FCM 710: Architecture of Secure Operating Systems

Instructor: Shamik Sengupta, Office: 4210N

Assignment 1 (Total 40 points)

Assigned on: Feb 18, 2010, Due back on: March 2, 2010

1. [3+3+3=9] The issue of prioritized resource utilization (memory, CPU resources, storage, network bandwidth or power) shows up in different forms in different types of operating systems. List what resources must be managed with more priority in each of the following settings:
   a) Mainframe systems
   b) Workstations connected to servers
   c) Handheld devices (e.g., PDA)

   Explain why you think so.

2. [3+3=6] Describe the differences between symmetric and asymmetric multiprocessing. State the advantages and disadvantages of each of these.

3. [5+10=15] As we designed the shared memory implementation of producer-consumer problem in class using a circular array with two logical pointers (see the lecture slides), the solution allows at most \( \text{BUFFER\_SIZE} - 1 \) items in the buffer at the same time.

   a) Explain this by simply drawing a shared memory buffer and the positions of ‘in’ and ‘out’ in diagrams.
   b) Also, provide a solution (algorithm or pseudo-code) such that at most \( \text{BUFFER\_SIZE} \) items can be in the buffer at the same time.

4. [10] Write a simple client-server communication architecture using any programming language of your choice. The client process requests for day and time from the server process. The server process responds back to the client process with the current day and time (of the server) at the client prompt. (You need to submit the source code, reasonable documentations to understand the code and the screenshots of the outputs)