

VE477

Introduction to Algorithms

Challenge 2

Manuel — UM-JI (Fall 2017)

- Improve algorithmic and implementation skills
- No deadline
- Rewarded by a bonus on the final grade

In this challenge the goal is to write efficient C/C++ implementations of advanced algorithms.

Rules

Follow the rules below:

- Implementations must be done in C or C++;
- The two following topics can be studied:
 - Implement the following functions for the Y-fast trie data structure¹:

```
* void init(YTrie t);                * YNode insert(YTrie t, int k);
* YNode find(YTrie t, int k);        * void delete(YTrie t, int k);
* YNode successor(YTrie t, int k);   * void destory(YTrie t);
* YNode predecessor(YTrie t, int k);
```
 - Implement Fürer algorithm for computing the product of two very large integers. Only provide a library, i.e. no main function. The highest level function should have prototype

```
number furer(number, number);
```
- To obtain a reward there is no need to study and work on both problems;
- Short interviews will be held at the end of the semester;

Reward

The reward will be determined as follows.

- Any implementation that is partial, not running, or written in language different from C/C++, will not be awarded any bonus;
- For a single student a total reward of 5 marks on the course grade can be awarded:
 - 2 for Y-fast trie;
 - 3 for Fürer algorithm;
- For a group of several students the above rewards are multiplied by two and freely shared among the students in the group;
- All the running programs will compete together:
 - The fastest will obtain the full reward n ;
 - Other implementations will be awarded $n - 0.25 \cdot r$, where r is their rank;
 - Programs written in C and C++ will compete in the same category;

¹(i) All the elements (keys) in the trie are expected to be integers; (ii) The data-types YNode and YTrie must be implemented