Applications of Parallel Computing

1. Use a web browser, download the Linpack Benchmark report and print it off. (use the url http://www.netlib.org/nse/, click on repositories, click on "Netlib Software Repository", click on "The Netlib Repository (the files are in here)", click on "benchmark". Down load the postscript file "performance.ps" from the "benchmark" directory of netlib and print it.

2. Download the routines from LAPACK that will solve a general system of linear equations in full precision (64-bit floating point).

3. Solve the following matrix problems. Define a matrix of order 12 of the following form: $A_{i,j} = \frac{1}{i+j-1}$, set the elements the right-hand-side to be the sum of the rows of the matrix A. Using the LAPACK routines, compute the solution $Ax = b$.

4. What should the solution be?

5. Explain why your solution is what it is.

6. Compute the residue $\frac{||Ax-b||}{||A||||x||\epsilon}$, (where ϵ is the machine precision).

7. Why is this so small?

8. Now define a matrix of order 12 using a random number generator. (One can be found in the Linpack benchmark program, look in directory "benchmark" for file "linpackd" there is a function call RAN). Set up the right-hand-side the same as before and compute the solution.

9. Explain why your solution is what it is.

10. Compute the residue $\frac{||Ax-b||}{||A||||x||\epsilon}$.

11. Why are things normal in this case?