

## [Solution for DMCommunity June-2023 Challenge “Miss Manners”](#)

### Problem Definition

Miss Manners is throwing a party and being a good host, she wants to arrange good seating. She wants to seat the guests in boy-girl-boy-girl arrangement so that each guest will have someone on the left or right that has a common hobby. Help Miss Manners to do it for parties with 16, 32, 64, and 128 guests described in the Excel file available from [here](#).

### Problem Representation with [Java Solver](#)

```
package miss.manners;

import javax.constraints.*;
import com.jayasolver.JavaSolver;
import com.openrules.operators.PrimitiveArrayOperators;

public class OptimizationProblem extends JavaSolver {

    Party party;
    Guest[] guests;
    Var[] seatVars;

    public OptimizationProblem(Party party) {
        this.party = party;
        guests = party.getGuests();
    }
}
```

```

public void define() {
    try {
        seatVars = new Var[guests.length];
        for (int i = 0; i < guests.length; i++) {
            seatVars[i] = csp.variable("guest-" + guests[i].getName(), 0, guests.length - 1);
        }

        for (int i = 0; i < guests.length; i++) {
            for (int j = 0; j < guests.length; j++) {
                Var var1 = seatVars[i];
                if (j != i) {
                    Var var2 = seatVars[j];
                    boolean compatible = true;
                    // Check genders
                    if (guests[i].getGender().equals(guests[j].getGender())) {
                        compatible = false;
                    } else {
                        // Check hobbies
                        int[] hobbies1 = guests[i].getHobbies();
                        int[] hobbies2 = guests[j].getHobbies();
                        if (!PrimitiveArrayOperators.intersect(hobbies1, hobbies2)) {
                            compatible = false;
                        }
                    }
                    if (compatible == false) { // post incompatibility constraints
                        csp.postIfThen(csp.linear(var1, "=", 0), csp.linear(var2, "!=", 1));
                        csp.postIfThen(csp.linear(var1, ">", 0), csp.linear(var2, "!=", var1.minus(1)));
                        csp.postIfThen(csp.linear(var1, "=", guests.length - 1), csp.linear(var2, "!=", 0));
                        csp.postIfThen(csp.linear(var1, "<", guests.length - 1), csp.linear(var2, "!=", var1.plus(1)));
                    }
                }
            }
        }
        // Post constraint "All guests occupy different seats"
        csp.postAllDiff(seatVars);
    } catch (Exception e) {
        csp.log("Problem is over-constrained");
    }
}

```

```
public Solution solve() {
    Solver solver = csp.getSolver();
    Solution solution = solver.findSolution();
    if (solution == null) {
        csp.log("No Solutions");
    } else {
        for (int i = 0; i < guests.length; i++) {
            Guest guest = guests[i];
            int value = solution.getValue("guest-" + guest.getName());
            guest.setSeat(value + 1);
            System.out.println(guests[i]);
        }
    }
    solver.logStats();
    return solution;
}
}
```

## Execution Results

### Party of 16

Running < MissMannersTest > - OpenRules Decision Manager, Release 9.2.0 (build of 2023-06-14)

Running 'testCases-Test16' defined at testCases (B5:C5)

JSR-331 "Constraint Programming API" Release 2.2.0

JSR-331 Implementation based on Constrainer 5.4.0

Java Solver Release 2.2.0 (build of Dec 19, 2021)

Problem: miss.manners.OptimizationProblem

Guest(name=1,gender=m,hobbies=[2, 1, 3],seat=1)

Guest(name=2,gender=f,hobbies=[2, 1, 3],seat=2)

Guest(name=3,gender=m,hobbies=[3, 2],seat=3)

Guest(name=4,gender=m,hobbies=[3, 2, 1],seat=5)

Guest(name=5,gender=m,hobbies=[2, 1, 3],seat=7)

Guest(name=6,gender=m,hobbies=[2, 3, 1],seat=9)

Guest(name=7,gender=f,hobbies=[1, 2, 3],seat=4)

Guest(name=8,gender=m,hobbies=[3, 1],seat=11)

Guest(name=9,gender=m,hobbies=[2, 3, 1],seat=13)

Guest(name=10,gender=m,hobbies=[3, 2, 1],seat=15)

Guest(name=11,gender=f,hobbies=[1, 3, 2],seat=6)

Guest(name=12,gender=f,hobbies=[3, 1, 2],seat=8)

Guest(name=13,gender=f,hobbies=[2, 3],seat=10)

Guest(name=14,gender=f,hobbies=[1, 2],seat=12)

Guest(name=15,gender=f,hobbies=[2, 3, 1],seat=14)

Guest(name=16,gender=f,hobbies=[2, 3],seat=16)

Execution time: 16 msec

## Party of 32

Running 'testCases-Test32' defined at testCases (B6:C6)

JSR-331 "Constraint Programming API" Release 2.2.0

JSR-331 Implementation based on Constrainer 5.4.0

Java Solver Release 2.2.0 (build of Dec 19, 2021)

Problem: miss.manners.OptimizationProblem

Guest(name=dave,gender=m,hobbies=[1, 3, 2],seat=1)

Guest(name=doug,gender=m,hobbies=[3, 1, 2],seat=3)

Guest(name=jane,gender=f,hobbies=[2, 1],seat=2)

Guest(name=kate,gender=f,hobbies=[3, 1],seat=4)

Guest(name=scott,gender=m,hobbies=[2, 3],seat=5)

Guest(name=sue,gender=f,hobbies=[3, 2],seat=6)

Guest(name=ann,gender=f,hobbies=[2, 1, 3],seat=8)

Guest(name=john,gender=m,hobbies=[1, 2],seat=7)

Guest(name=chuck,gender=m,hobbies=[1, 3],seat=9)

Guest(name=hope,gender=f,hobbies=[2, 1, 3],seat=10)

Guest(name=jill,gender=f,hobbies=[1, 2],seat=12)

Guest(name=dan,gender=m,hobbies=[2, 3],seat=11)

Guest(name=carol,gender=f,hobbies=[2, 1, 3],seat=14)

Guest(name=alex,gender=m,hobbies=[1, 3],seat=13)

Guest(name=pam,gender=f,hobbies=[1, 3],seat=16)

Guest(name=tim,gender=m,hobbies=[3, 1],seat=15)

Guest(name=d,gender=m,hobbies=[1, 3, 2],seat=17)

Guest(name=e,gender=m,hobbies=[3, 1, 2],seat=19)

Guest(name=f,gender=f,hobbies=[2, 1],seat=18)

Guest(name=g,gender=f,hobbies=[3, 1],seat=20)

Guest(name=h,gender=m,hobbies=[2, 3],seat=21)

Guest(name=i,gender=f,hobbies=[3, 2],seat=22)

Guest(name=j,gender=f,hobbies=[2, 1, 3],seat=24)

Guest(name=k,gender=m,hobbies=[1, 2],seat=23)

Guest(name=l,gender=m,hobbies=[1, 3],seat=25)

Guest(name=m,gender=f,hobbies=[2, 1, 3],seat=26)

Guest(name=n,gender=f,hobbies=[1, 2],seat=28)

Guest(name=o,gender=m,hobbies=[2, 3],seat=27)

Guest(name=p,gender=f,hobbies=[2, 1, 3],seat=30)

Guest(name=q,gender=m,hobbies=[1, 3],seat=29)

Guest(name=r,gender=f,hobbies=[1, 3],seat=32)

Guest(name=s,gender=m,hobbies=[3, 1],seat=31)

Execution time: 26 msec

## Party of 64

Running 'testCases-Test64' defined at testCases (B7:C7)

JSR-331 "Constraint Programming API" Release 2.2.0

JSR-331 Implementation based on Constrainer 5.4.0

Java Solver Release 2.2.0 (build of Dec 19, 2021)

Problem: miss.manners.OptimizationProblem

Guest(name=1,gender=m,hobbies=[2, 1, 3],seat=1)

Guest(name=2,gender=f,hobbies=[2, 1, 3],seat=2)

Guest(name=3,gender=m,hobbies=[3, 2],seat=3)

Guest(name=4,gender=m,hobbies=[3, 2, 1],seat=5)

Guest(name=5,gender=m,hobbies=[2, 1, 3],seat=7)

Guest(name=6,gender=m,hobbies=[2, 3, 1],seat=9)

Guest(name=7,gender=f,hobbies=[1, 2, 3],seat=4)

Guest(name=8,gender=m,hobbies=[3, 1],seat=11)

Guest(name=9,gender=m,hobbies=[2, 3, 1],seat=13)

Guest(name=10,gender=m,hobbies=[3, 2, 1],seat=15)

Guest(name=11,gender=m,hobbies=[1, 3, 2],seat=17)

Guest(name=12,gender=f,hobbies=[3, 1, 2],seat=6)

Guest(name=13,gender=m,hobbies=[2, 3],seat=19)

Guest(name=14,gender=m,hobbies=[1, 2],seat=21)

Guest(name=15,gender=m,hobbies=[2, 3, 1],seat=23)

Guest(name=16,gender=f,hobbies=[2, 3],seat=8)

Guest(name=17,gender=f,hobbies=[3, 2],seat=10)

Guest(name=18,gender=m,hobbies=[1, 3, 2],seat=25)

Guest(name=19,gender=f,hobbies=[3, 1],seat=12)

Guest(name=20,gender=f,hobbies=[1, 3, 2],seat=14)

Guest(name=21,gender=m,hobbies=[2, 3],seat=27)

Guest(name=22,gender=m,hobbies=[2, 3],seat=29)

Guest(name=23,gender=f,hobbies=[1, 2],seat=16)

Guest(name=24,gender=f,hobbies=[3, 1, 2],seat=18)

Guest(name=25,gender=f,hobbies=[3, 1, 2],seat=20)

Guest(name=26,gender=m,hobbies=[2, 1, 3],seat=31)

Guest(name=27,gender=f,hobbies=[2, 3, 1],seat=22)

Guest(name=28,gender=m,hobbies=[1, 2],seat=33)

Guest(name=29,gender=f,hobbies=[2, 3, 1],seat=24)

Guest(name=30,gender=f,hobbies=[2, 1, 3],seat=26)

Guest(name=31,gender=m,hobbies=[1, 2, 3],seat=35)  
Guest(name=32,gender=m,hobbies=[1, 2],seat=37)  
Guest(name=33,gender=m,hobbies=[2, 3, 1],seat=39)  
Guest(name=34,gender=f,hobbies=[2, 1, 3],seat=28)  
Guest(name=35,gender=f,hobbies=[2, 3],seat=30)  
Guest(name=36,gender=m,hobbies=[2, 1],seat=41)  
Guest(name=37,gender=m,hobbies=[2, 1],seat=43)  
Guest(name=38,gender=f,hobbies=[1, 3, 2],seat=32)  
Guest(name=39,gender=m,hobbies=[3, 1, 2],seat=45)  
Guest(name=40,gender=f,hobbies=[1, 2, 3],seat=34)  
Guest(name=41,gender=m,hobbies=[2, 1, 3],seat=47)  
Guest(name=42,gender=m,hobbies=[3, 1],seat=49)  
Guest(name=43,gender=m,hobbies=[1, 3, 2],seat=51)  
Guest(name=44,gender=m,hobbies=[3, 1, 2],seat=53)  
Guest(name=45,gender=m,hobbies=[1, 2],seat=55)  
Guest(name=46,gender=f,hobbies=[1, 2, 3],seat=36)  
Guest(name=47,gender=m,hobbies=[1, 2],seat=57)  
Guest(name=48,gender=f,hobbies=[3, 2],seat=38)  
Guest(name=49,gender=m,hobbies=[3, 2],seat=59)  
Guest(name=50,gender=m,hobbies=[2, 3],seat=61)  
Guest(name=51,gender=f,hobbies=[2, 1, 3],seat=40)  
Guest(name=52,gender=m,hobbies=[1, 2, 3],seat=63)  
Guest(name=53,gender=f,hobbies=[2, 1],seat=42)  
Guest(name=54,gender=f,hobbies=[1, 2, 3],seat=44)  
Guest(name=55,gender=f,hobbies=[1, 2, 3],seat=46)  
Guest(name=56,gender=f,hobbies=[2, 1, 3],seat=48)  
Guest(name=57,gender=f,hobbies=[3, 2, 1],seat=50)  
Guest(name=58,gender=f,hobbies=[3, 1, 2],seat=52)  
Guest(name=59,gender=f,hobbies=[1, 2, 3],seat=54)  
Guest(name=60,gender=f,hobbies=[3, 1],seat=56)  
Guest(name=61,gender=f,hobbies=[3, 2, 1],seat=58)  
Guest(name=62,gender=f,hobbies=[2, 3],seat=60)  
Guest(name=63,gender=f,hobbies=[3, 1, 2],seat=62)  
Guest(name=64,gender=f,hobbies=[3, 2],seat=64)

Execution time: 69 msec



## Party of 128

Running 'testCases-Test128' defined at testCases (B8:C8)

JSR-331 "Constraint Programming API" Release 2.2.0

JSR-331 Implementation based on Constrainer 5.4.0

Java Solver Release 2.2.0 (build of Dec 19, 2021)

Problem: miss.manners.OptimizationProblem

Guest(name=1,gender=m,hobbies=[2, 3, 1, 4, 5],seat=1)

Guest(name=2,gender=f,hobbies=[3, 2, 1, 4, 5],seat=2)

Guest(name=3,gender=f,hobbies=[5, 4, 2],seat=4)

Guest(name=4,gender=m,hobbies=[3, 2, 1, 4],seat=3)

Guest(name=5,gender=m,hobbies=[2, 5, 3],seat=5)

Guest(name=6,gender=f,hobbies=[1, 4, 2, 5, 3],seat=6)

Guest(name=7,gender=f,hobbies=[1, 2, 3, 5],seat=8)

Guest(name=8,gender=m,hobbies=[3, 5],seat=7)

Guest(name=9,gender=m,hobbies=[3, 5, 2, 4],seat=9)

Guest(name=10,gender=m,hobbies=[2, 3, 4, 5, 1],seat=11)

Guest(name=11,gender=m,hobbies=[2, 4, 5, 1],seat=13)

Guest(name=12,gender=f,hobbies=[3, 5, 2],seat=10)

Guest(name=13,gender=f,hobbies=[5, 1],seat=12)

Guest(name=14,gender=m,hobbies=[3, 5, 1, 4],seat=15)

Guest(name=15,gender=m,hobbies=[5, 2, 1, 3, 4],seat=17)

Guest(name=16,gender=m,hobbies=[2, 5, 4],seat=19)

Guest(name=17,gender=m,hobbies=[4, 3],seat=21)

Guest(name=18,gender=f,hobbies=[2, 4, 5, 1],seat=14)

Guest(name=19,gender=m,hobbies=[5, 2],seat=23)

Guest(name=20,gender=m,hobbies=[2, 3],seat=25)

Guest(name=21,gender=m,hobbies=[4, 3, 2, 1],seat=27)

Guest(name=22,gender=m,hobbies=[1, 2, 4],seat=29)

Guest(name=23,gender=f,hobbies=[4, 5, 2],seat=16)

Guest(name=24,gender=f,hobbies=[4, 3, 2, 1, 5],seat=18)

Guest(name=25,gender=m,hobbies=[4, 5],seat=31)

Guest(name=26,gender=m,hobbies=[1, 2],seat=33)

Guest(name=27,gender=m,hobbies=[3, 5, 2],seat=35)

Guest(name=28,gender=f,hobbies=[4, 1, 3, 2, 5],seat=20)

Guest(name=29,gender=f,hobbies=[3, 5],seat=22)

Guest(name=30,gender=m,hobbies=[2, 1],seat=37)

Guest(name=31,gender=m,hobbies=[3, 1, 4],seat=39)  
Guest(name=32,gender=f,hobbies=[2, 1, 5],seat=24)  
Guest(name=33,gender=f,hobbies=[5, 4],seat=28)  
Guest(name=34,gender=m,hobbies=[4, 5, 2],seat=41)  
Guest(name=35,gender=f,hobbies=[3, 1, 4, 5, 2],seat=26)  
Guest(name=36,gender=m,hobbies=[1, 4, 2, 3],seat=43)  
Guest(name=37,gender=f,hobbies=[4, 2, 1],seat=30)  
Guest(name=38,gender=f,hobbies=[3, 1, 2, 4],seat=32)  
Guest(name=39,gender=m,hobbies=[5, 2],seat=45)  
Guest(name=40,gender=m,hobbies=[2, 3],seat=47)  
Guest(name=41,gender=f,hobbies=[5, 3],seat=40)  
Guest(name=42,gender=m,hobbies=[5, 4],seat=49)  
Guest(name=43,gender=m,hobbies=[3, 4, 5],seat=51)  
Guest(name=44,gender=f,hobbies=[2, 4, 3, 1],seat=34)  
Guest(name=45,gender=m,hobbies=[2, 4],seat=53)  
Guest(name=46,gender=m,hobbies=[4, 1, 5],seat=55)  
Guest(name=47,gender=m,hobbies=[2, 5, 4],seat=57)  
Guest(name=48,gender=f,hobbies=[3, 1],seat=36)  
Guest(name=49,gender=m,hobbies=[1, 5, 4, 3, 2],seat=59)  
Guest(name=50,gender=m,hobbies=[2, 4, 3],seat=61)  
Guest(name=51,gender=m,hobbies=[1, 2, 5, 4],seat=63)  
Guest(name=52,gender=f,hobbies=[5, 3, 1, 4],seat=38)  
Guest(name=53,gender=f,hobbies=[5, 1, 4, 2, 3],seat=42)  
Guest(name=54,gender=f,hobbies=[1, 3],seat=60)  
Guest(name=55,gender=m,hobbies=[2, 4],seat=65)  
Guest(name=56,gender=m,hobbies=[2, 3],seat=67)  
Guest(name=57,gender=f,hobbies=[2, 1, 4],seat=44)  
Guest(name=58,gender=m,hobbies=[5, 3, 2, 1, 4],seat=69)  
Guest(name=59,gender=f,hobbies=[2, 3, 5],seat=46)  
Guest(name=60,gender=f,hobbies=[4, 2, 3, 5],seat=48)  
Guest(name=61,gender=m,hobbies=[1, 2, 4, 3],seat=71)  
Guest(name=62,gender=f,hobbies=[3, 2, 5, 4, 1],seat=50)  
Guest(name=63,gender=f,hobbies=[2, 3, 4, 1, 5],seat=52)  
Guest(name=64,gender=f,hobbies=[2, 4, 1, 5, 3],seat=54)  
Guest(name=65,gender=m,hobbies=[5, 3, 2, 1, 4],seat=73)  
Guest(name=66,gender=f,hobbies=[5, 3, 4],seat=56)  
Guest(name=67,gender=f,hobbies=[1, 4],seat=58)  
Guest(name=68,gender=m,hobbies=[4, 2, 1, 5],seat=75)  
Guest(name=69,gender=m,hobbies=[3, 4, 1],seat=77)

Guest(name=70,gender=f,hobbies=[3, 5, 1, 4, 2],seat=62)  
Guest(name=71,gender=m,hobbies=[3, 1, 4],seat=79)  
Guest(name=72,gender=m,hobbies=[4, 3, 1],seat=81)  
Guest(name=73,gender=f,hobbies=[4, 1, 3],seat=64)  
Guest(name=74,gender=f,hobbies=[1, 4, 2, 5, 3],seat=66)  
Guest(name=75,gender=f,hobbies=[4, 2],seat=68)  
Guest(name=76,gender=f,hobbies=[5, 4, 3, 2, 1],seat=70)  
Guest(name=77,gender=m,hobbies=[1, 5],seat=83)  
Guest(name=78,gender=m,hobbies=[5, 1],seat=85)  
Guest(name=79,gender=f,hobbies=[1, 3, 4, 2, 5],seat=72)  
Guest(name=80,gender=m,hobbies=[5, 1, 2, 4],seat=87)  
Guest(name=81,gender=m,hobbies=[4, 1],seat=89)  
Guest(name=82,gender=m,hobbies=[3, 4, 1, 2, 5],seat=91)  
Guest(name=83,gender=f,hobbies=[1, 3, 4],seat=74)  
Guest(name=84,gender=m,hobbies=[3, 4],seat=93)  
Guest(name=85,gender=f,hobbies=[4, 1],seat=76)  
Guest(name=86,gender=m,hobbies=[3, 4],seat=95)  
Guest(name=87,gender=m,hobbies=[5, 4, 2, 3],seat=97)  
Guest(name=88,gender=m,hobbies=[2, 5, 3, 1, 4],seat=99)  
Guest(name=89,gender=f,hobbies=[5, 2, 4, 1],seat=78)  
Guest(name=90,gender=m,hobbies=[2, 4, 5],seat=101)  
Guest(name=91,gender=f,hobbies=[2, 3, 5, 1, 4],seat=80)  
Guest(name=92,gender=f,hobbies=[3, 1, 2, 5],seat=82)  
Guest(name=93,gender=f,hobbies=[3, 1, 2],seat=84)  
Guest(name=94,gender=f,hobbies=[2, 5],seat=86)  
Guest(name=95,gender=f,hobbies=[3, 4],seat=88)  
Guest(name=96,gender=m,hobbies=[1, 4, 2, 5, 3],seat=103)  
Guest(name=97,gender=f,hobbies=[4, 2, 5],seat=90)  
Guest(name=98,gender=m,hobbies=[5, 4],seat=105)  
Guest(name=99,gender=f,hobbies=[2, 5],seat=98)  
Guest(name=100,gender=m,hobbies=[2, 3, 5, 4],seat=107)  
Guest(name=101,gender=f,hobbies=[2, 1, 5, 3, 4],seat=92)  
Guest(name=102,gender=f,hobbies=[2, 1, 5, 3, 4],seat=94)  
Guest(name=103,gender=m,hobbies=[2, 1, 4, 3, 5],seat=109)  
Guest(name=104,gender=m,hobbies=[5, 3, 4, 1, 2],seat=111)  
Guest(name=105,gender=f,hobbies=[4, 2],seat=96)  
Guest(name=106,gender=f,hobbies=[4, 5, 1],seat=100)  
Guest(name=107,gender=f,hobbies=[3, 1, 2, 5, 4],seat=102)  
Guest(name=108,gender=f,hobbies=[4, 5, 1, 2, 3],seat=104)

Guest(name=109,gender=f,hobbies=[1, 2],seat=108)  
Guest(name=110,gender=m,hobbies=[5, 4, 1, 2],seat=113)  
Guest(name=111,gender=f,hobbies=[3, 2],seat=110)  
Guest(name=112,gender=f,hobbies=[4, 3, 5, 2, 1],seat=106)  
Guest(name=113,gender=f,hobbies=[1, 3, 5, 2],seat=112)  
Guest(name=114,gender=m,hobbies=[3, 2],seat=115)  
Guest(name=115,gender=m,hobbies=[2, 1, 5, 4],seat=117)  
Guest(name=116,gender=m,hobbies=[3, 4, 5, 1],seat=119)  
Guest(name=117,gender=f,hobbies=[4, 5, 2],seat=114)  
Guest(name=118,gender=f,hobbies=[2, 4, 3],seat=116)  
Guest(name=119,gender=m,hobbies=[5, 3],seat=121)  
Guest(name=120,gender=m,hobbies=[5, 1, 3, 2, 4],seat=123)  
Guest(name=121,gender=f,hobbies=[4, 2, 3, 5],seat=118)  
Guest(name=122,gender=m,hobbies=[1, 2, 5],seat=125)  
Guest(name=123,gender=m,hobbies=[2, 3, 1, 5],seat=127)  
Guest(name=124,gender=f,hobbies=[2, 3, 4],seat=120)  
Guest(name=125,gender=f,hobbies=[3, 5, 2, 4],seat=122)  
Guest(name=126,gender=f,hobbies=[2, 3, 1, 4],seat=124)  
Guest(name=127,gender=f,hobbies=[5, 1],seat=126)  
Guest(name=128,gender=f,hobbies=[2, 4, 1, 3],seat=128)

Execution time: 348 msec