

Performance HPC Linux  
Bull Echirolles

# Workbook run and first measures

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- Equipment list
- Thread placement
- First measure

- Equipment list
  - Hardware
  - Software

- Thread placement
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# Hardware

## NovaScale 3045

- ▶ Number of processor: 4 CPUs Itanium 2 (8 cores)
- ▶ Frequency: 1.6Ghz
- ▶ Memory size: 32G

## Networking equipment

- ▶ Infiniband network

# Software

- ▶ Bull Linux AS4 V5.1 FIX10
- ▶ Compiler: Fortran 10.1
- ▶ Compiler: C 10.1
- ▶ MPI: mpibull2
- ▶ NPB benchmark

## modules:

```
>module list  
Currently Loaded Modulefiles:  
1) oscar-modules/1.0.3
```

- Equipment list
- Thread placement

Taskset

KMP\_AFFINITY 1/2

KMP\_AFFINITY 2/2

- First measure

# Taskset

## Run CG with taskset

- ▶ `cd $HOME/TP/NPB3.2.1/NPB3.2-OMP`
- ▶ `export OMP_NUM_THREADS=4, KMP_ADDINITY=physical`
- ▶ Use taskset to run on 4 CPUs
- ▶ Record time elapsed
- ▶ Look top

# Taskset

## Run CG with taskset

- ▶ `cd $HOME/TP/NPB3.2.1/NPB3.2-OMP`
- ▶ `export OMP_NUM_THREADS=4, KMP_ADDINITY=physical`
- ▶ Use taskset to run on 4 CPUs  
`taskset -c 0-3 ./cg.B`
- ▶ Record time elapsed
- ▶ Look top



# Taskset

## Run CG with taskset

- ▶ `cd $HOME/TP/NPB3.2.1/NPB3.2-OMP`
- ▶ `export OMP_NUM_THREADS=4, KMP_ADDINITY=physical`
- ▶ Use taskset to run on 4 CPUs  
`taskset -c 0-3 ./cg.B`
- ▶ Record time elapsed 60.86
- ▶ Look top

# Taskset

## Run CG with taskset

- ▶ `cd $HOME/TP/NPB3.2.1/NPB3.2-OMP`
- ▶ `export OMP_NUM_THREADS=4, KMP_ADDINITY=physical`
- ▶ Use taskset to run on 4 CPUs
- ▶ Record time elapsed 60.86
- ▶ Look top

▶ Tasks: 161 total, 5 running, 156 sleeping, 0 stopped, 0 zombie  
Cpu(s): 1.2% us, 0.0% sy, 0.0% ni, 98.7% id, 0.0% wa, 0.0% hi, 0.0% si  
Mem: 24844992k total, 1293824k used, 23551168k free, 225728k buffers  
Swap: 80418048k total, 0k used, 80418048k free, 144832k cached

PID	USER	PR	NI	VIRT	RES	SHR	S	%CPU	%MEM	TIME+	P	COMMAND
16415	tp01	25	0	375m	346m	3520	R	99.9	1.4	0:26.06	0	cg.B
16417	tp01	25	0	375m	346m	3520	R	99.9	1.4	0:26.01	2	cg.B
16418	tp01	25	0	375m	346m	3520	R	99.9	1.4	0:26.01	1	cg.B
16419	tp01	25	0	375m	346m	3520	R	98.5	1.4	0:26.01	3	cg.B

# KMP\_AFFINITY 1/2 with 10.1.011

## Run CG

- ▶ `cd $HOME/TP/NPB3.2.1/NPB3.2-OMP`
- ▶ `export OMP_NUM_THREADS=4`
- ▶ `export KMP_ADDINITY=verbose,granularity=fine,compact`
- ▶ Record time elapsed
- ▶ Look top

# KMP\_AFFINITY 1/2 with 10.1.011

## Run CG

- ▶ `cd $HOME/TP/NPB3.2.1/NPB3.2-OMP`
- ▶ `export OMP_NUM_THREADS=4`
- ▶ `export KMP_ADDINITY=verbose,granularity=fine,compact`  
KMP\_AFFINITY: Internal thread 0 bound to OS proc set {0}  
KMP\_AFFINITY: Internal thread 1 bound to OS proc set {2}  
KMP\_AFFINITY: Internal thread 2 bound to OS proc set {4}  
KMP\_AFFINITY: Internal thread 3 bound to OS proc set {6}
- ▶ Record time elapsed
- ▶ Look top

# KMP\_AFFINITY 1/2 with 10.1.011

## Run CG

- ▶ `cd $HOME/TP/NPB3.2.1/NPB3.2-OMP`
- ▶ `export OMP_NUM_THREADS=4`
- ▶ `export KMP_ADDINITY=verbose,granularity=fine,compact`  
KMP\_AFFINITY: Internal thread 0 bound to OS proc set {0}  
KMP\_AFFINITY: Internal thread 1 bound to OS proc set {2}  
KMP\_AFFINITY: Internal thread 2 bound to OS proc set {4}  
KMP\_AFFINITY: Internal thread 3 bound to OS proc set {6}
- ▶ Record time elapsed 43.04
- ▶ Look top

# KMP\_AFFINITY 1/2 with 10.1.011

## Run CG

- ▶ `cd $HOME/TP/NPB3.2.1/NPB3.2-OMP`
- ▶ `export OMP_NUM_THREADS=4`
- ▶ `export KMP_ADDINITY=verbose,granularity=fine,compact`
- ▶ Record time elapsed 43.04
- ▶ Look top

# KMP\_AFFINITY 2/2 with 10.1.011

## Run CG

- ▶ `cd $HOME/TP/NPB3.2.1/NPB3.2-OMP`
- ▶ `export OMP_NUM_THREADS=4`
- ▶ `export KMP_ADDINITY=verbose,granularity=fine,scatter`
- ▶ Record time elapsed
- ▶ Look top

## KMP\_AFFINITY 2/2 with 10.1.011

### Run CG

- ▶ `cd $HOME/TP/NPB3.2.1/NPB3.2-OMP`
- ▶ `export OMP_NUM_THREADS=4`
- ▶ `export KMP_ADDINITY=verbose,granularity=fine,scatter`  
KMP\_AFFINITY: Internal thread 0 bound to OS proc set {0}  
KMP\_AFFINITY: Internal thread 1 bound to OS proc set {4}  
KMP\_AFFINITY: Internal thread 2 bound to OS proc set {1}  
KMP\_AFFINITY: Internal thread 3 bound to OS proc set {5}
- ▶ Record time elapsed
- ▶ Look top



## KMP\_AFFINITY 2/2 with 10.1.011

### Run CG

- ▶ `cd $HOME/TP/NPB3.2.1/NPB3.2-OMP`
- ▶ `export OMP_NUM_THREADS=4`
- ▶ `export KMP_ADDINITY=verbose,granularity=fine,scatter`  
KMP\_AFFINITY: Internal thread 0 bound to OS proc set {0}  
KMP\_AFFINITY: Internal thread 1 bound to OS proc set {4}  
KMP\_AFFINITY: Internal thread 2 bound to OS proc set {1}  
KMP\_AFFINITY: Internal thread 3 bound to OS proc set {5}
- ▶ Record time elapsed 42.62
- ▶ Look top

## KMP\_AFFINITY 2/2 with 10.1.011

### Run CG

- ▶ `cd $HOME/TP/NPB3.2.1/NPB3.2-OMP`
- ▶ `export OMP_NUM_THREADS=4`
- ▶ `export KMP_ADDINITY=verbose,granularity=fine,scatter`
- ▶ Record time elapsed 42.62
- ▶ Look top

# Perfmon

- ▶ `cd $HOME/TP/NPB3.2.1/NPB3.2-OMP/bin`
- ▶ Run perfmon to find MFLOPS, IPC and FPI for
  - CG on 4 CPUs (1 NVC)
  - CG on 4 CPUs (2 NVC)

(To be continued)



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