Quick Start Guide

NVIDIA/UIUC GPU Teaching Starter Kit – Accelerated Computing

Introduction

Welcome to the GPU Teaching Starter Kit – Accelerated Computing Quick Start Guide. This guide is intended to familiarize you with the main teaching content of the kit, some basic instructions on how to access other features of the kit and why it is considered a "Starter Kit".

This **GPU Teaching Kit** has been co-developed with academia and target a variety of academic disciplines that benefit from accelerated computing. These comprehensive packages contain everything an instructor needs to teach a full-term curriculum course with GPUs.

This GPU Teaching Kit covers introductory and advanced accelerated computing topics. The material is also useful for teaching parallel programming concepts in other academic disciplines such as machine learning, computer vision, robotics, computer architecture, high-performance computing, operating systems, mathematics, and computational domain sciences such as biology, physics, and chemistry.

All of the material is provided in electronic form which should make it easy for you to use as-as or with personal modifications to meet the needs of your particular course.

Why is it a "Starter Kit"?

This "Starter Kit" contains a subset of the entire set of modules contained in the full version of the Teaching Kit. You can view a list of this subset and how it fits into the entire set of modules in the *Syllabus.pdf* file contained in this package. The Starter Kit is intended to give you a feel for the content types found in all of the modules of the full version. After evaluating this material, if interested in the full version, please contact NVIDIA's GPU Educators Program at educators@nvidia.com .

Does this kit include GPU compute resources for labs and projects?

At this time, there is no standard GPU compute resource/platform included in the Starter Kit. However, there are plans to include a scalable compute solution in a future release of the kit. Therefore, you must have access to NVIDIA CUDA-capable GPU resources such as a GPU card or access to a remote cluster with GPUs.

Additional Requirements

You must have the CUDA Toolkit and a compatible C compiler. There is a basic, standalone tutorial on the CUDA Toolkit along with some basic labs in *Module 2.4: CUDA Toolkit*, and the latest version of the Toolkit can always be downloaded from https://developer.nvidia.com/cuda-toolkit. The CUDA Toolkit

documentation details the supported C compilers and OS requirements for Windows, Linux and Mac OSX, and includes a useful Quick Start Guide.

NOTE: You should have received an email invitation to the Teaching Kit's private BitBucket repository that contains the most recent version of the labs, along with the buildscripts. Please contact educators@nvidia.com if you have not yet received this email invitation.

Teaching Kit Content Types

All Teaching Kit content types are not applicable to every module. For example, *Module 6: Performance Considerations – Memory*, does not have a lab as it's a relatively small module.

Additionally, the projects/solutions are not associated to any particular module as they are open-ended in nature and deal with any number of module topics.

E-book Chapters

E-book chapters from the 2nd edition text "Programming Massively Parallel Processors: A Hands-on Approach" by David Kirk and Wen-Mei Hwu are included for each Starter Kit module. Much of the slide deck and lecture recording content is based on this textbook.

The information in these chapters is copyrighted. Please DO NOT share or distribute these electronic chapters with anyone.

Students are encouraged to purchase their own copy of the full textbook. As part of this Teaching Kit, your students can order a copy at a 30% discount with free shipping worldwide. For more information, please see *Ebook Distr Rules and Discounts.pdf*.

A complete copy of the e-book is included in the full version of the Teaching Kit.

Lecture slides

The lecture slides are in .ppt format and are designed to supplement the E-book chapters for in-class lectures. The files contain embedded audio to show examples of how you might present the slides and should be available in slideshow mode. This can also be useful for students as they can watch the lectures on their own time to incorporate "flipped" classroom aspect to your course.

You can disable the audio and/or presentation timing in PowerPoint by selecting "Slideshow" and deselecting "Play Narrations" and/or "Use Timings".

Lecture recordings

The lecture recordings are separate .mp4 video files and contain the same content as the lecture slide shows with the embedded audio. These files are included so that you can easily run these through a browser on your own class website for students to view on their own time to incorporate "flipped" classroom aspect to your course.

Quizzes/solutions

The intent of the quizzes is for students to be able to answer the questions based on the information in the module slides and slide videos. Each question is multiple-choice and includes a rationale for the correct answer.

Labs/solutions

The labs/solutions are designed to be 1-2 week hands-on programming assignments for students, and come as a .pdf file. The labs start with a description of the lab objectives and prerequisites. In most cases, the labs present pseudo-code and/or a solution code template for the students to start with.

The most recent version of the labs, along with the buildscripts, can be found on the Bitbucket repository linked in the given lab.

Projects/solutions

The projects are designed to be open-ended, multidisciplinary, final semester projects that should take 3-4 weeks to complete. The purpose of the project is to apply data parallelism and CUDA concepts to a more substantial piece of code than in the labs. Please see *project_motivate_rubric.pdf* for more details and an example grading rubric. The Starter Kit contains four real projects completed by students taking ECE 408: Applied Parallel Programming at UIUC. As some of the projects require special development tools and libraries not included in this kit, they will not run completely out-of-box. They should still be useful to motivate students and provide examples of projects that have been done in the past.

Other Resources

Another included resource is qwickLABS access. A qwikLAB is a live, hands-on, self-paced learning environment. Each lab includes a set of interactive instructions to walk students through a specific concept.

As these labs are hosted in the cloud, a student only needs a web-browser and internet access to participate. The labs are timed however, so once a student starts a lab, it must be completed during the allotted time. The purpose of the qwickLABs is to reinforce the concepts contained in the Teaching Kit. As part of the teaching kit we will provide you and your students free tokens to access the labs. Please see *qwickLABS Access.pdf* for more details.