Programming languages (TC-2006)
Midterm Exam - Prolog

Date: November 28, 2020

This exam contains six problems. You are requested to solve all of them. Please note that this time, there is no template for the solution. This is on purpose since you should have the flexibility to solve these problems to best fit your needs. Please note that you must submit only working code. If your code does not run, your final grade will be zero. Then, comment out any piece of code that does not work. However, feel free to include comments to explain your rationale, particularly when the code is commented out because it does not work as requested.

1 chess (10%)

Erik and Charles are more skilled in chess than Logan. Scott is not as good as Charles in chess, but he is better than Erik. Who is the best chess player? Write a program in Prolog that solves this problem.

2 classes (15%)

One student has lost her class schedule and is trying to figure it out. She only remembers some vague ideas:

- There are only three classes (Math, Logic and Programming), given by three different teachers (Mary, Steve and Robert).

- She only has classes on Monday, Wednesday and Friday (one class per day).

- The programming class, taught by Mary, goes after the logic class.

- Robert does not work on Mondays, which is also the day when the logic class does not take place.

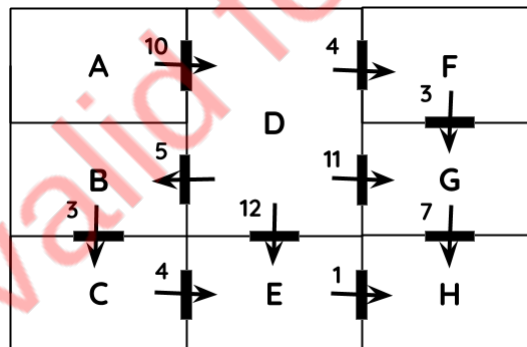Write a program in Prolog that helps the studen to solve this problem.

3 bags (15%)

There are three bags on a table. Each one of these bags is painted with a different color: pink, red and white. We know that inside these bags we can find corn, sorghum or wheat, but we ignore which bag contains each grain. If the bag that contains the corn is not pink and the sorghum is inside the white bag, what is the color of the bag that contains the wheat? Write a program in Prolog to answer this question.

4 `tmnt` (15%)

Regarding the walking distance from home to work, Raphael walks more than Leonardo, and Michelangelo walks more than Donatello but less than Leonardo. Who walks the most to get to work? Write a program in Prolog that solves this problem.

5 `escape` (20%)

While some brilliant scientists were working inside room A from a secret facility, a failure in the artificial intelligence that controls the facility forced all the systems to shut down. Our scientists have at most 25 minutes to get to room H where the extraction team can rescue them. If they fail to reach room H before the 25 minutes, the scientists will be locked inside the facility forever! Unfortunately, because of the failure, all the doors in the facility can open only in one direction, and a security delay mechanism for each door has been activated. Write a program in Prolog that finds a feasible espape route among the different rooms in the facility, in such a way that the scientists can get away before the lock out. For reference, consult the map of the secret facility:

6 `pert` (25%)

Write a program in Prolog that calculates the start and end time of each of the tasks depicted in the following PERT network:
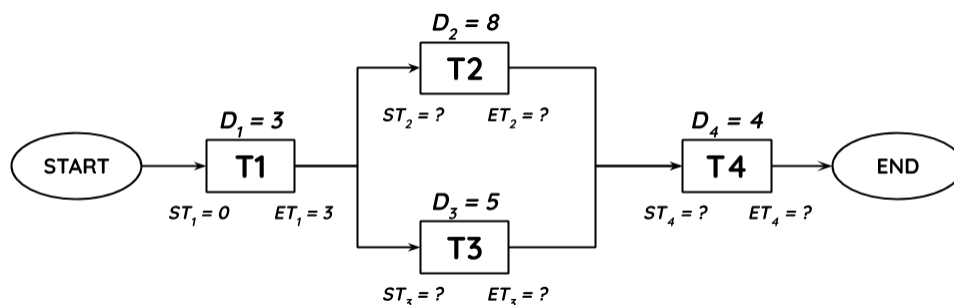
In this network, the first task (T1), starts at time 0 and, since its duration is 3 units of time, it ends at time 3. The second and third tasks, T2 and T3, respectively, must wait for T1 to finish before they can start. The last task can only start once T2 and T3 are finished.

Deliverables

Prepare a PL file that contains the functions requested and submit it to Canvas. **Please, do not submit other formats but PL**.

I promise to apply my knowledge, strive for its development, and not use unauthorized or illegal means to complete this activity, following the Tecnológico de Monterrey Student Code of Honor.