

NANYANG
TECHNOLOGICAL
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Project title: Optimization on computation-intensive application via heterogeneous system

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Nov. 9th, 2010



OUTLINE

- Introduction
- Motivation
- Research Focus
- Current work
- Future work

1.INTRODUCTION

- Many applications involve intensive computations
 - Scientific computing
 - Multimedia processing, such as virtual try-on system
- General purpose CPU low efficiency with computational-intensive applications
- Available hardware accelerators
 - FPGA, GPU

2. MOTIVATION

Three Questions:

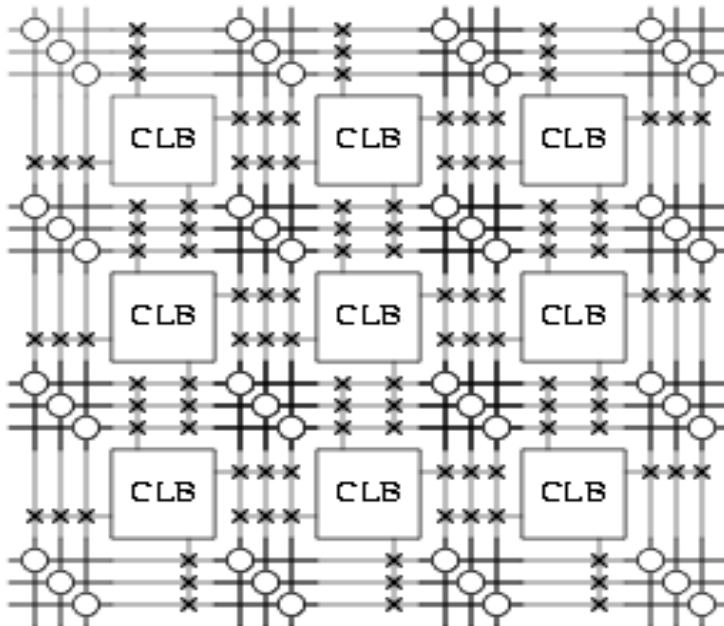
- Why FPGA?
- Why GPU?
- Why Heterogeneous?

2. MOTIVATION

Three Questions:

- Why FPGA? →

*Highly Customizable
Hardware Acceleration*



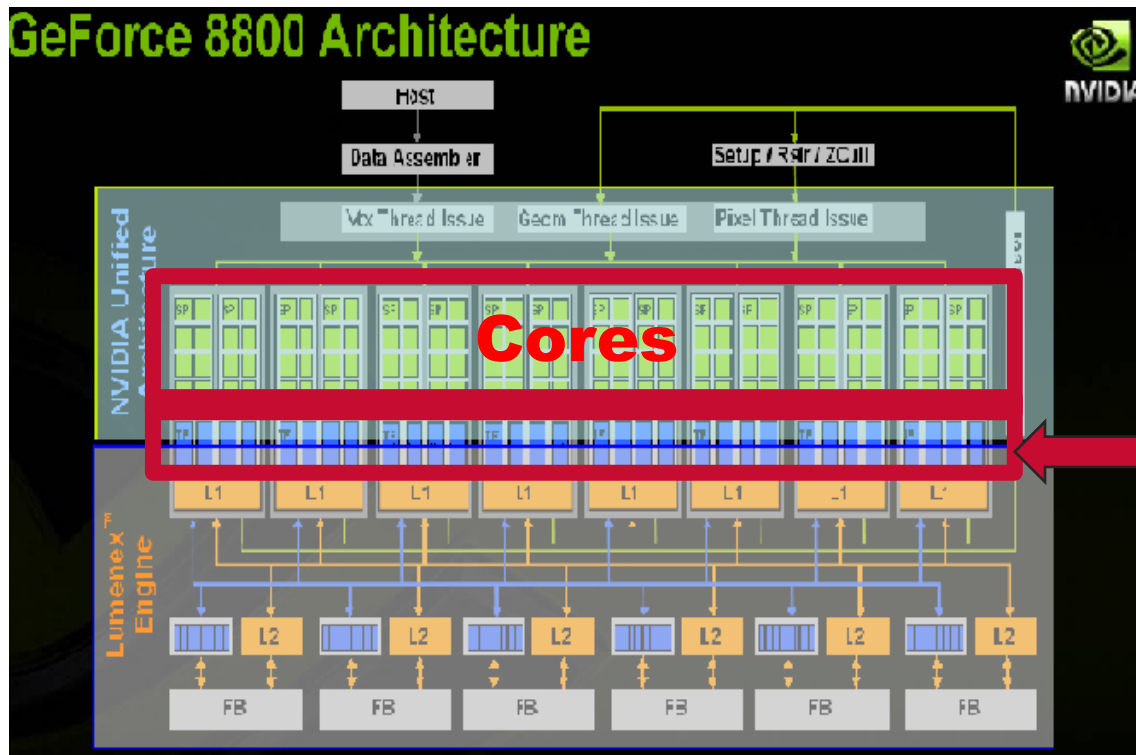
2. MOTIVATION

Three Questions:

- Why GPU? →

Massive parallel executive resources

e.g. GeForce 8800 GTX
16 cores, 128 CUDA cores



Why heterogeneous?

- Comparison between FPGA and GPU

FPGA	GPU
Accelerating both dependent and independent data	Most suitable for independent data (shared/on-chip memory)
Fix-point data	Floating-point data
Programmable architecture	Fixed architecture
Power efficient	High power consumption

3. Research Focus

- **Goals:**

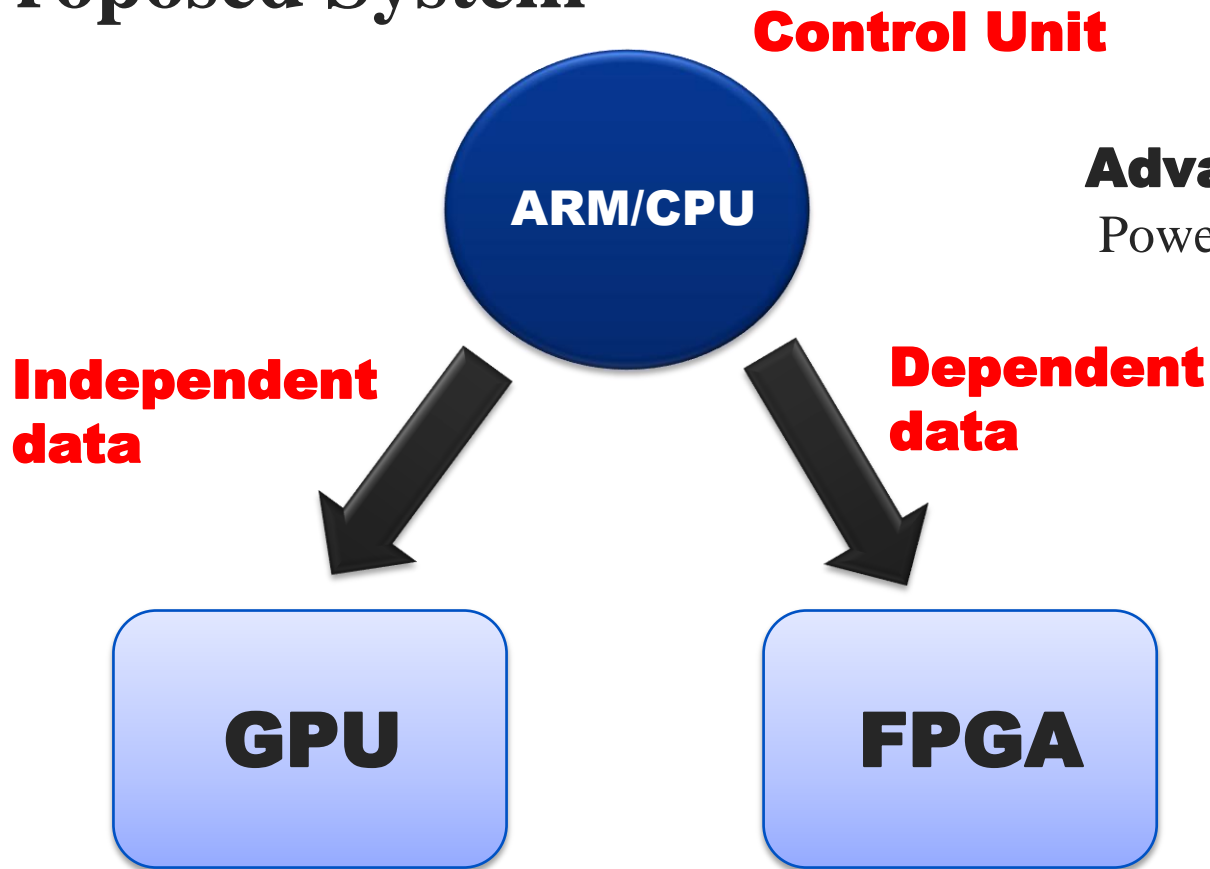
- 1). **Heterogeneous** hardware acceleration platform

- GPU+FPGA, CPU+FPGAs

- 2). Generalized **mapping** methodology

3. Research Focus

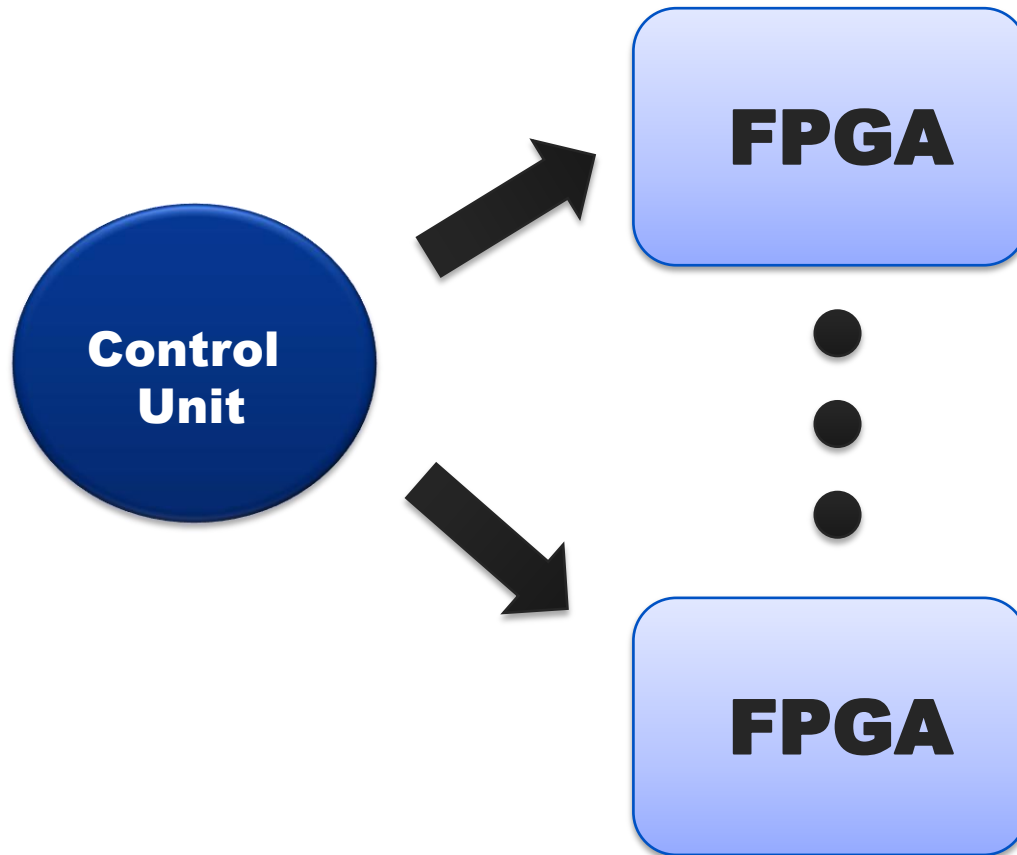
- Proposed System



Advanced Topic:
Power Consumption

3. Research Focus

- Alternative (**Reconfigurable Arch.**)



4. CURRENT WORK

- **Optimize Matrix Multiplication**

Method: FPGA+DSP

Problems:

- 1) float-point? Fixed-point?
- 2) Array issue during synthesis

Chunking matrix? Direct 2-D to 1-D?

5. FUTURE WORK

- GPU CUDA programming
- Design the heterogeneous platform
- Develop mapping methodology
- Advanced topic: low power

Thanks!
Any question?