SOLUTIONS FOR THE SECOND 3360/6310 QUIZ

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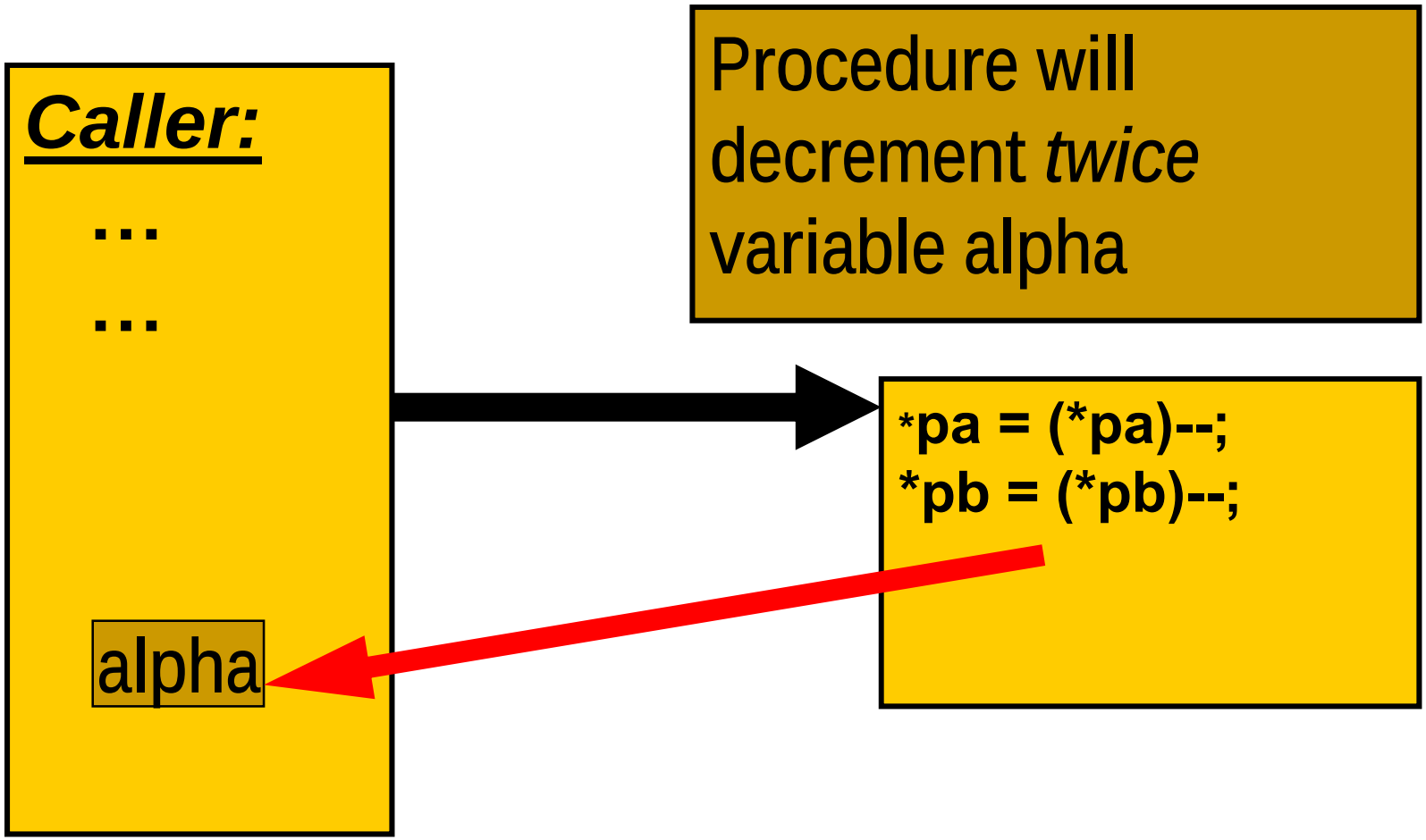
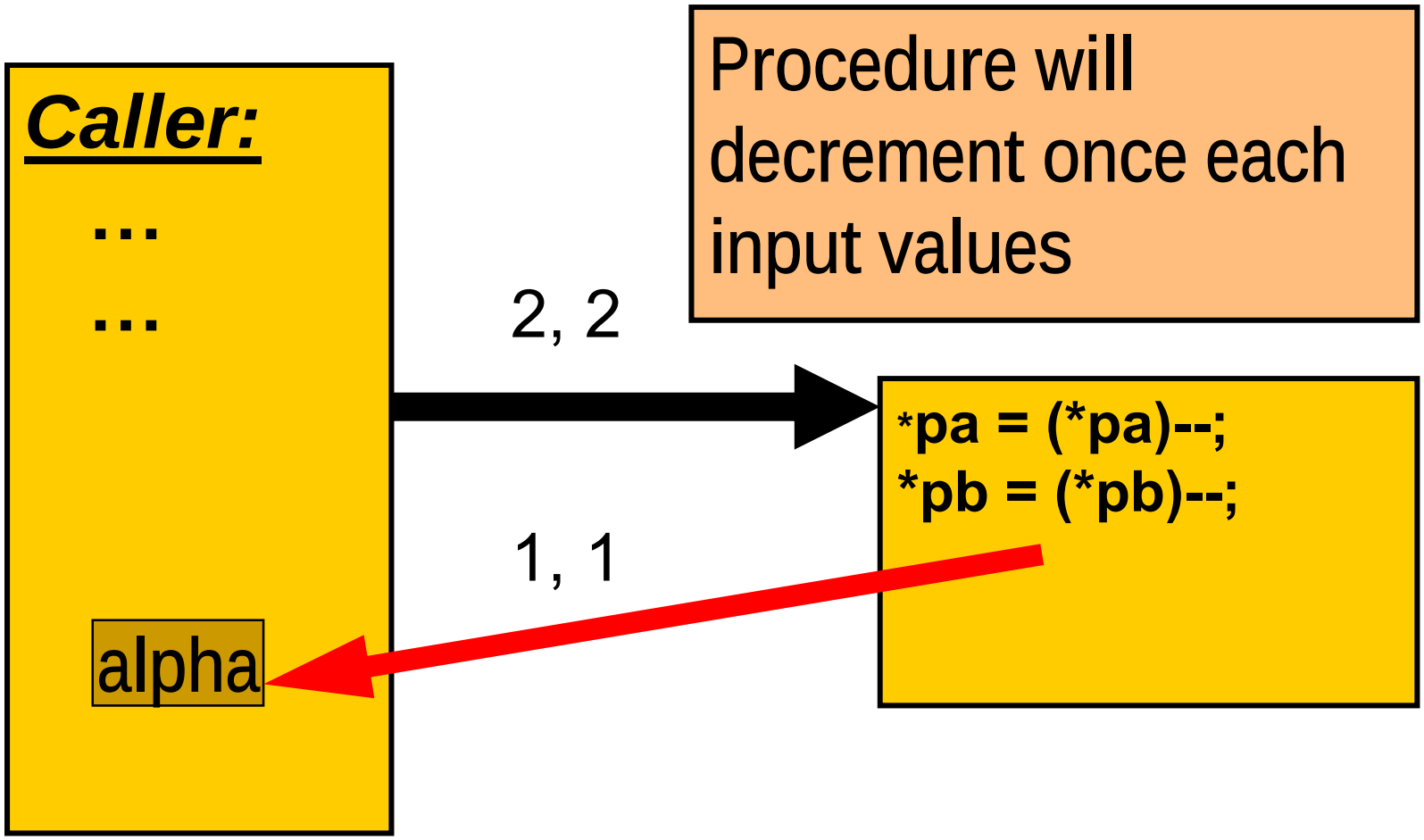
First question

- Consider the function
  - ```
    void doubledecrement(int *pa, int *pb){
      *pa = (*pa)--;
      *pb = (*pb)--;
    } // doubledecrement
    ```
- and assume the following calling sequence:
  - ```
    alpha = 2;
    doubledecrement (&alpha, &alpha);
    ```

Passing by reference



Passing by value and result



First question

- What will be the value of **alpha *after the call*** assuming that the call was:
  - A ***conventional procedure call***?
    - **alpha = 0**
  - A ***remote procedure call***?
    - **alpha = 1**

Second question

- Consider the following system V.4 scheduler:

```
#ts_quantum ts_tqexp ts_slpret ts_maxwait ts_lwait LVL
     800        X        1        16000        0    #  0
     400        0        2         8000        2    #  1
     200        1        3         4000        3    #  2
     100        2        3         2000        3    #  3
```

- Which level corresponds to the highest process priority?

Second question

- Consider the following system V.4 scheduler:

```
#ts_quantum ts_tqexp ts_slpret ts_maxwait ts_lwait LVL
     800        X        1        16000        0    #  0
     400        0        2         8000        2    #  1
     200        1        3         4000        3    #  2
     100        2        3         2000        3    #  3
```

- Which level corresponds to the highest process priority?
  - **Level 3**

Second question

- Consider the following system V.4 scheduler:

```
#ts_quantum ts_tqexp ts_slpret ts_maxwait ts_lwait LVL
     800        X        1        16000        0    #  0
     400        0        2         8000        2    #  1
     200        1        3         4000        3    #  2
     100        2        3         2000        3    #  3
```

- What brings a process in the **ts_tqexp** column**?**

Second question

- Consider the following system V.4 scheduler:

```
#ts_quantum ts_tqexp ts_slpret ts_maxwait ts_lwait LVL
     800        X        1        16000        0    #  0
     400        0        2         8000        2    #  1
     200        1        3         4000        3    #  2
     100        2        3         2000        3    #  3
```

- What brings a process in the **ts_tqexp** column**?**
  - **The process returned to the ready queue after having exhausted its time slice.**

Second question

- Consider the following system V.4 scheduler:

```
#ts_quantum ts_tqexp ts_slpret ts_maxwait ts_lwait LVL
     800        X        1        16000        0    #  0
     400        0        2         8000        2    #  1
     200        1        3         4000        3    #  2
     100        2        3         2000        3    #  3
```

- Which value in the table is ***not correct*****?**

Second question

- Consider the following system V.4 scheduler:

```
#ts_quantum ts_tqexp ts_slpret ts_maxwait ts_lwait LVL
     800         X         1        16000         0    #  0
     400         0         2         8000         2    #  1
     200         1         3         4000         3    #  2
     100         2         3         2000         3    #  3
```

- Which value in the table is ***not correct*****?**
  - **The value for ts_lwait at level 0**

Second question

- Consider the following system V.4 scheduler:

```
#ts_quantum ts_tqexp ts_slpret ts_maxwait ts_lwait LVL
     800        X        1        16000         0    #  0
     400        0        2         8000         2    #  1
     200        1        3         4000         3    #  2
     100        2        3         2000         3    #  3
```

- Why?

Second question

- Consider the following system V.4 scheduler:

```
#ts_quantum ts_tqexp ts_slpret ts_maxwait ts_lwait LVL
     800        X        1        16000        0    #  0
     400        0        2         8000        2    #  1
     200        1        3         4000        3    #  2
     100        2        3         2000        3    #  3
```

- Why?
  - **It does not prevent starvation for level 0 processes**

Third question

- What is the ***main drawback*** of ***virtual circuits and streams***?

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  - **The high setup cost of the connection.**

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- What is the ***sole disadvantage*** of ***atomic transactions***?

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  - **Their high cost.**

Third question

- How can we prevent deadlocks by ***denying*** the ***circular wait*** condition?

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- How can we prevent deadlocks by ***denying*** the ***circular wait*** condition?
  - **By requiring them to acquire all their resources in the same linear order.**

Third question

- What is the difference between ***blocking sends*** and ***non-blocking sends***?

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- What is the difference between ***blocking sends*** and ***non-blocking sends***?
  - **A blocking send waits until its message has been delivered to its recipient.**
  - **A non-blocking send does not.**

Third question

- What is the ***main disadvantage*** of ***lottery scheduling***?

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- What is the ***main disadvantage*** of ***lottery scheduling***?
  - **It does not guarantee that processes that received a lot of tickets will always execute ahead of the others.**

Third question

- What is the ***safest place*** to put your ***signal*()** call in your monitor procedures?

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- What is the ***safest place*** to put your ***signal*()** call in your monitor procedures?
  - **At the end of these procedures.**

Fourth question

- A small parking lot has space for 30 cars and a single entry/exit point that can only accommodate one car at a time.
- Complete the following solution in a way that avoids deadlocks.

Declarations

- `semaphore spaces = ______;`

  `semaphore green  = ______;`

leave_lot() function

```
leave_lot(){
        P(&green);
        get_out();
        V(&green);
        V(&spaces);
} //leave lot
```

enter_lot() function

```
enter_lot(){
        _____________________________________;
        _____________________________________;
        get_in();
        _____________________________________;
} // enter_lot
```

Declarations

- ```
  semaphore spaces =  30;

  semaphore green  =  1; // our mutex
  ```
  ```

enter_lot() function

```
enter_lot(){
    P(&spaces);
    _____________________________________;
    get_in();
    _____________________________________;
} // enter_lot
```

enter_lot() function

```
enter_lot(){
    P(&spaces);
    P(&green);
    get_in();
    V(&green);
} // enter_lot
```

Fifth question

- What is the major disadvantage of *busy waits*?
- What can we do to eliminate them?
- Are there cases where it is better to keep them?

Answers

- **Busy waits waste CPU cycles and cause unnecessary context switches.**
- **We should use instead kernel-supported solutions that move the waiting processes to the blocked state.**
- **For short waits in multicore architectures.**