



Radar Pulse Compression Using the NVIDIA CUDA SDK

Stephen Bash, David Carpman, and David Holl

HPEC 2008

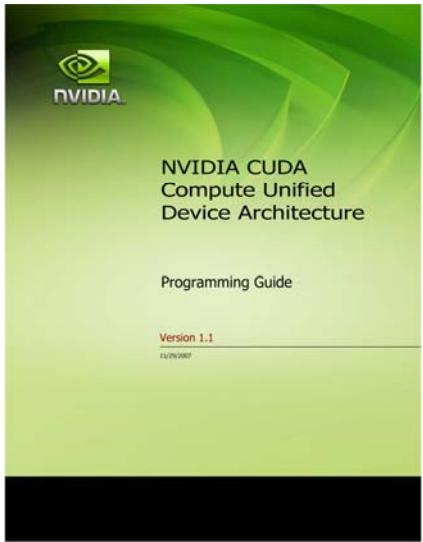
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MIT Lincoln Laboratory

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NVIDIA Compute Unified Device Architecture SDK





- Create custom kernels that run on GPU
- Extension of C language
- Provides driver- and runtime-level APIs
- Includes numerical libraries
 - CUFFT
 - CUBLAS
- $\$/GFLOP \rightarrow GPU=\$1.27 \quad CPU=\$29.18$

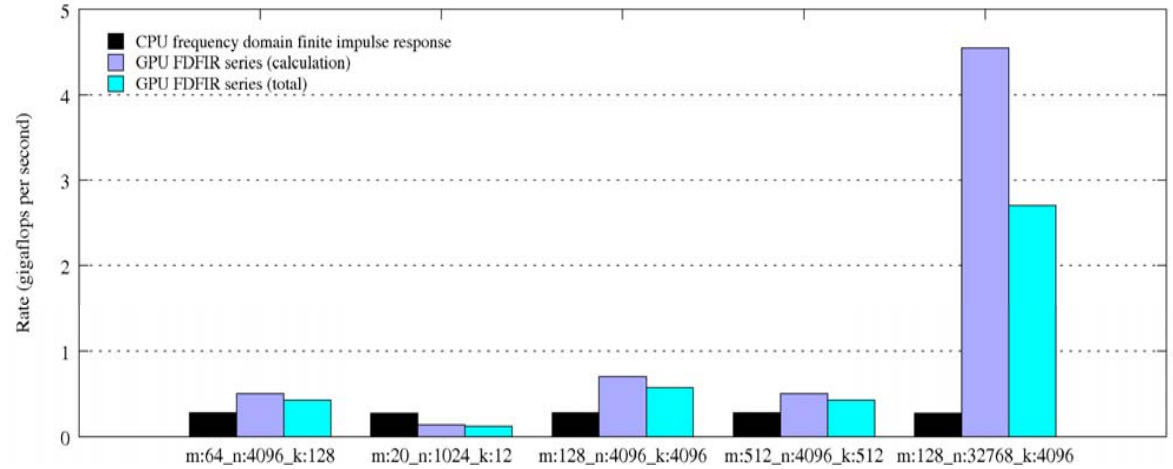
HPEC 07:

Benchmarking the NVIDIA 8800GTX with the CUDA Development Platform

Michael McGraw-Herdeg, MIT
 Douglas P. Enright, The Aerospace Corporation
 B. Scott Michel, The Aerospace Corporation

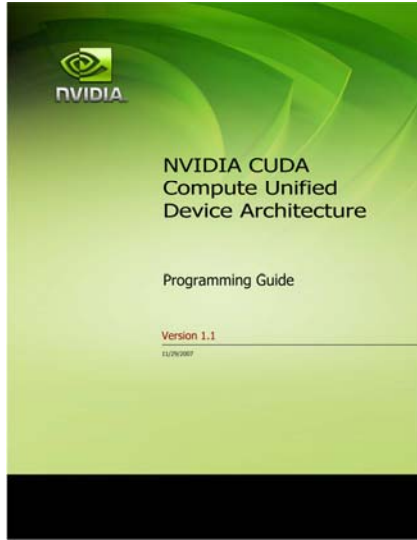
 

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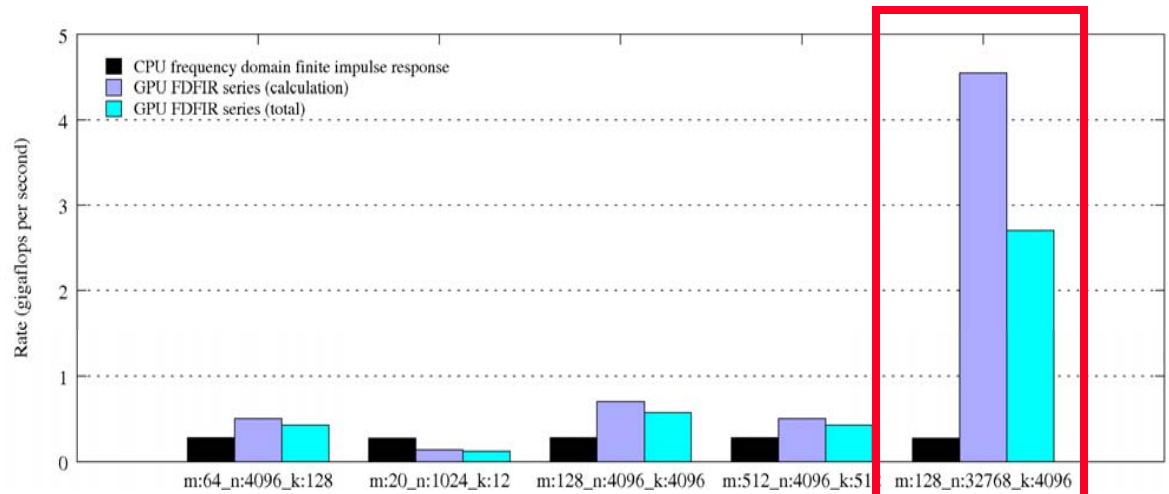
HPEC 07:

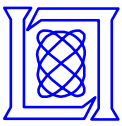
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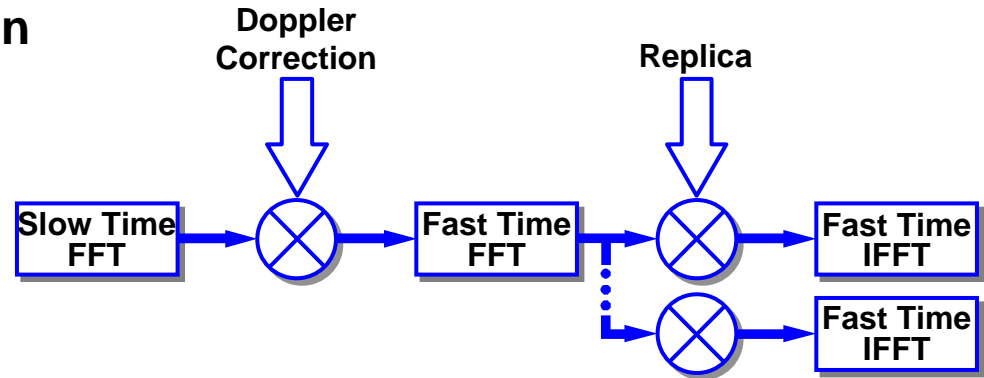
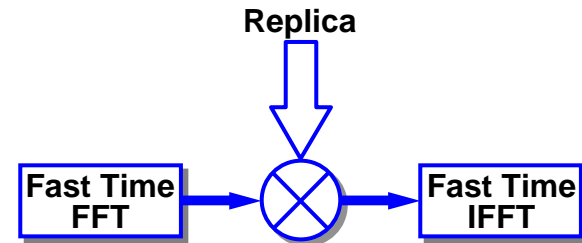
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Radar Pulse Compression

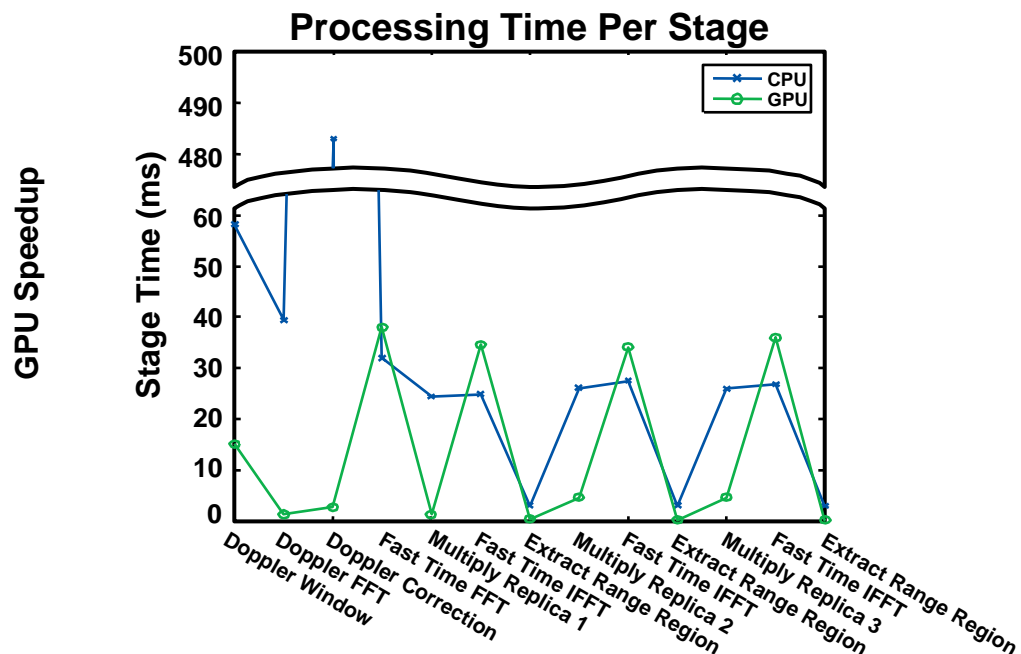
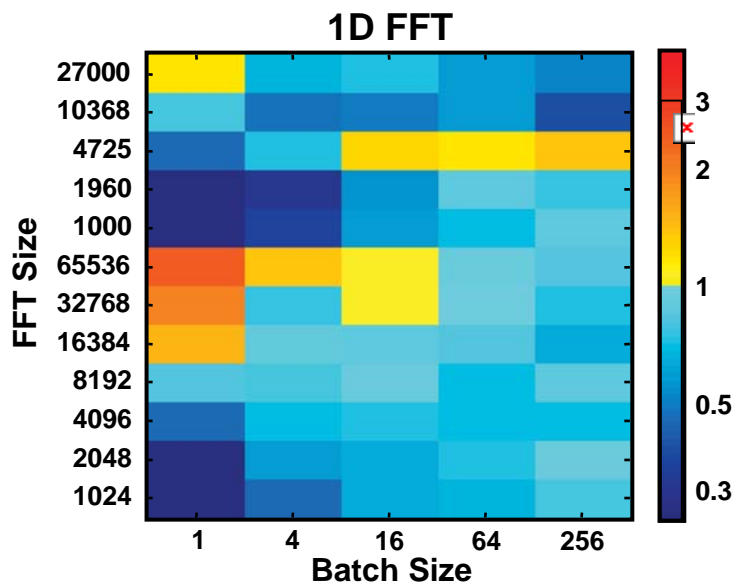
- **Waveform design and processing to achieve higher range resolution and sensitivity***
- **Processing consists of convolution with FIR filter**
 - **Doppler tolerant (top): traditional frequency domain convolution**
 - **Doppler intolerant (bottom): additional FFT and Doppler correction required**

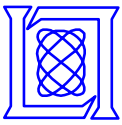




GPU vs. CPU Comparison

- CPU vs GPU comparison in real-world conditions
 - 2 GHz dual quad-core AMD Opterons vs eVGA eGeForce 8800 Ultra
 - Memory transfer to and from GPU included in timing





Backups



Reference: \$/GFLOP

As of July 2007, these products represent the top of the line consumer CPU and graphics card according to floating point computational power:

1. Kentsfield Core 2 Extreme QX6800

37.7 GFLOPS – fastest CPU as of 7/16/2007

http://www.tomshardware.com/2007/07/16/cpu_charts_2007/page36.html

\$1100 – price as of March 10, 2008

<http://www.google.com/products?q=Kentsfield+Core+2+Extreme+QX6800>

\$/GFLOPS = \$29.18

Notes: Price excludes motherboard + power supply + memory + GPU

2. EVGA GeForce 8800 Ultra Superclocked (NVIDIA)

576 GFLOPS – theoretical peak

http://en.wikipedia.org/wiki/GeForce_8_Series

\$730 – price as of March 10, 2008

<http://www.google.com/products?q=768-P2-N887-AR&scoring=p>

\$/GFLOPS = \$1.27

Notes: Price includes 768 MB GDDR3 memory, but excludes: motherboard + power supply + CPU