

ENEL428 Software Engineering II

Assignment 4

Due:

Thursday October 6th at 5pm.

Objective:

To gain experience in parallelising code using the MPI and OpenMP libraries and to estimate economic requirements for a commercial contract.

Introduction:

A large Chinese mining company have sent a space probe to a region of the Orion Nebula where they suspect not only is there a abundant supply of harvestable dark matter but also signs of intelligent life. The probe used the Modified Alcubierre Warp drive which solved many of the causality problems associated with the original Cochrane Drive. The probe returned after two solar years with approximately ten million 1024 X 1024 double precision images of the region of interest. On inspection the images were blurred, probably as a result of an incorrect motion correction with the target. There was also some minimal gamma radiation noise present, probably from an old nearby supernova. Scientists have determined that the images can be cleaned up using the Richardson-Lucy convolution filter and the mining company have put out a tender for the restoration of the images. Your company wishes to tender and your boss wants an estimate on the hardware and time commitment for the project. You don't have unlimited resources.

Description:

Implement the Richardson-Lucy filter using MPI and OpenMP on the departmental cluster OldeSparky, which a kind colleague (Dave van Leeuwen) has put together for you to experiment with. Choose some representative images to experiment with. You do not have to implement the code from scratch as the idea is to find out what kind of architecture is best suited for the project. Develop your program under Linux, you can develop and test on any PC in CAE2. What we are looking for is performance data to trade time against cost of hardware to complete the project. Write a report for your boss. Above all explain what you did and why you did it. The report, the data and your conclusions are the important part!

You will submit the documented source code, binaries, your best sample image, and a report in a zip file to the drop box on Learn before the due time, additionally a printed copy of the report will be placed in the ENEL428 box on Level 4.

Marking Schedule:

Source code and documentation:	25%
Report and Performance Data:	75%