LE18.5

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LE18.5.1: Real-time Constraints

0.0/1.0 point (ungraded)

Three devices, D1, D2, and D3, are serviced by interrupt handlers in an interrupt system that may choose to use either strong (preemptive) priorities or weak (nonpreemptive) priorities. Their service times and maximum request rates are shown in the table below.

Device	Service time	Maximum frequency	Deadline
D1	100us	1/(1000us)	300us
D2	150us	1/(300us)	240us
D3	250us	1/(1000us)	1050us

1. Assuming each device were interrupting at its maximum rate, what fraction of the CPU time would be used to service **D1**? What fraction of the CPU time would be left for background computing? Answer in percent. Enter your response as "N%".

   Give PERCENTAGE of CPU used to service D1:

   Give PERCENTAGE of unused CPU:

2. Can the requirements given in the table above be met using a **weak** priority ordering among the interrupt requests? If so give priority ordering for D1, D2, D3 or select device(s) whose deadlines cannot be met. Select all that apply.

   Weak priority ordering or list device(s) with possibly missed deadlines:

   - [ ] D1 > D2
   - [ ] D1 > D3
   - [ ] D2 > D1
   - [ ] D2 > D3
   - [ ] D3 > D1
   - [ ] D3 > D2
   - [ ] D1 misses deadline
   - [ ] D2 misses deadline
   - [ ] D3 misses deadline

3. Can the requirements given in the table above be met using a **strong** priority ordering among the interrupt requests? If so give priority ordering for D1, D2, D3 or select device(s) whose deadlines cannot be met. Select all that apply.

   Strong priority ordering or list device(s) with missed deadlines:

   - [ ] D1 > D2
   - [ ] D1 > D3
   - [ ] D2 > D1

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- [ ] D2 > D3
- [ ] D3 > D1
- [ ] D3 > D2
- [ ] D1 misses deadline
- [ ] D2 misses deadline
- [ ] D3 misses deadline

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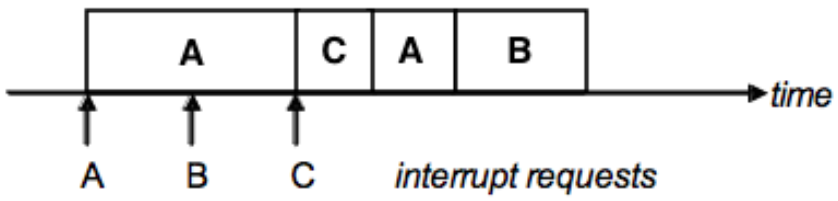
LE18.5.2: Assigning Priorities

0.0/1.0 point (ungraded)

The following timeline shows how a processor executes interrupt handlers in response to interrupt requests (shown as ↑ in the diagram) from devices A, B and C. Assume that the processor is idle before the first interrupt request arrives.



1. Does the processor implement a weak priority system or strong priority system? If there's not enough information to decide, select "Can't Tell".

Type of priority system (weak, strong, can't tell):

- ( ) Weak
- ( ) Strong
- ( ) Can't Tell

2. Indicate the relative priorities of A, B and C, e.g., select "A > B" if A has a higher priority than B. Select "None" if you can't tell. Select all that apply.

Relative priorities of A, B and C:

- [ ] A > B
- [ ] A > C
- [ ] B > A
- [ ] B > C
- [ ] C > A
- [ ] C > B

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- [ ] None

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- [x] 18.5.1 (C) Rationale? 4
With only one PRI level (Earlist Deadline D2>D1>D3), the time to service Dev2 would preempt every attempt to service Dev3, correct...

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