Programming Parallel Computers

Instructions

Grading computers

Here are the key specifications of the grading computers. Your code is running on **real hardware**, without any virtualization or other abstraction layers, and your code is not running concurrently with any other processes (there is just a lightweight sandbox that prevents submitted code from accidentally doing something it is not expected to do).

Software

- Operating system: Ubuntu 22.04.
- C++ compilers: GCC 12.1.0 and Clang 14.0.0.
- Nvidia CUDA development environment: CUDA 12.1.

CPU

- The CPU model is **Intel Xeon W-2255**.
- This is a CPU that uses the **Cascade Lake microarchitecture**.
- There are 10 cores, each of which can run 2 hardware threads using **Hyper-threading**.
- The CPU supports **AVX**, AVX2, and **AVX-512** instructions, and at best each CPU core can execute two FMA operations for 512-wide vectors in each clock cycle.
- The nominal clock frequency is 3.7 GHz. The exact clock frequency depends on the workload, but when running multithreaded code that uses AVX2 instructions, you should expect it to run at 3.8 GHz, and if you use AVX-512 instructions, you should expect it to run at 3.4 GHz.
- Four 16GB DDR4 memory modules, running at 2934 million transfers per second.

GPU

- The GPU is **Nvidia Quadro RTX 4000**, with a TU104 chip.
- This is a GPU that uses the **Turing microarchitecture**.
- The best source for the detailed technical specifications is probably **this Wikipedia article**.