FIT5216: Modelling Discrete Optimization Problems
Inclass Task 8: RetailRoster

1 Problem Statement

In a retail roster for a set of people `PERSON` we need to assign people to shifts { `opening`, `morning`, `lunch`, `afternoon`, `closing` } for each of seven week days `MON, TUE, WED, THU, FRI, SAT, SUN`. Each person has preferences for each day and shift given by data in the form

```
enum SHIFT = { opening, morning, lunch, afternoon, closing };
enum DAY = { MON, TUE, WED, THU, FRI, SAT, SUN };
enum PERSON;
array[PERSON,DAY,SHIFT] of int: pref;
```

The following constraints apply:

- Each person can take at most two shifts a day
- A person who is `closing` cannot be on `afternoon`.
- A person who is on `morning` cant be on `opening`.
- A person who is on `closing` cant be on `opening`.
- There needs to be at exactly one person on `opening` and `closing`, at least 2 people on `morning` and `lunch` and at least 3 people on `afternoon`
- There needs to be at least 8 people in total assigned to `opening`, `morning` and `lunch`.
- There needs to be at least 8 people in total assigned to `lunch`, `afternoon` and `closing`.
- No person can be assigned a shift ofn a day when their preference for that shift is 0.

Build a MiniZinc model `retailroster.mzn` to find a solution. Use the variable declarations and output:

```
array[PERSON,DAY] of var set of SHIFT: r;
output ["r = array2d(PERSON,DAY,\(r));\n"];
```

Note that you may want to use a different representation for defining the constraints. You may want to just create these variables when a solution is found declaring them as

```
array[PERSON,DAY] of set of SHIFT: r :: output_only = ...
```

where the missing expression `...` calculates the value of this array from your actual representation of the decisions, once they are all fixed!

2 Instructions

Edit the provided `mzn` model files to solve the problems described above. Your implementations can be tested locally by using the *Run* icon in the MiniZinc IDE or by using,

```
minizinc ./modelname.mzn ./datafile.dzn
```

at the command line.