

Homework 10

(106 points)

1. Is the task set $(T, C) = (5, 2), (10, 6), (16, 3)$ feasible under the following scheduling schemes? Prove why or why not. State if the approach you use has polynomial, pseudo-polynomial, or exponential time complexity.
 - A. Preemptive, dynamic-priority scheduling (6 points)
 - B. Preemptive, static-priority scheduling (10 points)
2. Give two “additional complexities” that real-world systems may have. Discuss why a task or system might exhibit this behaviour and how it makes building and/or testing a schedulable system more challenging. Write at least four sentences. (8 points)
3. Create a task set of three tasks that can cause at least four time units of priority inversion blocking for τ_1 and at least two time units of priority inversion blocking for τ_2 . State $(\varphi_i, T_i, C_i, \delta_{i,A})$ for each task and draw a schedule that produces the required priority inversions. (20 points)
4. Consider the task set $(T_i, C_i, \delta_{i,A}) = (5, 2, 1), (7, 4, 3)$ scheduled by RM with the Non-Preemptive Protocol.
 - A. What are B_1 and B_2 ? (4 points)
 - B. Assume both τ_1 and τ_2 always execute their CPU-only work first and then execute their work that requires access to Resource A (so CPU+ R_A work) second. Draw the schedule that is produced by these constraints from time 0 to time 35. (10 points)
 - C. Assume both τ_1 and τ_2 always execute their work that requires Resource A first and then execute their work that is CPU-only second. Draw the schedule that is produced by these constraints from time 0 to time 35. (10 points)
 - D. Conduct the modified RTA test for all tasks. Can we guarantee that this task set is schedulable by RM? (12 points)
5. Consider the task set $(T_i, C_i, \delta_{i,A}) = (9, 4, 1), (25, 6, 3), (30, 5, 2)$ scheduled by RM with the Non-Preemptive Protocol.
 - A. Conduct the modified RM utilization test for all tasks. Can we guarantee that this task set is schedulable by RM? (10 points)
 - B. Conduct the modified RTA test for all tasks. Can we guarantee that this task set is schedulable by RM? (16 points)

Feedback

1. How much time did you spend completing this assignment (ignoring interruptions)?
2. How much time did you spend doing the assigned reading (ignoring interruptions)?
3. Any other feedback?