4.	Fachgebiet Architektur eingebetteter Systeme **Multicore Architectures**	WS13/14

Assignment start: 05.01.2015 Submission deadline: 19.01.2015

Assignment 1 - GPU and CUDA Intro **35 Points**

In this assignment a CUDA kernel should be developed and used to calculate a fractal. A single threaded regular C implementation is provided in julia.c. This program should be ported to the GPU using CUDA.

Each GPU thread should calculate the value of a single pixel.

- Implement a program that renders the fractal using CUDA and writes it to a PPM file (See the provided single-threaded version).
  - Allocate memory on the GPU for the image
  - Allocate memory on the host
  - Implement the fractal calculating kernel
  - Call the kernel
  - Transfer the image back
  - Save the image using the provided function
- Analyze the performance using GPGPU-SIM
- Calculate SIMD-Efficiency from gpgpu-sim Output
  - Evaluate Runtime (in cycles) and SIMD-Efficiency using different block-sizes
  - Test at least the following blocksizes
    - 1D Blocks: 1,16,32,256
    - 2D Blocks: 4x4, 8x8, 8x32, 32x8, 16x16
  - Report the results and explain the differences in runtime and SIMD-Efficiency