Scheduling on a dynamic priority exchange server

A study paper on Butazzo's dynamic priority exchange server under the dynamic scheduling algorithms

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Abstract—In the world of real time systems, there are many scheduling options to ensure that the system meets the appropriate timing constraints and works exactly as intended and predicted. The Dynamic priority exchange server is an extension of the priority exchange server based on the Earliest Deadline First algorithm, in which the main function is that priorities of assigned tasks are interchangeable in their runtime.

Index Terms—Real-time, Scheduling, Dynamic, Server, aperiodic, periodic

I. INTRODUCTION

Real-time systems have been a crucial part of society since processor based technology has been introduced to the world. Many examples of application include Industrial, automotive and medical applications and many more. [1] Every computer controlled system needs to perform according to its given function, but in many cases the functions of the systems include time constraints for certain tasks. For these types of applications Real-time systems are required to ensure the execution of given tasks according to the time constraints of the system. If the system reacts too late to a given task, it could have mild or catastrophic consequences depending on the type of system and its use case. [1] Foreseeing and preventing such cases without them happening in the first place, makes predictability the most crucial attribute for real time systems.

For any real-time System, a given task can be seen as a process that needs to be executed by the CPU of the system. To ensure predictability and properly handle all tasks within the given time constraints, an operating system with the proper task scheduling algorithm is needed in the system. When a CPU receives a set of tasks from the system that, it has to be assigned to processing each task in a way that can be determined and controlled. [1]. To achieve the proper way of assigning the CPU to the right task at the right time to make sure the system does not fail its time constraints, there are many scheduling algorithms that can be used. In this paper, the main topic will be about the Priority exchange server (DPE), proposed by Spuri and Buttazzo, which is based on the Earliest deadline first algorithm. [1]

II. BASICS FOR DYNAMIC PRIORITY EXCHANGE SERVER

To understand how the dynamic priority exchange server operates, one has to explore the functionality of its basics first. Decomposing DPE, we see:

- DPE is based on the earliest deadline first (EDF) algorithm. [1]
- DPE is a Server in the system, which works in the same way as a periodic task. The polling server serves as its basis. [1]
- DPE can be seen as an extension of the priority exchange server, in which case it is important to understand its functionality first. [1]

A. Earliest Deadline First algorithm

(PLATZHALTER) Basic description of the EDF algorithm

B. Polling Server

(PLATZHALTER) Explaining the functionality and behaviour of a polling server in different scheduling algorithms.

C. Priority exchange Server

(PLATZHALTER) Advanced formal description of the behaviour of an priority exchange server

III. DYNAMIC PRIORITY EXCHANGE SERVER

(PLATZHALTER) Formal description of the DPE algorithm

IV. CHALLENGES AND ADVANTAGES OF DPES

(PLATZHALTER) Advantages and disadvantages

V. APPLICATION EXAMPLE

(PLATZHALTER) Applicatione example of DPE

VI. COCLUSION

conclusion of studies on the dynamic priority exchange server

REFERENCES

[1] G. C. Buttazzo, *Hard real-time computing systems predictable scheduling algorithms and applications.* MTM, 2013.