Running GEANT4 Functions on a GPU

Discussion of Results

Stuart Douglas – dougls2
Rob Gorrie – gorrierw
Matthew Pagnan – pagnanmm
Victor Reginato – reginavp

McMaster University

April 8, 2016

Overview

Brief Project Overview

Take an existing particle simulation toolkit - GEANT4 - and have some functions run on a GPU device to improve performance.

Definition: GEANT4

GEANT4 is

Stakeholders

What is GEANT4

What is GP-GPU

Scope

Purpose

Why G4ParticleHPVector

Two Implementations

Entire G4ParticleHPVector Object on GPU

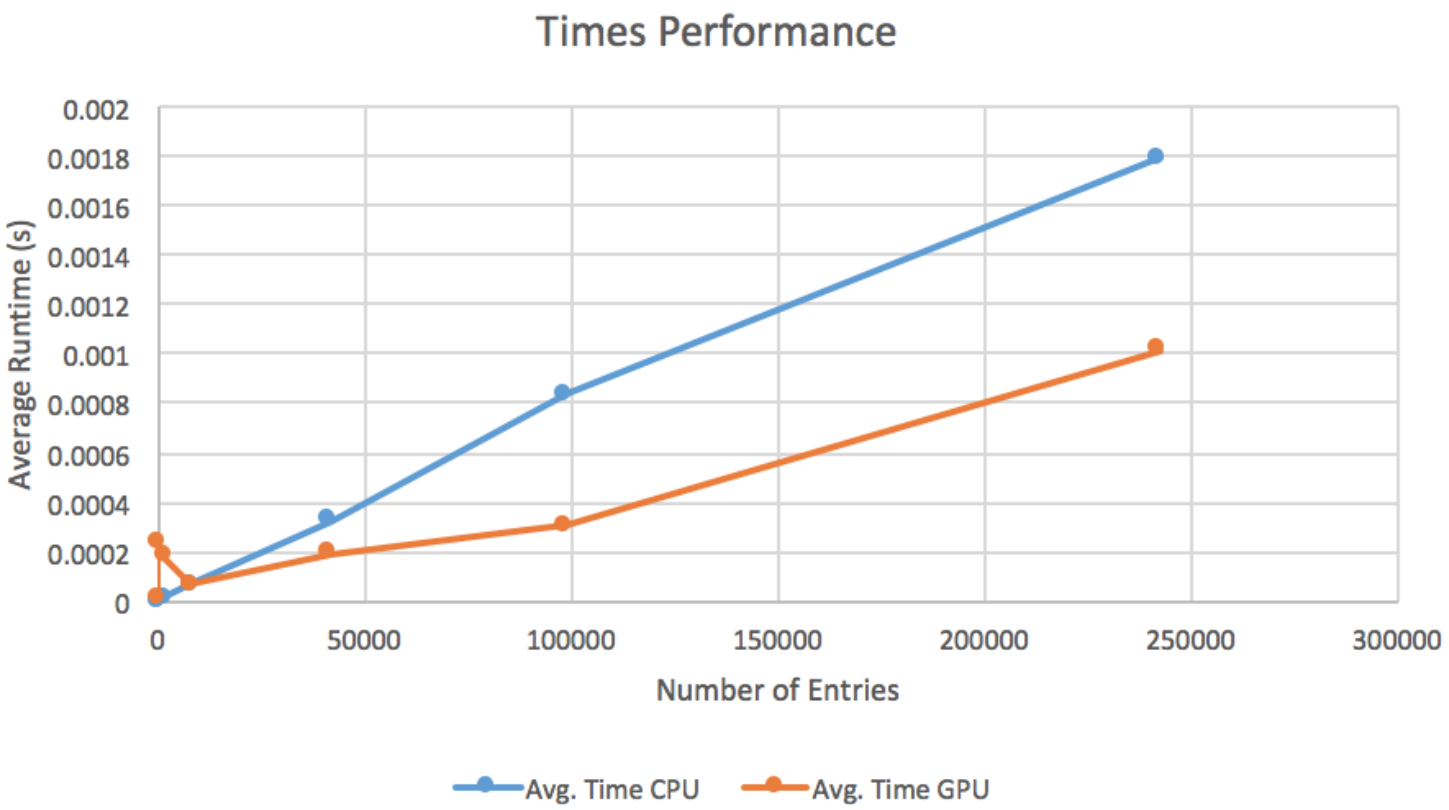
Add New Function on GPU

Performance Summary

- Most functions slower on GPU until ~10,000 entries
- Most *commonly-used* functions significantly slower on GPU
  - Lots of data accesses
- Many problems in vector class not well-suited to parallelism

Performance Results - `Times`

- Multiplies each point in vector by factor



Performance Discussion

Accuracy

Testing

Summary of Results

Recommendations