

Programming on the GPU with CUDA

One-day course for researchers, PhD and MSc students

April 13, 2021

What is a GPU? Nowadays the Graphics Processing Unit (GPU) is a mainstream hardware component in high-performance computing. For affordable budgets anyone can harness supercomputer performance. However, realizing efficient parallelism combines three knowledge areas: firstly, on the architecture and compute capabilities of the GPUs; then, on special constructs for programming a GPU-equipped computer; finally, on the special algorithms for performing logical and mathematical operations in parallel.

What is CUDA? CUDA stands for Compute Unified Device Architecture. It is a software-development tool kit for programming on the GPUs maintained by the mainstream manufacturer Nvidia. CUDA provides language extensions for C, C++, FORTRAN, and Python as well as knowledge-specific libraries. A single source code is then able to instruct the CPU and GPU alike. Also, CUDA-extended codes keep pace closely with the rapid developments in the underlying technology.

Goals and prerequisites To guide you in this development niche, the [Delft Institute for Computational Science and Engineering](#) (DCSE) offers a CUDA course every quarter. We will explain basic principles and advanced topics on GPU programming with CUDA. You will apply these notions in our labroom with hands-on examples. After this course you will be able to get simple CUDA programs running on a GPU-equipped computer. As prerequisite, a rudimentary understanding of programming languages like C++ or Java is ideal; that of FORTRAN or Python will be helpful too. Some interest in linear algebra and iterative solvers is a little advantage.

Schedule and instructors Prof Kees Vuik, Ir Kees Lemmens of the Faculty of Electrical Engineering, Mathematics and Computer Science teach the course. For the schedule we refer to https://www.aanmelder.nl/gpucourse_april13_2021.

Location Delft University of Technology, Faculty of Mathematics & Computer Science, Van Mourik Broekmanweg 6, 2628 XE Delft. The classes are given in Building 28, ‘Penguin’ Laboratory Room (E0.380).

Costs and registration For members of DCSE this course is free. For other participants the costs are € 100,- online and on campus € 200,- including lunch (only for on campus participants) with course material. Lunch, refreshments, lecture materials are included.

Please sign up at https://www.aanmelder.nl/gpucourse_april13_2021. The maximum number of participants is 35.

More info The course’s splash page is <https://www.tudelft.nl/cse/education/courses/cuda-course/>. Please contact C.W.J.Lemmens@tudelft.nl for content or dcse@tudelft.nl for administration and logistics.

