority modification

Explanation: When a high priority task is indirectly preempted by a medium priority task effectively inverting the relative priority of the two tasks, the scenario is called priority inversion.

52. Process synchronization can be done on _____ [c]

a) hardware level b) software level

c) both hardware and software level d) none of the mentioned

Explanation: Process synchronization can be done on both hardware and software level. Critical section problems can be resolved using hardware synchronisation. But this method is not simple for implementation so software synchronization is mostly used.

53. A monitor is a module that encapsulates _____ [d]

a) shared data structures b) procedures that operate on shared data structure

c) synchronization between concurrent procedure invocation d) all of the mentioned

Explanation: A monitor is a module that encapsulates shared data structures, procedures that operate on shared data structure, synchronization between concurrent procedure invocation.

54. To enable a process to wait within the monitor _____ [a]

a) a condition variable must be declared as condition

b) condition variables must be used as boolean objects

c) semaphore must be used d) all of the mentioned

Explanation: To enable a process to wait within the monitor a condition variable must be declared as condition.

Process Creation

55. Restricting the child process to a subset of the parent's resources prevents any process from [c]

a) overloading the system by using a lot of secondary storage

b) under-loading the system by very less CPU utilization

c) overloading the system by creating a lot of sub-processes

d) crashing the system by utilizing multiple resources

Explanation: Restricting the child process to a subset of the parent's resources prevents any process from overloading the system by creating a lot of sub-processes. A process creates a child process, child process requires certain resources to complete its task. A child process can demand required resources directly from the system, but by doing this system will be overloaded. So to avoid overloading of the system, the parent process shares its resources among children.

56. A parent process calling _____ system call will be suspended until children processes terminate. [a]

a) wait b) fork c) exit d) exec

Explanation: A parent process calling wait system call will be suspended until children processes terminate. A parameter is passed to wait system call which will obtain exit status of child as well as wait system call returns PID of terminated process.

57. Cascading termination refers to termination of all child processes if the parent process terminates _____ [c]

a) Normally b) Abnormally c) Normally or abnormally d) None of the mentioned

Explanation: Cascading termination refers to termination of all child processes if the parent process terminates Normally or Abnormally. Some systems don't allow child processes to exist if the parent process has terminated. Cascading termination is normally initiated by the operating system.

58 With _____ only one process can execute at a time; meanwhile all other process are waiting for the processor. With _____ more than one process can be running simultaneously each on a different processor. [d]

a) Multiprocessing, Multiprogramming b) Multiprogramming, Uniprocessing

c) Multiprogramming, Multiprocessing d) Uniprogramming, Multiprocessing

Explanation: With Uniprogramming only one process can execute at a time; meanwhile all other processes are waiting for the processor. With Multiprocessing more than one process can run simultaneously each on different processors. The Uniprogramming system has only one program inside the core while the Multiprocessing system has multiple processes inside multiple cores. The core is one which executes instructions and stores data locally into registers.

59. In UNIX, each process is identified by its _____ [c]

a) Process Control Block b) Device Queue

c) Process Identifier d) None of the mentioned

Explanation: In Unix, each process is identified by its Process Identifier or PID. The PID provides unique value to each process in the system so that each process can be identified uniquely.

60. In UNIX, the return value for the fork system call is _____ for the child process and _____ for the parent process. [c]

a) A Negative integer, Zero b) Zero, A Negative integer

c) Zero, A nonzero integer d) A nonzero integer, Zero

Explanation: In Unix, the return value of the fork system call is Zero for the child process and Non-zero value for parent process. A fork system call returns the PID of a newly created (child) process to the parent and returns Zero to that newly created (child) process.

61. The child process can _____ [a]

a) be a duplicate of the parent process b) never be a duplicate of the parent process

c) cannot have another program loaded into it d) never have another program loaded into it

Explanation: The child process can be a duplicate of the parent process. The child process created by fork consists of a copy of the address space of the parent process.

62. The child process completes execution, but the parent keeps executing, then the child process is known as _____ [b]

a) Orphan b) Zombie c) Body d) Dead

Explanation: The child process completes execution, but the parent keeps executing, then the child process is known as Zombie. When a child process terminates, its resources get deallocated but its entry in the Process Control Block (PCB) remains there until its parent calls wait system call.

Inter Process Communication

63. What is Inter process communication? [b]

a) allows processes to communicate and synchronize their actions when using the same address space

b) allows processes to communicate and synchronize their actions

c) allows the processes to only synchronize their actions without communication

d) none of the mentioned

Explanation: Interprocess Communication allows processes to communicate and synchronize their actions. Interprocess Communication (IPC) mechanism is used by cooperating processes to exchange data and information.There are two models of IPC:→ Shared Memory→ Message Passing

64. Message passing system allows processes to _____ [a]

a) communicate with each other without sharing same address space

b) communicate with one another by resorting to shared data

c) share data d) name the recipient or sender of the message

Explanation: Message Passing system allows processes to communicate with each other without sharing the same address space.

65. Which of the following two operations are provided by the IPC facility? [d]

a) write & delete message b) delete & receive message

c) send & delete message d) receive & send message

Explanation: Two operations provided by the IPC facility are receive and send messages. Exchange of data takes place in cooperating processes.

66. Messages sent by a process _____ [c]

a) have to be of a fixed size b) have to be a variable size

c) can be fixed or variable sized d) none of the mentioned

Explanation: Messages sent by a process can be fixed or variable size. If the message size of the process is fixed then system level implementation is straightforward but it makes the task of programming more difficult. If the

message size of the process is variable then system level implementation is more complex but it makes the task of programming simpler.

67. The link between two processes P and Q to send and receive messages is called [a]

a) communication link b) message-passing link

c) synchronization link d) all of the mentioned

Explanation: The link between two processes P and Q to send and receive messages is called communication link. Two processes P and Q want to communicate with each other; there should be a communication link that must exist between these two processes so that both processes can able to send and receive messages using that link.

68. Which of the following are TRUE for direct communication? [b]

a) A communication link can be associated with N number of process(N = max. number of processes supported by system)

b) A communication link is associated with exactly two processes

c) Exactly N/2 links exist between each pair of processes(N = max. number of processes supported by system)

d) Exactly two link exists between each pair of processes

Explanation: For direct communication, a communication link is associated with exactly two processes. One communication link must exist between a pair of processes.

69. In indirect communication between processes P and Q _____ [c]

a) there is another process R to handle and pass on the messages between P and Q

b) there is another machine between the two processes to help communication

c) there is a mailbox to help communication between P and Q

d) none of the mentioned

Explanation: In indirect communication between processes P and Q there is a mailbox to help communication between P and Q. A mailbox can be viewed abstractly as an object into which messages can be placed by processes and from which messages can be removed.

70. In the non blocking send _____ [b]

a) the sending process keeps sending until the message is received

b) the sending process sends the message and resumes operation

c) the sending process keeps sending until it receives a message d) none of the mentioned

Explanation: In the non blocking send, the sending process sends the message and resumes operation. Sending process doesn't care about reception. It is also known as asynchronous send.

71. In the Zero capacity queue _____ [b]

a) the queue can store at least one message

b) the sender blocks until the receiver receives the message

c) the sender keeps sending and the messages don't wait in the queue

d) none of the mentioned

Explanation: In the Zero capacity queue the sender blocks until the receiver receives the message. Zero capacity queue has maximum capacity of Zero; thus message queue does not have any waiting message in it.

72. The Zero Capacity queue _____ [b]

a) is referred to as a message system with buffering

b) is referred to as a message system with no buffering

c) is referred to as a link d) none of the mentioned

Explanation: The Zero capacity queue is referred to as a message system with no buffering. Zero capacity queue has maximum capacity of Zero; thus message queue does not have any waiting message in it.

73. Bounded capacity and Unbounded capacity queues are referred to as _____ [b]

a) Programmed buffering b) Automatic buffering

c) User defined buffering d) No buffering

Explanation: Bounded capacity and Unbounded capacity queues are referred to as Automatic buffering. Buffer capacity of the Bounded capacity queue is finite length and buffer capacity of the Unbounded queue is infinite.

Remote Procedure Calls

74. Remote Procedure Calls are used _____ [c]

a) for communication between two processes remotely different from each other on the same system

b) for communication between two processes on the same system

c) for communication between two processes on separate systemsd) none of the mentioned

75. To differentiate the many network services a system supports _____ are used. [c]

a) Variables b) Sockets c) Ports d) Service names

76. RPC provides a(an) _____ on the client side, a separate one for each remote procedure. [a]

a) stub b) identifier c) name d) process identifier

76. What is stub? [d]

a) transmits the message to the server where the server side stub receives the message and invokes procedure on the server side

b) packs the parameters into a form transmittable over the network

c) locates the port on the server d) all of the mentioned

77. To resolve the problem of data representation on different systems RPCs define [c]

a) machine dependent representation of data b) machine representation of data

c) machine-independent representation of data d) none of the mentioned

78. What is the full form of RMI? [d]

a) Remote Memory Installation b) Remote Memory Invocation

c) Remote Method Installation d) Remote Method Invocation

79. The remote method invocation _____ [b]

a) allows a process to invoke memory on a remote object

b) allows a thread to invoke a method on a remote object

c) allows a thread to invoke memory on a remote object

d) allows a process to invoke a method on a remote object

80. A process that is based on IPC mechanism which executes on different systems and can communicate with other processes using message based communication, is called [c]

a) Local Procedure Call b) Inter Process Communication

c) Remote Procedure Call d) Remote Machine Invocation

Process Structures

81. The initial program that is run when the computer is powered up is called [d]

a) boot program b) bootloader c) initialize d) bootstrap program

82. How does the software trigger an interrupt? [b]

a) Sending signals to CPU through bus b) Executing a special operation called system call

c) Executing a special program called system program

d) Executing a special program called interrupt trigger program

83. What is a trap/exception? [b]

a) hardware generated interrupt caused by an error

b) software generated interrupt caused by an error

c) user generated interrupt caused by an error d) none of the mentioned

84. What is an ISR? [c]

a) Information Service Request b) Interrupt Service Request

c) Interrupt Service Routine d) Information Service Routine

85. What is an interrupt vector? [a]

a) It is an address that is indexed to an interrupt handler

b) It is a unique device number that is indexed by an address

c) It is a unique identity given to an interrupt d) None of the mentioned

86. DMA is used for _____ [a]

a) High speed devices(disks and communications network) b) Low speed devices

c) Utilizing CPU cycles d) All of the mentioned

87. In a memory mapped input/output _____ [b]

a) the CPU uses polling to watch the control bit constantly, looping to see if a device is ready

b) the CPU writes one data byte to the data register and sets a bit in control register to show that a byte is available

c) the CPU receives an interrupt when the device is ready for the next byte

d) the CPU runs a user written code and does accordingly

88. In a programmed input/output(PIO) _____ [a]

a) the CPU uses polling to watch the control bit constantly, looping to see if a device is ready

b) the CPU writes one data byte to the data register and sets a bit in control register to show that a byte is available

c) the CPU receives an interrupt when the device is ready for the next byte

d) the CPU runs a user written code and does accordingly

89. In an interrupt driven input/output _____ [c]

a) the CPU uses polling to watch the control bit constantly, looping to see if a device is ready

b) the CPU writes one data byte to the data register and sets a bit in control register to show that a byte is available

c) the CPU receives an interrupt when the device is ready for the next byte

d) the CPU runs a user written code and does accordingly

90. In the layered approach of Operating Systems _____ [b]

a) Bottom Layer(0) is the User interface b) Highest Layer(N) is the User interface

c) Bottom Layer(N) is the hardware d) Highest Layer(N) is the hardware

91. How does the Hardware trigger an interrupt? [a]

a) Sending signals to CPU through a system bus

b) Executing a special program called interrupt program

c) Executing a special program called system program

d) Executing a special operation called system call.

92. Which operation is performed by an interrupt handler? [d]

a) Saving the current state of the system

b) Loading the interrupt handling code and executing it

c) Once done handling, bringing back the system to the original state it was before the interrupt occurred

d) All of the mentioned

CPU Scheduling

93. Which module gives control of the CPU to the process selected by the short-term scheduler? [a]

a) dispatcher b) interrupt c) scheduler d) none of the mentioned

94. The processes that are residing in main memory and are ready and waiting to execute are kept on a list called _____ [b]

a) job queue b) ready queue c) execution queue d) process queue.

95. In priority scheduling algorithm _____ [a]

a) CPU is allocated to the process with highest priority

b) CPU is allocated to the process with lowest priority

c) Equal priority processes can not be scheduled d) None of the mentioned

96. In priority scheduling algorithm, when a process arrives at the ready queue, its priority is compared with the priority of _____ [b]

a) all process b) currently running process c) parent process d) init process

98. Which algorithm is defined in Time quantum? [b]

a) shortest job scheduling algorithm b) round robin scheduling algorithm

c) priority scheduling algorithm d) multilevel queue scheduling algorithm.

99. Process are classified into different groups in _____ [d]

a) shortest job scheduling algorithm b) round robin scheduling algorithm

100. In multilevel feedback scheduling algorithm _____ [a]

a) a process can move to a different classified ready queue

b) classification of ready queue is permanent

c) processes are not classified into groups d) none of the mentioned

101. Which one of the following can not be scheduled by the kernel? [b]

a) kernel level thread b) user level thread c) process d) none of the mentioned

Explanation: User level threads are managed by thread library and the kernel is unaware of them.

CPU Scheduling Benefits

102. CPU scheduling is the basis of _____ [b]

a) multiprocessor systems b) multiprogramming operating systems

c) larger memory sized systems d) none of the mentioned

102. With multiprogramming _____ is used productively. [a]

a) time b) space c) money d) all of the mentioned.

103. What are the two steps of a process execution? [b]

a) I/O & OS Burst b) CPU & I/O Burst

c) Memory & I/O Burst d) OS & Memory Burst

104. An I/O bound program will typically have _____ [c]

a) a few very short CPU bursts b) many very short I/O bursts

c) many very short CPU bursts d) a few very short I/O bursts

105. A process is selected from the ___ queue by the ___ scheduler, to be executed. [c]

a) blocked, short term b) wait, long term c) ready, short term d) ready, long term

106. In the following cases non – preemptive scheduling occurs? [b]

a) When a process switches from the running state to the ready state

b) When a process goes from the running state to the waiting state

c) When a process switches from the waiting state to the ready state

d) All of the mentioned

107. The switching of the CPU from one process or thread to another is called [d]

a) process switch b) task switch c) context switch d) all of the mentioned

108. What is Dispatch latency? [c]

a) the speed of dispatching a process from running to the ready state

b) the time of dispatching a process from running to ready state and keeping the CPU idle

c) the time to stop one process and start running another one d) none of the mentioned

109. Scheduling is done so as to _____ [a]

a) increase CPU utilization b) decrease CPU utilization

c) keep the CPU more idle d) none of the mentioned

110. Scheduling is done so as to _____ [a]

a) increase the throughput b) decrease the throughput

c) increase the duration of a specific amount of work d) none of the mentioned.

111. What is Turnaround time? [d]

a) the total waiting time for a process to finish execution

b) the total time spent in the ready queue

c) the total time spent in the running queue

d) the total time from the completion till the submission of a process

112. Scheduling is done so as to _____ [b]

a) increase the turnaround time b) decrease the turnaround time

c) keep the turnaround time same

d) there is no relation between scheduling and turnaround time

113. What is Waiting time? [b]

a) the total time in the blocked and waiting queues

b) the total time spent in the ready queue

c) the total time spent in the running queue

d) the total time from the completion till the submission of a process

114. Scheduling is done so as to _____ [c]

a) increase the waiting time b) keep the waiting time the same

c) decrease the waiting time d) none of the mentioned.

115. What is Response time? [b]

a) the total time taken from the submission time till the completion time

b) the total time taken from the submission time till the first response is produced

c) the total time taken from submission time till the response is output.

CPU Scheduling Algorithms

116. Round robin scheduling falls under the category of _____ [b]

a) Non-preemptive scheduling b) Preemptive scheduling

c) All of the mentioned d) None of the mentioned

117. With round robin scheduling algorithm in a time shared system _ [a]

a) using very large time slices converts it into First come First served scheduling algorithm

b) using very small time slices converts it into First come First served scheduling algorithm

c) using extremely small time slices increases performance

d) using very small time slices converts it into Shortest Job First algorithm

Explanation: All the processes will be able to get completed.

118. The portion of the process scheduler in an operating system that dispatches processes is concerned with _____ [a]

a) assigning ready processes to CPU

b) assigning ready processes to waiting queue

c) assigning running processes to blocked queue

d) all of the mentioned

119. Complex scheduling algorithms _____ [a]

a) are very appropriate for very large computers

b) use minimal resources

c) use many resources

d) all of the mentioned

Explanation: Large computers are overloaded with a greater number of processes.

120. What is FIFO algorithm? [b]

a) first executes the job that came in last in the queue

b) first executes the job that came in first in the queue

c) first executes the job that needs minimal processor

d) first executes the job that has maximum processor needs

121 The strategy of making processes that are logically runnable to be temporarily suspended is called _____ [b]

a) Non preemptive scheduling

b) Preemptive scheduling

c) Shortest job first

d) First come First served

122. What is Scheduling? [a]

a) allowing a job to use the processor

b) making proper use of processor

c) all of the mentioned

d) none of the mentioned

122. There are 10 different processes running on a workstation. Idle processes are waiting for an input event in the input queue. Busy processes are scheduled with the Round-Robin time sharing method. Which out of the following quantum times is the best value for small response times, if the processes have a short runtime, e.g. less than 10ms? [a]

a) tQ = 15ms b) tQ = 40ms c) tQ = 45ms d) tQ = 50ms

123. Orders are processed in the sequence they arrive if ___ rule sequences the jobs. [c]

a) earliest due date b) slack time remaining c) first come, first served d) critical ratio

124. Which of the following algorithms tends to minimize the process flow time? [b]

a) First come First served b) Shortest Job First

125. Under multiprogramming, turnaround time for short jobs is usually _____ and that for long jobs is slightly _____ [b]

a) Lengthened; Shortened b) Shortened; Lengthened

c) Shortened; Shortened d) Shortened; Unchanged

126 Which of the following statements are true? (GATE 2010) [d]

I. Shortest remaining time first scheduling may cause starvation

II. Preemptive scheduling may cause starvation

III. Round robin is better than FCFS in terms of response time

a) I only b) I and III only c) II and III only d) I, II and III

Explanation: I) Shortest remaining time first scheduling is a preemptive version of shortest job scheduling. It may cause starvation as shorter processes may keep coming and a long CPU burst process never gets CPU.II) Preemption may cause starvation. If priority based scheduling with preemption is used, then a low priority process may never get CPU.III) Round Robin Scheduling improves response time as all processes get CPU after a specified time.

127. Which is the most optimal scheduling algorithm? [b]

a) FCFS – First come First served b) SJF – Shortest Job First

c) RR – Round Robin d) None of the mentioned

128. The real difficulty with SJF in short term scheduling is _____ [b]

a) it is too good an algorithm b) knowing the length of the next CPU request

c) it is too complex to understand d) none of the mentioned

129. The FCFS algorithm is particularly troublesome for _____ [b]

a) time sharing systems b) multiprogramming systems

c) multiprocessor systems d) operating systems

Explanation: In a time sharing system, each user needs to get a share of the CPU at regular intervals.

130. Consider the following set of processes, the length of the CPU burst time given in milliseconds. [a]

Process	Burst time
P1	6
P2	8
P3	7
P4	3

Assuming the above process being scheduled with the SJF scheduling algorithm.

a) The waiting time for process P1 is 3ms b) The waiting time for process P1 is 0ms

c) The waiting time for process P1 is 16ms d) The waiting time for process P1 is 9ms

131. Preemptive Shortest Job First scheduling is sometimes called _____ [d]

a) Fast SJF scheduling

b) EDF scheduling – Earliest Deadline First

c) HRRN scheduling – Highest Response Ratio Next

d) SRTN scheduling – Shortest Remaining Time Next

132. An SJF algorithm is simply a priority algorithm where the priority is _____ [a]

a) the predicted next CPU burst b) the inverse of the predicted next CPU burst

c) the current CPU burst d) anything the user wants

Explanation: The larger the CPU burst, the lower the priority.

133. Choose one of the disadvantages of the priority scheduling algorithm? [c]

a) it schedules in a very complex manner b) its scheduling takes up a lot of time

c) it can lead to some low priority process waiting indefinitely for the CPU

d) none of the mentioned

134. What is 'Aging'? [d]

a) keeping track of cache contents

b) keeping track of what pages are currently residing in memory

c) keeping track of how many times a given page is referenced

d) increasing the priority of jobs to ensure termination in a finite time

135. A solution to the problem of indefinite blockage of low – priority processes is [d]

a) Starvation b) Wait queue c) Ready queue d) Aging

136. Which of the following statements are true? (GATE 2010)

i) Shortest remaining time first scheduling may cause starvation

ii) Preemptive scheduling may cause starvation

iii) Round robin is better than FCFS in terms of response time [d]

a) i only b) i and iii only c) ii and iii only d) i, ii and iii

137. Which of the following scheduling algorithms gives minimum average waiting time? [b]

a) FCFS b) SJF c) Round – robin d) Priority

.

The Critical Section (CS) Problem and Solutions

138. Concurrent access to shared data may result in _____ [c]

a) data consistency b) data insecurity c) data inconsistency d) none of the mentioned

139. A situation where several processes access and manipulate the same data concurrently and the outcome of the execution depends on the particular order in which access takes place is called _____ [b]

a) data consistency b) race condition c) aging d) starvation.

140. The segment of code in which the process may change common variables, update tables, write into files is known as _____ [b]

a) program b) critical section c) non – critical section d) synchronizing

141. Which of the following conditions must be satisfied to solve the critical section problem? [d]

a) Mutual Exclusion b) Progress c) Bounded Waiting d) All of the mentioned

142. Mutual exclusion implies that _____ [a]

a) if a process is executing in its critical section, then no other process must be executing in their critical sections

b) if a process is executing in its critical section, then other processes must be executing in their critical sections

c) if a process is executing in its critical section, then all the resources of the system must be blocked until it finishes execution

d) none of the mentioned

143. Bounded waiting implies that there exists a bound on the number of times a process is allowed to enter its critical section _____ [a]

a) after a process has made a request to enter its critical section and before the request is granted

b) when another process is in its critical section

c) before a process has made a request to enter its critical section

d) none of the mentioned

144. A minimum of _____ variable(s) is/are required to be shared between processes to solve the critical section problem. [b]

a) one b) two c) three d) four

145. In the bakery algorithm to solve the critical section problem _____ [b]

a) each process is put into a queue and picked up in an ordered manner

b) each process receives a number (may or may not be unique) and the one with the lowest number is served next

c) each process gets a unique number and the one with the highest number is served next

d) each process gets a unique number and the one with the lowest number is served next

Semaphores

146. An un-interruptible unit is known as _____ [b]

a) single b) atomic c) static d) none of the mentioned

147. TestAndSet instruction is executed _____ [c]

a) after a particular process b) periodically c) atomically d) none of the mentioned

148. Semaphore is a/an _____ to solve the critical section problem. [c]

a) hardware for a system b) special program for a system

c) integer variable d) none of the mentioned

149. What are the two atomic operations permissible on semaphores? [a]

a) wait b) stop c) hold d) none of the mentioned

150. What are Spinlocks? [d]

a) CPU cycles wasting locks over critical sections of programs

b) Locks that avoid time wastage in context switches

c) Locks that work better on multiprocessor systems

d) All of the mentioned

151. What is the main disadvantage of spinlocks? [b]

a) they are not sufficient for many process b) they require busy waiting

c) they are unreliable sometimes d) they are too complex for programmers

152. The wait operation of the semaphore basically works on the basic _____ system call. [b]

a) stop() b) block() c) hold() d) wait()

153 The signal operation of the semaphore basically works on the basic ___ system call. [b]

a) continue() b) wakeup() c) getup() d) start()

154. If the semaphore value is negative _____ [a]

a) its magnitude is the number of processes waiting on that semaphore

b) it is invalid

c) no operation can be further performed on it until the signal operation is performed on it

d) none of the mentioned

155. The code that changes the value of the semaphore is _____ [c]

a) remainder section code b) non – critical section code

c) critical section code d) none of the mentioned

156. The following program consists of 3 concurrent processes and 3 binary semaphores. The semaphores are initialized as S0 = 1, S1 = 0, S2 = 0.

Process P0

```
while(true)
{
   wait(S0);
   print '0';
   release(S1);
   release(S2);
}
```

Process P1

wait(S1);

release(S0);

Process P2

wait(S2);

release(S0);

How many times will P0 print '0'? [c]

a) At least twice b) Exactly twice c) Exactly thrice d) Exactly once

157. Each process Pi, i = 0,1,2,3,……,9 is coded as follows.

repeat

P(mutex)

{Critical Section}

V(mutex)

forever

The code for P10 is identical except that it uses V(mutex) instead of P(mutex). What is the largest number of processes that can be inside the critical section at any moment (the mutex being initialized to 1)? [c]

a) 1 b) 2 c) 3 d) None of the mentioned

Explanation: Any one of the 9 processes can get into critical section after executing P(mutex) which decrements the mutex value to 0. At this time P10 can enter critical section by incrementing the value to 1. Now any of the 9 processes can enter the critical section by again decrementing the mutex value to 0. None of the remaining processes can get into their critical sections.

158. Two processes, P1 and P2, need to access a critical section of code. Consider the following synchronization construct used by the processes.

```
Process P1 :
while(true)
{
w1 = true;
while(w2 == true);
Critical section
w1 = false;
}
```

```
Remainder Section

Process P2 :
while(true)
{
w2 = true;
while(w1 == true);
Critical section
w2 = false;
}
Remainder Section
```

Here, w1 and w2 have shared variables, which are initialized to false. Which one of the following statements is TRUE about the above construct? [d]

a) It does not ensure mutual exclusion b) It does not ensure bounded waiting

c) It requires that processes enter the critical section in strict alternation

d) It does not prevent deadlocks but ensures mutual exclusion

159. What will happen if a non-recursive mutex is locked more than once? [b]

a) Starvation b) Deadlock c) Aging d) Signaling

Explanation: If a thread which had already locked a mutex, tries to lock the mutex again, it will enter into the waiting list of that mutex, which results in a deadlock. It is because no other thread can unlock the mutex.

160. What is a semaphore? [c]

a) is a binary mutex b) must be accessed from only one process

c) can be accessed from multiple processes d) none of the mentioned

161. What are the two kinds of semaphores? [b]

a) mutex & counting b) binary & counting c) counting & decimal d) decimal & binary

162. What is a mutex? [b]

a) is a binary mutex b) must be accessed from only one process

c) can be accessed from multiple processes d) none of the mentioned

163. At a particular time of computation the value of a counting semaphore is 7.Then 20 P operations and 15 V operations were completed on this semaphore. The resulting value of the semaphore is? (GATE 1987) [b]

a) 42 b) 2 c) 7 d) 12

Explanation: P represents Wait and V represents Signal. P operation will decrease the value by 1 every time and V operation will increase the value by 1 every time.

164. A binary semaphore is a semaphore with integer values _____ [a]

a) 1 b) -1 c) 0.8 d) 0.5

165. The following pair of processes share a common variable X.

```
Process A
int Y;
A1: Y = X*2;
A2: X = Y;

Process B
int Z;
B1: Z = X+1;
B2: X = Z;
```

X is set to 5 before either process begins execution. As usual, statements within a process are executed sequentially, but statements in process A may execute in any order with respect to statements in process B. How many different values of X are possible after both processes finish executing? [c]

a)two b)three c)four d) eight

Explanation: Here are the possible ways in which statements from A and B can be interleaved.

A1 A2 B1 B2: X = 11 A1 B1 A2 B2: X = 6 A1 B1 B2 A2: X = 10

B1 A1 B2 A2: X = 10 B1 A1 A2 B2: X = 6 B1 B2 A1 A2: X = 12.

166. The program follows to use a shared binary semaphore T.

```
Process A
int Y;
A1: Y = X*2;
A2: X = Y;
signal(T);

Process B
int Z;
B1: wait(T);
B2: Z = X+1;
X = Z;
```

T is set to 0 before either process begins execution and, as before, X is set to 5.

Now, how many different values of X are possible after both processes finish executing? [a]

a) one b) two c) three d) four

Explanation: The semaphore T ensures that all the statements from A finish execution before B begins. So now there is only one way in which statements from A and B can be interleaved:A1 A2 B1 B2: X = 11.

167. Semaphores are mostly used to implement _____ [b]

a) System calls b) IPC mechanisms c) System protection d) None of the mentioned

168. Spinlocks are intended to provide _____ only. [b]

a) Mutual Exclusion b) Bounded Waiting c) Aging d) Progress

Classic Synchronization Problems

169. The bounded buffer problem is also known as _____ [c]

a) Readers – Writers problem b) Dining – Philosophers problem

c) Producer – Consumer problem d) None of the mentioned

170. In the bounded buffer problem, there are the empty and full semaphores that [a]

a) count the number of empty and full buffers

b) count the number of empty and full memory spaces

c) count the number of empty and full queues d) none of the mentioned

171. In the bounded buffer problem _____ [b]

a) there is only one buffer b) there are n buffers (n being greater than one but finite)

c) there are infinite buffers d) the buffer size is bounded

172. To ensure difficulties do not arise in the readers – writers problem _____ are given exclusive access to the shared object. [b]

a) readers b) writers c) readers and writers d) none of the mentioned

173. The dining – philosophers problem will occur in case of _____ [a]

a) 5 philosophers and 5 chopsticks b) 4 philosophers and 5 chopsticks

c) 3 philosophers and 5 chopsticks d) 6 philosophers and 5 chopsticks

174. A deadlock free solution to the dining philosophers problem _____ [b]

a) necessarily eliminates the possibility of starvation

b) does not necessarily eliminate the possibility of starvation

c) eliminates any possibility of any kind of problem further d) none of the mentioned

175. All processes share a semaphore variable mutex, initialized to 1. Each process must execute wait(mutex) before entering the critical section and signal(mutex) afterward.

Suppose a process executes in the following manner.

```
signal(mutex);
.....
critical section
.....
wait(mutex);
```

In this situation : [c]

a) a deadlock will occur b) processes will starve to enter critical section

c) several processes maybe executing in their critical section d) all of the mentioned

176. All processes share a semaphore variable mutex, initialized to 1. Each process must execute wait(mutex) before entering the critical section and signal(mutex) afterward.

Suppose a process executes in the following manner. [a]

```
wait(mutex);
.....
critical section
.....
wait(mutex);
```

a) a deadlock will occur

b) processes will starve to enter critical section

c) several processes maybe executing in their critical section

d) all of the mentioned

177. Consider the methods used by processes P1 and P2 for accessing their critical sections whenever needed, as given below. The initial values of shared boolean variables S1 and S2 are randomly assigned. (GATE 2010)

Method used by P1 :

```
while(S1==S2);
Critical section
S1 = S2;
```

Method used by P2 :
while(S1!=S2);
Critical section
S2 = not(S1);

Which of the following statements describes properties achieved? [d]

a) Mutual exclusion but not progress

b) Progress but not mutual exclusion

c) Neither mutual exclusion nor progress

d) Both mutual exclusion and progress

178. A monitor is a type of _____ [c]

a) semaphore

b) low level synchronization construct

c) high level synchronization construct

d) none of the mentioned

179. A monitor is characterized by _____ [a]

a) a set of programmer defined operators

b) an identifier

c) the number of variables in it

d) all of the mentioned

180. A procedure defined within a _____ can access only those variables declared locally within the _____ and its formal parameters. [d]

a) process, semaphore

b) process, monitor

181. The monitor construct ensures that_____ [a]

a) only one process can be active at a time within the monitor

b) n number of processes can be active at a time within the monitor (n being greater than 1)

c) the queue has only one process in it at a time

d) all of the mentioned

182. What are the operations that can be invoked on a condition variable? [a]

a) wait & signal b) hold & wait c) signal & hold d) continue & signal

183. Which is the process of invoking the wait operation? [a]

a) suspended until another process invokes the signal operation

b) waiting for another process to complete before it can itself call the signal operation

c) stopped until the next process in the queue finishes execution

d) none of the mentioned

183. If no process is suspended, the signal operation _____ [c]

a) puts the system into a deadlock state b) suspends some default process execution

c) nothing happens d) the output is unpredictable

Deadlock

184. What is a reusable resource? [a]

a) that can be used by one process at a time and is not depleted by that use

b) that can be used by more than one process at a time

c) that can be shared between various threads d) none of the mentioned

185. Which of the following condition is required for a deadlock to be possible? [d]

a) mutual exclusion

b) a process may hold allocated resources while awaiting assignment of other resources

c) no resource can be forcibly removed from a process holding it d) all of the mentioned

186. A system is in the safe state if _____ [a]

a) the system can allocate resources to each process in some order and still avoid a deadlock

b) there exist a safe sequence

c) all of the mentioned d) none of the mentioned

187. The circular wait condition can be prevented by _____ [a]

a) defining a linear ordering of resource types b) using thread

c) using pipes d) all of the mentioned

188. Which one of the following is the deadlock avoidance algorithm? [a]

a) banker's algorithm b) round-robin algorithm

c) elevator algorithm d) karn's algorithm

189. What is the drawback of banker's algorithm? [d]

a) in advance processes rarely know how much resource they will need

b) the number of processes changes as time progresses

c) resource once available can disappear d) all of the mentioned

190. For an effective operating system, when to check for deadlock? [c]

a) every time a resource request is made b) at fixed time intervals

c) every time a resource request is made at fixed time intervals d) none of the mentioned

191. A problem encountered in multitasking when a process is perpetually denied necessary resources is called _____ [b]

a) deadlock b) starvation c) inversion d) aging

192. Which one of the following is a visual (mathematical) way to determine the deadlock occurrence? [a]

a) resource allocation graph b) starvation graph

193. To avoid deadlock _____ [a]

a) there must be a fixed number of resources to allocate

b) resource allocation must be done only once

c) all deadlocked processes must be aborted d) inversion technique can be used

Deadlock Prevention

194. The number of resources requested by a process _____ [c]

a) must always be less than the total number of resources available in the system

b) must always be equal to the total number of resources available in the system

c) must not exceed the total number of resources available in the system

d) must exceed the total number of resources available in the system

195. The request and release of resources are _____ [c]

a) command line statements b) interrupts c) system calls d) special programs

196. What are Multithreaded programs? [b]

a) lesser prone to deadlocks b) more prone to deadlocks

c) not at all prone to deadlocks d) none of the mentioned

Explanation: Multiple threads can compete for shared resources.

197. For a deadlock to arise, which of the following conditions must hold simultaneously? [d]

a) Mutual exclusion b) No preemption c) Hold and wait d) All of the mentioned

198. For Mutual exclusion to prevail in the system _____ [a]

a) at least one resource must be held in a non sharable mode

b) the processor must be a uniprocessor rather than a multiprocessor

c) there must be at least one resource in a sharable mode d) all of the mentioned

Explanation: If another process requests that resource (non – shareable resource), the requesting process must be delayed until the resource has been released.

199. For a Hold and wait condition to prevail _____ [b]

a) A process must be not be holding a resource, but waiting for one to be freed, and then request to acquire it

b) A process must be holding at least one resource and waiting to acquire additional resources that are being held by other processes

c) A process must hold at least one resource and not be waiting to acquire additional resources

d) None of the mentioned

200. Deadlock prevention is a set of methods _____ [a]

a) to ensure that at least one of the necessary conditions cannot hold

b) to ensure that all of the necessary conditions do not hold

c) to decide if the requested resources for a process have to be given or not

d) to recover from a deadlock

201. For non sharable resources like a printer, mutual exclusion _____ [a]

a) must exist b) must not exist c) may exist d) none of the mentioned

Explanation: A printer cannot be simultaneously shared by several processes.

202. For sharable resources, mutual exclusion _____ [b]

a) is required b) is not required

c) may be or may not be required d) none of the mentioned

Explanation: They do not require mutually exclusive access, and hence cannot be involved in a deadlock.

203. To ensure that the hold and wait condition never occurs in the system, it must be ensured that _____ [d]

a) whenever a resource is requested by a process, it is not holding any other resources

b) each process must request and be allocated all its resources before it begins its execution

c) a process can request resources only when it has none d) all of the mentioned

Explanation: c – A process may request some resources and use them. Before it can can request any additional resources, however it must release all the resources that it is currently allocated.

204. The disadvantage of a process being allocated all its resources before beginning its execution is _____ [b]

a) Low CPU utilization b) Low resource utilization

c) Very high resource utilization d) None of the mentioned

205. To ensure no preemption, if a process is holding some resources and requests another resource that cannot be immediately allocated to it _____ [d]

a) then the process waits for the resources be allocated to it

b) the process keeps sending requests until the resource is allocated to it

c) the process resumes execution without the resource being allocated to it

d) then all resources currently being held are preempted

206. One way to ensure that the circular wait condition never holds is to _____ [a]

a) impose a total ordering of all resource types and to determine whether one precedes another in the ordering

b) to never let a process acquire resources that are held by other processes

c) to let a process wait for only one resource at a time d) all of the mentioned

Deadlock Avoidance

207. Each request requires that the system consider the _____ to decide whether the current request can be satisfied or must wait to avoid a future possible deadlock. [a]

a) resources currently available b) processes that have previously been in the system

c) resources currently allocated to each process

d) future requests and releases of each process

208. Given a priori information about the _____ number of resources of each type that maybe requested for each process, it is possible to construct an algorithm that ensures that the system will never enter a deadlock state. [c]

a) minimum b) average c) maximum d) approximate

209. A deadlock avoidance algorithm dynamically examines the _____ to ensure that a circular wait condition can never exist. [a]

a) resource allocation state b) system storage state c) operating system d) resources

Explanation: Resource allocation states are used to maintain the availability of the already and current available resources.

210. A state is safe, if _____ [b]

a) the system does not crash due to deadlock occurrence

b) the system can allocate resources to each process in some order and still avoid a deadlock

c) the state keeps the system protected and safe d) all of the mentioned

211. A system is in a safe state only if there exists a _____ [c]

a) safe allocation b) safe resource c) safe sequence d) all of the mentioned

212. All unsafe states are _____ [b]

a) deadlocks b) not deadlocks c) fatal d) none of the mentioned

213. A system has 12 magnetic tape drives and 3 processes : P0, P1, and P2. Process P0 requires 10 tape drives, P1 requires 4 and P2 requires 9 tape drives.

Process
P0
P1
P2

Maximum needs (process-wise: P0 through P2 top to bottom)
10
4
9

Currently allocated (process-wise)
5
2
2

Which of the following sequence is a safe sequence? [d]

a) P0, P1, P2 b) P1, P2, P0 c) P2, P0, P1 d) P1, P0, P2

214. If no cycle exists in the resource allocation graph _____ [b]

a) then the system will not be in a safe state b) then the system will be in a safe state

c) all of the mentioned d) none of the mentioned

215. The resource allocation graph is not applicable to a resource allocation system _____ [a]

a) with multiple instances of each resource type b) with a single instance of each resource type

c) single & multiple instances of each resource type d) none of the mentioned

216. The Banker's algorithm is ___ than the resource allocation graph algorithm. [a]

a) less efficient b) more efficient c) equal d) none of the mentioned

217. The data structures available in the Banker's algorithm are _____ [d]

a) Available b) Need c) Allocation d) All of the mentioned

218. The content of the matrix Need is _____ [c]

a) Allocation – Available b) Max – Available c) Max – Allocation d) Allocation – Max

219. A system with 5 processes P0 through P4 and three resource types A, B, C have A with 10 instances, B with 5 instances, and C with 7 instances. At time t0, the following snapshot has been taken:

Process
P0
P1
P2
P3
P4

Allocation (process-wise : P0 through P4 top **TO** bottom)

A	B	C
0	1	0
2	0	0
3	0	2
2	1	1
0	0	2

MAX (process-wise: P0 through P4 top **TO** bottom)

A	B	C
7	5	3
3	2	2
9	0	2
2	2	2
4	3	3

Available

A	B	C
3	3	2

The sequence <P1, P3, P4, P2, P0> leads the system to _____ [b]

a) an unsafe state b) a safe state c) a protected state d) a deadlock

Deadlock Detection

220. The wait-for graph is a deadlock detection algorithm that is applicable when _____ [a]

a) all resources have a single instance b) all resources have multiple instances

221. An edge from process Pi to Pj in a wait for graph indicates that _____ [a]

a) Pi is waiting for Pj to release a resource that Pi needs

b) Pj is waiting for Pi to release a resource that Pj needs

c) Pi is waiting for Pj to leave the system d) Pj is waiting for Pi to leave the system

222. If the wait for graph contains a cycle _____ [a]

a) then a deadlock does not exist b) then a deadlock exists

c) then the system is in a safe state d) either deadlock exists or system is in a safe state

223. If deadlocks occur frequently, the detection algorithm must be invoked _____ [b]

a) rarely b) frequently c) rarely & frequently d) none of the mentioned

224. What is the disadvantage of invoking the detection algorithm for every request? [c]

a) overhead of the detection algorithm due to consumption of memory

b) excessive time consumed in the request to be allocated memory

c) considerable overhead in computation time d) all of the mentioned

225. A deadlock eventually cripples system throughput and will cause the CPU utilization to _____ [b]

a) increase b) drop c) stay still d) none of the mentioned

226. Every time a request for allocation cannot be granted immediately, the detection algorithm is invoked. This will help identify _____ [a]

a) the set of processes that have been deadlocked

b) the set of processes in the deadlock queue

c) the specific process that caused the deadlock d) all of the mentioned

227. A computer system has 6 tape drives, with 'n' processes competing for them. Each process may need 3 tape drives. The maximum value of 'n' for which the system is guaranteed to be deadlock free is? [a]

a) 2 b) 3 c) 4 d) 1

228. A system has 3 processes sharing 4 resources. If each process needs a maximum of 2 units then, deadlock _____ [a]

a) can never occur b) may occur c) has to occur d) none of the mentioned

229. 'm' processes share 'n' resources of the same type. The maximum need of each process doesn't exceed 'n' and the sum of all their maximum needs is always less than m+n. In this setup, deadlock _____ [a]

a) can never occur b) may occur c) has to occur d) none of the mentioned

Deadlock Recovery

230. A deadlock can be broken by _____ [c]

a) preempt all resources from all processes b) abort all the process in the system

c) abort one or more processes to break the circular wait d) none of the mentioned

231. The two ways of aborting processes and eliminating deadlocks are _____ [c]

a) Abort all deadlocked processes b) Abort all processes

c) Abort one process at a time until the deadlock cycle is eliminated

d) All of the mentioned

232. Those processes should be aborted on occurrence of a deadlock, the termination of which? [b]

a) is more time consuming b) incurs minimum cost

c) safety is not hampered d) all of the mentioned

233. The process to be aborted is chosen on the basis of the following factors? [d]

a) priority of the process b) process is interactive or batch

c) how long the process has computed d) all of the mentioned

234. Cost factors for process termination include _____ [c]

a) Number of resources the deadlock process is not holding

b) CPU utilization at the time of deadlock

c) Amount of time a deadlocked process has thus far consumed during its execution

d) All of the mentioned

235. If we preempt a resource from a process, the process cannot continue with its normal execution and it must be _____ [b]

a) aborted b) rolled back c) terminated d) queued

236. To _____ to a safe state, the system needs to keep more information about the states of processes. [b]

a) abort the process b) roll back the process c) queue the process d) none of the mentioned

237. If the resources are always preempted from the same process _____ can occur. [d]

a) deadlock b) system crash c) aging d) starvation

238. What is the solution to starvation? [a]

a) the number of rollbacks must be included in the cost factor

b) the number of resources must be included in resource preemption

c) resource preemption be done instead d) all of the mentioned

Memory Management – Swapping Processes

239. What is Address Binding? [d]

a) going to an address in memory b) locating an address with the help of another address

c) binding two addresses together to form a new address in a different memory space

d) a mapping from one address space to another

240. Binding of instructions and data to memory addresses can be done at ___ [d]

a) Compile time b) Load time c) Execution time d) All of the mentioned

241. If the process can be moved during its execution from one memory segment to another, then binding must be _____ [a]

a) delayed until run time b) preponed to compile time

c) preponed to load time d) none of the mentioned

242. What is Dynamic loading? [b]

a) loading multiple routines dynamically b) loading a routine only when it is called

c) loading multiple routines randomly d) none of the mentioned

243. What is the advantage of dynamic loading? [a]

a) A used routine is used multiple times b) An unused routine is never loaded

c) CPU utilization increases d) All of the mentioned

244. The idea of overlays is to _____ [d]

a) data that are needed at any given time

b) enable a process to be larger than the amount of memory allocated to it

c) keep in memory only those instructions d) all of the mentioned

255. The _____ must design and program the overlay structure. [a]

a) programmer b) system architect c) system designer d) none of the mentioned

256. The _____ swaps processes in and out of the memory. [a]

a) Memory manager b) CPU c) CPU manager d) User

257. If a higher priority process arrives and wants service, the memory manager can swap out the lower priority process to execute the higher priority process. When the higher priority process finishes, the lower priority process is swapped back in and continues execution. This variant of swapping is sometimes called? [c]

a) priority swapping b) pull out, push in c) roll out, roll in d) none of the mentioned

258. If binding is done at assembly or load time, then the process _____ be moved to different locations after being swapped out and in again. [c]

a) can b) must c) can never d) may

259. In a system that does not support swapping _____ [a]

a) the compiler normally binds symbolic addresses (variables) to relocatable addresses

b) the compiler normally binds symbolic addresses to physical addresses

c) the loader binds relocatable addresses to physical addresses

d) binding of symbolic addresses to physical addresses normally takes place during execution

260. Which of the following is TRUE? [c]

a) Overlays are used to increase the size of physical memory

b) Overlays are used to increase the logical address space

c) When overlays are used, the size of a process is not limited to the size of the physical memory

d) Overlays are used whenever the physical address space is smaller than the logical address space

261. The address generated by the CPU is referred to as _____ [b]

a) Physical address b) Logical address c) Neither physical nor logical d) None of the mentioned

262. The address loaded into the memory address register of the memory is referred to as _____ [a]

a) Physical address b) Logical address c) Neither physical nor logical d) None of the mentioned

263. The run time mapping from virtual to physical addresses is done by a hardware device called the [b]

a) Virtual to physical mapper b) Memory management unit

c) Memory mapping unit d) None of the mentioned

264. The base register is also known as the _____ [c]

a) basic register b) regular register c) relocation register d) delocation register

265. The size of a process is limited to the size of _____ [a]

a) physical memory b) external storage c) secondary storage d) none of the mentioned

Memory Management

266. CPU fetches the instruction from memory according to the value of _____ [a]

a) program counter b) status register c) instruction register d) program status word

267. A memory buffer used to accommodate a speed differential is called _____ [b]

a) stack pointer b) cache c) accumulator d) disk buffer

268. Which one of the following is the address generated by CPU? [c]

a) physical address b) absolute address c) logical address d) none of the mentioned

269. Run time mapping from virtual to physical address is done by _____ [a]

a) Memory management unit b) CPU c) PCI d) None of the mentioned

270. Memory management technique in which system stores and retrieves data from secondary storage for use in main memory is called? [b]

a) fragmentation b) paging c) mapping d) none of the mentioned

271. The address of a page table in memory is pointed by _____ [b]

a) stack pointer b) page table base register c) page register d) program counter

272. Program always deals with _____ [a]

a) logical address b) absolute address c) physical address d) relative address

273. The page table contains _____ [a]

a) base address of each page in physical memory b) page offset

c) page size d) none of the mentioned

274. What is compaction? [c]

a) a technique for overcoming internal fragmentation b) a paging technique

c) a technique for overcoming external fragmentation d) a technique for overcoming fatal error

275. Operating System maintains the page table for _____ [a]

a) each process b) each thread c) each instruction d) each address

Memory Management – Memory Allocation

276. The main memory accommodates _____ [a]

a) operating system b) cpu c) user processes d) all of the mentioned

277. What is the operating system? [c]

a) in the low memory b) in the high memory

c) either low or high memory (depending on the location of interrupt vector)

278. In contiguous memory allocation _____ [a]

a) each process is contained in a single contiguous section of memory

b) all processes are contained in a single contiguous section of memory

c) the memory space is contiguous d) none of the mentioned

279. The relocation register helps in _____ [c]

a) providing more address space to processes b) a different address space to processes

c) to protect the address spaces of processes d) none of the mentioned

280. With relocation and limit registers, each logical address must be _____ the limit register. [a]

a) less than b) equal to c) greater than d) none of the mentioned

281. The operating system and the other processes are protected from being modified by an already running process because _____ [D]

a) they are in different memory spaces b) they are in different logical addresses

c) they have a protection algorithm

d) every address generated by the CPU is being checked against the relocation and limit registers

282. Transient operating system code is code that _____ [B]

a) is not easily accessible b) comes and goes as needed

c) stays in the memory always d) never enters the memory space

283. Using transient code, __ the size of the operating system during program execution.[c]

a) increases b) decreases c) changes d) maintains

284. When memory is divided into several fixed sized partitions, each partition may contain [a]

a) exactly one process b) at least one process c) multiple processes at once d) none of the mentioned

285. In fixed size partition, the degree of multiprogramming is bounded by _____ [a]

a) the number of partitions b) the CPU utilization c) the memory size d) all of the mentioned

286. The first fit, best fit and worst fit are strategies to select a _____ [c]

a) process from a queue to put in memory b) processor to run the next process

c) free hole from a set of available holes d) all of the mentioned

287. The main memory accommodates _____ [b]

a) operating system b) cpu c) user processes d) all of the mentioned

288. A solution to the problem of external fragmentation is _____ [a]

a) compaction b) larger memory space c) smaller memory space d) none of the mentioned

289. Another solution to the problem of external fragmentation problem is to _____ [a]

a) permit the logical address space of a process to be noncontiguous

b) permit smaller processes to be allocated memory at last

c) permit larger processes to be allocated memory at last d) all of the mentioned

290. If relocation is static and is done at assembly or load time, compaction____ [a]

a) cannot be done b) must be done c) must not be done d) can be done

291. The disadvantage of moving all process to one end of memory and all holes to the other direction, producing one large hole of available memory is _____ [a]

a) the cost incurred b) the memory used c) the CPU used d) all of the mentioned

292. _____ is generally faster than _____ and _____ [a]

a) first fit, best fit, worst fit b) best fit, first fit, worst fit

c) worst fit, best fit, first fit d) none of the mentioned

293. External fragmentation exists when? [a]

a) enough total memory exists to satisfy a request but it is not contiguous

b) the total memory is insufficient to satisfy a request

c) a request cannot be satisfied even when the total memory is free

d) none of the mentioned

294. External fragmentation will not occur when? [d]

a) first fit is used b) best fit is used c) worst fit is used

d) no matter which algorithm is used, it will always occur

295. Sometimes the overhead of keeping track of a hole might be _____ [b]

a) larger than the memory b) larger than the hole itself

c) very small d) all of the mentioned

296. When the memory allocated to a process is slightly larger than the process, then _____ [a]

a) internal fragmentation occurs b) external fragmentation occurs

c) both internal and external fragmentation occurs d) neither internal nor external fragmentation occurs

Memory Management – Paging

297. Physical memory is broken into fixed-sized blocks called _____ [a]

a) frames b) pages c) backing store d) none of the mentioned

298. Logical memory is broken into blocks of the same size called _____ [b]

a) frames b) pages c) backing store d) none of the mentioned

299. Every address generated by the CPU is divided into two parts. They are _____ [b]

a) frame bit & page number b) page number & page offset

c) page offset & frame bit d) frame offset & page offset

300. The _____ is used as an index into the page table. [b]

a) frame bit b) page number c) page offset d) frame offset

301. The _____ table contains the base address of each page in physical memory. [c]

a) process b) memory c) page d) frame

302. The size of a page is typically _____ [b]

a) varied b) power of 2 c) power of 4 d) none of the mentioned

303. If the size of logical address space is 2 to the power of m, and a page size is 2 to the power of n addressing units, then the high order _____ bits of a logical address designate the page number, and the ____ low order bits designate the page offset. [d]

a) m, n b) n, m c) m – n, m d) m – n, n

304. With paging there is no _____ fragmentation. [b]

a) internal b) external c) either type of d) none of the mentioned

305. The operating system maintains a _____ table that keeps track of how many frames have been allocated, how many are there, and how many are available. [c]

a) page b) mapping c) frame d) memory

306. Paging increases the _____ time. [c]

a) waiting b) execution c) context – switch d) all of the mentioned

307. Smaller page tables are implemented as a set of _____ [d]

a) queues b) stacks c) counters d) registers

308. The page table registers should be built with _____ [b]

a) very low speed logic b) very high speed logic c) a large memory space d) none of the mentioned

309. For larger page tables, they are kept in main memory and a _____ points to the page table. [a]

a) page table base register b) page table base pointer c) page table register pointer d) page table base

310. For every process there is a _____ [a]

a) page table b) copy of page table c) pointer to page table d) all of the mentioned

311. Time taken in memory access through PTBR is _____ [d]

a) extended by a factor of 3 b) extended by a factor of 2 c) slowed by a factor of 3 d) slowed by a factor of 2

312. Each entry in a translation lookaside buffer (TLB) consists of _____ [a]

a) key b) value c) bit value d) constant

313. If a page number is not found in the TLB, then it is known as a _____ [a]

a) TLB miss b) Buffer miss c) TLB hit d) All of the mentioned

314. An _ uniquely identifies processes and is used to provide address space protection for that process. [b]

a) address space locator b) address space identifier c) address process identifier d) none of the mentioned

315. The percentage of times a page number is found in the TLB is known as _____ [b]

a) miss ratio b) hit ratio c) miss percent d) none of the mentioned

316. Memory protection in a paged environment is accomplished by _____ [d]

a) protection algorithm with each page b) restricted access rights to users

c) restriction on page visibility d) protection bit with each page

317. When the valid – invalid bit is set to valid, it means that the associated page [c]

a) is in the TLB b) has data in it

c) is in the process's logical address space d) is the system's physical address space

318. Illegal addresses are trapped using the _____ bit. [c]

a) error b) protection c) valid – invalid d) access

319. When there is a large logical address space, the best way of paging would be [b]

a) not to page b) a two level paging algorithm

c) the page table itself d) all of the mentioned

320. In a paged memory, the page hit ratio is 0.35. The required to access a page in secondary memory is equal to 100 ns. The time required to access a page in primary memory is 10 ns. The average time required to access a page is? [c]

a) 3.0 ns b) 68.0 ns c) 68.5 ns d) 78.5 ns

321. To obtain better memory utilization, dynamic loading is used. With dynamic loading, a routine is not loaded until it is called. For implementing dynamic loading _____ [d]

a) special support from hardware is required

b) special support from operating system is essential

c) special support from both hardware and operating system is essential

d) user programs can implement dynamic loading without any special support from hardware or operating system

322. In paged memory systems, if the page size is increased, then the internal fragmentation generally [b]

a) becomes less b) becomes more c) remains constant d) none of the mentioned

Memory Management – Segmentation

323. In segmentation, each address is specified by _____ [a]

a) a segment number & offset b) an offset & value c) a value & segment number d) a key & value

324. In paging the user provides only _____ which is partitioned by the hardware into ___ and __ [a]

a) one address, page number, offset b) one offset, page number, address

c) page number, offset, address d) none of the mentioned

325. Each entry in a segment table has a _____ [a]

a) segment base b) segment peak c) segment value d) none of the mentioned

326. The segment base contains the _____ [b]

a) starting logical address of the process b) starting physical address of the segment in memory

c) segment length d) none of the mentioned

327. The segment limit contains the _____ [c]

a) starting logical address of the process b) starting physical address of the segment in memory

c) segment length d) none of the mentioned

328. The offset 'd' of the logical address must be _____ [b]

a) greater than segment limit b) between 0 and segment limit

c) between 0 and the segment number d) greater than the segment number

329. If the offset is legal _____ [a]

a) it is used as a physical memory address itself

b) it is subtracted from the segment base to produce the physical memory address

c) it is added to the segment base to produce the physical memory address

d) none of the mentioned

330. When the entries in the segment tables of two different processes point to the same physical location [c]

a) the segments are invalid b) the processes get blocked c) segments are shared d) all of the mentioned

331. The protection bit is 0/1 based on _____ [c]

a) write only b) read only c) read – write d) none of the mentioned

332. If there are 32 segments, each of size 1Kb, then the logical address should have _____ [a]

a) 13 bits b) 14 bits c) 15 bits d) 16 bits

Explanation: To specify a particular segment, 5 bits are required. To select a particular byte after selecting a page, 10 more bits are required. Hence 15 bits are required.

333. Consider a computer with 8 Mbytes of main memory and a 128K cache. The cache block size is 4 K. It uses a direct mapping scheme for cache management. How many different main memory blocks can map onto a given physical cache block? [c]

a) 2048 b) 256 c) 64 d) 8

334. A multilevel page table is preferred in comparison to a single level page table for translating virtual address to physical address because _____ [b]

a) it reduces the memory access time to read or write a memory location

b) it helps to reduce the size of page table needed to implement the virtual address space of a process

c) it is required by the translation lookaside buffer

d) it helps to reduce the number of page faults in page replacement algorithms