Algorithm Engineering

Exercise No. 3

Tuesday 4th November, 2014

Submission

(1) Submit your solution with `$ git request-pull` (or similar) to jkm@informatik.uni-jena.de.

1 Fix outstanding issues

Address and fix problems of your last submission.

2 More algorithms for computing Fibonacci numbers

Implement more algorithms from the lecture.

(1) Compute Fibonacci numbers using the formula

$$\begin{pmatrix} F_n \\ F_{n+1} \end{pmatrix} = \begin{pmatrix} 0 & 1 \\ 1 & 1 \end{pmatrix}^n \begin{pmatrix} 0 \\ 1 \end{pmatrix}$$

in logarithmic running time.

(2) Implement the formula derived in the lecture which computes Fibonacci numbers without relying on matrix products.

(3) Use a lookup table to compute Fibonacci numbers in constant time (up to some fixed Fibonacci number).

As always test your implementations to aid correctness.

3 Make it fail

Write a test that makes your implementations fail. Why does it fail? How can one fix it? At what costs? Answer these questions near the failing test case.