

Project title: Exploration of GPU Usage and Design in Medical Imaging Applications

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Brief description of project (1-3 paragraphs):

In class we have already reviewed the most basic of CPU designs ranging from single cycle to pipelined CPUs. In an effort to further understand the subtleties of designing processing units, I will explore the design decisions and options for a more specialized processing units in a field I am interested in: medical imaging. Medical Imaging often requires intensive computational reconstruction of a 3-D image from 2-D slices and use the best graphic processing units (GPUs) available.

The project will consist of learning about GPUs in general, then focusing on design decisions for the specific types of medical image processing and algorithms used.

2-3 references you plan to use

[Medical image segmentation on GPUs – A comprehensive review](#)

Books on GPUs:

Kirk and Hwu, 2010: Programming Massively Parallel Processors, A Hands-on Approach

Sanders and Kandrot, 2011: CUDA by Example – An Introduction to General-Purpose GPU Programming

Minimum, planned, and stretch deliverables

Minimum: Basic Understanding of GPU

Planned: Looking at how GPU design could be optimized specifically for the types of analysis, algorithms, and data common in medical imaging (MRI, CT, etc...)

Stretch: Try and build a general model

- Work plan (by Tuesday)

Phase 1: GPU Background

12/1: Basic GPU Research and Understanding

12/5: GPU Design Decision Research Complete

Phase 2: Medical Imaging GPU

12/10: Medical Imaging Algorithm Assessment

12/12: Poster or Presentation of Material

