COMP30660
Computer Architecture & Organisation

Assignment 2

Multiprocessing

Due April 26th

Objective

The objective of this exercise is to evaluate speedup derived from 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 Moodle page that provides a basic multiprocessing framework. The Notebook contains code to set up a multiprocessing Pool and use that Pool to process tasks. If multiple cores are available the Pool can use those cores to speed up 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. Either a or b.
   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 as a single file.
- A PDF document (not more than 2 pages) presenting the results of your evaluations.

Each individual should make a submission with submissions from a pair naming both contributors, i.e. pairs submit two copies of the same submission.