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## **ID5130 - Parallel Scientific Computing**

## **Assignment - 2**

1.

**Status of code: runs-and-gives-correct-result**

The following plot represents obtained the numerical and analytical solution as a function of x using LU decomposition for dense matrix (the sparse matrix method will not have enough parallelism) for N = 100 and number of gangs = 10.

Both the numerical and analytical solution plots are overlapping one another. Therefore, the result of LU decomposition is correct.

The following table shows the time taken (micro-seconds) by the full parallel solver for number of gangs = 10, 100, 1000 for N = 1000.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *Function()* |  | *10* | *100* | *1000* |
| *init\_A()* | *-* | *723* | *649* | *648* |
| *init\_b()* | *-* | *18* | *18* | *19* |
| *LU\_Decompose()* | *LU Decomposition* | *1,287,945* | *1,275,398* | *1,273,345* |
| *Forward Substitution* | *959* | *1,181* | *958* |
| *Backward Substitution* | *1,199* | *1,373* | *1,198* |
| *main()* | *-* | *38* | *38* | *42* |
| *Total Time* | | *1,290,882* | *1,278,657* | *1,276,210* |

2.

**Status of code: runs-and-gives-correct-result**

The following table shows the time taken (micro-seconds) by the serial and the parallel codes using Cholesky decomposition for N = 10, 100, 1000. The optimum number of gangs used was = 100.

|  |  |  |
| --- | --- | --- |
|  | *Serial* | *Parallel* |
| *N = 10* | *671.000* | *90* |
| *N = 100* | *973.028* | *147* |
| *N = 1000* | *172,980.334* | *2,418* |