# Homework 11

April 11, 2014

## Instruction

Write the answers to all questions in one text file of the name `hwk11.pl`.

## Prolog programming

In this homework, you will implement Prolog program to generate legal class schedules. Make sure that your program can be loaded into Prolog console and yield the correct output. I have provided a template file with some facts about class rooms, instructors' teaching assignment, the course requirements, and the lists of class starting time and end time.

You should implement the following predicates:

1. Define a predicate legal_time(T) to generate legal time: `between(S, E)` so that
   (a) S is from the list of the legal start time
   (b) E is from the list of the legal end time
   (c) $E - S$ is a legal duration

   Note that legal_time predicate is just a normal predicate that returns true or false except that you can write either legal_time(T) or legal_time(between(11, 12)) in a query. In the former case, you generate T while in the latter case, you verify whether between(11, 12) is legal.

2. Define a predicate legal_schedule(X) that returns true if $X$ is a legal `schedule(C, R, between(S, E))` where
   (a) between(S, E) is a legal time and
   (b) the capacity and media requirements of C are satisfied by R
   (c) the duration of the class is no longer than $E - S$.

Make sure the predicates can be used in the following test cases:

```
 ?- legal_time(X).
X = between(11, 12) ;
X = between(11, 12.5) ;
X = between(14, 15) ;
X = between(14, 15.5) ;
X = between(15, 16) ;
X = between(15, 16.5) ;
false .

?- legal_schedule(schedule(c1, r3, between(9, 10))).
false.

?- legal_schedule(schedule(c1, r3, between(11, 12))).
true .

?- legal_schedule(schedule(c1, r2, between(11, 12))).
false.

?- legal_schedule(schedule(c2, r1, between(11, 12))).
false.

?- legal_schedule(schedule(c2, r1, between(11, 12.5))).
true .

?- gen_schedule(X).
X = [schedule(c1, r3, between(14, 15)), schedule(c2, r1, between(11, 12.5)),
     schedule(c3, r2, between(15, 16.5)), schedule(c4, r1, between(14, 15)),
     schedule(c5, r1, between(15, 16.5)), schedule(c6, r2, between(11, 12.5))] ;

X = [schedule(c1, r3, between(14, 15)), schedule(c2, r1, between(11, 12.5)),
     schedule(c3, r3, between(15, 16.5)), schedule(c4, r1, between(14, 15)),
     schedule(c5, r1, between(15, 16.5)), schedule(c6, r2, between(11, 12.5))] ;
...

?- num_of_schedule(X).
X = 16.
```