UECS2103/2403/2423 Operating Systems
Tutorial 3

1. List the advantages of ULTs.

2. What will happen to the process when a user-level thread in that process issues a system call?

3. What will happen to the threads that are still running if a process exits?

4. What is the disadvantage of KLT compared to ULT?

5. An application consists of the following tasks:

   Task T1: Waits for user request from a communication port and pass the request to task T2 once the request received.
   Task T2: receives request passed by task T1, backup the file required by the request and return to Ready state.
   Task T3: Periodically clean the temporary and cache files.

   a) Should the tasks implemented as User-level or Kernel-level threads? Explain your answer.

   b) Process Y is created when the application is executed. While process Y is **running**, task T1 starts, determine the states of process Y and thread if task T1 was implemented as

      i) user-level thread. Briefly explain your answer.

      ii) kernel-level thread. Briefly explain your answer.

6. There are two main tasks in an application, both tasks will write the results of computations into the same data file. Is the application suitable to be implemented as multithreaded? State your reason.

7. Process K, which is a new process, is moved to short-term queue. After a while, it is selected to execute when a currently running process terminates. After its time slice exhausted, process K is placed into the queue again. However, the operating system has to swap process K out from the main memory so that more free memory space can be allocated to another process. When that process terminates, process K continues its execution and then waiting for file to be transferred to a storage device. After the file transfer completed, process K is placed into queue again. Before process K is selected to execute again, user has decided to terminate it.

   a) List the state transitions of process K based on the 7-state model.

   b) Given that the functions of opening file and transferring file are part of the operating system, state the changes to the execution mode of process K, from the beginning of its execution until the file has completely transferred.

   c) If the file transfer was handled by a user-level thread, will the process K be blocked? Briefly explain your answer.

8. An application is designed to perform the following tasks:

   Task T1: Randomly generate a prime number within a specified range.
   Task T2: Perform computation based on the prime number generated by task T1.
   Task T3: Transform the results computed by task T2 into graphical information and display it on the screen.

   Should you implement the tasks as User-level threads or Kernel-level threads in the application? Justify your answer.