CS 330 - Winter 2025
Assignment W2

Due: Wednesday, January 22, 2025 (start of class)

You should submit a physical copy of your written homework at the start of class.

[2 points] Collaboration Statement

Be sure to include a collaboration statement with your assignment, even if you worked alone.

[25 points] Problem 1 - Non-Preemptive Scheduling

Consider the following task set, in which each task τ_i is represented as (Φ_i, C_i, D_i):

$$\tau = \{\tau_1, \tau_2, \tau_3, \tau_4\} = \{(0, 2, 9), (1, 4, 6), (2, 1, 4), (4, 3, 8)\}$$

a) Draw the pruned scheduling tree and mark the branches that are pruned by Bratley's algorithm. Your final tree should have a similar form to Figure 3.10 (Buttazzo p. 57).

b) Draw the path in the scheduling tree for the heuristic $h = C_i$ using the Spring Algorithm.

c) Draw the path in the scheduling tree for the heuristic $h = d_i$.

d) Give a heuristic that selects another feasible ordering, and draw that path in the scheduling tree. Your heuristic may only use one or more of the parameters Φ_i, C_i, D_i, and d_i.

[23 points] Problem 2 - EDF with Implicit Deadlines

For this problem, we will work with the following task set, in which each task τ_i is represented as (T_i, C_i):

$$\tau = \{(T_i, C_i)\} = \{(4, 1), (6, 1), (8, 3), (10, 2)\}.$$

a) Perform the utilization-based schedulability test. What does it say about the schedulability of the task set generally?

b) Draw a schedule from $t = 0$ to $t = 20$ for the task set, assuming EDF scheduling. Be sure to draw one line per task, and include all release and deadline arrows and all completion hats.

c) Make a change to some task parameter that causes the task system to fail the utilization-based schedulability test. Explain the change you made, the result of the test, and what that means about whether some other algorithm could schedule it.