Tristan Heywood

Russell Graves

ECE 5780

Lab 2 Report

Resource scheduling algorithms, such as Rate Monotonic (RM) and Earliest Deadline First (EDF), have been used extensively in real-time systems to manage competing tasks with different priorities. Both RM and EDF have their unique features that affect the generated schedules in terms of preemptions and deadlines missed.

RM is a static priority scheduling algorithm that assigns higher priority to tasks with shorter periods. Thus, RM tends to provide a lower number of preemptions and deadline misses for tasks with shorter periods. This is because shorter period tasks will have more opportunities to execute in between the longer period tasks, resulting in a better utilization of the processor. However, when tasks have the same period, RM is not effective in avoiding preemptions and deadline misses. Additionally, RM requires the task to have its period defined and fixed, which might be a challenge for tasks with varying behavior or dynamic environments.

On the other hand, EDF is a dynamic priority scheduling algorithm that assigns higher priority to tasks with closer deadlines. EDF tends to provide fewer deadline misses because it ensures that the closest deadline task executes first, avoiding any potential conflicts. However, this may cause more preemptions, as the priorities are constantly changing based on the deadlines, which may cause overhead in the system. EDF is effective when the task's deadline is not fixed, as it allows the task to adapt to the environment and changes in task behavior.

While working on this lab, one observation we had was that implementing EDF was easier than RM. This would generally be the opposite of what a person would expect as RM requires less processing power as it has static scheduling. We determined that EDF was easier because we worked on creating an RM scheduler first. Since we had gone through trial and error with the RM scheduler, the EDF scheduler was easier to create as we could use what we had learned in the previous segment of the lab.

In conclusion, both RM and EDF have their strengths and weaknesses in generating schedules. RM provides fewer preemptions and deadline misses for tasks with shorter periods, while EDF provides fewer deadline misses by prioritizing tasks with closer deadlines. The choice of which algorithm to use depends on the system requirements and the task characteristics. Therefore, it is essential to consider the characteristics of the tasks and the system when selecting the appropriate scheduling algorithm.