IHPCSS16
Hybrid Challenge

Results

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Stats: Language, MPI+X, Reported Time

<table>
<thead>
<tr>
<th>Language</th>
<th>Description</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>F</td>
<td>ACC</td>
<td>7.35</td>
</tr>
<tr>
<td>F</td>
<td>ACC</td>
<td>7.57</td>
</tr>
<tr>
<td>C</td>
<td>ACC</td>
<td>7.80</td>
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<tr>
<td>C</td>
<td>ACC</td>
<td>8.87</td>
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<tr>
<td>C</td>
<td>ACC</td>
<td>24.00</td>
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<td>F</td>
<td>ACC</td>
<td>26.30</td>
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<tr>
<td>F</td>
<td>ACC</td>
<td>41.50</td>
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<tr>
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<td>ACC</td>
<td>44.30</td>
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<tr>
<td>C</td>
<td>ACC</td>
<td>112.00</td>
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<tr>
<td>C</td>
<td>ACC + OMP</td>
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<tr>
<td>F</td>
<td>OMP</td>
<td>20.80</td>
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<tr>
<td>C</td>
<td>Pure OMP</td>
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<tr>
<td>F</td>
<td>OMP</td>
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<tr>
<td>F</td>
<td>OMP</td>
<td>40.33</td>
</tr>
<tr>
<td>C</td>
<td>OMP</td>
<td>40.69</td>
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<tr>
<td>C</td>
<td>OMP</td>
<td>41.00</td>
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<tr>
<td>C</td>
<td>OMP</td>
<td>41.54</td>
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<tr>
<td>C</td>
<td>OMP</td>
<td>42.70</td>
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<tr>
<td>C</td>
<td>OMP</td>
<td>45.00</td>
</tr>
</tbody>
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Special Mention

• Pure OpenMP on Xeon Phi!
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  – Sergio Iserte
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#SBATCH -t 01:00:00
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  #SBATCH -t 01:00:00
  #SBATCH -N 1
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#SBATCH -t 01:00:00
#SBATCH -N 1
#SBATCH --ntasks-per-node 1
Special Mention

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```
#SBATCH -t 01:00:00
#SBATCH --ntasks-per-node 1
#SBATCH -p LM
```
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```bash
#SBATCH -t 01:00:00
#SBATCH -N 1
#SBATCH --ntasks-per-node 1
#SBATCH -p LM
#SBATCH -c 576
```
Special Mention

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```bash
#SBATCH -t 01:00:00
#SBATCH -N 1
#SBATCH --ntasks-per-node 1
#SBATCH -p LM
#SBATCH -c 576
#SBATCH --res=IHPCSS
```
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```bash
#SBATCH -t 01:00:00
#SBATCH -N 1
#SBATCH --ntasks-per-node 1
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#SBATCH -c 576
#SBATCH --res=IHPCSS
...
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#SBATCH -N 1
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#SBATCH -c 576
##SBATCH --res=IHPCSS
...
export KMP_AFFINITY=compact
```
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#SBATCH -t 01:00:00
#SBATCH -N 1
#SBATCH --ntasks-per-node 1
#SBATCH -p LM
#SBATCH -c 576
##SBATCH --res=IHPCSS
...
export KMP_AFFINITY=compact
export OMP_NUM_THREADS=$NTHREAD
```
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```
#SBATCH -t 01:00:00
#SBATCH -N 1
#SBATCH --ntasks-per-node 1
#SBATCH -p LM
#SBATCH -c 576
##SBATCH --res=IHPCSS
...
export KMP_AFFINITY=compact
export OMP_NUM_THREADS=$NTHREAD
#export OMP_NESTED=TRUE
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#SBATCH -t 01:00:00
#SBATCH -N 1
#SBATCH --ntasks-per-node 1
#SBATCH -p LM
#SBATCH -c 576
##SBATCH --res=IHPCSS
...
export KMP_AFFINITY=compact
export OMP_NUM_THREADS=$NTHREAD
#export OMP_NESTED=TRUE
(time ./$OMPPROG) 2>&1
```
OpenMP winner

- Best reported code had issues: time verified but
  - most prints removed
  - no copy back loop – toggled between two arrays (i.e. pointer swap)
OpenMP winner

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• I measured: 40.69, 40.32, 40.38 and 40.99
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• So the winner is ...
  – Robert Chiodi
OpenACC winner

• Reported winner was actual winner: I measured 7.34

• But ... had removed some prints
  – put back in: still best at 7.35
  – I replaced reduce + bcast with allreduce
  – had to fix bug in waitall (no ierr!) but got: 7.33

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  – Takuya Sibayama

mpif90 -acc -fast laplace_impi.f90
#SBATCH -N 4
#SBATCH -p GPU
#SBATCH --ntasks-per-node 4
#SBATCH --gres=gpu:4
#SBATCH -t 1
#SBATCH --reservation=IHPCSS

#export PGI_ACC_TIME=1
mpirun -n 16 ./a.out