

Linear and Integer Programming (ADM II)

Martin Skutella
Axel Werner

Torsten Ueckerdt
Jannik Matuschke

Programming exercise 1

Deadline: 17 Dec 2007

Write a program that implements the revised simplex algorithm in `JAVA` or `C/C++`. Your program should be capable of

- reading `.lp` files in the format that `CPLEX` writes and reads;
- writing and printing the found optimal solution and the objective value at the optimum;
- printing—if requested—the important parameters like reduced costs, entering and exiting variables in every iteration.

You will find several example problems for testing on the website. Your program will have to deal with these instances correctly. Note also that the code has to be well commented!

Hand in the source code of your program by mail to `awerner@math.tu-berlin.de` by Monday, 17 Dec. Additionally, you will have to briefly explain your program to one of our team. This should be done during the unix-pool priority times in the same week. Details on the whole procedure will follow.

Here's some advice on how you could proceed—you don't have to stick to it, however.

1. Provide routines for handling matrices and vectors—multiplication, extracting and changing rows and columns of matrices, calculating inverse matrices and similar tasks.
2. Implement phase II of the simplex method and test it by hardcoding test instances.
3. Finish and test the whole two-phase simplex algorithm in the same way.
4. Write a parser for the input and routines that transform the input into standard form.

Note that it is *always* a *very* good idea to extensively test the smaller modules before assembling them to a more complicated program. Also, print out intermediate results of calculations and log messages to find possible errors.