**CSE3102-Operating Systems**

**Assignment-1**

**1A.** What is the main advantage of the microkernel approach to system design? How do user programs

and system services interact in a microkernel architecture? What are the disadvantages of using the

microkernel approach?

**1B.** Which of the following instructions should be privileged? State Yes or No and justify your answer.

1. Disable all interrupts
2. Read Program Status Word(register which tracks current state of OS)
3. Clearing virtual memory
4. Switch from user to kernel mode

**2A.** Give two reasons why caches are useful. What problems do they solve? What problems do they

cause? If a cache can be made as large as the device for which it is caching (for instance, a cache as

large as a disk),why not make it that large and eliminate the device?

**2B**. What is the relationship between a guest operating system and a host operating system in a system

like VMware? What factors need to be considered in choosing the host operating system?

**3A.** What is the output for the variable val in the parent and child process for the code given below.

Justify your answer.

|  |  |
| --- | --- |
| a) | b) |
| main ()  {  val = 5;  if(fork())  wait(&val);  val++;  printf("%d\n", val);  return val;  } | main()  {  val = 5;  if(fork())  wait(&val);  else  exit(val);  val++;  printf("%d\n", val);  return val; } |

**3B.** Discuss how the problem of maintaining coherence of cached data manifests itself in (1.5M)

the following processing environments:

a. Single-processor systems

b. Multiprocessor systems

c. Distributed systems

**4A**. Give an example for something that will make a process to do

1. Voluntary Context Switch
2. Involuntary Context Switch

Also relate your answer for each to the process state diagram.

**4B.** An alert reviewer notices a consistent spelling error in the manuscript on Operating Systems textbook, about to go to press. The book has about 700 pages, each with 50 lines of 80 characters each. How long would it take to process (i.e., make one pass through) the manuscript, assuming that the manuscript is in the following levels of the memory hierarchy:

|  |  |  |  |
| --- | --- | --- | --- |
| S.No | Type | Capacity | Access Time |
| 1 | Registers | <1KB | 1nsec |
| 2 | Cache | 1MB | 2nsec |
| 3 | Main Memory | 1GB | 10nsec |
| 4 | Magnetic Disk | 50GB | 10msec |
| 5 | Magnetic Tape | 100GB | 100sec |

For internal storage methods, assume the access time is per character, for disk devices, assume the access time is per block of 1024 characters, and for tape assume the access time is to the time to get to the start of the data, with subsequent access time similar to disk access.

**5A**. Given a system with n processes, how many possible ways can those processes be scheduled. Give a

formula in terms of n. Also for each of the following transitions between process state, indicate

whether transition is possible or not. If its possible, give an example of one thing that would cause it

and if its impossible, justify your answer.

1. Run🡪 ready b)Waiting🡪Run c)Run🡪 Terminated

**5B.**What will happen to the child processes if the parent process dies in Unix operating system. Also write how parent process detects the termination of a child process mentioning the required system calls.