**CS595. Homework 6**

1) Build PETSc in debug mode (configure with ‘--with-debugging=1 PETSC\_ARCH=arch-cs595’) and

in optimized mode (configure with ‘--with-debugging=0 PETSC\_ARCH=arch-cs595-o’)

2) Run $PETSC\_DIR/src/ksp/ksp/examples/tutorials/ex2.c:

mpiexec –n <np> ./ex2 –m 300 –n 300 –ksp\_type <ksp\_type> -pc\_type <pc\_type> -log\_summary <log\_file>

Machine: ada.cs.iit.edu

(SUSE Linux Enterprise Server on a Dell PowerEdge with 2 dual core 3GHz Intel Xeon processors and 4GB of RAM)

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| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Methods | np | Norm of  Error | No. of  Iterations | Total Time  (sec)  g mode | Total Time  (sec)  O mode | Dominating Operation |
| 1 | -ksp\_type gmres  -pc\_type none  -ksp\_max\_it 1000 | 1  2  4 |  |  | 3.977e-03 | 1.503e-03 |  |
| 2 | -ksp\_type cg  -pc\_type none  -ksp\_max\_it 1000 | 1  2  4 |  |  |  |  |  |
| 3 | -ksp\_type gmres  -pc\_type bjacobi  -sub\_pc\_type ilu | 1  2  4 | 0.00569458  0.00610788 | 561  743 |  | 1.341e+01  8.926e+00 |  |
| 4 | -ksp\_type gmres  -pc\_type bjacobi  -sub\_pc\_type lu | 1  2  4 | 1.73656e-10  0.00153372 | 1  78 |  | 2.819e+00  2.176e+00 |  |
| 5 | -ksp\_type cg  -pc\_type bjacobi  -sub\_pc\_type icc | 1  2  4 | 0.000295213  0.000178647 | 166  199 |  | 2.277e+00  1.027e+00 |  |
| 6 | -ksp\_type gmres  -pc\_type asm  -sub\_pc\_type lu | 1  2  4 | 6.91688e-05 | 35 |  | 1.248e+00 |  |
| 7 | -ksp\_type gmres  -pc\_type asm  -sub\_pc\_type lu  -pc\_asm\_overlap 2 | 1  2  4 | 2.45535e-05 | 27 |  | 1.050e+00 |  |
| 8 | -ksp\_type cg  -pc\_type sor  -pc\_sor\_local\_symmetric | 1  2  4 |  |  |  |  |  |

3) $PETSC\_DIR/snes/examples/tutorials/ex19.c:

First, run ‘./ex19 -dmmg\_nlevels 7 -ksp\_monitor -snes\_monitor -snes\_view’ to understand the algorithm

Then run mpiexec –n <np> ./ex19 -dmmg\_nlevels 7 -log\_summary <log\_file>

Machine: ada.cs.iit.edu/petsc.mcs.anl.gov

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| --- | --- | --- | --- |
| np | Total Time  (sec)  g mode | Total Time  (sec)  O mode | Dominating Operation |
| 1  2  4  6 | / 1.162e+01  9.633e+01/ 8.311e+00 | 2.048e+01/1.145e+01  1.117e+01/ 6.685e+00  1.322e+01/ 7.541e+00 |  |