

1. Where does Julia Cartwright work?

Julia Cartwright works at National Instruments.

2. What is PREEMT_RT? Hint: Google it.

This is a real-time operating system that is based off of Linux. A Linux patch named PREEMPT_RT is used when a real time operating system is needed.

3. What is mixed criticality?

This is the notion of having “two different degrees of time sensitivity” in terms of tasks. These tasks being interdependent creates this mixed criticality,

4. How can drivers misbehave?

Using Linux with PREEMPT_RT requires shared driver stacks between these resources and can cause these drivers to misbehave.

5. What is Δ in Figure 1?

This is the delta which is the time in which an event has occurred until the corresponding real time task in the system.

6. What is Cyclictest[2]?

It takes a time stamp and sleeps for six durations which corresponds to around 10 ms. Then records another time stamp when this thread becomes active again. The difference between these can help find the delta as displayed in figure 1.

7. What is plotted in Figure 2?

This is the plotted delta values from a cyclictest. These values are plotted in a histogram and appear to have a normal distribution to a certain extent. The purple is congif PREEMPT in a mainline kernel. The green is the same hardware system and is utilizing the real time PREEMT_RT, thus increasing the performance and efficiency of the system as displayed in figure 2.

8. What is dispatch latency? Scheduling latency?

Dispatch latency is the time the time from the hardware being actuated to the interrupt actually being woken up. For example pressing a key to the system registering that an interrupt has to be sent to the CPU. Scheduling latency is the other half of this as this is the time it takes for the system to send this message from the interrupt dispatch to the CPU to schedule the task itself.

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9. What is mainline?

The mainline displays the process in which we interpret interrupts. This begins with hardirq and then goes into non critical irq and finally external events.

10. What is keeping the **External event** in Figure 3 from starting?

The non critical irq as this is needed for the process to begin in this task pipeline.

11. Why can the **External event** in Figure 4 start sooner?

A signal is sent to trigger the external event and it pauses the non critical irq to run and resumes the execution of the non critical irq after it is complete.