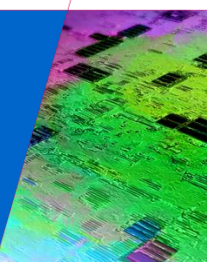


# General Purpose GPU symposium

Introducing GPU architectures

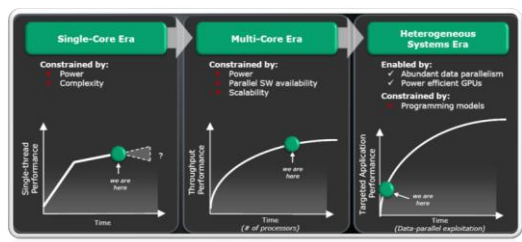
Henk Corporaal



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Where innovation starts

## Why do we need GPUs?

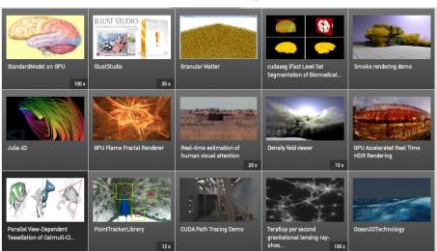


Source: AMD Financial Analyst Day, 11th of November 2009

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## What do GPUs bring us?

### Acceleration for computer graphics




Source: NVIDIA CUDA Zone, [www.nvidia.com/cuda](http://www.nvidia.com/cuda)

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## What do GPUs bring us?

### Acceleration for image processing




Source: NVIDIA CUDA Zone, [www.nvidia.com/cuda](http://www.nvidia.com/cuda)

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## What do GPUs bring us?

### Acceleration for linear algebra




Source: NVIDIA CUDA Zone, [www.nvidia.com/cuda](http://www.nvidia.com/cuda)

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## What do GPUs bring us?

### Acceleration for molecular dynamics



Source: NVIDIA CUDA Zone, [www.nvidia.com/cuda](http://www.nvidia.com/cuda)

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### What do GPUs bring us?

#### Acceleration for medical applications

Source: NVIDIA CUDA Zone, www.nvidia.com/cuda

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### What do GPUs bring us?

#### And many more other applications

Filter by Application Type:

- Computational Fluid Dynamics
- Computer Aided Engineering
- Digital Content Creation
- Electronic Design Automation
- Finance
- Game Physics
- Graphics
- Imaging
- Medical Imaging
- Numerics
- Life Sciences
- Libraries
- Oil & Gas
- Programming Tools
- Ray Tracing
- Science
- Signal Processing
- Video & Audio
- Other

Filter by Content Type:

- Application
- Code
- Multimedia
- Paper
- Presentation

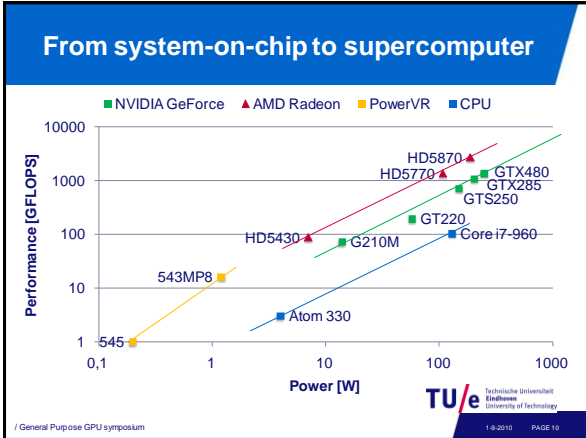
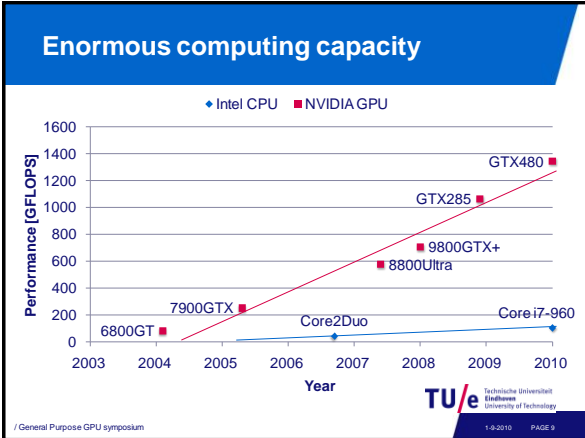
Filter by Organization Type:

- Academia
- Commercial
- Research

Source: NVIDIA CUDA Zone, www.nvidia.com/cuda

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### From system-on-chip to supercomputer

#### PowerVR low-power GPUs

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### From system-on-chip to supercomputer

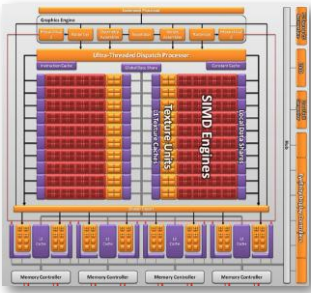
#### Intel Larrabee x86-GPU

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## From system-on-chip to supercomputer

**AMD ATI Radeon GPUs**



**1600 VLIW processing elements**



**2 TFLOPS per GPU**

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## From system-on-chip to supercomputer

**NVIDIA GeForce/Tesla GPUs**

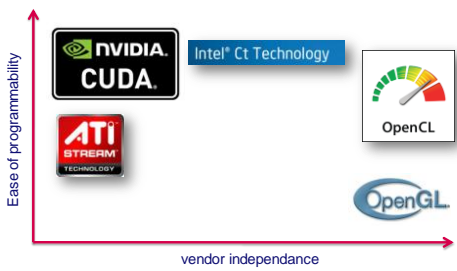



**Tesla S2070: 4TFLOPS!**

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## Programming languages



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## Interesting links

- GPU research at the TU/e ES-group: [www.es.ele.tue.nl/gpu/](http://www.es.ele.tue.nl/gpu/)
- Mapping matrix multiplication on a GPU: <http://sites.google.com/site/5kk70gpu/matrixmul-example>
- Mapping reduction on a GPU: [http://developer.download.nvidia.com/compute/cuda/1\\_1/Website/projects/reduction/doc/reduction.pdf](http://developer.download.nvidia.com/compute/cuda/1_1/Website/projects/reduction/doc/reduction.pdf)

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## Morning program

- 10:00 Introducing massively parallel processing using GPUs  
*Gert-Jan van den Braak (Electronic Systems, TU/e)*  
*Cedric Nugteren (Electronic Systems, TU/e)*
- 10:30 GPU programming paradigms  
*Wouter Caarls (Biorobotics Lab, TUDelft)*
- 11:00 Coffee Break
- 11:30 Cross platform GP-GPU with OpenCL  
*George van Venrooij (Organic Vectors)*
- 12:00 Automatic parallelization of C-code  
*Jos van Eijndhoven (VectorFabrics)*
- 12:30 Lunch Break

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