## Distributed GPGPU Computing

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#### CPU vs GPU

"<IMAGE GPU vs CPU>"

# Why GPGPU?

The theoretical calculation power of a GPU is much higher than a CPU.

#### Example

CPU (Intel Xeon E5-2670 v3):

- 12 Cores, 2.3 GHz, 32 FLOPS/cycle
  - 884 GFLOPS
- Prize: ∼ 1500 \$

GPU (NVidia Tesla K40):

- 2880 Cores, 745 MHz, 2 FLOPS/cycle
  - 4291 GFLOPS
- Prize: ~ 4000 \$

So, what computational tasks are actually suitable for GPGPU?

#### Problems suitable for GPGPU

Every problem that fits the SPMD programming scheme, can benefit greatly from GPGPU.

#### Examples:

- Fluid Simulations
- Mathematical Vector Operations
- Image Processing
- Stencil Based Simulations

#### SPMD based Programming Languages:

- CUDA (NVidia)
- OpenCL (Platform independent)

### OpenCL

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## Advantages over MPI

# Affect on distributed GPGPU programming

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# Layout

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# Getting devices

## Writing data to the device

# Creating a kernel

# Executing the kernel

# Reading the result

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## bla

# Scaling

## Parallel Efficiency