NAME: ___________________________________ (FIRST NAME **FIRST**) **SCORE:** _____

COSC 4330 FIRST QUIZ JUNE 17, 2014

*This exam is **closed book**. You can have **one page** of notes. UH expels cheaters.*

1. *Questions with Short Answers:* (6×5 points)

(a) Why would a process ***interrupt itself***?

To make a system call.

(b) Why is ***memory protection*** always implemented in hardware?

Because it has be done for very memory reference and must thus be done very fast.

(c) What is the purpose of the UNIX **signal( )** system call?

To specify what a process should to when it receives a signal: the default is to terminate.

(d) In which ***state*** is a process waiting for the CPU?

In the READY state.

(e) Which feature of UNIX made it ***more portable*** than previous operating systems?

It was written in a high-level language—C—rather than in assembler.

(f) Why is it ***easier*** to write programs using kernel-supported threads than user-level threads?

Kernel-supported threads allow threads to do blocking system calls without sending all the threads sharing the same address space to the WAITING state

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2. ***Advantage and disadvantages:*** *you will get no credit if you answer mentions a disadvantage when an advantage is asked and vice versa.* (6×5 points)

(a) What is the main advantage of ***all lightweight processes*** over ***regular processes***?

They are much cheaper to create than regular processes because the kernel does not have to

create a new address space for each thread.

(b) What is the main disadvantage of ***monolithic kernels***?

They are fairly complex and hard to maintain.

(c) What is the main advantage of ***multithreaded servers***?

They can handle several requests in parallel.

(d) What is the main advantage of ***dual-mode processors***? ____________________

Dual-mode processors prevent user processes from performing themselves I/O operations by

making all I/O instructions privileged instructions that can only be executed by the kernel.

(e) What is the major advantage of microkernels? ____________________

Microkernels allow kernel extensions to run in user space, which prevents them from crashing the

kernel. (Also: Microkernels are smaller, more manageable and easier to secure.)

(f) What is the main advantage of ***symmetric multiprocessing*** over ***master/slave organizations***?

All processors can run kernel code, which avoids one potential bottleneck.

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3. How many lines will this program print? (5 points)

```
int main(){
        if (fork() == 0) {
                printf("Hello World!\n");
        }
                printf("Goodbye!\n")
} // main
```

Answer: three **lines**

4. What should the OS do when there is ***not enough free memory***? (5 points)

It should swap out some processes and send them the SUSPENDED state.

Which processes are the ***best candidates*** for this action? (5 points)

The processes that have been for a long time in the WAITING state as well as VERY LOW priority processes,

And the ***worst candidates***? (5 points)

READY processes.

5. Give examples of ***real-time processes*** with: (2×5 points)

(a) Hard deadlines: Process control, airplane navigation, … _

(b) Soft deadlines: MP3 and video players.

6. How would you redirect the ***output*** of a program to the file **logfile.txt ?** (2×5 points)

```
fd = open("logfile.txt", O_WRONLY | O_CREAT, 0644);

close(1); // we close stdout

dup(fd); // we create a duplicate of fs into the first free descriptor, which happens to be stdin

close(fd);
```

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