Optimization of Priority based CPU Scheduling Algorithms to Minimize Starvation of Processes using an Efficiency Factor

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Abstract

The priority based CPU scheduling algorithm (i.e. Shortest Job First (SJF) or Priority Scheduling (PS)) is a kind of scheduling algorithm that assigns the CPU to processes based on the priority of each process. The shortcoming of both of these algorithms is starvation (i.e. starvation of processes with longer burst times in the case of SJF and starvation of processes with lower priorities in the case of PS). This paper proposes a new algorithm that introduces the concept of EFFICIENCY FACTOR to all processes. This proposed algorithm was implemented and benchmarked against SJF, PS and the Optimum Service Time Concept for Round Robin Algorithm (OSTRR) by [9] using Uniform distribution to generate the burst times, Exponential distribution to generate the priorities and Poisson distribution to generate the arrival times of processes. It is observed that in the SJF category, the traditional SJF produced better Average Waiting Time (AWT), Average Turnaround Time (ATAT), Average Response Time (ART) and Waiting Time Variance Deviation (WTVD) compared with the proposed SJF. But they both produced the same Number of Context Switches (NCS). The proposed SJF produced better
results compared with OSTRR with respect to AWT, ATAT, ART, NCS and WTVD. While in the PS category, the proposed priority produced better AWT, ATAT, ART and WTVD compared to the traditional Priority scheduling algorithm. But they both produced the same NCS. The proposed Priority algorithm produced better results compared with OSTRR with respect to NCS and WTVD also produced almost the same result in terms of AWT and ATAT in all categories of the statistical distributions used. Based on these results, the proposed priority algorithm should be preferred over the traditional priority algorithm.

References


Index Terms

Computer Science, Algorithms
Keywords

CPU scheduling algorithms, Efficiency factor, Shortest Job First Scheduling, Starvation, Priority Scheduling, Waiting Time Variance Deviation