高性能计算应用实践

Lab8 实验报告

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1.硬件配置

```
nobody1@nobody1-virtual-machine:~/hpl/bin/linux$ lscpu
架构:                    x86_64
  CPU 运行模式:          32-bit, 64-bit
  Address sizes:         45 bits physical, 48 bits virtual
  字节序:                Little Endian
CPU:                     2
  在线 CPU 列表:         0,1
厂商 ID:                 AuthenticAMD
  型号名称:              AMD Ryzen 7 5800H with Radeon Graphics
    CPU 系列:            25
    型号:                80
    每个核的线程数:      1
    每个座的核数:        1
    座:                  2
    步进:                0
    BogoMIPS:            6388.00
```

频率：3.2GHz

2.cpu 理论峰值计算

4x2x2x3.2x2=102.4 Gflops

3.测试

```
- The matrix A is randomly generated for each test.
- The following scaled residual check will be computed:
      ||Ax-b||_oo / ( eps * ( || x ||_oo * || A ||_oo + || b ||_oo ) * N )
- The relative machine precision (eps) is taken to be               1.110223e-16
- Computational tests pass if scaled residuals are less than                16.0

================================================================================
T/V                N    NB     P     Q               Time                 Gflops
--------------------------------------------------------------------------------
WR11C2R4       20352   192     1     1             74.52             7.5419e+01
HPL_pdgesv() start time Fri Oct 13 08:56:35 2023

HPL_pdgesv() end time   Fri Oct 13 08:57:49 2023

--------------------------------------------------------------------------------
||Ax-b||_oo/(eps*(||A||_oo*||x||_oo+||b||_oo)*N)=   2.25389380e-03 ...... PASSED
================================================================================

Finished      1 tests with the following results:
              1 tests completed and passed residual checks,
              0 tests completed and failed residual checks,
              0 tests skipped because of illegal input values.
--------------------------------------------------------------------------------
```

4.软件

编译器 gcc 11.4.0　OpenMPI 4.1.4

OpenBlas 0.3.21

5.参数

```
HPLinpack benchmark input file
Innovative Computing Laboratory, University of Tennessee
HPL.out      output file name (if any)
6            device out (6=stdout,7=stderr,file)
1            # of problems sizes (N)
20352         Ns
1            # of NBs
192           NBs
0            PMAP process mapping (0=Row-,1=Column-major)
1            # of process grids (P x Q)
1            Ps
2            Qs
16.0         threshold
1            # of panel fact
2            PFACTs (0=left, 1=Crout, 2=Right)
1            # of recursive stopping criterium
4            NBMINs (>= 1)
1            # of panels in recursion
2            NDIVs
1            # of recursive panel fact.
1            RFACTs (0=left, 1=Crout, 2=Right)
1            # of broadcast
1            BCASTs (0=1rg,1=1rM,2=2rg,3=2rM,4=Lng,5=LnM)
1            # of lookahead depth
1            DEPTHs (>=0)
2            SWAP (0=bin-exch,1=long,2=mix)
64           swapping threshold
0            L1 in (0=transposed,1=no-transposed) form
0            U  in (0=transposed,1=no-transposed) form
1            Equilibration (0=no,1=yes)
8            memory alignment in double (> 0)
###### This line (no. 32) is ignored (it serves as a separator). #######
0                               Number of additional problem sizes for PTRANS
1200 10000 30000                values of N
0                               number of additional blocking sizes for PTRANS
40 9 8 13 13 20 16 32 64        values of NB
```

6.问题

在最后运行 HPL 时，无法运行成功，检查 HPL.dat 文件，发现参数 Qs 被设置为 2，改为 1 即可