

复查测验提交: 第6章 进程同步 作业

用户	工科试验班 (信息) 裴弈心
课程	操作系统
测试	第6章 进程同步 作业
已开始	19-10-28 下午11:17
已提交	19-11-2 下午10:41
截止日期	19-11-5 下午11:51
状态	已完成
尝试分数	得 88 分, 满分 96 分
已用时间	119 小时 24 分钟
显示的结果	所有答案, 已提交的答案, 正确答案

问题 1

得 10 分, 满分 10 分

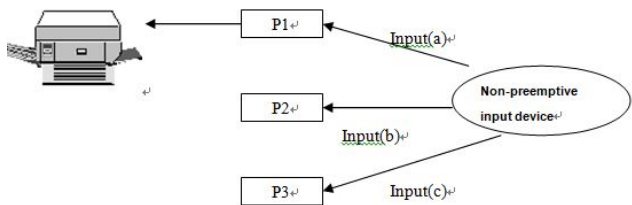
There are three cooperative processes P1, P2, and P3. They read data , denoted as a、 b and c,from the same input device, as shown in figure below. The input device is an exclusive access device.The first datum(a) must be read by process P1, the second datum(b) is read by process P2, and the third datum(c) by process P3. These three processes perform the following calculations:

P1: $x = a + b$

P2: $y = a * b$

P3: $z = y + c - a$

P1, which is linked to the printer, should print the results of x,y, and z. Write the pseudo code for the three processes, using semaphores to synchronize their activities.



所选答案:

```

int x, y, z;
semaphore t1,t2, t3, t4, t5;
t1 = t2 = t3 = t4 = t5 = 0;
P1:{
input(a);
signal(t1);
wait(t2);
x = a + b;
wait(t5);
print(x);
print(y);
print(z);
}
P2:{
wait(t1);
input(b);
signal(t2);
signal(t3);
y = a * b;
signal(t4);
}
P3:{
wait(t3);
input(c);
wait(t4);
z = y + c - a;
signal(t5);
}

```

正确答案:

Semaphore :s1,s2,s3,s4,s5:=0;

P1:

P2:

P3:

```

{
input (a)
signal(s1)
wait(s2)
x=a+b
wait(s5)
Print (x,y,z)
}

```

```

{
wait(s1)
input (b)
signal(s2)
signal(s3)
y=a*b
signal(s4)
}

```

```

{
wait(s3)
input (c)
wait(s4)
z=y+c-a
signal(s5)
}

```



问题 2

得 10 分, 满分 10 分

In a system, there are multiple producer processes which produce numbers to a buffer and multiple consumer processes which consume numbers from the buffer, where the buffer is shared among all producers and consumers. The following variables are shared among all processes:

```

int nextc=0, nextp=0, buf[10];
semaphore full,empty,mutex;

```

Producer and consumer processes are given in the following C++-like pseudo programs

Producer Process:

```

int itemp;
while(1){
1  itemp = rand(); // Generate a number
2  P(empty);
3  P(mutex);
4  buf[nextp]=itemp;
5  nextp=(nextp+1)%10;
6  V(mutex);
}

```

Consumer Process:

```

int itemc;
while(1){
1  P(full);
2  P(mutex);
3  itemc=buf[nextc];
4  nextc=(nextc+1)%10;
5  V(mutex);
6  V(empty);
}

```

```

7  V(full);                                7  cout << itemc << endl;
}                                           }

```

(1) What are the critical sections in the given producer and consumer processes? (4 marks)

(2) How should the semaphores **full**, **empty**, and **mutex** be initialized? (3 marks)

(3) If we switch the order of 2 and 3 in the producer process and the order of 1 and 2 in the consumer process, would the system still work properly? Justify your answer. (3 marks)

Producer Process

...

```

1 itemp = rand(); // Generate a number
2 P(mutex);
3 P(empty);
...

```

Consumer Process

...

```

1 P(mutex);
2 P(full);
3 itemc=buf[nextc];
...

```

所选答案: (1) producer: from line 4 to line 5; consumer: from line 3 to line 4.
 (2) full = 0, empty = 10, mutex = 1.
 (3) Ofcourse not. If the buf is full and producer create a new item, it must wait at line 3 P(empty), which means producer should wait an empty slot. However, the producer has down P(mutex), so consumer can't do critical section's operation and can't remove any item. It must wait at line 1 P(mutex). So, in this case, both producer and consumer are waiting, it's a dead lock.

正确答案: ☒ (1) Producer: Lines 4 and 5. Consumer: Lines 3 and 4.
 (2) empty = 10, mutex = 1, and full = 0.
 (3) No, the system may be deadlocked. For example, if a producer gets mutex semaphore but there is no more empty item, no consumers can continue and the system is deadlocked.

问题 3

得 4 分, 满分 4 分

In the producer-consumer problem, the order of wait operations cannot be reversed, while the order of signal operations can be reversed.

所选答案: ☒ 对
 答案: ☒ 对
☐ 错

问题 4

得 4 分, 满分 4 分

Suppose that a process is executing "counter=counter+1" while another process is executing concurrently and independently "counter=counter-1", where the counter is a variable shared between the two processes. Given that the value of counter is five before execution, the possible value(s) after both processes finish their statement are .

所选答案: ☒ C. All of above
 答案: A. Six
 B. Four

☒ C. All of above

D. Five

问题 5

得 0 分, 满分 4 分

The mutual exclusion semaphore of two concurrent processes has the value 0 (zero) at this moment. It indicates that_____.

所选答案:
案:

☒ D.

a process has entered the critical-section, another process is waiting to enter the critical-section

答案:

☒ A.

a process has entered the critical-section, and no process is being blocked

B. two processes have entered the critical-section

C. no process has entered the critical-section

D.

a process has entered the critical-section, another process is waiting to enter the critical-section

问题 6

得 4 分, 满分 4 分

The initial value of semaphore S is 2. if the value is -4 at present, how many processes are blocked on this semaphore .

所选答案:

☒ D. 4

答案:

A. 1

B. 2

C. 3

☒ D. 4

问题 7

得 4 分, 满分 4 分

Three processes are synchronizing on a shared code segment which is protected by a semaphore. If at most two processes are allowed to enter the code segment simultaneously, which of the following results shows the possible values that the semaphore may have?

所选答案:

☒ D. 2, 1, 0, -1

答案:

A. 2, 1, 0, -1, -2

B. 3, 2, 1, 0

C. 1, 0, -1, -2

☒ D. 2, 1, 0, -1

问题 8

得 4 分, 满分 4 分

有两个进程P1和P2描述如下:

shared data:

```
int counter = 6;
```

P1 :

```
Computing;
```

```
counter=counter+1;
```

P2:

```
Printing;
```

```
counter=counter-2;
```

两个进程并发执行，运行完成后，counter的值不可能为_____。

所选答案: ☒ C. 6

答案: A. 4

B. 7

☒ C. 6

D. 5

问题 9

得 4 分, 满分 4 分

_____是可以用来解决临界区（Critical Section）问题。

所选答案: ☒ C. 测试与设置（Test-and-Set）指令

答案: A. 时间片轮转算法

B. LRU算法

☒ C. 测试与设置（Test-and-Set）指令

D. 银行家算法

问题 10

得 4 分, 满分 4 分

下列哪一个问题只包含进程互斥问题？

所选答案: ☒ D. 两个进程都要使用打印机

答案: A. 田径场上的接力比赛

B. 一个生产者和一个消费者通过一个缓冲区传递产品

C. 公共汽车上司机和售票员的协作

☒ D. 两个进程都要使用打印机

问题 11

得 4 分, 满分 4 分

有一个计数信号量S，若干个进程对S进行了28次P操作和18次V操作后，信号量S的值为0，然后又对信号量S进行了3次V操作。请问此时有多少个进程等待在信号量S的队列中？

所选答案: ☒ C. 0

答案: A. 7

B. 2

☒ C. 0

D. 3

问题 12

得 4 分, 满分 4 分

假设一个正在运行的进程对信号量S进行了P (WAIT) 操作后, 信号量S的值变为-1, 此时该进程将_____。

所选答案: ☒ A. 转为等待状态

答案: ☒ A. 转为等待状态

B. 继续运行

C. 转为就绪状态

D. 终止

问题 13

得 4 分, 满分 4 分

In the producer-consumer problem, the order of wait operations cannot be reversed, while the order of signal operations can be reversed.

所选答案: ☒ 对

答案: ☒ 对

错

问题 14

得 4 分, 满分 4 分

As to semaphores, we can think an execution of signal operation as applying for a resource.

所选答案: ☒ 错

答案: 对

☒ 错

问题 15

得 4 分, 满分 4 分

Binary semaphores are those that are used by no more than two threads.

所选答案: ☒ 错

答案: 对

☒ 错

问题 16

得 4 分, 满分 4 分

An atomic operation is a machine instruction or a sequence of instructions that must be executed to completion without interruption

所选答案: ☒ 对

答案: ☒ 对
☐ 错

问题 17

得 4 分, 满分 4 分

While a process is blocked on a semaphore's queue, it is engaged in busy waiting.

所选答案: ☒ 错

答案: ☐ 对
☒ 错

问题 18

得 4 分, 满分 4 分

Critical section can be enforced with a general semaphore whose initial value is greater than 1.

所选答案: ☒ 错

答案: ☐ 对
☒ 错

问题 19

得 4 分, 满分 4 分

Suppose 9 producers and 6 consumers share a buffer with size of 8. In order to use the buffer properly, the semaphore mutex of critical section of the buffer is initialized to ____。

所选答案: ☒ C. 1

答案: A. 8
B. 6
☒ C. 1
D. 9

问题 20

得 4 分, 满分 4 分

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 sections should be initialized to ____。

所选答案: ☒ C. 3


答案: A. 1
B. 5
☒ C. 3
D. 0

问题 21

得 0 分, 满分 4 分

Which of the following Critical Section problem solutions results in busy-waiting?

所选答案:  D. Semaphore

- 答案:
- A. Monitor
 - B. critical region
 -  C. Special machine instruction
 - D. Semaphore

2020年1月4日 星期六 下午04时01分15秒 CST

← 确定