Ian Buck

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The complexity of the problem is hidden by the simplicity of the solution.

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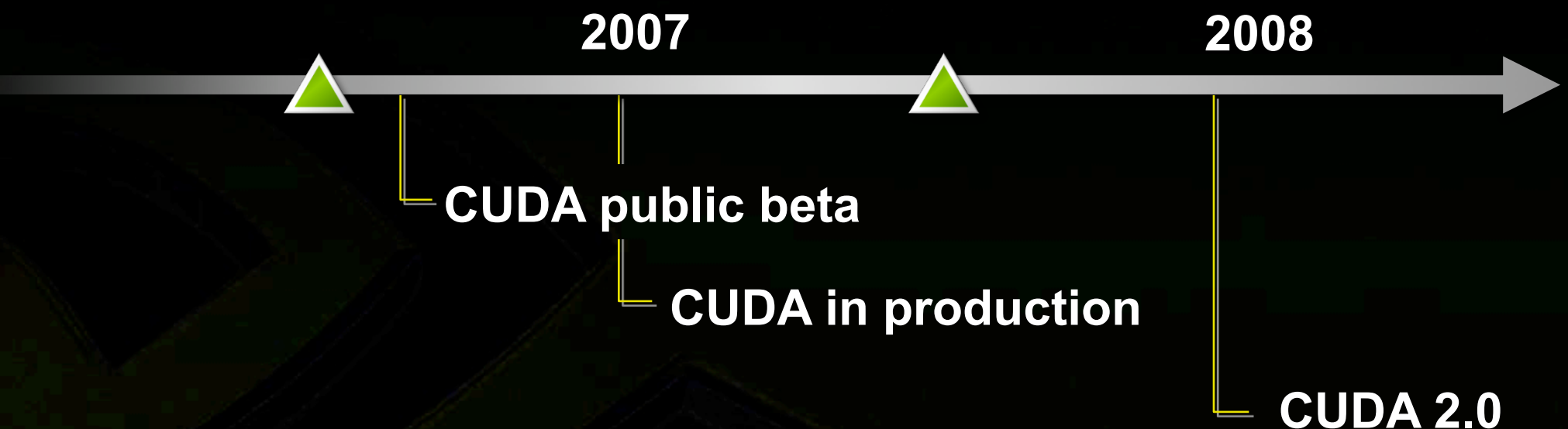
CUDA Development



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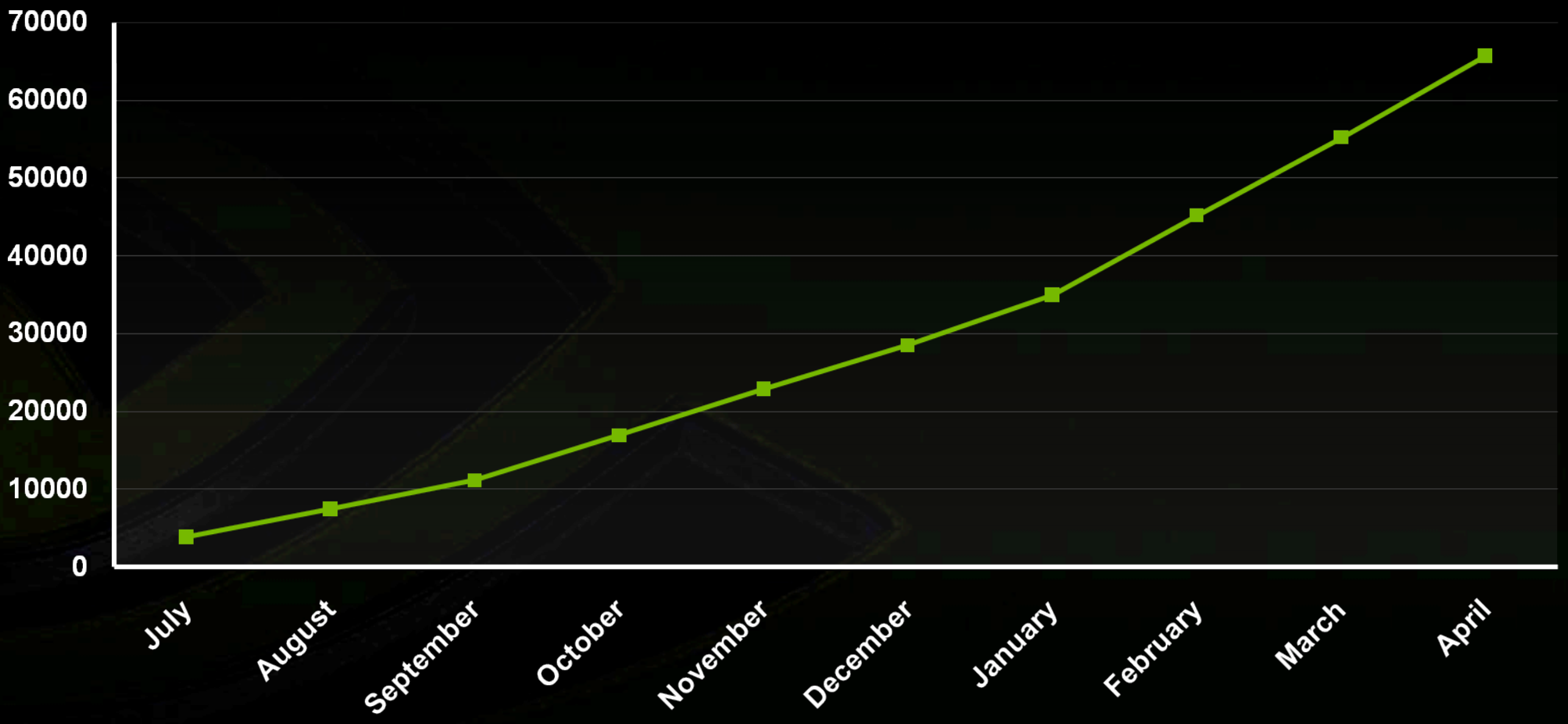
CUDA Compiler Downloads



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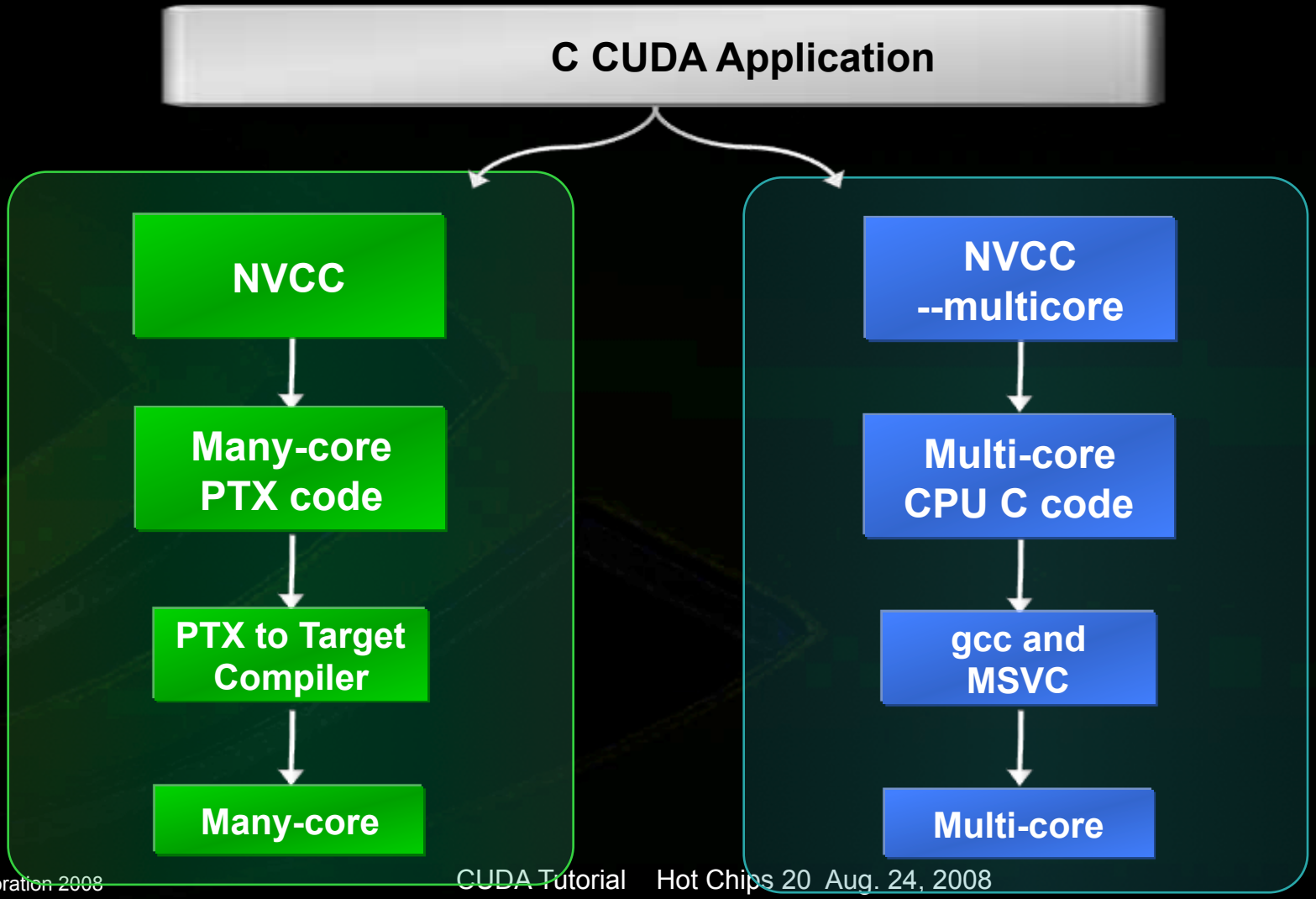
CUDA 2.0: Many-core + Multi-core support



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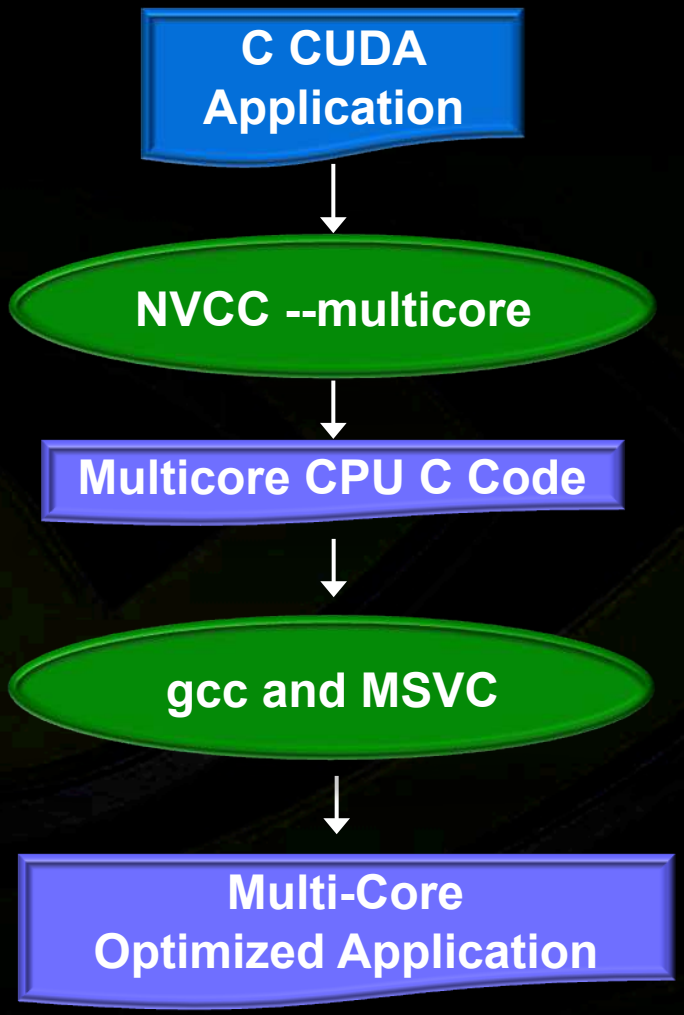
Compiling CUDA for Multi-Core



- NVCC generates code for multi-cor
- Alpha in July
- More cores = more performance

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What's Next for CUDA

Fortran

C++

Multiple GPUs

Debugger

Profiler

GPU Cluster

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Building a 100TF datacenter

CPU 1U Server	Tesla 1U System
4 CPU cores	4 GPUs: 960 cores
0.07 Teraflop	4 Teraflops
$ 2000	$ 8000
400 W	700 W
1429 CPU servers	25 CPU servers 25 Tesla systems
$ 3.1 M	$ 0.31 M
571 KW	27 KW

10x lower cost

21x lower power

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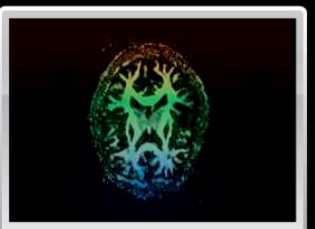
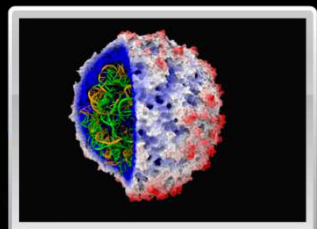
Beyond Gaming



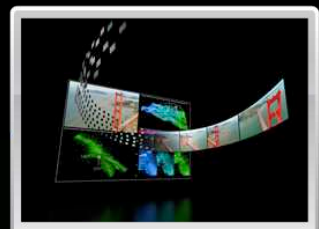
146X

Interactive visualization of volumetric white matter connectivity



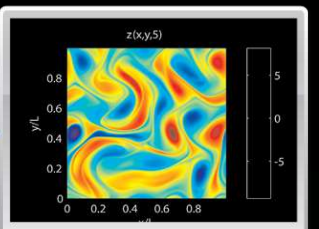
36X

Ionic placement for molecular dynamics simulation on GPU



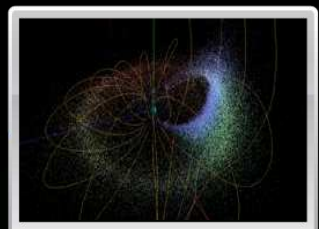
11X

Transcoding HD video stream to H.264 for portable video



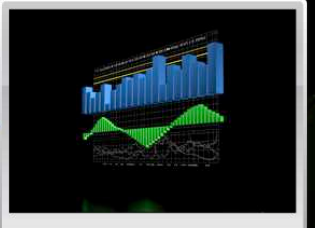
17X

Simulation in Matlab using .mex file CUDA function



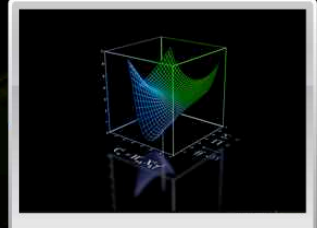
100X

Astrophysics N-body simulation



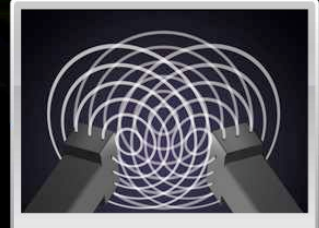
149X

Financial simulation of LIBOR model with swaptions



47X

GLAME@lab: An M-script API for linear Algebra operations on GPU

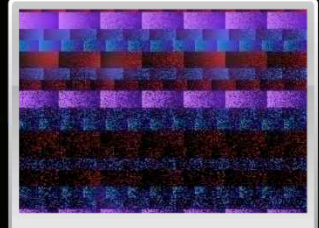


20X

Ultrasound medical imaging for cancer diagnostics

24X

Highly optimized object oriented molecular dynamics



30X

Cmatch exact string matching to find similar proteins and gene sequences

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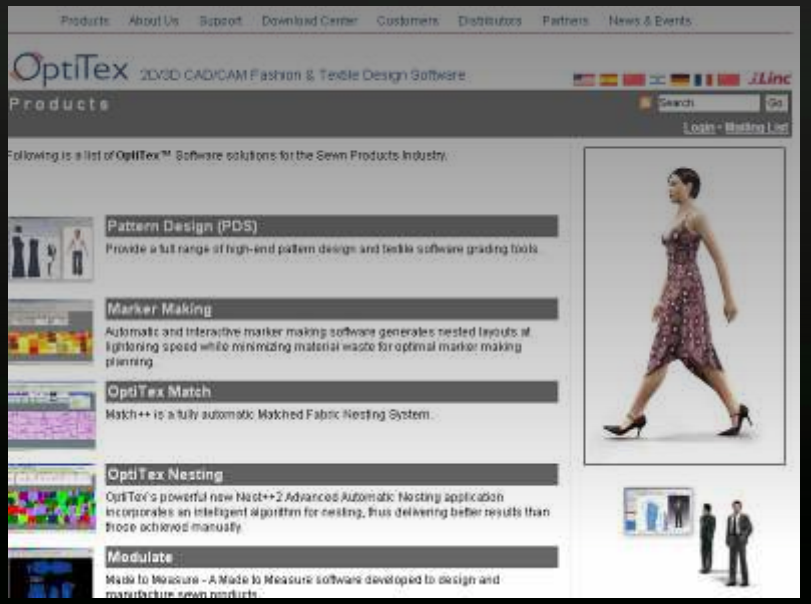
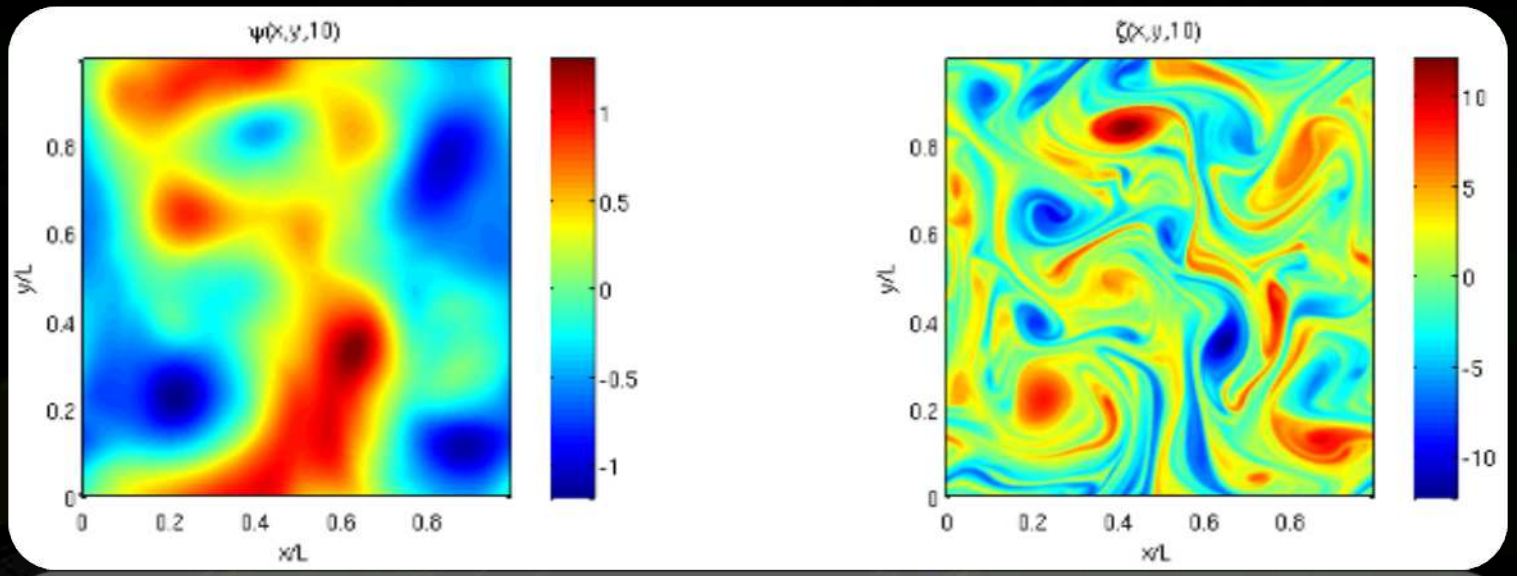
Design: CAD Design For Apparel Cloth Physics



CUDA Accelerates MATLAB®

17x Faster with GPU Compute

Pseudo-spectral simulation of 2D Isotropic turbulence



1024x1024 mesh, 400 RK4 steps, Windows XP, Core2 Duo 2.4Ghz vs GeForce 8800GTX

http://www.amath.washington.edu/courses/571-winter-2006/matlab/FS_2Dturb.m

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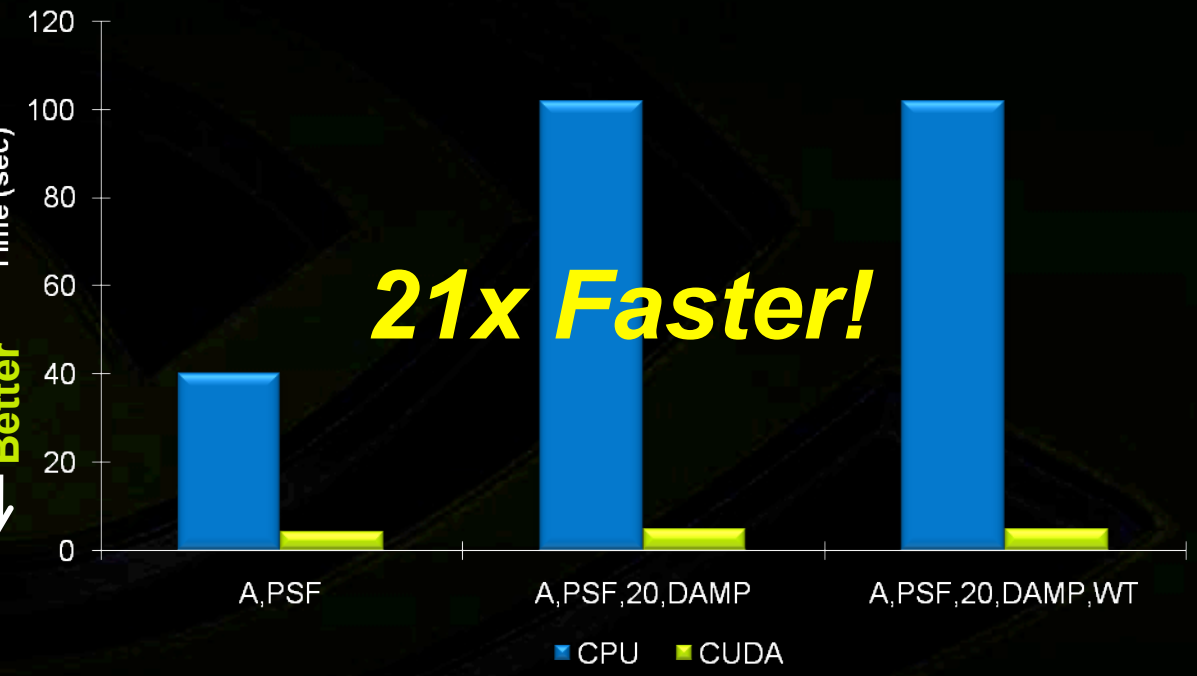
CUDA Advantage on MATLAB® Image Toolbox



Dual Xeon Core 2 Quad 5320 1.86GHz (8 cores) 4GB
NVIDIA Quadro 5600 1.5GB

Using MATLAB Lucy-Richardson Deconvolution: deconvlucy(. . .)
Results have max pixel difference of no more than 1 grey level

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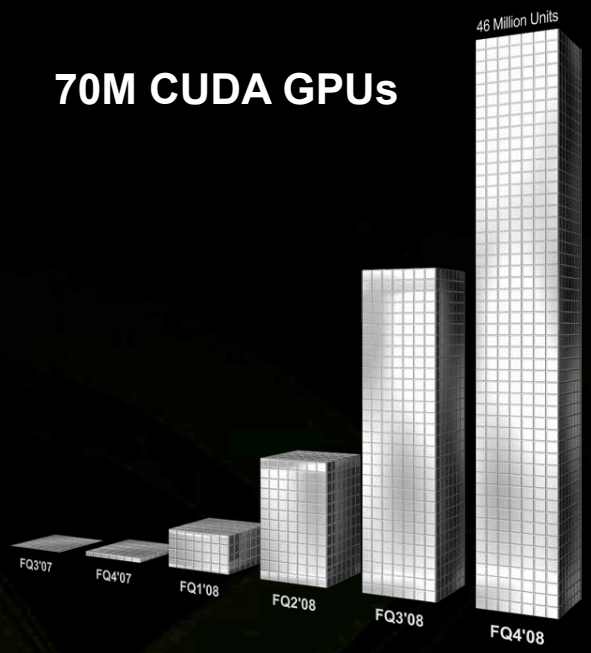
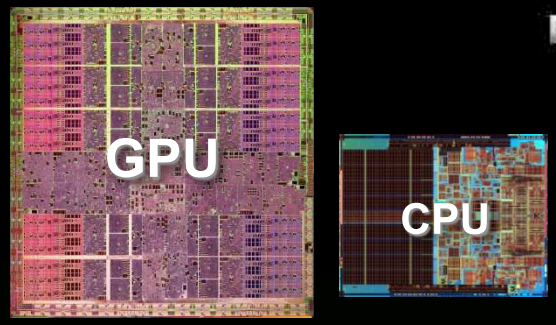
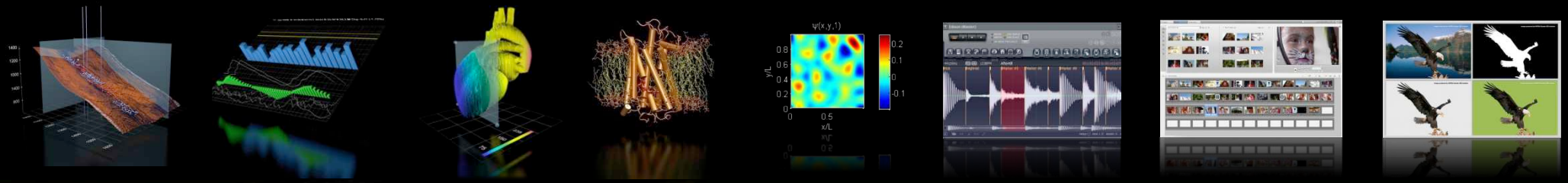


CUDA



Heterogeneous Computing



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