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A Comparative Study of the Implementation of SJF and SRT Algorithms on the GPU Processor Using CUDA

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Abstract

GPU (Graphical Processing Units) have become in a few years very powerful tools for parallel computing. They are currently used in several fields such as image processing, bioinformatics, medical applications and numerical computation...etc. Their advantages are faster processing and lower power consumption compared to CPU power. It is simple to program a GPU processor using the CUDA C language to perform tasks that are typically computed in parallel. But you need to understand the different architectural aspects of the GPU. In this paper, we will define and implement the two operating system algorithms the SJF (Shortest Job First) algorithm and the SRT (Shortest Remaining Time) algorithm in a single-wire CPU environment using the C language, and then the same algorithms will be implemented on the GPU using the CUDA C language, in order to compare the different performances of the implementation of the two algorithms on GPU and CPU processors and to verify the efficiency of this study.

Keywords: CUDA, GPU, CPU, SRT, SJF, thread.

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1. Introduction

With the emergence of high-level programming languages for graphics processing units (GPUs), GPUs have become more attractive to speed up tasks that are typically performed in parallel. Despite these new languages, it is difficult to use these complex architectures effectively. Indeed, graphics cards are evolving rapidly, with each generation bringing its own features dedicated to accelerating graphics routines or high-performance computing. The architectural details of these architectures remain largely secret, as manufacturers are reluctant to disclose the implementations used. These new features added to GPUs are the result of the simulation of different architectural solutions carried out by manufacturers to determine their validity and performance. The complexity and performance of today's GPUs present significant challenges when exploring new architectural solutions or refining certain parts of the processor.

GPU computing needs are increasing exponentially such as physical simulation [3], risk calculation for financial institutions, weather forecasting, video and audio encoding [4]. So, GPU computing has brought a huge advantage over the CPU in terms of performance (speed and energy efficiency). It is therefore one of the most interesting areas of research and development in modern computing. The GPU is a graphics processing unit that mainly allows us to run high quality graphics, which is the essential demand of the modern computing world. The main task of the GPU is to calculate 3D functions, this type of calculations is very difficult to do on the CPU (central processing unit), the GPU can help us to

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