Assignment: Using ASP in Practice for Solving CSP Problems
Fall 2013, CSCI 4450/8456, Intro to AI

ASP for solving CSP

1. (20 points) Formulate the following problem in ASP. In other words, write an ASP program in the language of CLINGO\(^1\) so that the answer sets of this program correspond to solutions of the problem below. Consult *A User’s Guide to gringo, clingo, and iclingo*, by Gebser et al. available at http://potassco.sourceforge.net for details of the language.

**Problem statement:** You are asked to determine the layout of a new, small college. The campus will have four structures: an administration structure (A), a bus stop (B), a classroom (C), and a dormitory (D). Each structure (including the bus stop) must be placed somewhere on the grid shown below.

![Grid](image)

Obviously, the domain of each variable A, B, C, D consists of six values: (1,1); (1,2); (1,3); (2,1); (2,2); (2,3). The layout must satisfy the following constraints:

i. The bus stop (B) must be adjacent to the road.

ii. The administration structure (A) and the classroom (C) must both be adjacent to the bus stop (B).

iii. The classroom (C) must be adjacent to the dormitory (D).

iv. The administration structure (A) must not be adjacent to the dormitory (D).

v. The administration structure (A) must not be on a hill.

vi. The dormitory (D) must be on a hill or adjacent to the road.

vii. All structures must be in different grid squares.

Here, adjacent means that the structures must share a grid edge, not just a corner.

**Answer sets format:** Use predicate *place* to encode your solution. For example, if an answer set to your program contains atoms

\[
\text{place}(a, 1, 1) \quad \text{place}(b, 1, 2) \quad \text{place}(c, 1, 3) \quad \text{place}(d, 2, 1)
\]

then we interpret it as follows: variable administration structure (A) is assigned a value (1,1), variable bus stop (B) is assigned a value (1,2), and so on.

\(^1\)http://potassco.sourceforge.net/.
Use `#show` and `#hide` constructs of the CLINGO language to ensure that the output of your program contains only `place` predicates and nothing else.

**Submission instructions:** Bring to class on the 30th of October

- listing of your program
- output produced by CLINGO. Instruct CLINGO to find all solutions to the problem: use command

```
clingo name_of_your_program 0
```

Also create a folder called AIFALL2013 in your linux-lab account and place a file named place.lp containing the code of your program into it.