Publication date : 03/26/2024

Course : C++, parallel programming with CUDA in Visual Studio with NVIDIA cards

use the GPU to improve performance

Practical course - 2d - 14h00 - Ref. CDU
Price : 1500 CHF E.T.

★★★★☆ 4,6 / 5

In this training course, you will discover, evaluate and manipulate the CUDA SDK from NVIDIA, a leader in the use of the GPU to improve data parallelism performance. You'll acquire all the knowledge you need to implement CUDA.

Teaching objectives

At the end of the training, the participant will be able to:

- ✓ Understand the benefits of using the GPU as an independent computing resource
- ✓ Using the GPU with CUDA in the Visual Studio environment
- ✓ Linking C++11 threads to GPU usage
- ✓ Verify interest as part of a complete project

Intended audience

C/C++ application designers and developers, software architects.

Prerequisites

Good knowledge of C/C++ and threads, experience required. Basic knowledge of C++11.

Practical details

Hands-on work

Development of a test application, evaluation of the different solutions proposed and comparison with equivalent CPU processing.

Teaching methods

Theoretical presentations followed by code review and implementation on a test application.

PARTICIPANTS

C/C++ application designers and developers, software architects.

PREREQUISITES

Good knowledge of C/C++ and threads, experience required. Basic knowledge of C++11.

TRAINER QUALIFICATIONS

The experts leading the training are specialists in the covered subjects. They have been approved by our instructional teams for both their professional knowledge and their teaching ability, for each course they teach. They have at least five to ten years of experience in their field and hold (or have held) decision-making positions in companies.

ASSESSMENT TERMS

The trainer evaluates each participant’s academic progress throughout the training using multiple choice, scenarios, hands-on work and more.
Participants also complete a placement test before and after the course to measure the skills they’ve developed.

Course schedule

1 Introduction

- GPU usage compared to CPU.
- The CUDA SDK from NVIDIA.
- Alternatives and complements to CUDA.

Demonstration

Presentation of the test application and evaluation of CPU results.

2 CUDA installation

- Installation of the specific CUDA driver and SDK.
- Installation of NSIGHT, the CUDA-specific environment in Visual Studio.
- Exploring application examples.
- Recovery of installed graphics card capacities.

Hands-on work

CUDA installation, project creation and validation.

3 Basic implementation

- The fundamentals of kernel function execution.
- Creating a kernel function.
- Calling a kernel function.
- Memory transfers between host and GPU.
- Asynchronous execution of a GPU code sequence.
- Debugging code executed on the GPU.

Hands-on work

Add a code sequence to be executed on the GPU to the test application, and compare the results with the existing C++11 code. Use of the NSIGHT debugger.

4 Using CUDA's different memory options

- Shared memory within a thread block, different options.
- Optimization between memory dedicated to data and the size of the code to be executed.
- Mapped allocations between host memory and graphics card memory.
- The use of portable memory between the host and several graphics cards.

Hands-on work

Manipulate the different options in the test application. Find the best solution for a given case.

5 Other CUDA applications

- The use of Streams, parallel execution on different graphics cards.
- Using CUDA in C++ with Thrust.
- CUDA alternatives or complements such as C++ AMP, OpenCL, OpenAPP.

Case study

Exploration of complementary and alternative solutions, comparison using the test application.

TEACHING AIDS AND TECHNICAL RESOURCES

• The main teaching aids and instructional methods used in the training are audiovisual aids, documentation and course material, hands-on application exercises and corrected exercises for practical training courses, case studies and coverage of real cases for training seminars.

• At the end of each course or seminar, ORSYS provides participants with a course evaluation questionnaire that is analysed by our instructional teams.

• A check-in sheet for each half-day of attendance is provided at the end of the training, along with a course completion certificate if the trainee attended the entire session.

TERMS AND DEADLINES

Registration must be completed 24 hours before the start of the training.

ACCESSIBILITY FOR PEOPLE WITH DISABILITIES

Do you need special accessibility accommodations? Contact Mrs. Fosse, Disability Manager, at psh-accueil@orsys.fr to review your request and its feasibility.

6 Conclusion

- The scope for using the GPU as an alternative to the CPU.
- Best practices.

Dates and locations

REMOTE CLASS
2026 : 30 Mar., 11 June, 26 Oct.