

Problem 4

Verifying Correctness:

I wrote a verification program that compares the images reconstructed using the serial and the parallel codes. The program reads the images, takes their absolute difference, and returns the maximum value of this difference. If the difference is zero, then the two images are exactly the same. Otherwise there is something wrong with the parallel code. (Note that the compared images have to have the same resolution).

| Processes | | 1 | 2 | 4 | 8 |
|-----------|------|---------|---------|---------|---------|
| P4A | 512 | 35.314 | 18.212 | 10.100 | 6.562 |
| | 1024 | 137.908 | 70.271 | 38.314 | 26.237 |
| | 2048 | 544.929 | 277.114 | 151.454 | 103.932 |
| P4B | 512 | 35.338 | 19.054 | 11.259 | 7.627 |
| | 1024 | 138.115 | 72.854 | 41.420 | 27.631 |
| | 2048 | 540.546 | 285.219 | 161.421 | 107.586 |

Figure 1: Running times of *P4A* and *P4B* executed on Resonance Node with different resolutions and number of processes

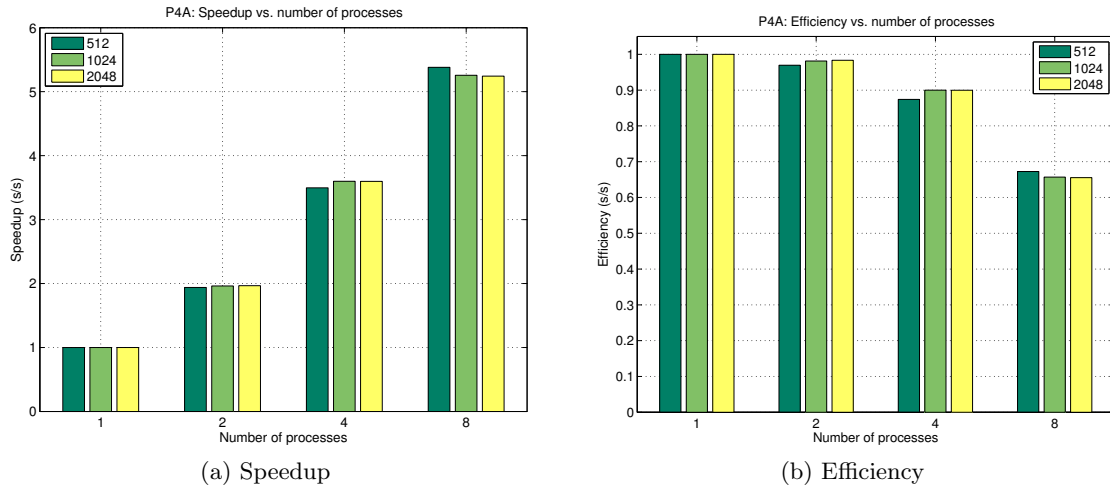
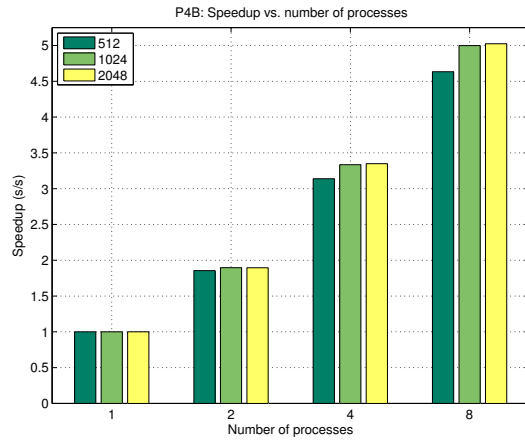
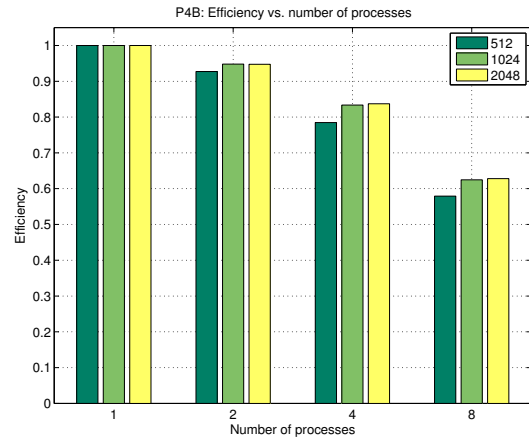


Figure 2: Speedup and efficiency plots for *P4A* executed on Resonance Node

We can see from Figure 3b that efficiency increases (looking at the data run with the same number of processes) when Image Size is increased. Comparing Figure 3b to Figure 2b, we see that this doesn't apply to P4A. It should be noted that P4A demonstrates higher speedup than P4B, and outperforms P4B in almost all cases.



(a) Speedup



(b) Efficiency

Figure 3: Speedup and efficiency plots for $P4B$ executed on Resonance Node