LAB

NUMA Control for Hybrid Applications

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What you will learn

- Using numactl in execution of serial, MPI and a 2x# (2 tasks each with # threads) hybrid code

- For on site users, untar the file numahybrid.tar
  - cd (Start in your home directory.)
  - tar xvf ~train00/numahybrid.tar (extract files)
  - cd numahybrid

- For remote users, download the lab_numahybrid_external.tar, and refer the README in it about how to experiment numactl on your local system.

numactl_serial on Stampede

The memory intensive daxpy code is run on two different sockets using local, interleave and off-socket-memory policies. See the job script and the table on the next page for the numactl options. Run the job and report the times and relative performance.

- Change directory to numactl_serial:

  $ cd numactl_serial
- Compile the dapxy program:

  $ make
- Launch the batch job:

  $ sbatch job

numactl_serial on Stampede

- From the job output fill in the table.

Command	Time (secs)
no numactl options	
numactl -l --physcpubind 0	
numactl -l --physcpubind 3	
numactl -l --physcpubind 8	
numactl -l --physcpubind 11	
numactl -i all --physcpubind 0	
numactl -i all --physcpubind 3	
numactl -i all --physcpubind 8	
numactl -i all --physcpubind 11	
numactl -m 1 --physcpubind 6	
numactl -m 0 --physcpubind 9	

Rank the performance of no numactl options, local, interleave, and off-socket-memory policies.

1.)

2.)

3.)

4.)

Why ?

numactl_2x1, 2x2 on Stampede

The daxpy code is run as 2 tasks in a node (2x1) and 2 tasks with 2 threads in a node(2x2).

- Change the corresponding directory:

  $ cd numactl_2x1 or numactl_2x2
- Compile the hybrid_dapxy program:

  $ make
- Launch the batch job:

  $ sbatch job

numactl_2x1, 2x2 on Stampede

- From the job output fill in the table.

Command	Time (secs)	
	2x1	2x2
no numactl options		
numactl -l		
numactl -i all		
numactl tacc_affinity		

- Rank the performance for each case

Rank	2x1	2x2
1		
2		
3		
4		

numactl_2x1, 2x2 on Stampede

- Repeat the previous two steps a few times and try to interpret the ranking

Rank	2x1	2x2
1		
2		
3		
4		

Rank	2x1	2x2
1		
2		
3		
4		

Rank	2x1	2x2
1		
2		
3		
4		

Rank	2x1	2x2
1		
2		
3		
4		