

Name:

CSCI 460 Operating Systems

Participation Test 5

Instructions: Write your name above. Relax and attempt the problems below. This is NOT a quiz and participation credit will be given for any sincere attempt. (Later, solutions will be posted on the course webpage.) Turn in the sheet at the end of the class to receive your participation credit.

This question is on real-time scheduling. Least laxity first (LLF) is a real-time scheduling algorithm for period tasks. Laxity (or slack time) is the amount of time between the time when a task would complete if it started now and its next deadline. This is in fact the time of the available scheduling window. Formally laxity can be defined as

$$\text{Laxity} = (\text{deadline time}) - (\text{current time}) - (\text{processing time}).$$

By name, LLF selects the task with the minimum laxity to run next. A tie can be broken by the FCFS policy.

(1.1) Suppose a task currently has a laxity of t , by how long may the scheduler delay starting this task and still meet the deadline?

The task may be delayed by up to time t and still meet its deadline.

(1.2) What does it mean for a task to have a laxity 0?

The task must be executed right away, otherwise it will not meet its deadline.

(1.3) What does it mean for a task to have a negative laxity?

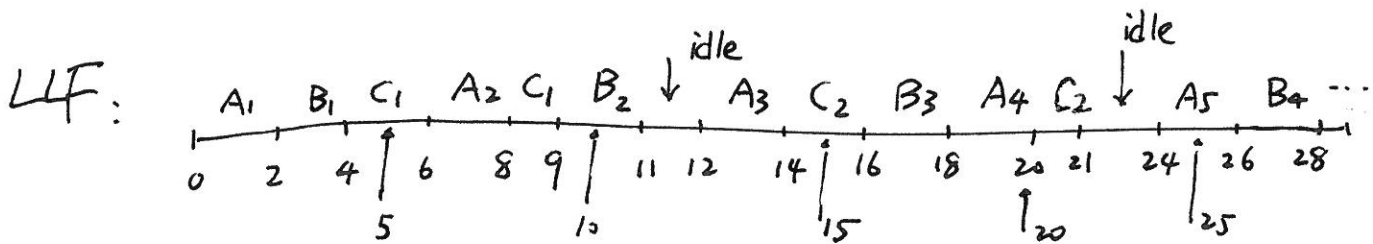
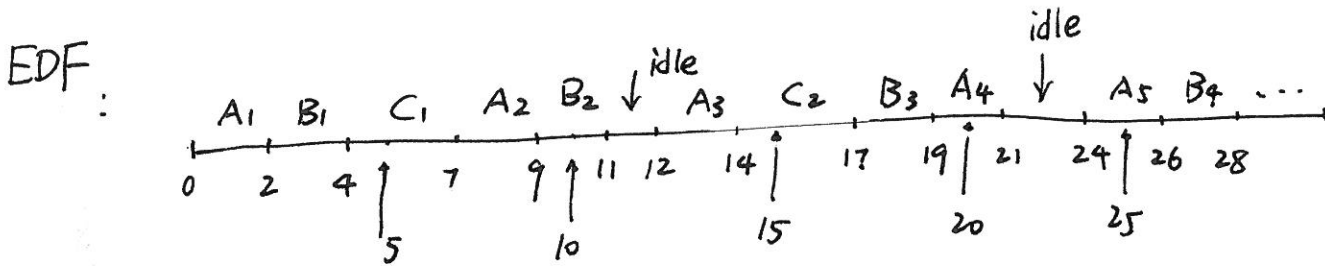
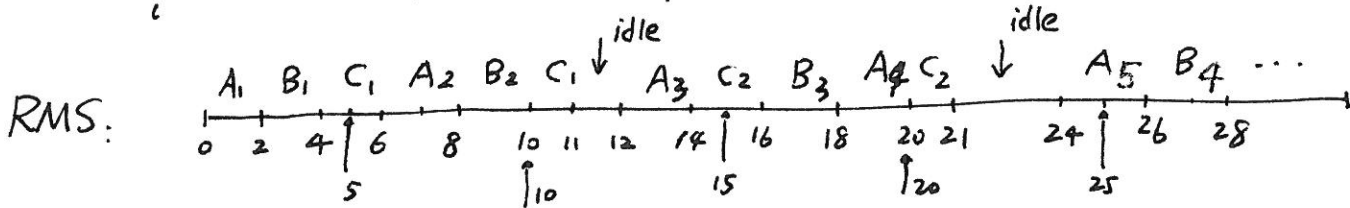
The task cannot meet its deadline.

(1.4) Run rate monotone scheduling (RMS), earliest-deadline first (EDF), and LLF for the following table of periodic tasks. The preemption may occur at 5-ms intervals.

Task	Period	Processing Time
A	6	2
B	8	2
C	12	3

$$U_1 = \frac{2}{6} = 33\%, \quad U_2 = \frac{2}{8} = 25\%, \quad U_3 = \frac{3}{12} = 25\%$$

$$\sum_i U_i = 83\% < 100\%$$



In all cases, the pattern repeats every 24 ms.