LMU LUDWIG-MAXIMILIANS-UNIVERSITÄT MÜNCHEN

lrz

Technische Universität München

Praktikum im WS 2023
Evaluierung moderner HPC-Architekturen und -Beschleuniger (LMU)
Evaluation of Modern Architectures and Accelerators (TUM)

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Assignment 00 – Due: -

1. System Usage and Modules Package

(a) Make sure you can login to the systems on BEAST (`ice1, milan2, thx2, cs2`). Please **always check for jobs** run by other users with `top` or `htop` before running your experiments. Do not start your job while another job is running, since this will disturb measurements of both jobs. Avoid running long jobs, blocking the system for others, and cancel your failing processes.

```
$ lscpu                          # show details of system architecture
$ top                            # show currently running processes
```

(b) When you want to use another compiler or software package, you can make use of the *Modules package* (see `man module`).

```
$ module list                    # list loaded modules
$ module avail                   # list all compilers/packages available
$ module load <package-name>     # load a module
$ module unload <package-name>   # unload a module
$ module switch <package-name>   # switch module (unload and load)
```

(c) The `lstopo` tool from the Hwloc module is useful to obtain more detailed informations about the current system's topology and memory hierarchy compared to `lscpu`.

```
$ module load hwloc              # load hwloc module first
$ lstopo                         # show details of system architecture
```

2. **Compiler Usage**

(a) **GCC**
The GNU C/C++ compiler (GCC) is provided on every system. The default loaded GCC version may not always provide good performance. Please switch to a recent version before you compile with gcc.

Listing 1: Switching from GCC 8.1.0 to GCC 11.0.0 on cs2

```
$ gcc -v
gcc version 8.3.1 20191121 (Red Hat 8.3.1-5) (GCC)
$ module avail gcc
gcc/8.1.0(default)  gcc/10.2.1(default)  gcc/11.0.0
$ module switch gcc/11.0.0
$ gcc -v
gcc version 11.0.0 20201028 (experimental) (GCC)
```

(b) **Other Compilers**
Besides GCC, a set of other compilers is provided on every system. Not every compiler is provided on each system. Some of them are architecture-specific. Additionally, different compilers may use a different set of compiler flags. Please refer to the compiler's man-pages and documentations.

- **Clang** [1]
  - `clang/clang++`
  - `man clang`
- **Intel oneAPI C/C++ Compiler** (only on ice and milan)
  - `icx/icpx`
  - `man icc`
- **Cray C/C++ Compiler** (only on cs)
  - `cc/CC` [2]
  - `man craycc / man crayCC` [3]

[1] `module avail llvm`
[2] Note that you have to set `-h omp` instead of `-fopenmp` to use the Cray C/C++ Compiler with OpenMP.
[3] `https://support.hpe.com/hpesc/public/docDisplay?docId=a00115116en_us&page=index.html`