SFWR ENG 4AA4

Kemal Ahmed
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Dr. Down

Note: information from the pre-requisite, SFWR ENG 3DX4 will not be included in this summary (although corrections will be).

Contents

Real-Time Systems

Classifications

What happens upon failure to meet deadlines:

- **Soft**: performance is degraded but not destroyed
- **Firm**: a few times will simply degrade performance, but after may lead to system failure
- **Hard**: complete and catastrophic system failure
  - **Safety Critical**: may cause injury / death (a type of hard)

Forward difference method: derivatives using $f'(x) = \dfrac{f(x+h) - f(x)}{h}$

Backwards Difference method: derivatives using $f'(x) = \dfrac{f(x) - f(x-h)}{h}$

Controller [C(s)]:
Input [E(s)]:
Output [U(s)]:

$$U(s) = C(s)E(s)$$

Task optimization

Task [T]: $T_i = (p_i, r_i, e_i, d_i)$

Period [p]: time between tasks are repeatedly released
Release time [r]: time it takes to release task
Execution time [e]: slowest time task could take to be completed (but assume the tasks will take this long no matter what)
Deadline [d]: when task needs to be completed

If $r_i = 0$ and $p_i = d_i$, then write $T_i = (p_i, e_i)$

Types of Scheduling

FIFO

First In First Out (FIFO):
- Could cause problems for tasks whose execution time is significantly shorter than the rest when there are deadlines
  - E.g. $T_1 = (100, 3)$; $T_2 = (2, 1)$
- A.K.A. **First Come, First Served (FCFS)**

Frame Size:
Schedule: the order in which tasks will be executed