Fall Semester, 2004 **B.Y. Choueiry**

CSCE 421/821: Foundations of Constraint Processing

Homework 4

Assigned: Friday, October 15, 2004

Due: Monday, November 1st, 2004

Total value: 120 points. Penalty of 20 points for lack clarity and documentation in code. Bonus of 10 points for constructive feedback.

Notes: This homework must be done individually. *If you receive help from anyone, you must clearly acknowledge it.* Always acknowledge sources of information (URL, book, class notes, etc.). Please inform instructor quickly about typos or other errors.

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Implementation of advanced backtrack search mechanisms

The goal of this exercise is to implement 3 advanced backtrack search mechanisms and test it on the test cases of Homework 2.

- Implementing a mechanism for improving the backtracking: BJ or CBJ.
  (Instructor's preference: CBJ) 30 points
- Implementing a mechanism for reducing the effort of consistency checking: BM or FC.
  (Instructor's preference: FC) 30 points
- Implementing the hybrid of the above two mechanisms.
  (Instructor's preference: FC-CBJ) 30 points

- Reporting the results obtained from solving the four examples of homework 2 — 30 points
- Your impressions. — **Bonus:** 10 points

General indications:

- *Please make sure that you keep your code and protect your files.* Your name, date, and course number must appear in each file of code that you submit.
- All programs must be compiled, run and tested on `cse.unl.edu`. Programs that do not run correctly in this environment will not be accepted.
- You must submit a README file so that we know to run and test your code.

1 Advanced BT search mechanisms

Taking the ordering heuristic (i.e., LD, degree, and ddr) and the ordering strategy (i.e., static and dynamic) as parameters:

1. Implement a mechanism for improving the backtracking: BJ or CBJ. (Instructor's preference: CBJ)
2. Implement a mechanism for reducing the effort of consistency checking: BM or FC. (Instructor's preference: FC)
3. Implement the hybrid of the above two mechanisms. (Instructor's preference: FC-CBJ)

2 Performance comparison

For the following working conditions:

- For one variable ordering heuristic (i.e., choosing one from LD, degree, and ddr)
- under *both* static and dynamic ordering, and
- searching for both *one* and *all* solutions,

Conduct the following tasks:

- Evaluate the the four search strategies implemented so far (i.e., the above 3 plus BT of Homework 3) in terms of #CC, #NV, and CPU time,
- compare their performance,
- and conclude with your observations.

Hint: verify Prosser's conclusions and that of Kondrak and van Beek's. Do these conclusions hold under dynamic orderings?

3 Your impressions

Tell us whether you find the set of Homework 2, Homework 3, and Homework 4 useful or not and how they can possibly be improved.