Peformance of ogs6#PETSc: Preliminary results

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The example for the performance test is simple 2D Poisson problem, which is one of ogs6 test. The original mesh has been refined 6 times, and it gives a mesh with 1,179,647 quadrilateral elements and 1,181,953 nodes. Tests have been performed with 2, 6, 12, 24 and 36 cores, respectively on the new developer machine envinf1.

test 1: KSP bcgs solver with bjacobi preconditioner

We firstly take the bcgs (BiCGStab) solver for speedup test. The wall clock times that elapsed in the individual computing tasks are list in 1, while Fig. 2 shows the speedup.

Table 1: Time used in major computational tasks of test 1 (in second)

Cores	Total	Equation assembly	Linear solver
2	31.43	0.637516	23.658
6	13.02	0.222503	10.3495
12	8.81	0.113172	7.34892
24	10.06	0.0612562	8.83863
36	7.69	0.053267	6.960

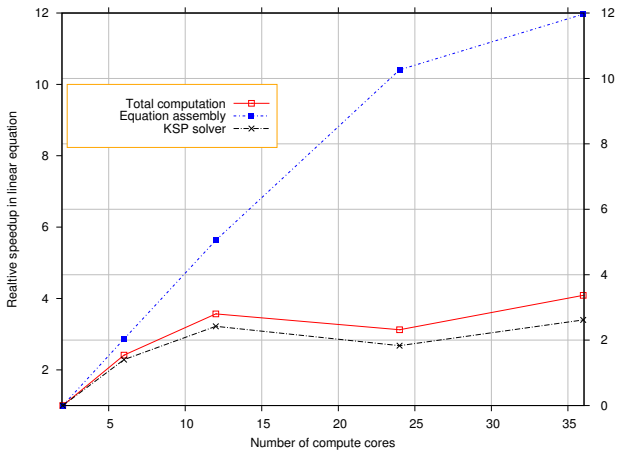

Figure 1: Relative speedup in the test 1

test 2: KSP cg solver with bjacobi preconditioner

Then we changed the linear solver to cg. The wall clock times that elapsed in the individual computing tasks are list in 2. and the speedup is depicted in Fig. **??**

The solver runs faster than bcgs. The results shows that the speedup is totally lost after 12 computer cores. However, the scalability is still good with uo to 6 compute cores.

Table 2: Time used in major computational tasks of test 2 (in second)

Cores	Total	Equation assembly	Linear solver
2	15.62	0.414177	10.5759
6	7.26	0.144996	5.38899
12	5.487	0.0833149	4.08424
24	7.12	0.083647	6.24571
36	17.86	0.030853	17.8457

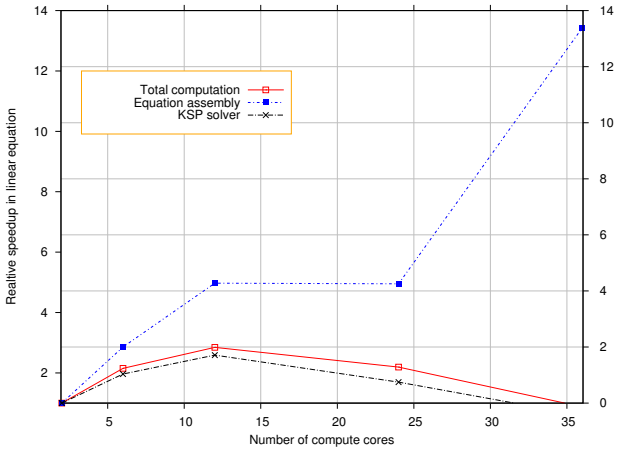

Figure 2: Relative speedup in the test 2

Concluding remarks

- Equation assembly is very fast and scalable.
- The speedup in linear solver are influenced by MPI communication. Different type of solver gives different scalability for this small simple problem.
- Momery usage is a little large (512 M). This and 2D problem help the fast equation assembly.
- The test size is too small and simple to conduct a decent performance test.