DM 502 Programming A

Fall 2010 Project (Part 1)

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September 14, 2010

Introduction
The purpose of the project for DM502 is to try in practice the use of programming techniques and knowledge about the programming language Java on small but interesting examples. The project consists of two parts.

Please make sure to read this entire note before starting your work on this part of the project. Pay close attention to the sections on deadlines, deliverables, and exam rules.

Exam Rules
This first part of the project is a part of the final exam. Both parts of the project have to be passed to pass the overall project.

Thus, the project must be done individually, and no cooperation is allowed beyond what is explicitly stated in this document.

Deliverables
A short project report (at least 4 pages without front page and appendix) has to be delivered. This report has to contain the following 7 sections (for details see the slides for September 14):

- front page
- specification
- design
- implementation
- testing
- conclusion
- appendix

The report has to be delivered using Blackboard's Assignment Hand-In functionality. Delivering by e-mail or to the teacher is only considered acceptable in case Blackboard is down before the deadline.

Deadline

September 28, 12:00

The Problem
Julius Caesar scrambled his messages by shifting every letter of a word by a certain number of steps in the alphabet. We have two functions, *encrypt* that scrambles a message into a seemingly senseless text and *decrypt* that unscrambles a given text into the original message.

The key in this scrambling method is the number of steps a letter is shifted. If we know this number, we can unscramble by shifting all letters back by the same number. Consider the following examples:

- shifting b by 5: $b \to c \to d \to e \to f \to g$ (result is g)
- shifting w by 6: $w \to x \to y \to z \to a \to b \to c$ (result is c)
- shifting g back by 5: $g \to f \to e \to d \to c \to b$ (result is b)

Your task in this part of the project is to write a Java program that reads a text from an input file given as a first argument, asks the user for a key (the number of shifts) and whether to decrypt or encrypt. The resulting text is then printed to the screen. If an output file is given as a second argument, the resulting text should additionally be written to that output file.

The Input
The input is a normal message containing only words over the alphabet $a, b, \ldots, z$ separated by whitespace. Thus, our input might look like this:

```
galia est
pacata
```

The Output
The output of your solver should also be a text containing only words over the alphabet $a, b, \ldots, z$ separated by whitespace. Thus, our output for a shift of 25 might look like:

```
fzkhz
drs
ozbzsz
```

The Task
Implement a main method that handles the input and output from and to files and from and to the user. Then implement two methods `public static String encrypt(String message, int key)` and `public static String decrypt(String text, int key)` that scramble and unscramble as described above. Use these methods in your main method in order to achieve the required behaviour.