Multiple Choice Q&A

1. **What is the primary purpose of semaphores in synchronization?**

   a) Mutual Exclusion
   b) Interprocess Communication
   c) Resource Allocation
   d) Deadlock Avoidance
   Answer: a)

2. **Which classical synchronization problem involves two processes trying to write to the same shared resource simultaneously?**

   a) Readers-Writers Problem
   b) Dining Philosophers Problem
   c) Producer-Consumer Problem
   d) Bounded-Buffer Problem
   Answer: a)

3. **In the context of synchronization, what is a critical region?**

   a) A region with critical code
   b) A region that is highly sensitive
   c) A region of shared resources
   d) A region prone to deadlocks
   Answer: c)

4. **What is the role of a monitor in synchronization?**

   a) Enforce mutual exclusion
   b) Provide a visual display of processes
   c) Manage system resources
   d) Ensure fair scheduling
   Answer: a)

5. **Which IPC mechanism is suitable for communication between processes on the same computer system?**

a) Pipes
b) FIFOs
c) Message Queues
d) Shared Memory
Answer: d)

6. In the context of interprocess communication, what is a pipe?

a) A physical connector
b) A file descriptor
c) A communication channel
d) A synchronization primitive
Answer: c)

7. Which IPC mechanism is a named pipe with a file-like interface?

a) Pipes
b) FIFOs
c) Message Queues
d) Shared Memory
Answer: b)

8. What is the primary advantage of message queues in IPC?

a) Low latency
b) Simple implementation
c) Asynchronous communication
d) Direct memory access
Answer: c)

9. Which IPC mechanism is suitable for communication between processes on different computer systems?

a) Pipes
b) FIFOs
c) Message Queues
d) Shared Memory
Answer: c)

10. In the context of IPC, what does RPC stand for?

a) Remote Procedure Call
b) Read-Process-Write
c) Reliable Process Communication
d) Resource Provisioning and Control
Answer: a)

11. Which IPC mechanism involves sending messages directly between processes without using a kernel buffer?

a) Pipes
b) FIFOs
c) Message Passing
d) Shared Memory
Answer: c)

12. What is a semaphore's initial value typically set to for mutual exclusion?

a) 0
b) 1
c) -1
d) Infinity
Answer: b)

13. Which classical synchronization problem involves philosophers sitting around a dining table, thinking and eating?

a) Readers-Writers Problem
b) Dining Philosophers Problem
c) Producer-Consumer Problem
d) Bounded-Buffer Problem
Answer: b)

14. What is the purpose of a mutex in synchronization?

a) Mutual Exclusion
b) Deadlock Prevention

c) Priority Inversion
d) Starvation Avoidance
Answer: a)

15. Which IPC mechanism involves mapping a portion of memory between processes?

a) Pipes
b) FIFOs
c) Message Queues
d) Shared Memory
Answer: d)

16. What happens if a process tries to enter a critical section when a semaphore's value is zero?

a) Process gets suspended
b) Process enters critical section
c) Process is terminated
d) Process goes into sleep mode
Answer: a)

17. Which synchronization problem involves a bounded buffer that can hold a limited number of items?

a) Readers-Writers Problem
b) Dining Philosophers Problem
c) Producer-Consumer Problem
d) Barber Shop Problem
Answer: c)

18. What is the primary purpose of a condition variable in synchronization?

a) Notify waiting processes
b) Provide mutual exclusion
c) Implement semaphores

d) Ensure deadlock avoidance
Answer: a)

19. Which IPC mechanism is commonly used for communication in a client-server architecture?

a) Pipes
b) FIFOs
c) Message Queues
d) Remote Procedure Call
Answer: d)

20. What does the "starvation" problem refer to in synchronization?

a) Processes waiting indefinitely
b) Inadequate resource allocation
c) Lack of mutual exclusion
d) Priority inversion
Answer: a)

21. Which IPC mechanism is considered a lightweight form of interprocess communication?

a) Pipes
b) FIFOs
c) Message Passing
d) Shared Memory
Answer: c)

22. What is the purpose of a semaphore's "wait" operation?

a) Increment semaphore value
b) Decrement semaphore value
c) Set semaphore to zero
d) Reset semaphore to initial value
Answer: b)

23. In the context of IPC, what is a socket?

a) A physical connector
b) A file descriptor
c) A communication endpoint
d) A synchronization primitive

Answer: c)

24. What is the primary advantage of using message queues over shared memory for IPC?

a) Lower latency
b) Simplicity of implementation
c) Greater flexibility
d) Direct memory access

Answer: c)

25. Which classical synchronization problem involves customers waiting for services from a limited number of resources?

a) Readers-Writers Problem
b) Dining Philosophers Problem
c) Producer-Consumer Problem
d) Barber Shop Problem

Answer: d)

26. What is the purpose of virtual memory in a computer system?

a) Increase RAM size
b) Extend the physical memory
c) Enhance CPU performance
d) Reduce disk space usage

Answer: b)

27. In logical versus physical address space, which represents the addresses generated by the CPU?

a) Logical
b) Physical
c) Both

d) None of the above
Answer: a)

28. Swapping is a technique used for

a) Memory Allocation
b) Process Scheduling
c) File Organization
d) Disk Management
Answer: b)

29. Contiguous Allocation is characterized by

a) Random allocation
b) Non-contiguous allocation
c) Sequential allocation
d) Dynamic allocation
Answer: c)

30. Paging is a memory management scheme that divides the physical memory into

a) Fixed-sized blocks
b) Variable-sized blocks
c) Pages
d) Segments
Answer: a)

31. What is the advantage of using Paging over Contiguous Allocation?

a) Reduced external fragmentation
b) Better CPU utilization
c) Improved process creation time
d) All of the above
Answer: d)

32. Segmentation is a memory management scheme that divides the logical memory into

a) Fixed-sized blocks
b) Variable-sized blocks
c) Pages
d) Segments
Answer: d)

33. Combining Segmentation with Paging is known as

a) Hybrid Memory Management
b) Memory Mapping
c) Virtual Memory
d) Segmented Paging
Answer: d)

34. What is Demand Paging?

a) Loading pages on-demand
b) Loading all pages at once
c) Swapping processes on-demand
d) Loading pages after a delay
Answer: a)

35. In Page Replacement, the algorithm decides which page to replace based on

a) Least Recently Used (LRU)
b) First In First Out (FIFO)
c) Optimal Page Replacement
d) All of the above
Answer: d)

36. Which page replacement algorithm uses the principle of removing the page that will not be used for the longest time?

a) LRU
b) FIFO
c) Optimal

d) Clock

Answer: a)

37. What is the primary drawback of the FIFO page replacement algorithm?

a) Complexity
b) Poor performance
c) Belady's Anomaly
d) Limited applicability

Answer: c)

38. The Clock page replacement algorithm is also known as

a) LRU
b) Second Chance
c) FIFO with Aging
d) Optimal Clock

Answer: b)

39. Which page replacement algorithm uses a circular list and a hand pointer?

a) LRU
b) FIFO with Aging
c) Clock
d) Optimal

Answer: c)

40. The Optimal page replacement algorithm serves as a reference for comparing other algorithms but is

a) Impossible to implement
b) Feasible but impractical
c) Easy to implement
d) Limited applicability

Answer: b)

41. What is the goal of the Thrashing phenomenon in memory management?

a) Efficient memory usage
b) Increased CPU utilization
c) Frequent page faults
d) Improved process execution time

Answer: c)

42. Which memory management technique aims to avoid Thrashing?

a) Contiguous Allocation
b) Paging
c) Segmentation
d) Working Set Model

Answer: d)

43. What is the purpose of the Translation Lookaside Buffer (TLB) in virtual memory?

a) Store page table entries
b) Speed up address translation
c) Manage page replacement
d) Control disk access

Answer: b)

44. In a Demand Paging system, when is a page brought into memory?

a) Only when it is first referenced
b) After a delay
c) At the start of the program
d) Only when all pages are referenced

Answer: a)

45. Which of the following is a disadvantage of Segmentation with Paging?

a) Simplicity
b) Fragmentation issues
c) Efficient use of memory
d) Improved process isolation
Answer: b)

46. The page table in virtual memory is used for

a) Storing page contents
b) Address translation
c) Disk management
d) Process scheduling
Answer: b)

47. What is External Fragmentation?

a) Unused memory in a process
b) Holes in the free memory
c) Allocation of pages in memory
d) Disk fragmentation
Answer: b)

48. Which memory management technique supports dynamic allocation of memory partitions?

a) Contiguous Allocation
b) Paging
c) Segmentation
d) Demand Paging
Answer: c)

49. Which of the following is an advantage of Demand Paging?

a) Faster program startup
b) Lower page fault rate
c) Reduced memory utilization
d) Decreased CPU utilization
Answer: b)

50. The term "Thrashing" in memory management refers to

a) Frequent page faults
b) Efficient memory usage
c) Disk fragmentation
d) Dynamic memory allocation

Answer: a)

51. Which page replacement algorithm approximates optimal page replacement but is easier to implement?

a) LRU
b) FIFO with Aging
c) Clock
d) Optimal

Answer: b)

52. The main goal of Memory Management is to

a) Maximize CPU utilization
b) Minimize page faults
c) Maximize disk space usage
d) Optimize process execution time

Answer: a)

53. In Demand Paging, if a page is not found in memory, what occurs?

a) The program terminates
b) A page fault is triggered
c) The CPU is halted
d) The program continues running

Answer: b)

54. Which memory management technique requires contiguous allocation of memory?

a) Paging
b) Segmentation
c) Contiguous Allocation

d) Demand Paging

Answer: c)

55. The Working Set Model helps prevent Thrashing by

a) Increasing the number of frames
b) Adjusting the page size
c) Monitoring the program's working set
d) Disabling Demand Paging

Answer: c)

56. The concept of "Locality of Reference" is related to

a) Memory Access Patterns
b) Page Replacement Algorithms
c) Virtual Memory
d) Disk Organization

Answer: a)

57. Which of the following is a disadvantage of Contiguous Allocation?

a) Fragmentation issues
b) Inefficient memory usage
c) Difficulty in implementing
d) Enhanced process isolation

Answer: a)

58. What is the purpose of a Page Table Entry (PTE) in virtual memory?

a) Store page contents
b) Manage page replacement
c) Translate virtual addresses
d) Control disk access

Answer: c)

59. Which algorithm replaces the page that will be used at the furthest point in the future?

a) FIFO

b) Optimal
c) LRU
d) Clock
Answer: b)

60. The term "Swapping" in memory management refers to

a) Moving pages between disk and memory
b) Exchanging pages between processes
c) Allocating pages in memory
d) Reducing page faults
Answer: a)

61. Which memory management technique supports dynamic allocation of fixed-sized blocks?

a) Contiguous Allocation
b) Paging
c) Segmentation
d) Demand Paging
Answer: b)

62. The clock hand in the Clock page replacement algorithm moves in what fashion?

a) Counter-clockwise
b) Clockwise
c) Random
d) Bidirectional
Answer: b)

63. In a Segmented Paging system, which address is translated first?

a) Logical Address
b) Physical Address
c) Segment Address
d) Page Address
Answer: a)

64. What is the primary purpose of a Page Fault?

a) Efficient memory usage
b) Improved CPU utilization
c) Handling invalid memory references
d) Preventing Thrashing
Answer: c)

65. Which memory management technique divides the logical memory into variable-sized pages?

a) Contiguous Allocation
b) Paging
c) Segmentation
d) Demand Paging
Answer: b)

66. In the Clock page replacement algorithm, what does the hand point to when a page is selected for replacement?

a) The page to be replaced
b) The next page to be checked
c) The first page in memory
d) The last page in memory
Answer: b)

67. The concept of "Thrashing" is most likely to occur when

a) The CPU is idle
b) The system is underloaded
c) The number of frames is too low
d) The working set is small
Answer: c)

68. Which page replacement algorithm uses a reference bit for each page?

a) LRU
b) FIFO with Aging

c) Clock
d) Optimal
Answer: b)

69. What is the purpose of the Anticipatory Paging technique?

a) Predict page accesses in advance
b) Speed up the page replacement process
c) Allocate pages dynamically
d) Prevent Thrashing
Answer: a)

70. Which of the following is a characteristic of the FIFO page replacement algorithm?

a) Simplicity
b) Complexity
c) Optimal replacement strategy
d) Ability to prevent Thrashing
Answer: a)

71. What does the Aging technique involve in page replacement algorithms?

a) Assigning an age to each page
b) Increasing the age of the oldest page
c) Reducing the age of all pages
d) Randomly selecting pages to age
Answer: a)

72. Which of the following is a disadvantage of Segmentation?

a) Efficient use of memory
b) Fragmentation issues
c) Dynamic allocation of memory segments
d) Improved process isolation
Answer: b)

73. How does demand paging contribute to better system performance?

a) Reducing memory overhead
b) Increasing page faults
c) Loading all pages into memory at once
d) Minimizing disk I/O
Answer: D)

74. Which memory management technique allows processes to share code and data?

a) Contiguous allocation
b) Paging
c) Segmentation
d) Swapping
Answer: C)

75. What is the main limitation of using fixed-size pages in paging?

a) Inefficient use of memory
b) Fragmentation
c) Complex address translation
d) Limited address space
Answer: B)

76. What is the primary purpose of a file system?

a) Data storage
b) Program execution
c) User authentication
d) Network communication
Answer: A)

77. Which access method allows direct access to any block on the storage device?

a) Sequential Access
b) Random Access
c) Indexed Access

d) Serial Access
Answer: B)

78. What is the role of a directory structure in a file system?

a) Organize files
b) Execute programs
c) Allocate memory
d) Manage network connections
Answer: A)

79. Which protection mechanism ensures that only authorized users can access a file?

a) Encryption
b) Authentication
c) Authorization
d) Compression
Answer: C)

80. In a file system structure, what is the purpose of the File Control Block (FCB)?

a) Store file metadata
b) Execute file operations
c) Allocate memory
d) Manage network connections
Answer: A)

81. What is the purpose of allocation methods in file systems?

a) Assigning storage to files
b) Authenticating users
c) Creating directories
d) Managing network connections
Answer: A)

82. Which free-space management technique maintains a list of free disk blocks?

a) Contiguous allocation
b) Linked allocation
c) Indexed allocation
d) Free list allocation
Answer: D)

83. What does the open system call do in file operations?

a) Create a new file descriptor
b) Read data from a file
c) Write data to a file
d) Close a file
Answer: A)

84. Which system call is used to create a new file in a file system?

a) create()
b) makefile()
c) newfile()
d) open()
Answer: A)

85. What is the purpose of the read system call in file operations?

a) Write data to a file
b) Close a file
c) Read data from a file
d) Create a new file descriptor
Answer: C)

86. In file operations, what does the write system call do?

a) Create a new file descriptor
b) Read data from a file
c) Write data to a file
d) Close a file
Answer: C)

87. What is the function of the close system call in file operations?

a) Close a file
b) Write data to a file
c) Read data from a file
d) Create a new file descriptor
Answer: A)

88. Which system call is used for repositioning the read/write pointer within a file?

a) seek()
b) move()
c) lseek()
d) position()
Answer: C)

89. What information does the stat system call provide about a file?

a) File size and modification time
b) File name and permissions
c) File content and creation time
d) File type and access time
Answer: A)

90. What is the purpose of the ioctl system call in file operations?

a) Input/output control operations
b) File creation and deletion
c) File reading and writing
d) File opening and closing
Answer: A)

91. Which access method involves reading the file from the beginning to the end?

a) Sequential Access
b) Random Access
c) Indexed Access

d) Serial Access
Answer: A)

92. In file systems, what is the primary purpose of a link?

a) Connect files in the same directory
b) Establish network connections
c) Create shortcuts to programs
d) Move files between directories
Answer: A)

93. Which directory structure organizes files and folders in a tree-like hierarchy?

a) Hierarchical Structure
b) Flat Structure
c) Sequential Structure
d) Linked Structure
Answer: A)

94. What is the purpose of the 'chmod' command in file systems?

a) Change file permissions
b) Change file ownership
c) Change file size
d) Change file content
Answer: A)

95. Which allocation method allows a file to be stored in non-contiguous blocks?

a) Contiguous allocation
b) Linked allocation
c) Indexed allocation
d) Variable allocation
Answer: B)

96. What is the primary role of the FAT (File Allocation Table) in file systems?

a) Manage file permissions
b) Maintain a list of free disk blocks
c) Organize file metadata
d) Control file access
Answer: B)

97. Which command is used to display the structure of directories in Unix/Linux?

a) ls
b) cd
c) mkdir
d) pwd
Answer: A)

98. What is the purpose of the 'umask' command in Unix/Linux?

a) Set default file permissions
b) Change directory permissions
c) Display file sizes
d) Rename files
Answer: A)

99. Which of the following is not a valid file protection mode in Unix/Linux?

a) rw-r--r--
b) rwxr-xr-x
c) -r-x--x--x
d) -rw-rw-r–
Answer: C)

100. What is the purpose of the 'chown' command in Unix/Linux?

a) Change file ownership
b) Change file permissions
c) Display file sizes

d) Rename files
Answer: A)

101. Which command is used to create a symbolic link in Unix/Linux?

a) ln -s
b) ln -h
c) link -s
d) symlink
Answer: A)

102. In Unix/Linux, what is the purpose of the 'df' command?

a) Display file system space usage
b) Delete files
c) Display file sizes
d) Change directory permissions
Answer: A)

103. Which file system structure allows files to be stored in fixed-size blocks?

a) Contiguous Allocation
b) Linked Allocation
c) Indexed Allocation
d) Clustered Allocation

Answer: D)

104. What is the purpose of the 'du' command in Unix/Linux?

a) Display file sizes
b) Delete files
c) Display file system space usage
d) Change directory permissions
Answer: C)

105. Which file system structure maintains a table of pointers for each file?

a) Contiguous Allocation
b) Linked Allocation
c) Indexed Allocation
d) Clustered Allocation
Answer: C)

106. Which allocation method has the potential for external fragmentation?

a) Contiguous Allocation
b) Linked Allocation
c) Indexed Allocation
d) Variable Allocation
Answer: A)

107. What is the purpose of the 'touch' command in Unix/Linux?

a) Update file access and modification time
b) Create a new file
c) Change file permissions
d) Display file sizes
Answer: B)

108. Which system call is used to change the attributes of a file in Unix/Linux?

a) chattr
b) chmod
c) chown
d) setattr
Answer: B)

109. In Unix/Linux, what does the 'sticky bit' do when set on a directory?

a) Prevents users from deleting files
b) Allows only the owner to write
c) Allows only the owner to execute

d) Prevents users from renaming files
Answer: A)

110. What is the purpose of the 'sync' command in Unix/Linux?

a) Synchronize file changes with disk
b) Display file sizes
c) Delete files
d) Change file permissions
Answer: A)

111. Which file system structure is susceptible to the "single point of failure" problem?

a) Hierarchical Structure
b) Flat Structure
c) Sequential Structure
d) Indexed Structure
Answer: D)

112. What is the purpose of the 'fsck' command in Unix/Linux?

a) File system check and repair
b) Display file sizes
c) Delete files
d) Change file permissions
Answer: A)

113. In Unix/Linux, what is the purpose of the 'mount' command?

a) Attach a file system to the directory
b) Display file sizes
c) Delete files
d) Change file permissions
Answer: A)

114. Which command is used to remove a directory in Unix/Linux?

a) rmdir
b) rm
c) remove
d) delete
Answer: A)

115. What is the purpose of the 'ln' command in Unix/Linux?

a) Create hard links between files
b) Display file sizes
c) Change file permissions
d) Delete files
Answer: A)

116. Which access method involves reading the file one record at a time?

a) Sequential Access
b) Random Access
c) Indexed Access
d) Serial Access
Answer: A)

117. What is the purpose of the 'tar' command in Unix/Linux?

a) Archive and compress files
b) Display file sizes
c) Delete files
d) Change file permissions
Answer: A)

118. Which of the following is an example of a non-volatile storage device?

a) RAM
b) SSD
c) Cache memory

d) Register
Answer: B)

119. What is the purpose of the 'mkfs' command in Unix/Linux?

a) Create a file system on a disk
b) Display file sizes
c) Delete files
d) Change file permissions
Answer: A)

120. Which of the following is a characteristic of a journaling file system?

a) Faster file access
b) Reduced risk of data corruption
c) Increased file storage capacity
d) Simpler file organization
Answer: B)

121. In a linked allocation file system, what does each file have?

a) A list of pointers to data blocks
b) A contiguous block of disk space
c) An index to the file's content
d) A table of file metadata
Answer: A)

122. Which file system structure allows files to be stored in multiple locations on the disk?

a) Contiguous Allocation
b) Linked Allocation
c) Indexed Allocation
d) Multilevel Allocation
Answer: B)

123. What is the primary role of the inode in Unix/Linux file systems?

a) Store file metadata
b) Manage file permissions
c) Allocate disk space
d) Control file access
Answer: A)

124. Which file system structure has a hierarchical organization with a single root directory?

a) Hierarchical Structure
b) Flat Structure
c) Sequential Structure
d) Linked Structure
Answer: A)

125. In Unix/Linux, what is the purpose of the 'ln -d' command?

a) Create a symbolic link
b) Create a hard link
c) Create a directory link
d) Delete a link
Answer: C)