

CSE341 – Programming Languages (Fall 2023)

Homework #4

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.

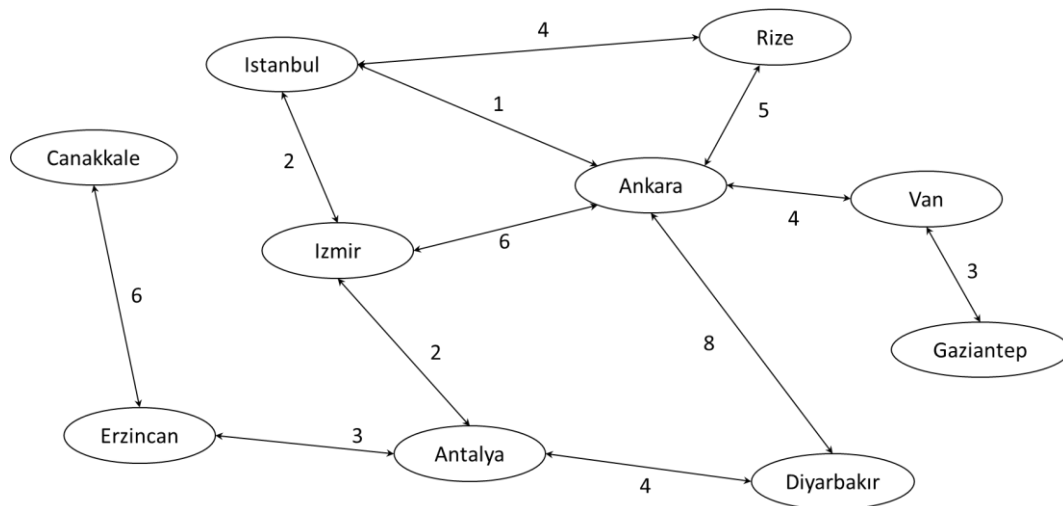
Part 1. [50pt] In this part of the homework, you are asked to write a simple expert system in Prolog for scheduling of classes. In your expert system, you will have rooms, courses, and people.

- A room has an ID, capacity (how many people it can hold), and operations hours given in one-hour increments from 8am until 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 "connection(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.



Add at least two more connections to this graph and build your knowledge base accordingly as described below.

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

`% knowledge base`

`...`

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

`...`

`% rules`

`...`

`connection (X,Y,C) :- schedule(X,Y,C). % 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:

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

`X = erzincan, C = 6 ;`

`X = antalya, C = 9 ;`

`...`