COSC 4330 SECOND MIDTERM JUNE 26, 2003

This exam is **closed book**. You can have **one page** of notes, that is, **one side of a sheet**. UH expels cheaters

1. For each of the statements below, indicate in one sentence whether the statement is true or false (2 points), **and why** (3 points).

(a) Most file servers process customer requests in a strictly sequential fashion.

FALSE, they process several requests in parallel (and that is why they are threaded).

(b) *Reliable datagrams* guarantee that no message will be lost or duplicated.

FALSE, they only guarantee that no message will be lost (but you could argue that the ACK mechanism will detect duplicates).

(c) You can simulate *non-blocking sends* using *blocking sends* and *positive acknowledgments*.

FALSE, you can simulate blocking sends using non-blocking sends and positive acknowledgments.

(d) Steps taken to decrease the *response time* of a system can sometimes decrease its *throughput.*

TRUE, it happens when we decrease the time slice in the Round-Robin scheduling policy.

2. Consider the following system V scheduler:

```
#ts_quantum ts_tqexp ts_slpret ts_maxwait ts_lwait LEVEL
    800         M        1        4000        1    #  0
    400         N        2        2000        2    #  1
    200         1        3        1000        T    #  2
    100         2        3         500        U    #  3
```

Give correct values for the four following parameters? (4×5 points)

M = _0__ **N =** _0__ **T =** _3__ **U =** _3__

3. What would you need to do to simulate streams using datagrams? (10 points)

(a) Use positive acknowledgments to ensure that all messages will be delivered intact.

(b) Attach a serial number to each message to detect duplicate messages and reorder messages that arrive out-of-orders.

(c) Remove message boundaries.

4. Two concurrent processes access the same shared variable **count**.

```
process one {                      process two {
   count = 0;                         count = 2;
```

```
    count++;                           } // two
} // one
```

What values can **`count`** take after the two processes have completed? (10 points)

Answers:__1, 2 and 3____

Explanation: The third value corresponds to the case when **`count = 2`** is executed after **`count = 0`** but before **`count++`**.

5. You are given a complex program that makes extensive use of kernel supported threads and ask to port it to an architecture that only has user-level threads. Your manager tells you that the port should be "a piece of cake." Do you agree with him? (5 points) Why? (5 points)

It will not be a piece of cake because of the way user-level threads support blocking system calls. You will have to replace all blocking system calls (including reads) by non-blocking systems calls and that is not a trivial task.

6. Answer in one sentence to each of the following questions: (6×5 points)

(a) What is the major disadvantage of *blocking sends*?

The sending process is blocked until the message is received by the receiver process. This will delay the sender process but not waste any CPU for the process will be in the waiting state.)

(b) How can you implement the *at most once* semantics in remote procedure calls?

By adding a serial number to each request and instruct the server not to process duplicate requests.

(c) What is the major disadvantage of *busy waits*?

They waste CPU cycles.

(d) What steps should a scheduler take to prevent process starvation?

It should increase the priority of any process that has been too long in the ready queue without ever gaining access to the CPU.

(e) What is the big advantage of preemptive scheduling policies?

Processes can preempt the CPU whenever a lower-priority process is using it.

(f) How would you pass a double-linked list to a remote procedure?

I would store it in array and pass along the information that it is a double-linked list.