COMP30660 - Computer Arch & Org (Conv) -2021/22

Assignment 2: Multiprocessing

[20 Points]

Objective

The objective of this exercise is to evaluate speedup derived using multiple CPU cores through the multiprocessing facility in Python.

Submission: This project can be done individually or in groups of two.

What is provided?

A Python Notebook (**MultiprocessingCore**) is available on the Brightspace page that provides a basic multiprocessing framework. The Notebook contains the code to set up a multiprocessing Pool and use that Pool to process tasks. If you are a Windows user, please use this notebook. If multiple cores are available, the Pool can use those cores to speed up the processing. The function in the sample code is a simple square-root function. So, it is not possible to see the impact of using multiple cores.

A naive function for checking primes is also provided. If this is used to check large numbers, (8 digit) it takes time and the speedup from using multiple cores will be evident.

There are plenty of primes to be found here: https://primes.utm.edu/lists/small/millions/

Tasks

1. Connect the check_prime function to the Pool processing function. Generate sets of work (numbers to be checked) to be processed by the pool. Quantify the speedup achieved with multiple cores (at least 2). **What lessons can be learned from these results? (75%)**
2. Complete only one of the following.
    a. Identify an alternative processing task that will also test the CPU and repeat the assessment. **What lessons can be learned from these results? (25%)**
    b. Repeat the exercise in 1 running on a VM through VirtualBox and assess the impact (performance hit) of using the VM. **(25%)**

**Note: At least on a Mac, the Python multiprocessing package seems to work better under Python 3.*

Deliverable

Your submission should have two components:

- Your code can be multiple files or all contained in one notebook
- A PDF document (**not more than 2 pages**) presenting the results of your evaluations with a font size no smaller than 10pt Arial.

Each individual should make a submission **on BrightSpace**. i.e. pairs should submit two copies of the same submission where the **names of contributors should be stated clearly**.