ID1020 – Algorithms and Data Structures
Project 1 – VT14 P2

1 Organisation

The project is a programming task that is somewhat more involved than the lab. The results will be presented orally and a grade assigned based on the quality of the solution and understanding of the involved concepts.

The project itself is split into two parts, *Project 1 (P1)* and *Project 2 (P2)*, such that P1 forms the basis and P2 expands and improves on P1.

1.1 Dates

Submission Wednesday, Dec. 18th, 23:59 in Bilda

Presentation Thursday, Dec. 19th, time-slots will be assigned.

1.2 Goals

The project has the following goals:

- Work with the algorithms and data structures presented in the course
- Reason about usage patterns in a software system and leverage this to make implementation decisions
- Work on a real problem within the context of the course

1.3 Requirements

For the project you will need the following:

- Java
- Maven

cf. Lab 2 for details.

1.4 Time

This depends heavily on your experience in writing code for more involved projects.
We can only recommend to start early, to get a feeling on how much time you will need to invest.
Make sure to think through the problem first before you throw yourself head first into coding. A good design from the beginning can save you many hours of wading through convoluted code later. Especially since you will have to reuse parts of your solution for P2.

Note: We would appreciate it if you could note the approximate time it took you to do the tasks on your report, so we can improve the estimations in the future.

1.5 Notations & Definitions

We denote the set of all natural numbers with $\mathbb{N} = \{1, 2, 3, 4, \ldots\}$ and $\mathbb{N}_0 = \{0\} \cup \mathbb{N}$. Similarly $\mathbb{R}$ denotes the set of all real numbers and $\mathbb{R}^+$ the set of all positive real numbers. The set of common complexity classes is denoted as follows:

$$\mathcal{C} = \left\{ f : \mathbb{N} \to \mathbb{R} \;\middle|\; f(n) \mapsto \left\{ \begin{array}{l} 1 \\ \log n \\ n \\ n \log n \\ n^r \text{ for some } r \in \mathbb{R}^+ \\ r^n \text{ for some } r \in \mathbb{R}^+ \\ n! \end{array} \right. \right\}$$

Let $\mathbb{R}^{\mathbb{N}}$ refer to the set of all functions $f : \mathbb{N} \to \mathbb{R}$ then clearly $\mathcal{C} \subseteq \mathbb{R}^{\mathbb{N}}$.

2 Background

3 Tasks