

MAGMA for Intel Xeon Phi

Next generation dense algebra library for heterogeneous systems with accelerators

Compiling and linking with MAGMA

To be able to compile and link code with MAGMA library user has to load following module:

```
$ module load magma/1.3.0-mic
```

To make compilation more user friendly module also sets these two environment variables:

MAGMA_INC - contains paths to the MAGMA header files (to be used for compilation step)

MAGMA_LIBS - contains paths to MAGMA libraries (to be used for linking step).

Compilation example:

```
$ icc -mkl -O3 -DHAVE_MIC -DADD_ -Wall $MAGMA_INC -c testing_dgetrf_mic.cpp -o testing_dgetrf_m
```

```
$ icc -mkl -O3 -DHAVE_MIC -DADD_ -Wall -fPIC -Xlinker -zmuldefs -Wall -DNOCHANGE -DHOST testing
```

Running MAGMA code

MAGMA implementation for Intel MIC requires a MAGMA server running on accelerator prior to executing the user application. The server can be started and stopped using following scripts:

To start MAGMA server use: `$MAGMAROOT/start_magma_server**`

To stop the server use: `$MAGMAROOT/stop_magma_server**`

For deeper understanding how the MAGMA server is started, see the following script: `$MAGMAROOT/launch_anselm_from_mic.sh**`

To test if the MAGMA server runs properly we can run one of examples that are part of the MAGMA installation:

```
[user@cn204 ~]$ $MAGMAROOT/testing/testing_dgetrf_mic
```

```
[user@cn204 ~]$ export OMP_NUM_THREADS=16
```

```
[lriha@cn204 ~]$ $MAGMAROOT/testing/testing_dgetrf_mic
```

Usage: /apps/libs/magma-mic/magmamicro-1.3.0/testing/testing_dgetrf_mic [options] [-h|--help]

M	N	CPU GFlop/s (sec)		MAGMA GFlop/s (sec)		PA-LU /(A *N)
1088	1088	---	(---)	13.93	(0.06)	---
2112	2112	---	(---)	77.85	(0.08)	---
3136	3136	---	(---)	183.21	(0.11)	---
4160	4160	---	(---)	227.52	(0.21)	---
5184	5184	---	(---)	258.61	(0.36)	---
6208	6208	---	(---)	333.12	(0.48)	---
7232	7232	---	(---)	416.52	(0.61)	---
8256	8256	---	(---)	446.97	(0.84)	---
9280	9280	---	(---)	461.15	(1.16)	---
10304	10304	---	(---)	500.70	(1.46)	---

Please note: MAGMA contains several benchmarks and examples that can be found in: \$MAGMAROOT/testing/**

MAGMA relies on the performance of all CPU cores as well as on the performance of the accelerator. Therefore on Anselm number of CPU OpenMP threads has to be set to 16: **export OMP_NUM_THREADS=16**

See more details at MAGMA home page.

References

[1] MAGMA MIC: Linear Algebra Library for Intel Xeon Phi Coprocessors, Jack Dongarra et. al, http://icl.utk.edu/projectsfiles/magma/pubs/24-MAGMA_MIC_03.pdf