ENEE499L Mid Semester Report

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Preliminary Research Using CUDA and libraries

Unfortunately, we did not have access to an NVIDIA capable GPU system before the arrival of the Jetson TK1 board. In the meantime, we made use of our time by researching the semantics of CUDA to familiarize ourselves with the available libraries; including how it can be used for optimizing parallelizable sections of sequential code. We started with examples from the programming guide, including few practice programs such as the classic version of "hello world" for CUDA which adds two arrays in parallel (Figure 1). It was also helpful to join the NVIDIA Developer Program on their website, allowing access to files, packages, and user guides for the Jetson TK1.

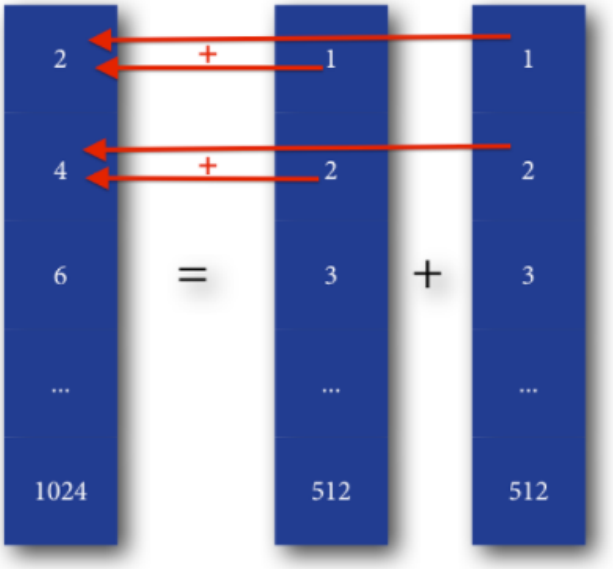

Figure 1[2]

Setting Up a Workspace for Lab

Upon arrival of the board on the 4th of October, we met with Mr. Bryan Quinn and Mr. Shyam Mehrota to acquire needed lab equipment and request lab space. We were denied access to any labs but were allowed to borrow some equipment from the ECE help desk, listed below:

- HDMI monitor with USB hubs
- Keyboard and mouse
- Multimeter
- Oscilloscope

The equipment is currently stored in Mr. Mehrota's office for when we need it.

In order to get the board up and running and continue installing software as needed, we needed to have access to the internet from the board's ethernet port. Since the ECE/University policy requires any ethernet device on the network to connect from the same ethernet port every time, we needed a stationary place for the board to connect from. Having been declined access to labs,

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we decided to bring the board to Tolga's house, where we set up a remote login via SSH. With little prior networking experience, this took a little over a week.

Running Measurable CUDA Code on the Jetson TK1

An installation of the CUDA toolkit for the JetsonTK1 was required to compile CUDA code. After compiling some sample code, we realized local compilation (on the board) takes a very long time. The sample code took 2 hours to compile! After some research, we decided to move forward using the project sync cross compilation (Figure 2), however this requires our local machines to have all the necessary libraries for NVIDIA cards. For now, we will write/edit projects on our local machine and build it on the Jetson TK1 (Figure 3). If the compilation process takes too long, we will attempt to migrate to the previous method.

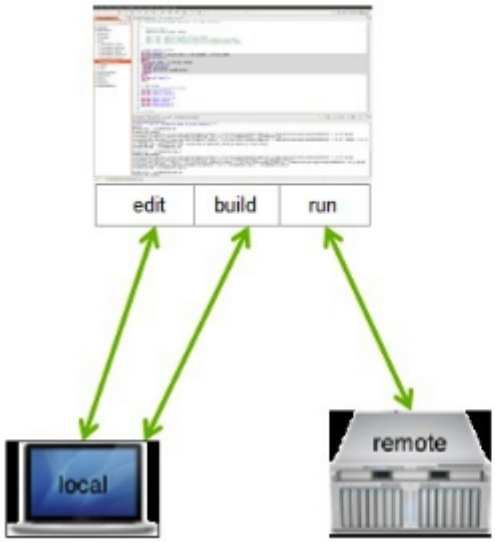

Figure 2[1]

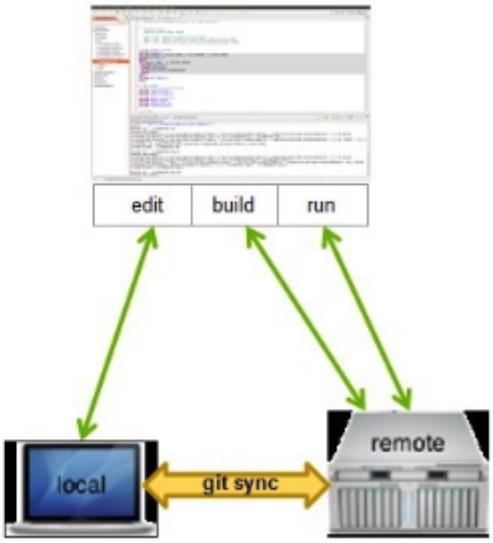

Figure 3[1]

Currently, we are working with a sample code, which performs parallelized matrix multiplication and records some basic runtime statistics (Figure 4). We are looking to expand upon this example further for more detailed statistics and add other operations as needed.

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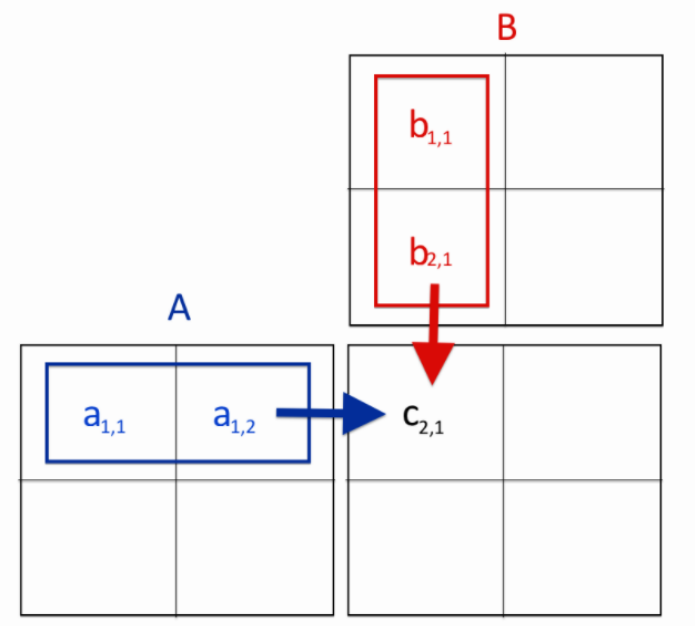

Figure 4[1]

Works Cited

1. NVIDIA. "Remote Application Development Using NVIDIA® Nsight™ Eclipse Edition." *Parallel Forall*. NVIDIA, 25 Aug. 2014. Web. 30 Oct. 2016.

2. Restocchi, Valerio. "Vector Addition "Hello World!" Example with CUDA on Mac OSX." - *QuantStart*. N.p., 4 Sept. 2014. Web. 30 Oct. 2016.