Improved Priority Exchange Server

Abdul-Azeez Olanlokun
Electronic Engineering
Hochschule Hamm-Lippstadt
Lippstadt, Germany
abdul-azeez.olanlokun@stud.hshl.de

***Abstract*—This paper is focused on the scheduling algorithm of the improved priority exchange server. In critical systems, it is important to meet deadlines, as there are a lot of processes running at the same time, these processes need to be given priority in other to avoid system overloads, which could lead to catastrophic occurrences in the system. In other to avoid these overloads, we need to schedule the system, giving priorities to tasks. In other to achieve an efficient scheduling system, we have extensively analyzed the use of the improved priority exchange server algorithm, which is a modification of the DPE server (Dynamic Priority Exchange Server, explained further in this paper), this is done by using the EDL scheduler (Earliest Deadline Late, explained further in this paper) idle times. This led to the increase in an efficient replenishment policy of this server, and also changed the dynamics of the scheduler which in turn allows regular running of the system at its highest priority.**

***Index Terms*—Improved priority, server, efficiency.**

A. The Definition of the IPE server

The Improved Priority Exchange (IPE) scussed here is built on the concept mentioned abo dify the DPE server in particular by utilizing the idle times of an EDL scheduler. Firstly, a far more efficient server replenishment policy was obtained. Secondly, the obtained server is no longer periodic and allows to always run as the system's highest priority. As a result, the IPE server is defined as follows:

- The IPE server has an aperiodic capacity, initially set to 0;
- At each instant $t = e_i + kH$, with $0 \leq i \leq p$ and $k \geq 0$, a replenishment of ${\Delta_i}^*$ units of time is scheduled for the server capacity; that is, at time $t = e_0$ the server will receive ${\Delta_0}^*$ units of time (the two arrays/vectors $\mathcal{E}$ and $\mathcal{D}^*$ have been defined in the previous section)."For context, $\mathcal{E} = (e_0, e_1 ..., e_p)$ which represents the times at which idle times occur, while the second vector $\mathcal{D}^* = ({\Delta_0}^*, {\Delta_1}^* ...., {\Delta_p}^*)$ represents the lengths of these idle times";
- The server priority is always the highest in the system, regardless of any other deadline.;
- All other rules of IPE (aperiodic requests and periodic instances executions, exchange and consumption of capacities) are the same as for a DPE server.

The IPE server has been scheduled with the same set of task shown in fig 3 above in the EDL server, which is shown in fig 4 below. We sl ake into account that the server replenishments are ng to the function ${\mathcal{F}^{\text{EDL}}}_{\mathcal{J}}$, which is illustrated in fig e arrival of the aperiodic request at $t = 8$ is immed ated to one unit of time by the server. Due to past deadline exchanges, the other two units are available at the priority level corresponding to deadline 12 and are allocated immediately after the first. The last one is later allocated at time $t = 12$,when a new unit of time is received by the server In this case, the optimal response time is maintained. As we will see later, the ideal EDL server performs marginally better than IPE in only a few cases. That is, IPE almost always behaves almost optimally.

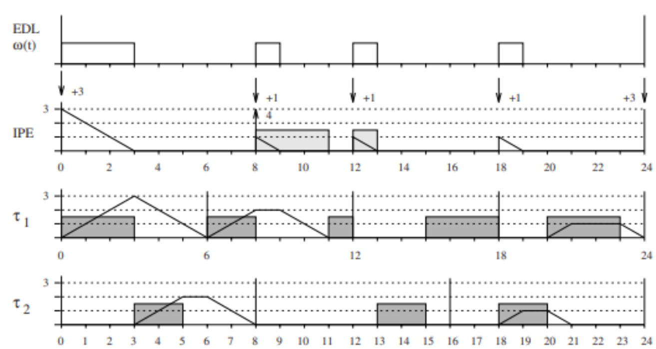

Fig. 1. An Example of Improved Priority Exchange server.

Ref

[1] C. Buttazzo, Hard Real-Time tems, vol. 24. Boston, MA: Springer US, 2011. doi: 10.1007/978-1-4614-0676-1.
[2] M. Spuri and G. Buttazzo, "Scheduling Aperiodic Tasks in Dynamic Priority Systems," The Journal of Real-Time Systems
[3] M. Spuri, G. Buttazzo, nd F. Sensini, "Robust Aperiodic Scheduling under Dynamic Priority Systems," In Proceedings IEEE Real-Time Systems Symposium, pp. 210-219, Pisa, Italy, 5-9 December, 1995.