ACCELERATOR BASED PROGRAMMING
UPPSALA UNIVERSITY
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EXERCISE 4: FIRST STEPS IN KOKKOS

This exercise is a preparation for the forth assignment.

1. Exercise Goal. The goal of this exercise is to get started with Kokkos. The goal is to run the exercises 01 and 02 listed athttps://github.com/kokkos/kokkos-tutorials/tree/main/Exercises on both the CPU and the GPU of UPPMAX/Snowy.

The tasks are as follows:

- Familiarize yourself with Kokkos by looking at the lecture material, and in particular the Kokkos guide https://github.com/kokkos/kokkos-tutorials/blob/main/LectureSeries/KokkosTutorial_01_Introduction.pdf.

- On your computer or UPPMAX, go to your favorite directory, e.g.
  `${HOME}/Kokkos`
  and download Kokkos:
  `git clone https://github.com/kokkos/kokkos`

- Download the Kokkos tutorials
  `git clone https://github.com/kokkos/kokkos-tutorials`

- Go to the first exercise
  `cd kokkos-tutorials/Exercises/01/Begin`

- Inspect the `Makefile` and adjust the paths to your system. If you have Kokkos in a directory `Kokkos/kokkos` of your home directory, you do not have to adjust it.

- To compile for the CPU, you do not have to do further adjustments and you can just run `make -j8`. To compile for the GPU, you need to either pass options to the command line when calling `make` or adjust the settings in the `Makefile`. To compile for CUDA, change the second line to

  `KOKKOS_DEVICES = "Cuda"`
  and line 14 to
  `KOKKOS_ARCH = "TURING75"`
  Also, to code on the CPU nodes of Snowy you need to adjust the CPU architecture as well, line 19,
  `KOKKOS_ARCH = "SNB"`

  Of course you still need to load the nvcc compiler when you want to Run this on the GPU.
- Follow *exercise 1* and initialize Kokkos. Compare with the respective code in the solution.

- Work on *exercise 2* regarding the memory spaces. Note that this will use unified memory between CPU and GPU, as seen by the `force_uvm` CUDA option.