Institute of Information & Communication Technology

University of Sindh, Jamshoro

BSIT part – III 2nd Semester Examination (Morning / Evening) Regular

ITEC-520 Operating System

February 17, 2021 Marks 60 Time: 2 hours

***Note: Attempt any four questions and all questions carry equal marks..***

Q.No.1 (a) Give examples of both software and hardware interrupts and discuss the role of an interrupt vector table and interrupt handlers in serving of an interrupt by operating system

(b) Programmed I/O, Interrupt-driven I/O and Direct Memory Access (DMA) are three different techniques for I/O operations. Discuss each one and compare among them.

(c) Give some reasons why caches are useful and what problems 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?

Q.No.2 (a) Using an API rather than direct system calls is a preferred method of calling OS routine; discuss why

(b) Through an example, show and discuss how the function call in the API is mapped into a corresponding system call within an operating system

(c) Compare among three methods of passing parameters to the operating system routines: (1) Simplest in which parameters are passed in registers, (2) Parameters stored in a block of memory and (3) Stack. Point out which of the most widely used operating systems use what parameters passing method?

Q.No.3 (a) What is distinction between blocking and non-blocking with regard to message passing? For what kind of applications is “Non-blocking send blocking receive” combination appropriate?

(b) How does the short-term scheduler (CPU scheduler) differ from the long-term scheduler (job scheduler)?

(c) What is context-switching? Also discuss the role of process control block (PCB) in context-switching between processes performed by the operating system

Q.No.4 (a) What does it mean to say a process is heavy-weight, whereas a thread light-weight?

(b) Discuss any two programming examples for each of two scenarios: (1) in which multithreading does not provide better performance than a single-thread solution and (2) in which multithreading provides better performance than a single-threaded solution.

(c) As a developer, you have an option of implementing independent activities in an application either as processes or as threads, Will you go with the former or the latter and why?

Q.No.5 (a) In what sense do user threads differ from kernel threads?

(b) Describe the actions taken by a thread library to context switch between user-level threads

(c) Discuss what thread pooling is? Take an example of a webserver with its three variants: (1) a single-threaded webserver, (2) a multithreaded webserver that creates a thread at the time of serving the request and (3) a multithreaded server with thread pooling, and compare among them with respect to performance and memory load.

Q.No.6 (a) Demonstrate conceptually, through examples, how concurrent execution of multiple processes (or threads) requiring access to the shared resource lead to a critical section problem.

(b)Discuss what mutual exclusion is, and list down and discuss briefly Mutual Exclusion requirements?

(c) List down and briefly discuss hardware-based mechanisms commonly used to implement mutual exclusion

or

(a) List down and briefly discuss various software based mechanisms commonly used in implementing Mutual Exclusion

(b) Show, through pseudocode, implementation of mutual exclusion using semaphores.

The End