COP 4600 – Introduction To Operating Systems – Summer 2014

Homework #1 – 150 points

Due: Friday May 30th (by 11:59 pm WebCourses time). NO LATE ASSIGNMENTS ACCEPTED

Answer each of the following questions completely. Make sure that your answers are neatly written and very readable. Points will be deducted if your assignment is not presented in a neat format.

1. (20 points)

The figure on page 47 of the Processes lecture notes implies that a process can only be in one event queue at a time.

- (a) Is it possible that you would want to allow a process to wait on more than one event at the same time? Explain and provide an example scenario.
- (b) In the case that a process could be waiting on two events simultaneously, how would you suggest modifying the queuing structure shown on page 47 to support this new feature?
- 2. (40 points)

The process state transition diagram on page 50 of the Processes lecture notes contains seven states (this is the state diagram that contains two suspend states). In principle, one could draw a transition between any two states, for a total of 42 different transitions ($_{n}P_{r} = n!/(n-r)!$, $_{7}P_{2} = 7!/5! = 5040/120 = 42$).

- (a) Explicitly list all of the possible (valid) transitions and give a brief example of what could cause that transition to occur.
- (b) Explicitly list all of the impossible (invalid) transitions and briefly explain why the transition is impossible. Note that some transitions will be invalid for the same reasons – you can group these transitions together if you like.

Process	Arrival Time	Processing Time
A	0	3
В	1	5
С	3	2
D	9	5
E	12	5

(90 points – 15 points each (a)-(f))
Consider the set of processes shown in the table below.

For each of the scheduling protocols of:

- (a) FCFS
- (b) Round-Robin (do for both time-quantum = 1 and time quantum = 2)
- (c) Shortest Process Next
- (d) Shortest Remaining Time
- (e) HRRN
- (f) Feedback (time-quantum = 1, assume 3 queue levels) do the following:
 - 1. Generate the Gantt chart showing the execution order/timing of these processes.
 - 2. Determine the average waiting time for a process.
 - 3. Determine the average turnaround time for a process.
 - 4. Determine the normalized turnaround time for a process.