FDD3015 Introduktion till programmering med GPGPU och användning för vetenskapliga beräkningar 7,5 hp

Introduction to Programming with GPGPU and Applications in Scientific Computing

När kurs inte längre ges har student möjlighet att examineras under ytterligare två läsår.

Fastställande

Kursplan för FDD3015 gäller från och med VT12

Betygsskala

undefined

Utbildningsnivå

Forskarnivå

Särskild behörighet

Programming experience in C.

Undervisningsspråk

Undervisningsspråk anges i kurstillfällesinformationen i kurs- och programkatalogen.

Lärandemål

The overall goal of the course is to give basic knowledge of the theory, hardware, and software approaches to parallel computing with GPGPU. Especially, hardware and software challenges plus the interactions between them, as well as exposure to research challenges in this field will be emphasized.

The course consists of two parts. Part 1 (4,5 hp) provides the introduction to the field, a detailed look at the device architecture, the basic programming considerations plus the presentation of possibilities to do performance optimizations. Part 2 (3,0 hp) introduces the software tools for the development of numerical applications and examples of algorithms from the field of scientific coomputing.

After the course you will be able to:

- understand the properties of GPGPU devices
- reason about the performance of programs running on it
- assess the potential and limitations of using a GPGPU
- write parallel programs for GPGPU.

Kursinnehåll

Part 1: Introduction, Basic programming

- introduction to CUDA and the device architecture of GPGPU
- the programming of GPGPU devices
- performance optimization and application examples.

Part 2: Scientific Programming

- libraries for the development of parallel numeric algorithms
- parallelization of numerical algorithms.

Assignments:

Part 1: One smaller and one larger programming project combined with questions to explain the used technology

Part 2: One programming project combined with questions to explain the used approach.

Kursupplägg

The theoretical knowledge will be evaluated by questions to answer as part of the programming project. The practical work comprises in part 1 a smaller and a larger programming project based on the usage of the CUDA SDK. The programming project in part 2 will be a numerical simulation program that is to realize by using the mathematical libraries delivered by the hardware vendor.

Examination

Examinator beslutar, baserat på rekommendation från KTH:s handläggare av stöd till studenter med funktionsnedsättning, om eventuell anpassad examination för studenter med dokumenterad, varaktig funktionsnedsättning.

Examinator får medge annan examinationsform vid omexamination av enstaka studenter.

Etiskt förhållningssätt

- Vid grupparbete har alla i gruppen ansvar för gruppens arbete.
- Vid examination ska varje student ärligt redovisa hjälp som erhållits och källor som använts.
- Vid muntlig examination ska varje student kunna redogöra för hela uppgiften och hela lösningen.