# 四川大学期末考试试题（闭卷）

## 2016~2017 学年第 2 学期　　B 卷

课程号：311006040　课程名称：操作系统　任课教师：＿＿＿＿＿＿

适用专业年级：软件工程 2015 级　学号：＿＿＿＿＿＿　姓名：＿＿＿＿＿＿

**考试须知**

四川大学学生参加由学校组织或由学校承办的各级各类考试，必须严格执行《四川大学考试工作管理办法》和《四川大学考场规则》。有考试违纪作弊行为的，一律按照《四川大学学生考试违纪作弊处罚条例》进行处理。

四川大学各级各类考试的监考人员，必须严格执行《四川大学考试工作管理办法》、《四川大学考场规则》和《四川大学监考人员职责》。有违反学校有关规定的，严格按照《四川大学教学事故认定及处理办法》进行处理。

| 题　　号 | 一(22%) | 二(15%) | 三(25%) | 四(38%) | 卷面成绩 |
|---|---|---|---|---|---|
| 得　　分 | | | | | |
| 阅卷时间 | | | | | |

**注意事项：**1. 请务必将本人所在学院、姓名、学号、任课教师姓名等信息准确填写在试题纸和添卷纸上；

2. **请将答案全部填写在本试题纸上；**

3. 考试结束，请将试题纸、添卷纸和草稿纸一并交给监考老师。

| 评阅教师 | 得分 |
|---|---|
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## 一、单项选择题（本大题共 11 小题，每小题 2 分，共 22 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 |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |

1. The general role of an operating system is to:

(A) Provide a set of services to system users

(B) Act as an interface between various computers

(C) None of the above

(D) Manage files for application programs

2. A primary objective of an operating system is:

(A) Convenience

(B) Efficiency

(C) Ability to evolve

(D) All of the above

3. The basic Two-State Process Model defines two possible states for a process in relationship to the processor:

(A) Running and Executing

(B) Running and Not Running

(C) Executing and Waiting

(D) None of the above

4. One of the disadvantages of User-Level Threads (ULTs) compared to Kernel-Level Threads (KLTs) is:

   (A) Scheduling is application specific

   (B) When a ULT executes a system call, all threads in the process are blocked

   (C) Thread switching does not require kernel mode privileges

   (D) All of the above

5. In order to implement mutual exclusion on a critical resource for competing processes, only one program at a time should be allowed:

   (A) In the critical section of the program

   (B) To perform message passing

   (C) To Exhibit cooperation

   (D) None of the above

6. All deadlocks involve conflicting needs for resources by:

   (A) One or more processes

   (B) Two or more processes

   (C) Three or more processes

   (D) None of the above

7. An actual location in main memory is called a(n):

   (A) Relative address

   (B) Logical address

   (C) Absolute address

   (D) None of the above

8. The real address of a word in memory is translated from the following portions of a virtual address:

   (A) Page number and frame number

   (B) Page number and offset

   (C) Frame number and offset

   (D) None of the above

9. In terms of the queuing model, the total time that a process spends in a system (waiting time plus service time) is called:

   (A) Normalized turnaround time (TAT)

   (B) Finish time (FT)

   (C) Turnaround or residence time (TAT)

   (D) None of the above

10. The I/O technique where the processor busy waits for an I/O operation to complete is called:

    (A) Programmed I/O

    (B) Interrupt-driven I/O

    (C) Direct memory access (DMA)

    (D) None of the above

11. In a tree-structured directory, the series of directory names that culminates in a file name is referred to as the:

    (A) Pathname

    (B) Working directory

    (C) Symbolic name

    (D) None of the above

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## 二、名词解释题（本大题共 5 小题，每小题 3 分，共 15 分）。

提示：解释每小题所给名词的含义，若解释正确则给分，若解释错误则无分，若解释不准确或不全面，则酌情扣分。

1. Race Condition

2. What is page and what is frame?

3. Medium-Term Scheduling

4. thrashing

5. Buddy system

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## 三、简答题（本大题共 5 小题，每小题 5 分，共 25 分）。

1. What is a TLB and what does it do?

2. What is the difference between a mode switch and a context switch? context

3. List two events that may take a process to a ready state.

4. What are four criteria of a good solution to the critical-section problem?

5. What information are recorded in a process control block for process management of operating systems?

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## 四、问答题（本大题共 3 小题，共 38 分）。

1、Consider the following snapshot of a system (P=Process, R=Resource) :

| Available | | | |
| --- | --- | --- | --- |
| RA | RB | RC | RD |
| 8 | 5 | 9 | 7 |

| Maximum Demand | | | | |
|---|---|---|---|---|
| | RA | RB | RC | RD |
| P0 | 3 | 2 | 1 | 4 |
| P1 | 0 | 2 | 5 | 2 |
| P2 | 5 | 1 | 0 | 5 |
| P3 | 1 | 5 | 3 | 0 |
| P4 | 3 | 0 | 3 | 3 |

| Current Allocation | | | | |
|---|---|---|---|---|
| | RA | RB | RC | RD |
| P0 | 1 | 0 | 1 | 1 |
| P1 | 0 | 1 | 2 | 1 |
| P2 | 4 | 0 | 0 | 3 |
| P3 | 1 | 2 | 1 | 0 |
| P4 | 1 | 0 | 3 | 0 |

Answer the following questions using banker's algorithm

a)Calculate the *Needs* matrix:（3 分）

| Needs | | | | |
|---|---|---|---|---|
| | RA | RB | RC | RD |
| P0 | | | | |
| P1 | | | | |
| P2 | | | | |
| P3 | | | | |
| P4 | | | | |

b) Is the system in a safe state? If so, show a safe order in which the processes can run. (5 分)

c) Can a request of one instance of RA by Process P0 be granted safely according to Banker's algorithm? （5 分）

2、Consider the following page reference string:

7,2,3,7,2,5,1,4,6,5,7,1,0,5,4,0,2,3,0,5

Assuming demand paging with 4 frames, please show the frame contents of the pages after each page reference for the following page-replacement algorithms and count the page interrupt times for every replacement algorithm.

a) LRU replacement (3 分)

b) Optimal replacement (3 分)

c) FIFO replacement (3 分)

d) Clock replacement (4 分)

3、There are three Process R1, R2 and C. Process R1 reads a series of integers from file1 then put them into buffer B1, Process R2 reads a series of integers from file2 and put them into buffer B2. Process C calculates the integers in buffer B1 and B2. Finish following program to coordinate these four processes to avoid losing data and repeating calculation. (共 12 分)

```
Semaphore S0 = 1;
Semaphore S1 = 1;
Semaphore S2 = 0;
Semaphore S3 = 0;
Integer B1, B2;
```

| process R1 ( ) | process R2 ( ) | process W1( ) |
|---|---|---|
| { | { | { |
| Integer i; | Integer i; | Integer r; |
| while ( true) { | while(true) { | while (true) { |
| //从 file1 读一个数到 i; | //从 file2 读一个数 i; | [_____]; |
| ReadAnInt (file1, i); | ReadAnInt (file2, i); | [_____]; |
| [_____]; | [_____]; | //计算 B1 和 B2; |
| B1 = i; | B2 = i; | r = Calculate (B1, B2); |
| [_____]; | [_____]; | [_____]; |
| } | } | [_____]; |
| } | } | Printout(r); |
| | | } |
| | | } |