

Module 1: Lecture Questions

Module 1 - Lecture 1 (Wednesday - 3/24/21)

None.

Module 1 - Lecture 2 (Thursday - 3/25/21)

1. What distinguishes Real-Time Software from Traditional Software?
2. What are three challenges of developing Real-Time Software?
3. What are the definitions of Latency, Execution time, response time, release time, relative deadline?
4. For a periodic task with a period of 1 msec, what is its relative deadline?
5. What is preemption?
6. How does adding priority and enabling preemption affect latency and execution times?
7. Under what conditions is a task considered schedulable?
8. In the ece3849_int_latency project, there is an event0 with a 6001 usec period and a clock running at 120 MHz.
 - a. What is the value of the TIMER0_PERIOD we use to program the interval timer for TIMER0?
 - b. If the event handler reads a current time value at the very beginning of the service routine of 700,000. What is the latency in usec of the event 0 task?
 - c. How can the service routine tell if it has met its deadline?
 - d. If the clock were running at a 100 MHz, how would it affect these calculations?

Module 1 - Lecture 3 (Friday - 3/26/21)

9. In a Canonical Real-Time Systems what are the three system assumptions do we make about the system.
10. Why is it important to use the maximum latency and execution values when calculating response time?
11. Describe the Round Robin and Priority Polling algorithms. List one pro and one con for each scheduling method.
12. In the Round Robin scheduling example, we had three event0 , event1, and event2.
 - a. Which event is most likely to be un-schedulable in this method? Why?
 - b. If we changed to Priority Polling which event is most likely to be un-schedulable? Under what conditions would this occur?

13. For the below tasks fill in the latency , response time, relative deadline and if it is schedulable using the Round Robin polling method.

| Event | Period | Execution Time | Latency | Response Time | Relative Deadline | Schedulable ? |
|--------|--------|----------------|---------|---------------|-------------------|---------------|
| eventA | 7 ms | 3 ms | | | | |
| eventB | 5 ms | 1 ms | | | | |
| eventC | 12 ms | 2 ms | | | | |

Module 1 - Lecture 4 (Monday - 3/29/21)

14. For the below tasks fill in the values for latency , response time, relative deadline and if it is schedulable using the Priority polling method.

- List in the priority column which task is high, mid and low priority and explain why.
- These are the same tasks from question 13. Did changing to Priority Polling improve the performance? Why / Why not?

| Event | Period | Execution Time | Priority | Latency | Response Time | Relative Deadline | Schedulable ? |
|--------|--------|----------------|----------|---------|---------------|-------------------|---------------|
| eventA | 7 ms | 3 ms | | | | | |
| eventB | 5 ms | 1 ms | | | | | |
| eventC | 12 ms | 2 ms | | | | | |

15. When using preemptive scheduling,

- What is the roll of the interrupt controller?
- What tasks run in the foreground? What tasks run in the background?
- How should the tasks be prioritized?
- What happens if all the interrupts have the same priority?
- Why does response time become more difficult to calculate?

16. Interrupts can be globally disabled for some or all of the ISR.

- Why would we want to disabled the interrupts?
- Why is it important to minimize the amount of time that interrupts are disabled for?

17. Below are the same tasks as in question 13 and 14. For each task fill in the priority, latency, relative deadline and if it is schedulable using preemptive scheduling / interrupts.

- Would you use preemptive scheduling for these tasks or stay with a polling strategy? Explain.

| Event | Period | Execution Time | Priority | Latency | Response Time | Relative Deadline | Schedulable ? |
|--------|--------|----------------|----------|---------|---------------|-------------------|---------------|
| eventA | 7 ms | 3 ms | | | | | |
| eventB | 5 ms | 1 ms | | | | | |
| eventC | 12 ms | 2 ms | | | | | |