CS3.301: Operating Systems and Networks

IIIT Hyderabad

Quiz 2

1. Explain the merits and demerits of fixed-size and variable-size message communication by considering the system designer and programmer levels.
2. Explain the merits and demerits of direct and indirect communication system designer and programmer levels.
3. Explain the merits and demerits of synchronous and asynchronous communication.
4. Consider a multiprocessor system and a multi-threaded program using a many-to-many threading model. Let the number of user-level threads in the program be more than the number of processors in the system. Discuss the performance implications of the following:
   a. "The number of kernel threads allocated to the program is greater than the number of processors but less than the number of user-level threads."
   b. "The number of kernel threads allocated to the program equals the number of processors."
5. Explain the role of the short-term scheduler.
6. Explain the issues if you do not employ a "medium-term scheduler".
7. Why is the separation of mechanism and policy a desired principle?
8. Using the following program, explain what will be the output at LINE A

```
#include <sys/types.h>
#include <stdio.h>
#include <unistd.h>
int value =5;

int main(){
   pid.t pid;
   pid=fork();
   if (pid == 0) {/* child process */
      value +=15;
   }
   else if (pid > 0){/* parent process */
      printf("PARENT: value =%d",value); /* LINE A */
      exit(0);
   }
}
```

9. Provide two programming examples in which multithreading performs better than a single-threaded execution.
10. Provide two programming examples in which multithreading does not provide better performance than a single-threaded execution.
11. Explain the words "Concurrency" and "Parallelism" with examples. Do you agree that the "multithreading framework improves both Concurrency and Parallelism on a multicore system?" Justify your answer.
12. "The notion of a virtual machine is a logical conclusion of layered design", elaborate.
13. What do you understand with the word "Atmost Once" semantics?

14. Suppose a CPU scheduling algorithm favours those programs that have used little processor time recently. Explain why this algorithm favours I/O-bound processes and does not permanently deny processor time to CPU-bound processes.
15. What is the purpose of thread pools?