Q5: CSPs: CS188x Offices

Problem 5: CSPs: CS188x Offices

You are tasked with designing a CSP that will assign CS188x staff members to offices in a satisfactory way.

The building has six offices (shown in figure below), labeled 1 through 6, with six occupants:

- Arjun (A)
- Ziang (X)
- Pieter (P)
- Dan (D)
- Ketrina (K)
- Zack (Z)

Offices can be *next to* one another, if they share a wall (for instance, Offices 1 & 6). Offices can also be *across* from one another (specifically, Offices 1 & 4, 2 & 5, 3 & 6).

The Robot is directly accessible from offices 1 and 6. The Golden Gate Bridge is visible from offices 3 and 4. There are two "halves" of the building—South (Offices 1-3) and North (Offices 4-6).

The following is a floorplan of the building, along with a list of constraints to be satisfied.

i. (A)rjun wants a view of the Golden Gate Bridge.

ii. (K)etrina's office must not be across from (X) Ziang's office.

iii. (P)ieter must have direct access to the robot.

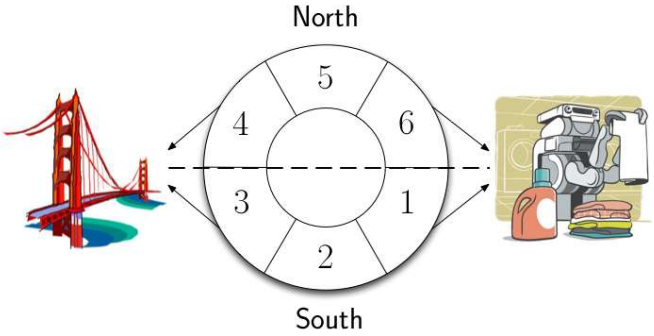
iv. (Z)ack must be next to (D)an.

v. (D)an must be across from (K)etrina's office.

vi. (P)ieter and (A)rjun cannot be next to one another.

vii. (P)ieter and (D)an must be on opposite sides of the building (if one is on the North side, the other must be on the South side).

viii. No two people may occupy the same office.



We recommend you work out the solutions to the following questions on a sheet of scratch paper, and then enter your results below.

Hide Constraints

Part 1: Constraints

Part 1.1

0.0/1.0 point (ungraded)

Which of the above constraints are unary? Check all that apply.

- [x] i
- [ ] ii
- [x] iii
- [ ] iv

- [ ] v
- [ ] vi
- [ ] vii
- [ ] viii

Submit You have used 0 of 1 attempt

Part 1.2

0.0/1.0 point (ungraded)

In the binary constraint graph for this CSP, how many edges are there? Assume that only one edge is allowed between each pair of nodes.

- [ ] 6
- [x] 15 ✔
- [ ] 20
- [ ] 30
- [ ] 36
- [ ] 64

Submit You have used 0 of 1 attempt

Answers are displayed within the problem

Part 1.3

0.0/1.0 point (ungraded)
Select all values for P that satisfy constraint iii.

- [x] 1 ✔
- [ ] 2
- [ ] 3
- [ ] 4
- [ ] 5
- [x] 6 ✔

Submit You have used 0 of 1 attempt

Answers are displayed within the problem

Part 2: Domain Filtering

Part 2.1

0.0/2.0 points (ungraded)
The table below shows the variable domains after unary constraints have been enforced and the value 1 has been assigned to the variable P (Pieter has been assigned Office 1).

A			3	4		

X	1	2	3	4	5	6
P	1					
D	1	2	3	4	5	6
K	1	2	3	4	5	6
Z	1	2	3	4	5	6

Check all values that remain in the variable domains after running Forward Checking with the above assignment.

A

- [x] 3
- [x] 4

X

- [ ] 1
- [x] 2
- [x] 3
- [x] 4
- [x] 5
- [x] 6

P

- [x] 1

D

- [ ] 1
- [ ] 2
- [ ] 3
- [x] 4
- [x] 5

K

- [ ] 1
- [x] 2
- [x] 3
- [x] 4
- [x] 5

Z

- [ ] 1
- [x] 2
- [x] 3
- [x] 4
- [x] 5

- [x] 6
- [x] 6
- [x] 6

Submit

You have used 0 of 2 attempts

Part 2.2

0.0/4.0 points (ungraded)

The table below shows the variable domains after unary constraints have been enforced, the value 1 has been assigned to the variable P, and the value 3 has been assigned to variable K.

A			3	4		
X	1	2	3	4	5	6
P	1					
D	1	2	3	4	5	6
K			3			
Z	1	2	3	4	5	6

Check all values that remain in the variable domains after enforcing arc consistency with the above assignments. (Remember that all values eliminated by forward checking will also be eliminated by enforcing arc consistency.)

A

- [ ] 3
- [x] 4 ✔

X

- [ ] 1
- [x] 2 ✔
- [ ] 3
- [ ] 4
- [ ] 5
- [ ] 6

P

- [x] 1 ✔

D	K	Z
☐ 1	☑ 3 ✔	☐ 1
☐ 2		☐ 2
☐ 3		☐ 3
☐ 4		☐ 4
☐ 5		☑ 5 ✔
☑ 6 ✔		☐ 6

Submit You have used 0 of 2 attempts

Answers are displayed within the problem