Assignment 3 - Raunak Borker

The Stabilized BiConjugate Gradient (BiCGSTAB) solver was benchmarked on the Stanford FarmShare corn machines using sample system of equations obtained from NASA. The results on a 16-core Xeon E5-2650 v2 @ 2.60GHz (PowerEdge R620, BTFQZ12) are as follows:

	`float`	`double`
nasa1824	0.10 sec / 907 iter	0.05 sec / 390 iter
nasa4704	did not converge	0.25 sec / 758 iter
nasasrb	did not converge	65 sec / 7792 iter

For all runs, the solver was run to a relative convergence criteria of 1.e-4.

Using double precision all 3 systems were seen to converge in lesser iterations than the size of the respective systems.

When the solver was run with single precision arithmetic the nasa1824 case was the only one that converged. Although it converged in less iterations than the size of the system, it took more than 2.3 times the iterations than were needed in double precision arithmetic. It would be expected that the time taken by single precision arithmetic is lower than double precision due to the faster access times associated with single precision floats, but it is observed that it takes almost 2 times the time of double precision for convergence. This could be attributed to the fact that for the smaller matrices there is not a significant difference in the time required for float versus double. This is because the small matrices fit in cache and the data access costs are much lower and performance is more limited by computation than data access.

With single precision floating points no convergence was observed in the nasa4704 and nasasrb cases. This could probably be attributed to the fact that the round off errors accompanying single precision floating point instigate the instabilities in the BiCGSTAB algorithm.