Institute of Information & Communication Technology

University of Sindh, Jamshoro

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

ITEC-520 Operating System

December 08, 2017 Marks 100 Time: 2.5 hours

***Note: Attempt any five questions. All questions carry equal marks***

Q.No.1 (a) List down and discuss (1) events that can cause hardware interrupt and software interrupt and (2) actions taken by operating system to serve an interrupt.

(b) When I/O operation is requested, how CPU interfaces with the I/O device to coordinate the transfer and how CPU knows when the memory operations are complete?

(c) All modern operating systems are interrupt-driven; explain this statement through some examples.

Q.No.2 (a) Discuss (1) how provision of dual mode protects operating system from errant users and errant users from one another and (2) how transition from user to kernel mode takes place?

(b) There are two ways of calling operating system routines: (1) System calls and (2) an API. What method would you prefer and why? Also show API-System Call-OS relationship through an example.

Q.No.3: A number of design approaches to constructing operating systems have been proposed in the literature and most notable ones are layered approach, modular kernel approach and microkernel approach. Answer the following as related to these design approaches.

(a) In what ways is the modular kernel approach similar to the layered approach?

(b) In what ways does the modular kernel approach differ from the layered approach?

(c) What is the main advantage of the microkernel approach?

(d) How do user programs and system services interact in the microkernel architecture?

(e) What are the disadvantages of using the microkernel approach?

Q.No.4 (a) Show diagrammatically the actions that Operating System takes to perform context-switching between processes

(b) Draw a Process State Diagram and discuss events that cause the process to change its state from one to another

(c) Describe the differences among short-term, medium-term, and long-term scheduling.

Q.No.5 Following are the questions related to threads. Answer them all.

(a) Discuss any two examples in which a multithreaded application provides better performance than a single-threaded application.

(b) Differentiate between user-level threads and kernel-level threads.

(c) Can a multithreaded solution using multiple user-level threads achieve better performance on a multiprocessor system than on a single-processor system?

(d) What is the idea of thread pooling? Discuss, through examples, how thread pooling improves the performance of the system.

Q.No.6 (a) Introduce, through few high-level examples, a critical section problem.

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

(c) Explain why interrupts are not appropriate for implementing mutual exclusion in multiprocessor systems.

(d) Discuss, through examples, how Mutual Exclusion can be implemented using Special Machine Instructions: (1) Compare & Swap Instruction and (2) Exchange Instruction. Also discuss serious disadvantages of use of special machine instructions for implementing Mutual Exclusion.

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

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

Q.No.7 Discuss the following:

a. CPU scheduling

b. Process Management

c. Virtual Memory Management

d. Virtual Machines