

Constraint Technology (course 1DL023)

Autumn 2008 – Assignment 2

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— Hard deadline: 18:00 on Friday 10 October 2008 —

Submission Instructions

1. This assignment is to be solved in teams of (at most) two students. Take our warning on plagiarism very seriously. *We assume that by submitting a solution you are certifying that it is solely the work of your team, and that everyone on the team contributed to elaborating this solution.*
2. Write clear answers. Justify all answers, except where explicitly not required. State any assumptions you make. Spell-check and grammar-check your answers.
3. Document each program you wrote by:
 - Instructions on how to compile and run it.
 - Sample test-run commands with inputs and outputs. (Check whether these test runs are reproducible by the program you submit.)

Verify whether you are using version 2.2.0 (or version 2.1.2 under Unix) of Gecode/J.

4. Put your answer files into a folder named *Lastname.Firstname* or *Lastname₁.Firstname₁–Lastname₂.Firstname₂*. Do not use any special characters in the folder name. Include only source code files, that is remove any executable files. Textual answers must be in *.pdf* or *.txt* format. Include a *ReadMe.txt* file to explain the purpose of each other file. Comply strictly with any answer filenames imposed by the questions. Make a *.tgz* or *.zip* compressed archive of maximum 1MB from this folder. *Verify whether it decompresses properly, reproducing your folder exactly, and actually corresponds to Assignment 2.*
5. Submit your compressed folder via the Course Manager server (whose clock may differ from yours) by the deadline given above. This deadline is hard and no other method of submission will be accepted, except in cases of force majeure. Late solutions will be penalised by 1 point for each 12h of delay, but solutions that are late by more than 60h will get 0 (zero) points.
6. When working in a team, *each* team member must submit a copy of the same solution. Only one of the submitted solution copies of a team will be graded, so make sure they are identical. The lateness penalty, if any, for a team will be determined by the moment of its *last* submitted solution copy.

Failure to follow the instructions above may result in 0 (zero) points, as we reserve the right to process your solutions automatically.

Question 1: Implementing $\max(x, y) = z$ (6 + 4 = 10 points)

Consider the $\max(x, y) = z$ constraint, which holds if and only if integer decision variable z holds the maximum value of integer decision variables x and y . Perform the following tasks:

- a. Define, in the notation of the course, a propagator for $\max(x, y) = z$ that takes subsumption into account and establishes bounds consistency. Explain your propagator with the help of figures. Under what condition is your propagator idempotent? Exhibit a store where your propagator is not idempotent when that condition is not met. In which situations can your propagator be rewritten into a simpler propagator?
- b. Implement your propagator in Gecode/J. Use the code skeleton at <http://www.it.uu.se/research/group/astra/gecode/Max.java> and just fill in the missing parts (marked by `TO DO` comments) after consulting the tutorial on propagator implementation at <http://www.it.uu.se/research/group/astra/gecode/implProp.pdf>.

Keep in mind the general instructions about programs on the first page.