

# CSE341 – Programming Languages (Fall 2021)

## Homework #3

**Handed out:** December 27, 2021.

**Due:** 11:55pm January 12, 2022.

**Hand-in Policy:** Source code and documentation should be submitted online as a single .zip or .rar file with naming convention studentid\_lastname\_firstname\_h3.zip via Teams by the submission deadline. No late submissions will be accepted.

**Collaboration Policy:** No collaboration is permitted. Any cheating (copying someone else's work in any form) will result in a grade of -100 for the first offense and -200 for the subsequent attempts.

**Grading:** Each homework will be graded on the scale 100. Unless otherwise noted, the questions/parts will be weighed equal.

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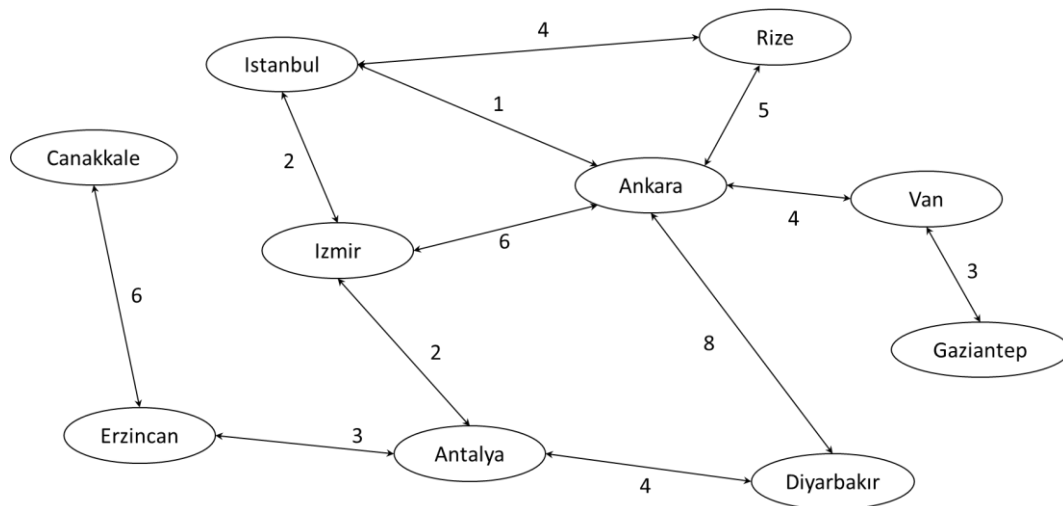
**Part 1.** [50pt] In this part of the homework, you are asked to write a simple expert system in Prolog for scheduling of classes. In your expert system, you will have rooms, courses and people.

- A room has an ID, capacity (how many people it can hold), and operations hours given in one-hour increments from 8am till 5pm. Occupancy information for a room includes the hour and the name of the course taking that hour. A room can also have special equipment such as a projector, a smart board and access for the handicapped.
- A course has an ID, an instructor, capacity, and one or more hours and the room information if they are assigned to a room. A course can have several students enrolled in it. A course can also have special needs such as a projector or a smart board. **Of course, if there is a special needs student enrolled, it should be assigned to a room with proper access for the special needs.**
- An instructor has an ID and several courses taught. The instructor may have preferences for rooms with a projector or smartboard.
- A student has an ID, and list of courses she/he attends. A student can also be handicapped.

Your expert system should be able to add a new student, course or a room to the system. It should respond to queries such as:

- Check whether there is any scheduling conflict.
- Check which room can be assigned to a given class.
- Check which room can be assigned to which classes.
- Check whether a student can be enrolled to a given class.
- Check which classes a student can be assigned.

**Part 2.** In the graph below you see the possible flights between some of the cities in Turkey. Write the predicate "route(X,Y,C) – a route between X and Y exists with cost C" that checks if there is a route between any given two cities.



Your Prolog program should have all the facts and predicates/rules. See the following:

```
% knowledge base
```

```
...
```

```
flight(istanbul,izmir,2). % fact: Istanbul and Izmir has a flight with cost 2.
```

```
...
```

```
% rules
```

```
...
```

```
route(X,Y,C) :- flight(X,Y,C). % a predicate indicating there exist a route between
                                % X and Y if there is flight between X and Y with cost
                                % C.
```

```
...
```

A single query to complete your program should check if there is a direct route between two given cities. Alternatively, it can list all the connected cities for a given city. See the following:

```
?- route(canakkale,X,C).
```

```
X = erzincan, C = 6 ;
```

```
X = antalya, C = 9 ;
```

```
...
```