

四川大学期末考试试题（闭卷）

（2021~2022 学年第 1 学期）

A

卷

课程号: 311006040 课程名称: 操作系统 任课教师: 左航、熊运余、陈楷民

适用专业年级: _____ 学号: _____ 姓名: _____

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评阅教师	得分

一、单项选择题（本大题共 20 小题，每小题 1.5 分，共 30 分）

提示：在每小题列出的四个备选项中只有一个是符合题目要求的，请将其代码填写在下表中。错选、多选或未选均无分。

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
16	17	18	19	20										

1. Address registers may contain:

- A. Memory addresses of data
- B. Memory addresses of instructions
- C. Partial memory addresses
- D. All of the above

2. A computer hardware feature that is vital to the effective operation of a multi-programming operating system is:

- A. Very large memory
- B. Multiple processors
- C. I/O interrupts and DMA
- D. All of the above

3. In the Process Based O/S:

- A. Major kernel functions are organized as separate process
- B. The User Process Image includes a kernel stack
- C. O/S code and data are contained in the shared address space
- D. None of the above

4. In the Five-State Process Model, the following represents a valid state transition:

- A. Running -> Blocked
- B. New -> Running
- C. New -> Blocked
- D. All of the above

5. A chief characteristic of a monitor is:

- A. A maximum of two processes may be executing in a monitor at a time
- B. A process enters the monitor by invoking one of its procedures
- C. Local data variables of the monitor are accessible by any procedure requesting use of the monitor
- D. All of the above

6. In the Resource Allocation Denial approach to Deadlock Avoidance, a safe state is defined as one in which:

- A. Several potential process sequences do not result in a deadlock:

- B. All potential process sequences do not result in a deadlock:
- C. At least one potential process sequence does not result in a deadlock
- D. None of the above
7. A conservative strategy for dealing with deadlocks that involves limiting access to resources and imposing restrictions on processes is called:
- A. Deadlock Detection
- B. Deadlock Prevention
- C. Deadlock Avoidance
- D. None of the above
8. An example of a consumable resource is the following:
- A. Messages
- B. Main Memory
- C. Printers
- D. All of the above
9. In the dynamic partitioning technique of memory management, the placement algorithm that has the worst performance is called:
- A. best-fit
- B. first-fit
- C. next-fit
- D. none of the above
10. About segmentation scheme for memory management, which statement is true:
- A. one segment per thread
- B. a number of segments which must be of equal size
- C. a number of segments which need not be of equal size
- D. 2 segments per thread for code and data
11. an absolute address in main memory is called a :
- A. relative address
- B. logical address
- C. physical address
- D. virtual address
12. Assume page size is 1k, which is the correct offset of virtual address 0x0D8A:
- A. 0x08A
- B. 0x18A
- C. 0x28A
- D. 0x38A
13. About the number of page table entries for each process, which statement is true:
- A. a fixed number, but is different for each process
- B. the same fixed number for each process
- C. a variable number when process runs
- D. none of the above
14. The replacement policy that is impossible to implement because it would require the o/s to have perfect knowledge of future events is called the:
- A. least recently used (lru) policy
- B. optimal policy
- C. clock policy
- D. none of the above
15. About inverted page table which statement is NOT true:
- A. the number of inverted page table entries is fixed for a computer

- B. chain pointer is contained in inverted page table entry
 C. process identifier is not contained in inverted page table entry
 D. use Hash function to help locate inverted page table entry
16. Which of the following scheduling policies allow the OS to interrupt the currently running process and move it to the ready state?
 A. preemptive
 B. first-come-first-served
 C. non-preemptive
 D. none of the above
17. In terms of the queuing model, the total time that a process spends in a system (waiting time plus service time) is called:
 A. finish time (ft)
 B. normalized turnaround time (tat)
 C. turnaround or residence time (tat)
 D. none of the above
18. An example of a block-oriented I/O device is
 A. CD-ROM
 B. modem
 C. printer
 D. all of the above
19. The following disk scheduling policy is useful as a benchmark against which to evaluate other disk scheduling policies because it provides a worst-case scenario:
 A. FIFO scheduling
 B. random scheduling
 C. priority scheduling
 D. none of the above
20. Sequential files are optimal in scenarios involving:
 A. applications that require infrequent updates
 B. applications that require frequent queries
 C. applications that require the processing of all records in the file
 D. all of the above

评阅教师	得分

二、简答题（本大题共 6 小题，每小题 5 分，共 30 分）。

1. Please illustrate the seven-state process state transition diagram(Two Suspend States).

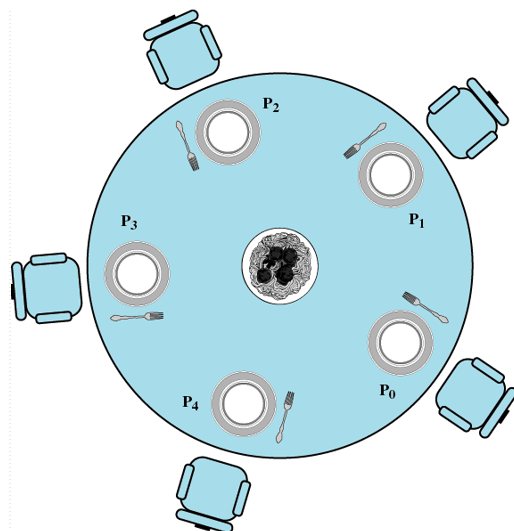
2. Describe the definition of Deadlock and Starvation .
3. Explain how can a two-level hierarchical page table save storage space and how many times of main memory access does it need to load a data from memory to CPU register if the whole page table are saved in main memory.
4. Briefly describe the three types of processor scheduling.
5. Briefly describe the RAID

6. What criteria are important in choosing a file organization?

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三、问答题（本大题共 3 小题，共 40 分）。

1.(15 分) Rethinking the Dining Philosophers Problem



- (1) Draw the resource allocation graph for deadlock of the Dining Philosophers Problem.(4 分)
- (2) Give one solution to the Dining Philosophers Problem using semaphore. Define semaphores and initialize them, simulate the synchronization and mutual exclusion. (9 分)
- (3) Describe your strategy to solve the deadlock of Dining Philosophers Problem.(2 分)

2.(15 分) In an OS adopts demand paging fetch policy, the page table of a process is as follows:

Page number	Frame number	Valid bit
0	--	0
1	27H	1
2	23H	1

The page size is 4kB. The resident set contains 2 frames. The OS adopts fixed allocation and local replacement policy. And the TLB is replaced with LRU replacement policy.

The memory access time is 100ns, one TLB access time is 10ns, one page fault process time is 500ns (include the process to load one page and update page table and TLB).

Assume the TLB is empty now;

The address is translated first by TLB, then page table once TLB misses (ignoring the update time of TLB);

If the valid bit is 0, the access to the page triggers a page fault. The page fault handler will load the page into main memory and re-execute the instruction that triggers the interrupt.

Now, the program need to access data in virtual address 0x2330、0x0565 and 0x2345.

Please answer:

(1) Calculate the access time for each of the three data. (9 分)

(2) The corresponding physical address of the three virtual addresses and explain why. (6 分)

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3.(10 分)Here is a table of processes and their associated arrival and Service times.

Process ID	Arrival Time	Service Time
Process A	0	4
Process B	2	5
Process C	3	3
Process D	8	4

Show the scheduling order for these processes under First-Come-First-Served (FCFS), Round-Robin (RR $q=1$) and Shortest Process Next(SPN).