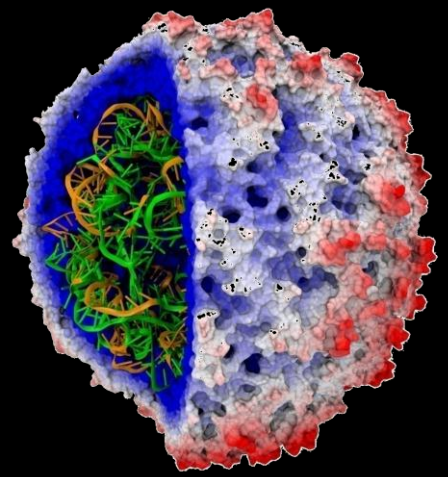
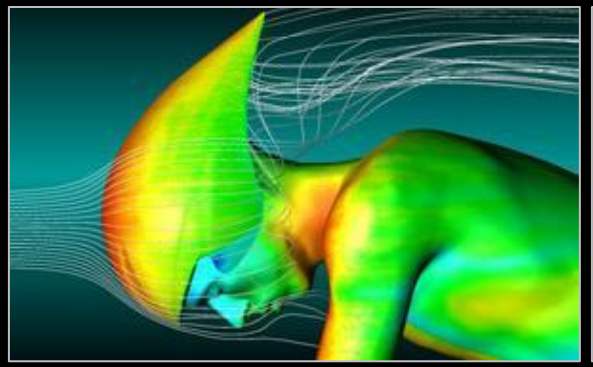
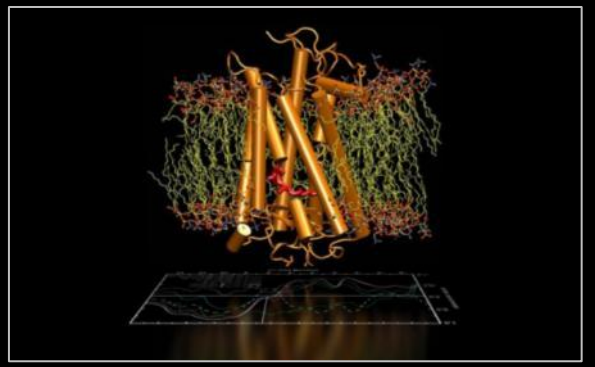
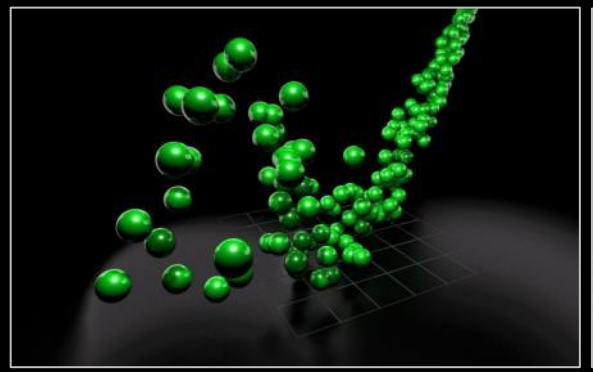
Heterogeneous Computing 동향









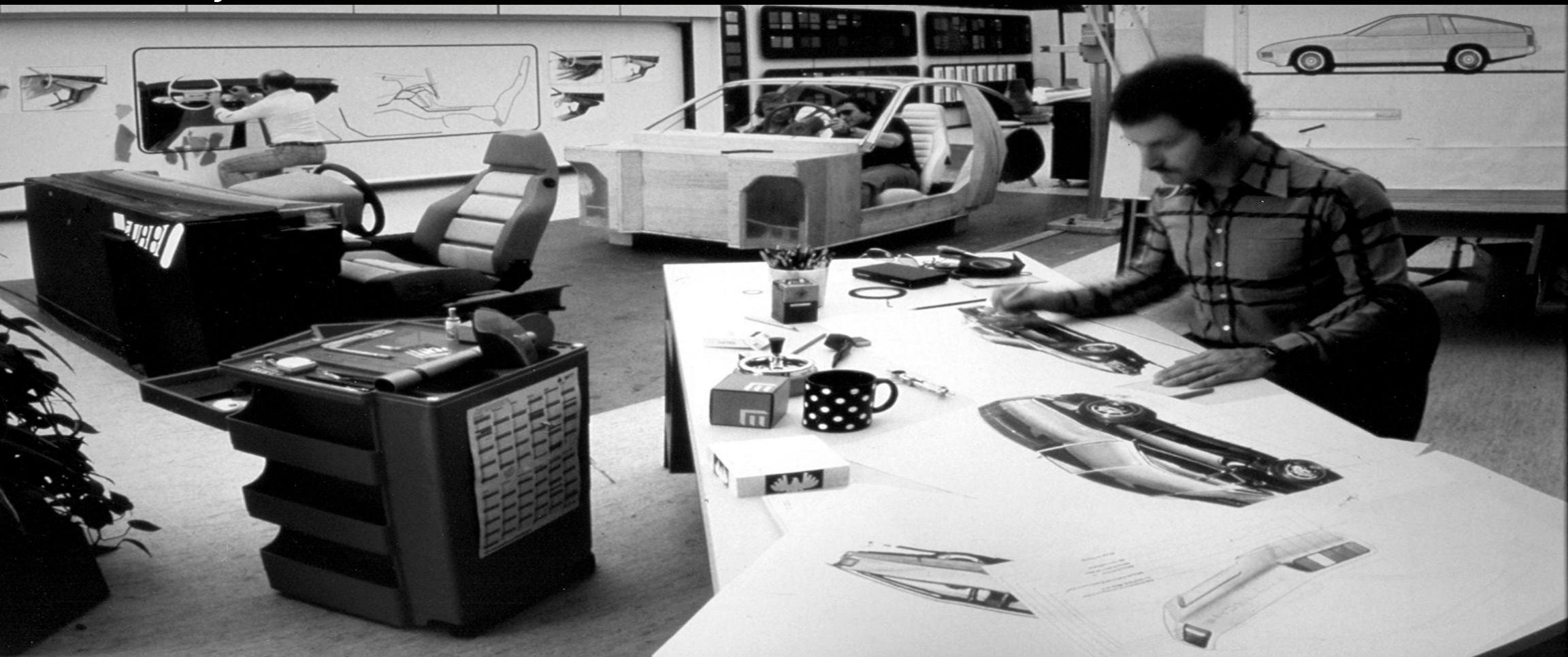
NVIDIA Korea

Professional Solution Group

이주석 – jslee@nvidia.com

Design Development

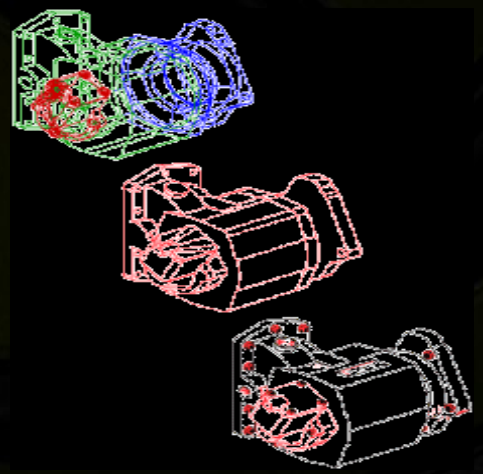
History

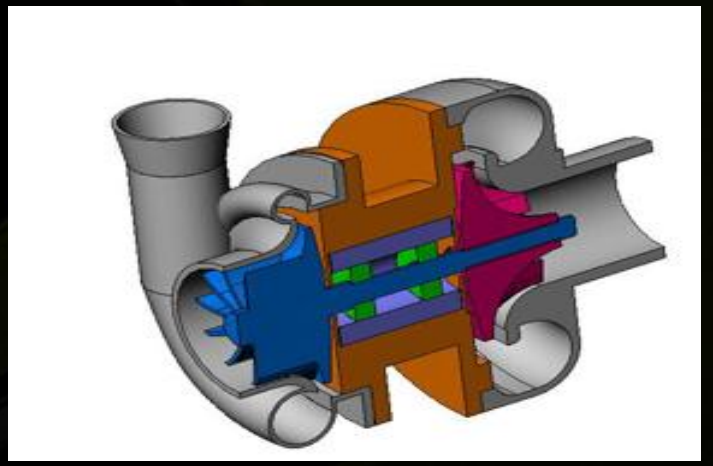


Design Development

Wireframe — Solid Models — Shaded Models — RT Shaders

1990s — 2000 — 2004 — 2007





Design Development

Today

Photo Realistic Modeling

Photo Realistic Modeling

CLO virtual fashion online

NVIDIA

Tuck

Shirring

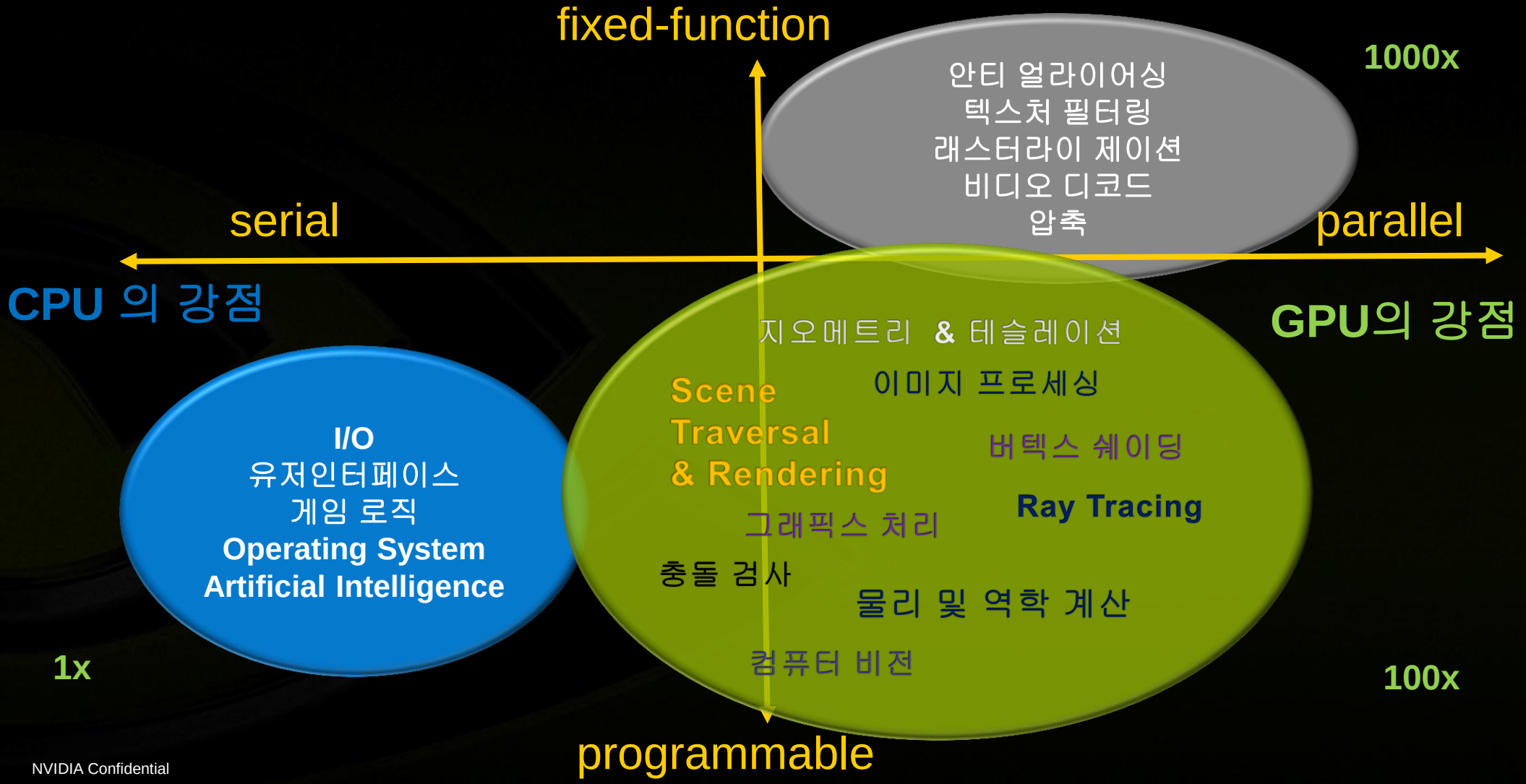
Pleats

Ironed Line

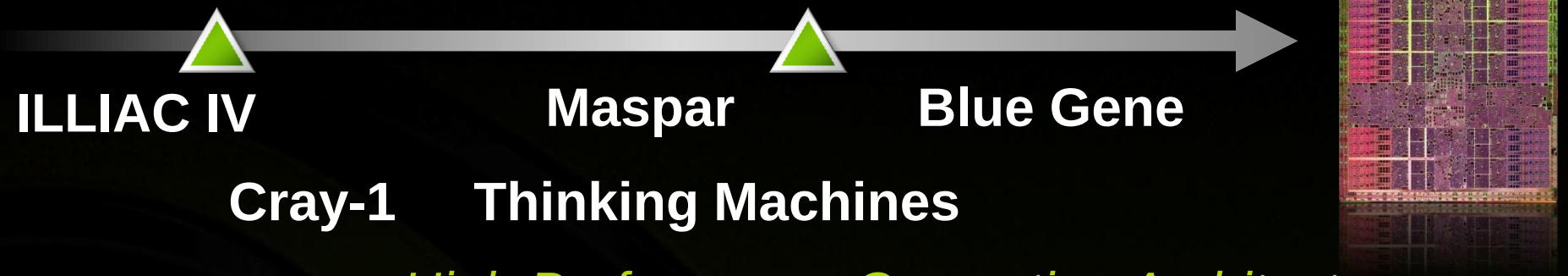
But Massive Data…

- 100Tb Working data set
- 18+ Months Production Schedule
- 50 Million CPU core

다양한 분야에서 **parallel computing** 요구 증가



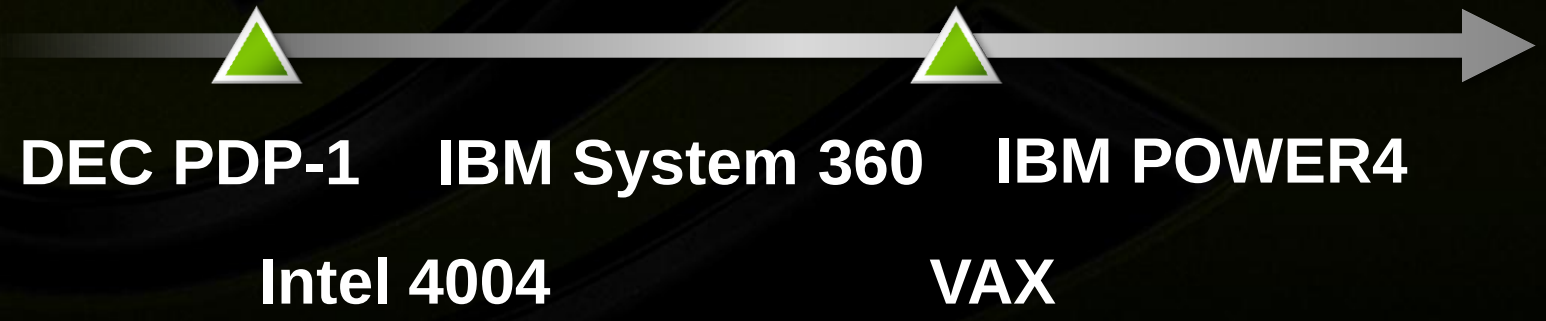
Many Core GPU vs Multi Core CPU의 진화

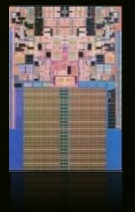


Many-Core GPUs

High Performance Computing Architectures

1960’

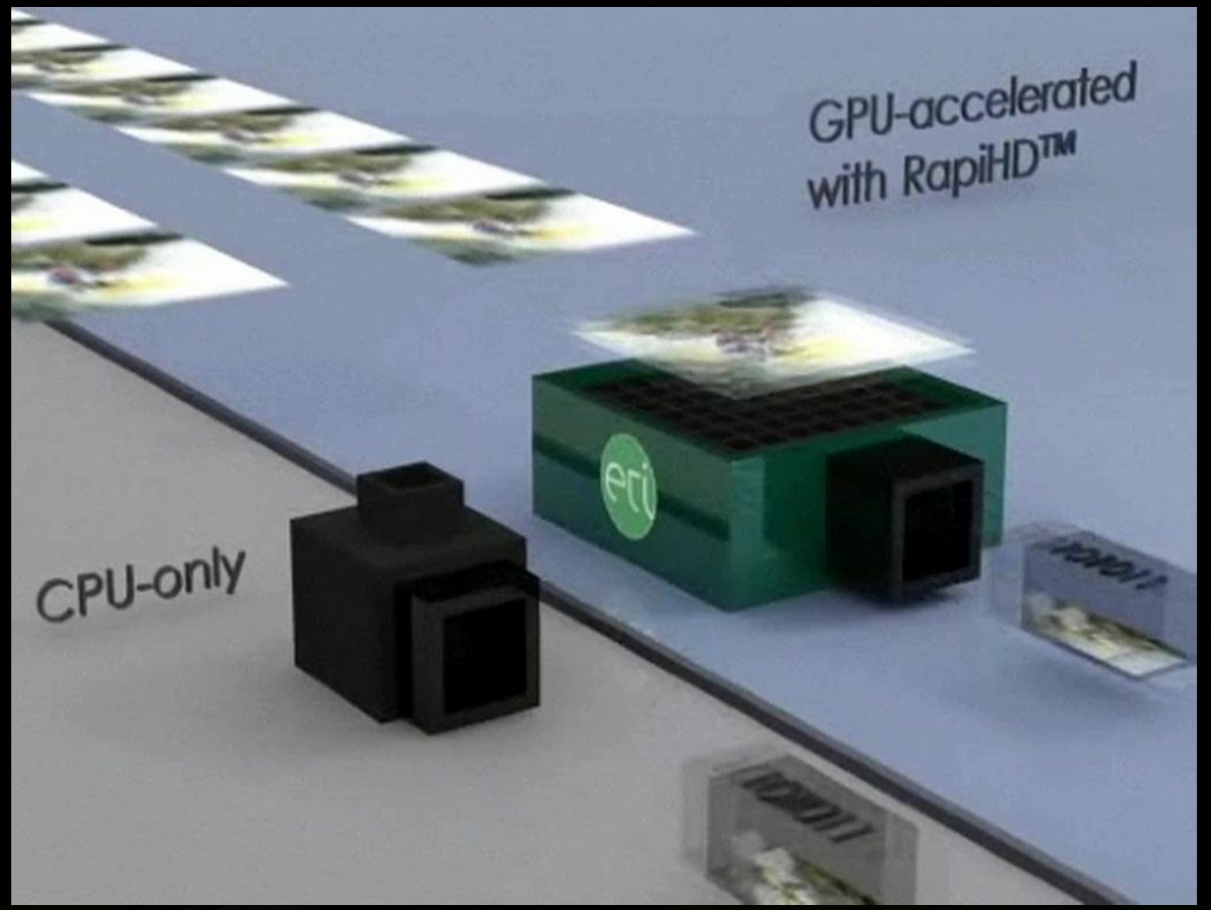


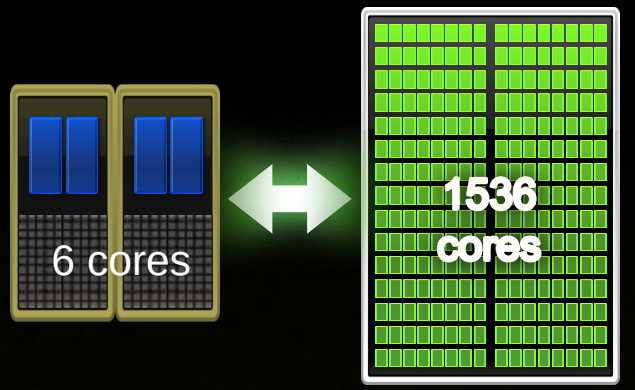


Multi-Core x86

Database, Operating System Sequential Architectures

Hybrid GPU 기술





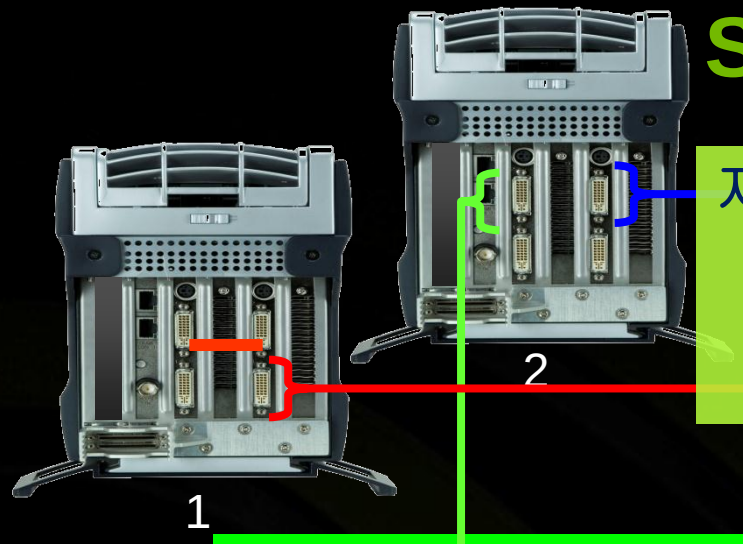
Computing with CPU + GPU

Heterogeneous Computing

Tesla는 대용량의 데이터를 처리하는데 있어서 가장 적합한 구조를 갖고 있으며

***CUDA**를 기반으로 프로그램이 이루어질 경우 데이터 처리에 있어서 **CPU** 대비 **10**배에서 **100**배까지도 속도가 빨라질 수 있다*

Simulation & Visualization

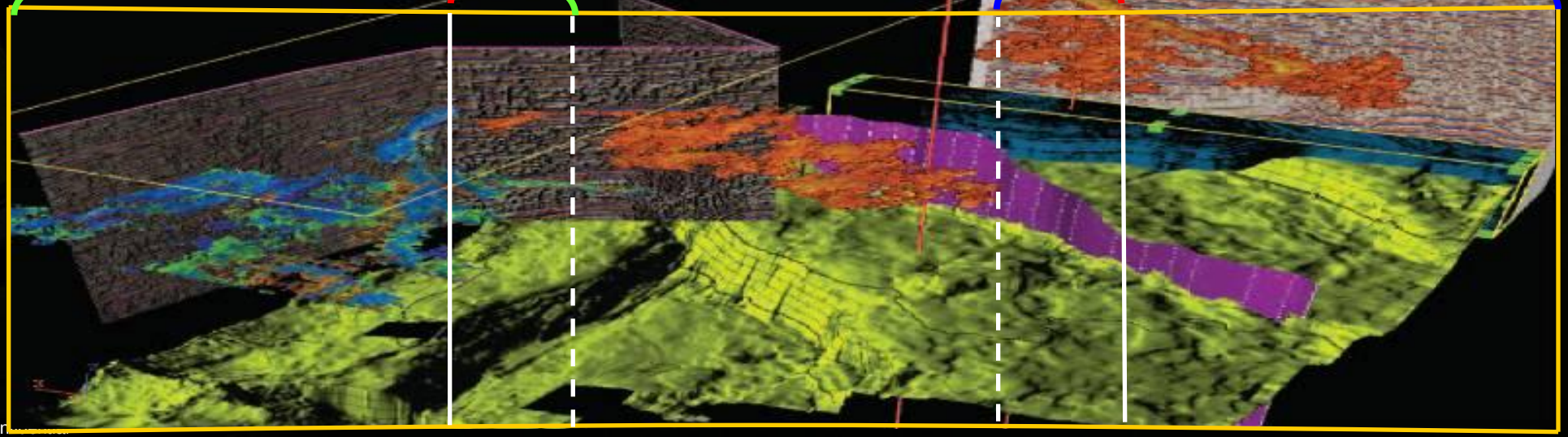


지질 탐사, 유전 탐사 : 충격파를 이용하여 지질, 해저 구조를 **CUDA**로 분석 그리고 **QuadroPlex**를 이용한 **8K** 고해상도 영상 구현

QuadroPlex #2: Card #1
Output #1 : 0.1

QuadroPlex #1: Card #1&2 (SLI)
Output #1:0.1

QuadroPlex #2: Card #2
Output #1:0.2



MAXIMUS : Design + Simulation

MAXIMUS
Workstation

Design Time = x

Design

+

Simulate

Simulation Time = ½ y

Application Code

Only Critical Functions

Parallelize using CUDA
Programming Model

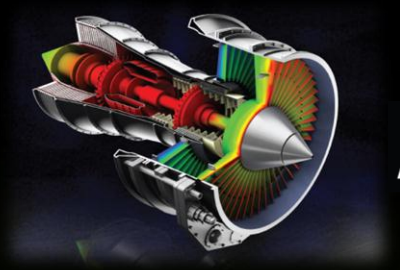
GPU

Rest of Sequential
CPU Code

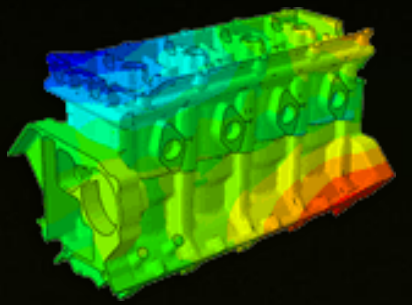
CPU

+

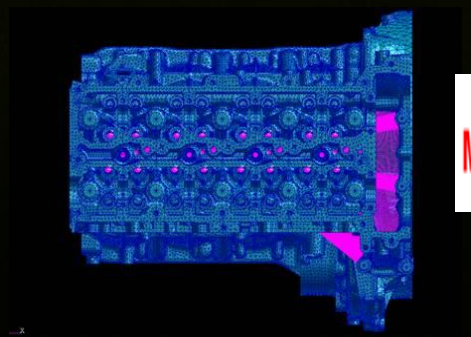
MAXIMUS : Design + Simulation



ANSYS

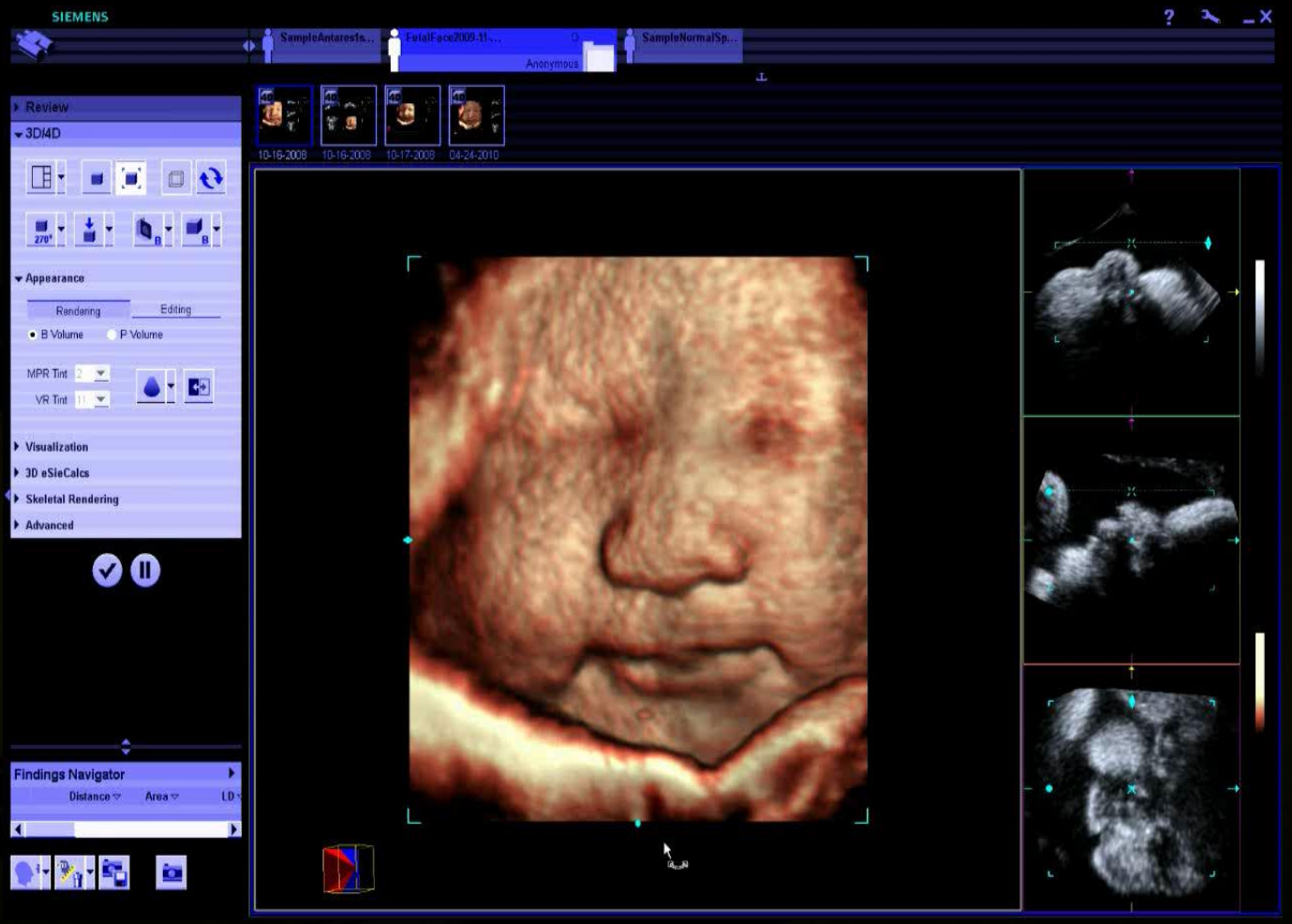


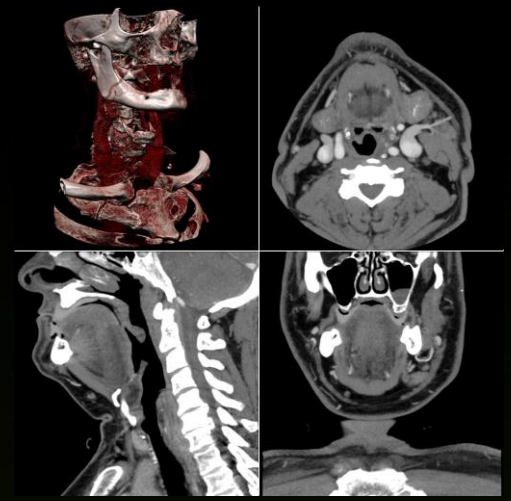
SIMULIA

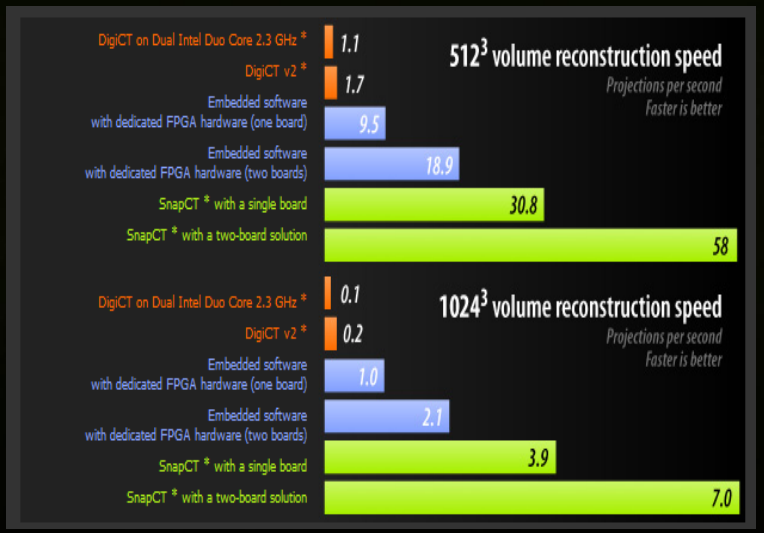


MSC Software
Simulating Reality, Delivering Certainty

CUDA를 이용한 2D to 3D volume reconstruction



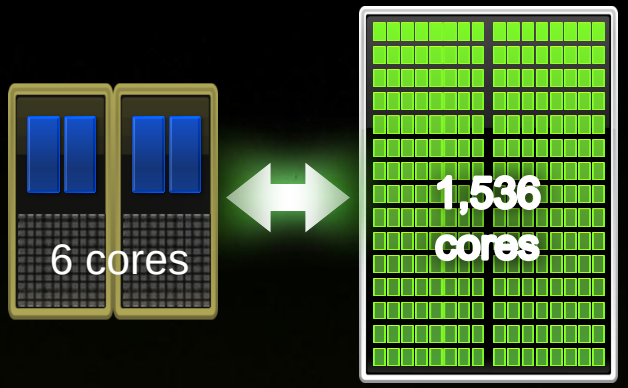




CUDA 기반 PhysX 엔진과 GPU 렌더팜

Autodesk

NVIDIA



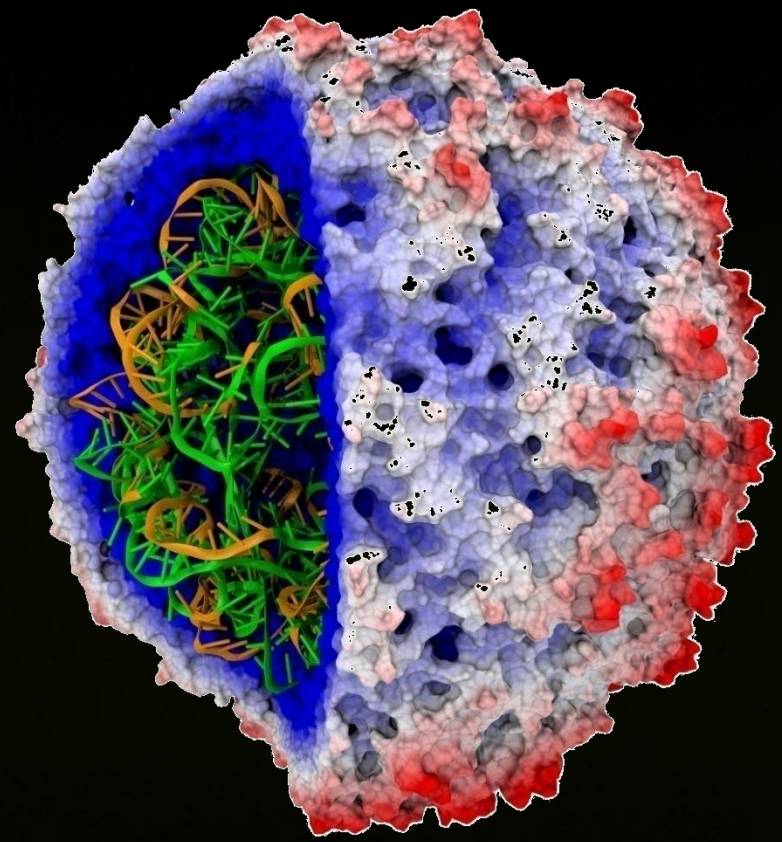
Computing with CPU + GPU

Heterogeneous Computing

PhysX™ by NVIDIA

VMD: Visual 분자동역학

- **VMD 1.9.1 with CUDA**
- 분자구조 시각화와 분석 능력 제공
- 전자 궤도 시각화에 대한 가속
- 정전기장을 해석하는 **Fast** 알고리즘 구현



클라우드 컴퓨팅 솔루션

vmware

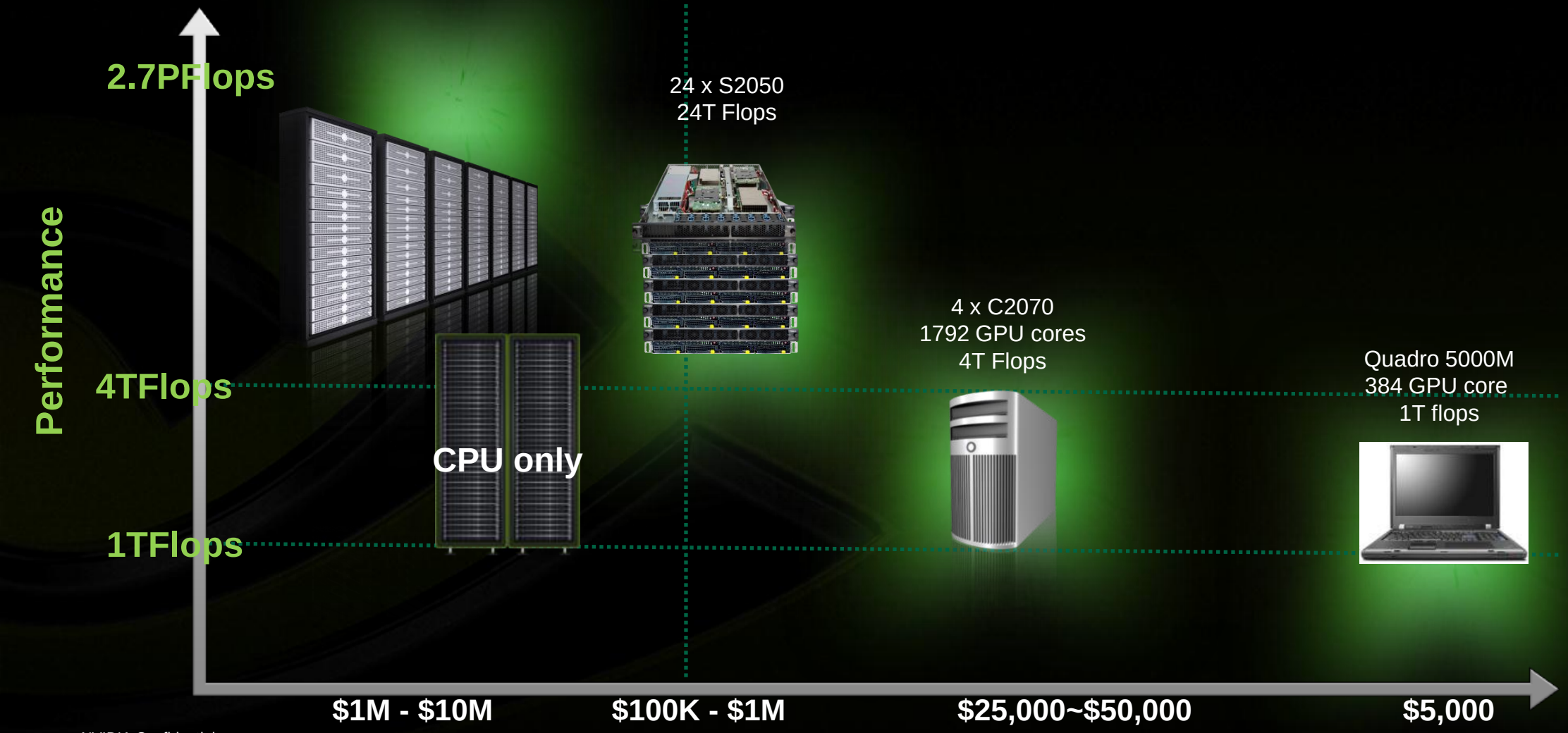
CITRIX

Microsoft

클라우드 컴퓨팅 솔루션

Visualization: Delta Tracing, Mestre, Italy
Design: Stofanel Investments GmbH, Rendered with mental ray®

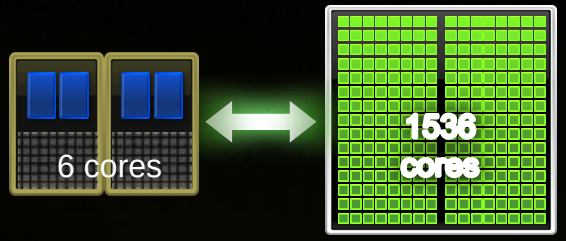
Paradigm Shift in IT systems



Beyond Graphics

전문가용 그래픽 성능

수퍼컴퓨팅 & 해석



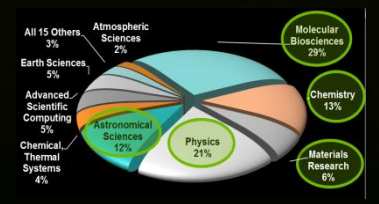
Computing with CPU + GPU

Heterogeneous Computing

NVIDIA QUADRO

3D 스테레오 및 특수영상

GPU Server

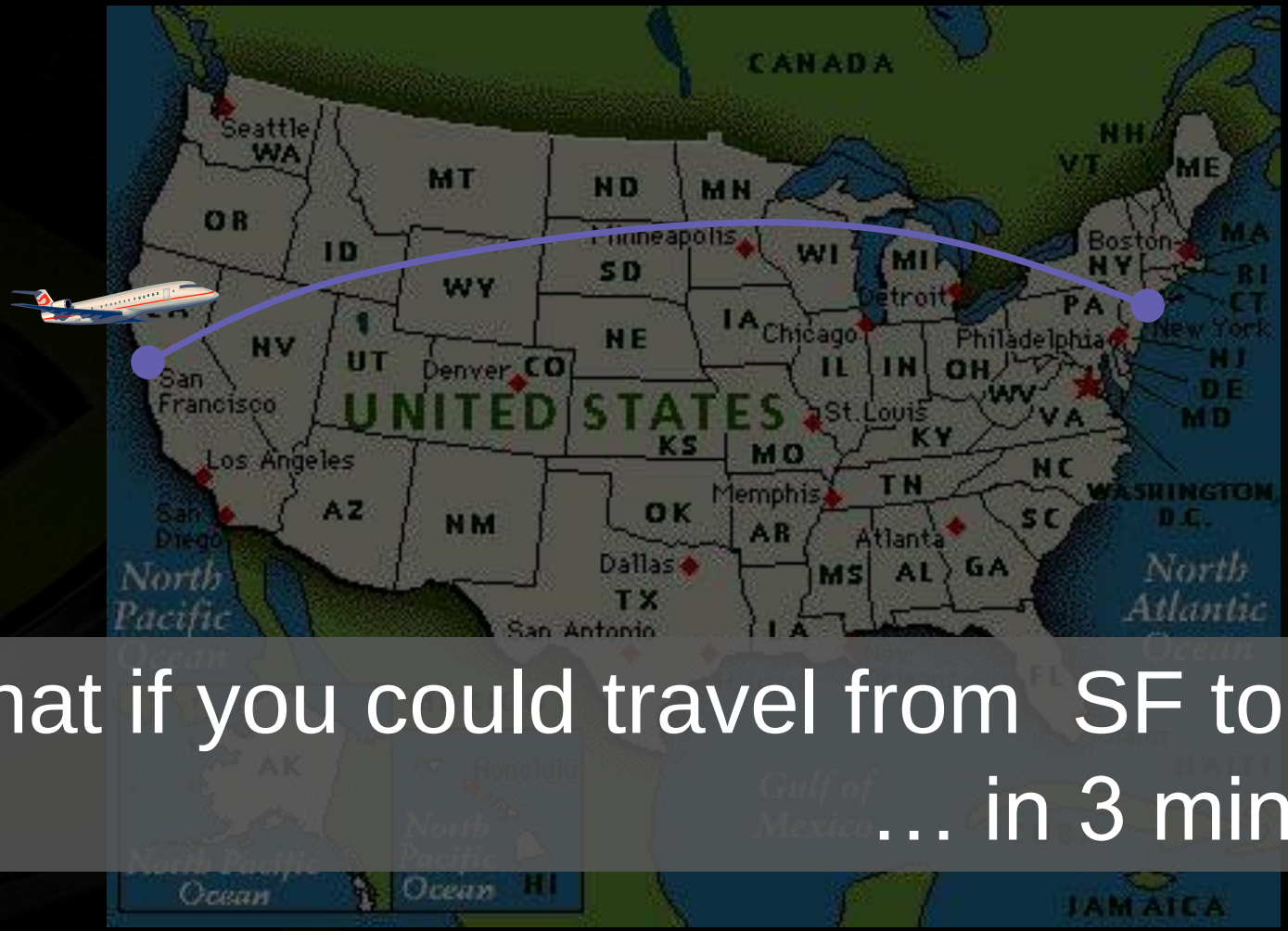


클라우드 컴퓨팅

그래픽 기술의 발전

1995 – NV1	2012 – GK104
	1,536 core
50MHz	1,006Mhz
1M Bytes	6G Bytes
0 GFLOPS	1.536 TFLOPS

Another 1000x in 15 years?



What if you could travel from SF to NYC … in 3 minutes?


NVIDIA
감사합니다