An-Najah National University
Faculty Of Engineering
Computer Engineering Department

Operating Systems

Assignment 2

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The Goal:

Demonstrate the performance of different Inter-Process Communication (IPC) techniques by adding two large arrays of double values and comparing results.

First step:

Create two arrays, `packet1` and `packet2`, filled with random double values.
`packet1` contains values from 0 and `N` (your student ID).
`packet2` contains values from 0 and 10.

Serial:

Calculate a result array (`result_packet1`) by raising each element of `packet1` to the power of the corresponding element in `packet2` using a simple loop. Then Measure the time for this.

Parallel with Shared Memory:

Create multiple processes (`M` processes) that divide the computation of the result array (`result_packet2`) among themselves. Each process computes a portion of the array and writes the results to shared memory. Measure the time taken for this parallel approach and check that `result_packet1` matches `result_packet2`.

Parallel with Message Passing:

Repeat the parallel computation, but this time use message passing to send results to the parent process and store them in `result_packet3`. Then check that `result_packet1` matches `result_packet3` and measure.

Results:

```
~$ g++ OSHW2.cpp -o output.cpp
~$ ./output.cpp
Serial Time: 0.260457 seconds
Parallel (Shared Memory) Time: 0.112721 seconds
Shared Memory: Match
Parallel (Message Passing) Time: 4.333445 seconds
Message Passing: Match
~$ g++ OSHW2.cpp -o output1.cpp
~$ ./output1.cpp
Serial Time: 0.261547 seconds
Parallel (Shared Memory) Time: 0.110474 seconds
Shared Memory: Match
Parallel (Message Passing) Time: 4.467983 seconds
Message Passing: Match
```

```
root@7a3e0641297d:/app# g++ -o OSHW2 OSHW2.cpp
root@7a3e0641297d:/app# ./OSHW2
Serial Time: 0.383334 seconds
Parallel (Shared Memory) Time: 0.270049 seconds
Shared Memory: Match
Parallel (Message Passing) Time: 10.821427 seconds
Message Passing: Match
```