浙江大学 2003 —2004 学年第一学期期终考试

《操作系统》课程试卷

考试时间： 120 分钟　开课学院: 计算机学院 专业:_____

姓名:_____ 学号:_____ 任课教师:_____

题序	一	二	三（1）	三（2）	三（3）	三（4）	三（5）	总分
评分								
评阅人								

PART I　Operating System Principle Exam

一、**Choose True(T) or False(F) for each of following statements and fill your answer in following blanks,** （20 marks）

1. (　　) 2. (　　) 3. (　　) 4. (　　) 5. (　　)

6. (　　) 7. (　　) 8. (　　) 9. (　　) 10. (　　)

11. (　　) 12. (　　) 13. (　　) 14. (　　) 15. (　　)

16. (　　) 17. (　　) 18. (　　) 19. (　　) 20. (　　)

1. **Process is an entity that can be scheduled.**
2. In the *producer-consumer* problem, the order of *wait* operations cannot be reversed, while the order of *signal* operations can be reversed.
3. As to semaphores, we can think an execution of *signal* operation as applying for a resource.
4. *Mutual exclusion* is a special synchronization relationship.
5. ***Paging* is a virtual memory-management scheme.**
6. If the size of disk space is large enough in the virtual **memory-management system, then a process can have unlimited address space.**
7. **Priority-scheduling algorithm must be preemptive.**
8. **In the virtual memory-management system, the running program can be larger than physical memory.**

9. File directory is stored in a fixed zone in main memory.
10. While searching a file, the searching must begin at the root directory.
11. Thread can be a basic scheduling unit, but it is not a basic unit of resource allocation.
12. A process will be changed to waiting state when the process can not be satisfied its applying for CPU.
13. If there is a loop in the resource-allocation graph, it shows the system is in a deadlock state.
14. The size of address space of a virtual memory is equal to the sum of main memory and secondary memory.
15. Virtual address is the memory address that a running program want to access.
16. If a file is accessed in direct access and the file length is not fixed, then it is suitable to use indexed file structure.
17. SPOOLing system means ***Simultaneous Peripheral Operation Off Line***.
18. Shortest-seek-time-first(SSTF) algorithm select the request with the minimum head move distance and seek time. It may cause starvation.
19. The main purpose to introduce buffer technology is to improve the I/O efficiency.
20. RAID level 5 stores data in N disks and parity in one disk.

二、Choose the CORRECT and BEST answer for each of following questions and fill your answer in following blanks, (30 marks)

1. ( )	**2. ( )**	**3. ( )**	**4. ( )**	**5. ( )**
6. ( )	**7. ( )**	**8. ( )**	**9. ( )**	**10. ( )**
11. ( )	**12. ( )**	**13. ( )**	**14. ( )**	**15. ( )**
16. ( )	**17. ( )**	**18. ( )**	**19. ( )**	**20. ( )**
21. ( )	**22. ( )**	**23. ( )**	**24. ( )**	**25. ( )**
26. ( )	**27. ( )**	**28. ( )**	**29. ( )**	**30. ( )**

1. A system call is _____。
   A、a user written sub-program　　B、a library program in advanced language
   C、a command in operating system　　D、an interface provided by OS for user program

2. _____system is able to manage and run multiple application programs。

A. GUI B. Windows Applications C. Multitasking D. Networking

3. In the following components in an operating , which one does not need hardware support ?
A. process scheduling B. clock management
C. address mapping D. interrupt system

4. Which of following descriptions about process is incorrect?
A. process is a dynamic concept B. process has life-cycle
C. process is a set of instructions D. processes can run concurrently

5. when round-robin(RR) scheduling algorithm is used to allocate the CPU to each process and a running state process uses up a time quantum, the state of that running process will become____。
A. Waiting B. Running C. Ready D. Terminated

6. Suppose there are three processes **P1,P2,P3 and their arriving time and executing time are in following table**:

Process	Arriving Time	Executing Time
P1	8:00	2 hours
P2	8:45	1 hour
P3	9:30	0.25 hour

They run on a CPU one by one. If Shortest-Job-First(SJF) scheduling algorithm (non-preemptive) is adopted, then these processes will run in following order _____。

A.P3，P2，P1 B、P1，P2，P3 C、P1，P3，P2 D、P3，P1，P2

7. Which of following process state changing is impossible to occur?
A. Ready →Running B. Running→Ready
C. Running→Waiting D. Waiting→Running

8. If there are N(N>2) processes and there is not any running state process scheduling program now, then which of following case is impossible to occur。
A. a running process, no ready process and N-1 waiting processes
B. a running process, N-1 ready processes and no waiting process
C. a running process, a ready process and N-2 waiting processes
D. no running process, 2 ready processes and N-2 waiting processes

9. Suppose 9 producers and 6 consumers share a buffer with size of 8. In order to use the buffer properly, the semaphore *mutex* of mutual exclusion of the buffer is initialized to____。
A. 1 B. 6 C. 8 D. 9

10. Suppose 5 processes share mutual exclusive sections. If 3 processes are permitted to enter the mutual exclusive sections at the same time, then the semaphore of mutual exclusion should be initialized to____。

A. 5 B. 3 C.1 D. 0

11. Suppose 4 processes arrive at the same time and the average execution time of every process is 2 hours. If they run on a CPU one by one, then the average turnaround time is ____。
A.1 hour B.5 hours C.2.5 hours D.8 hours

12. Banker’ s algorithm is one of ____algorithm。
A. deadlock recovery **B. deadlock avoidance**
C. deadlock prevention D. deadlock detection

13. If following situation appears in the resource-allocation graph, then we can consider that system is in deadlock state。
A. there is a loop
B. there is not any loop
C. each resource has only one instance and there is a loop
D. there is at least one request edge for each process node

14. Which of following scheduling algorithm can make minimum average turnaround time in case all jobs arrive at same time?
A. FCFS B. SJF C. RR D. Priority

15. Which memory management scheme will not suffer from internal fragmentation?
A. Paging B. Segmentation
C. Fixed-sized partitions D. Segmentation with paging

16. In computer systems *Translation Look-aside Buffer* (TLB) is used for _____。
A. storing file information B. exchanging data with main memory
C. translating address D. storing channel programs

17. Which of following memory management schemes is fit for program’ s dynamic linking?
A. Segmentation B. Paging
C. Dynamic-sized partitions D. Fixed-sized partitions

18. The maximum capacity of virtual memory is _____。
A. the sum of main and secondary memory size
B. determined by computer’s address structure
C. unlimited
D. determined by job’s address space

19. Suppose there is a virtual memory system. A process is allocated 3 frames and FIFO page-replacement algorithm is used. What is the number of page faults if the reference string is 1、2、3、4、1、2、5、1、2、3、4、5、6?
A.7 B.8 C.9 D.10

20. Suppose there is a segmentation memory management system. What is the maximum length of segment if address consists of 24 bits and segment number has 8 bits?

A. 2^{24} B. 2^{16} C. 2^{8} D. 2^{32}

21. In a paging memory management system, there is a page table as following:

Page No.	Frame No.
0	2
1	1
2	6
3	3
4	7

If the page size is 4KB, then paging address hardware will convert logical address 0 into physical address _____。

A.8192 B.4096 C.2048 D.1024

22. In a demand-paging computer system, following results are tested：CPU utilization rate is 20%，utilization rate of hard disk for swapping is 97.7%，utilization rate of other devices 5%。We can infer from these results that system is in anomaly。In this case, which of following solution can improve system performance?

A. to install a faster hard disk

B. to increase swap space with large capacity hard disk

C. to increase the number of running processes

D. to increase physical memory capacity via increasing memory chips

23. If a file system use two-level index allocation method(block size is 2KB, index address of each block occupies 4 bytes), what is the maximum size of a file which the file system can manage?

A. 2GB B. 1GB C. 512MB D. None of the above

24. To prevent unauthorized users' access to files, which of following solution is provided by operating system to ensure that only the users authorized by the file owner can access files?

A. file protection B. file secrecy C. file transform D. file share

25. In order to solving "naming conflict" for different users' files, we often use following method in file system.

A. special method B. tree-structured directories

C. path D. index

26. The basic access unit of files on disk is _____.

A. block B. record

C. cylinder D. track

27. An I/O channel is a special ____。
A. I/O device B.I/O controller C. processor D. memory

28. Virtual devices are implemented with _____ technology。
A. channel B. buffer C. SPOOLing D. controller

29. The I/O control of disk devices mainly adopt following method。
A. bit B. byte C. frame D. DMA

30. The speed of CPU output data is much faster than printing speed of a printer. In order to solving this problem, which of following technology is used?
A. parallel technology B. channel technology
C. buffer technology D. virtual technology

三、Please solve following questions（50 marks， 10 marks for each question）:

1. Suppose there are two processes P1 and P2 which own same priority. Semaphores S1 and S2 are initialized to 0. Please tell the possible value of x, y and z when concurrent processes P1 and P2 finish executing.

Process P1	**Process P2**
y=1;	x=1;
y=y+2;	x=x+1;
Signal(S1);	Wait(S1);
z=y+1;	x=x+y;
Wait(S2);	Signal(S2);
y=z+y;	z=x+z;

2. Suppose there are 8 tape drivers in a computer system and N processes compete to use these devices. The maximum demand of each process for tape drivers is 3. What is the maximum of N that system can avoid deadlock? Give explanation of your answer.

3. There is a paging system and its page table is in main memory.
（1）If it takes 1.5 microsecond to access main memory once, what is the time to finish accessing the desired byte in memory in this paging system?
（2）If there is a TLB in the system and its average hit ratio is 85%, and search time to TLB is 60 nanoseconds, what is time to finish a complete memory access?

4. Consider a file system on a disk that has both logical and physical block size of 512 bytes. Assume that the information about each file is already in memory. For each of the three allocation strategies (contiguous, linked, indexed), answer these questions:
(1). How is the logical-to-physical address mapping accomplished in this system? (For the indexed allocation, assume that a file is always less than 512 blocks long.)
(2). If we are currently at logical block 10 (the last block accessed was 20) and want to access logical block 5, how many physical blocks must be read from the disk?

5. Suppose that a disk drive has 1000 cylinders, numbered 0 to 999. The drive is currently serving a request at cylinder 345, and the disk arm will move in the direction of cylinder 0. The queue of pending requests, in FIFO order, is

123、874、692、475、105、376

Starting from the current head position, what is the total distance (in cylinders) that the disk arm moves to satisfy all the pending requests, for each of the following disk scheduling algorithms?

（A） FCFS，（B）SSTF，（C）SCAN，（E）C_SCAN，（F）C_LOOK