High-Performance Computing

Exercises

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Computing Fractal Images

Analyze the iteration formula $z = z^2 + c$

- Use the `org.apache.commons.math.complex`-Classes to project a 600x600-`Matrix` onto the complex number plane at $-0.3 <= z.re <= 0.3, -0.3 < z.im < 0.3$
- Start with $c = (-1, 0.28)$ and run as many iterations as necessary until $abs(z) > 150$, but 100 iterations maximum
- Use your `compute.Process`-class to assign the number of necessary iterations as "color values" to the corresponding matrix elements
- Depict your Matrix in a `java.awt.Image` and display it. Then, compute multiple tiles of the same image in parallel using your `Matrix.split`-method and measure the scalability
- Try to specify the same process via the Farm-HOC interfaces:

```
public interface Master<E>  {
    public E[][] split( E[] input,
                        int numWorkers );
    public E[] join(E[][] input);  }
public interface Worker<E>  {
    public E[] compute(E[] input);  }
```