COL788: Advanced Topics in Embedded Computing

Lecture 19 – Real-Time Scheduling

Vireshwar Kumar
CSE@IITD

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Semester I
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Reading Material

- Tindell, Ken, and Alan Burns. "Guaranteeing message latencies on control area network (CAN)." *Proceedings of the 1st International CAN Conference*. Citeseer, 1994.

- Davis, Robert I., et al. "Controller Area Network (CAN) schedulability analysis: Refuted, revisited and revised." *Real-Time Systems* 35.3 (2007): 239-272.

Scheduling

- Given a set of (computer) tasks (a.k.a., processes), **scheduling** is to determine when to execute which task, thus determining the execution order of these tasks.
  - Example: T1=‘fetch children to school’, T2=‘do classes’, T3=‘do shopping’

- In non-real-time systems, the typical goal of scheduling is to maximize average throughput (number of tasks completed per unit time) and/or to minimize average waiting time of the tasks.
  - Lift bus

- In the case of real-time scheduling, the goal is to meet the deadline of every task by ensuring each task can complete execution by its specified deadline.
  - CAN bus

Task Characterization

- Task *T* can be denoted as *(S, c, d, p)*
  - *c:* computation time (a.k.a., WCET – Worst Case Execution Time)
  - *S:* start time (a.k.a., release or ready time)
  - *d:* deadline (i.e., relative to the start time)
  - *p:* period (a.k.a., minimum separation)

What Next?

- Lecture 20
  - October 06, Monday, 11 am – 12 pm