Programming languages (TC-2006)

Midterm Exam - Prolog

Date: 11 June, 2021

This exam contains four 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 fit your needs best. Please note that you must submit only the 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 `candy` (20%)

Sanjev and Susan eat the rest of Jack's sweets, after he had enjoyed 3/8 of them. Susan eats 200% **more** than Sanjev, who only had 15 sweets. How many sweets did Jack eat? **Hint**: Use div to indicate integer division.

2 `ages` (25%)

Once upon a time, there were three children, Bob, Ben, and Tom. If you add together the age of Bob and Ben, you get Tom's age. If you add together the age of Bob and Ben, after having raised both to the power of the children involved in this puzzle, then you still get Tom's age squared. If you add together the age of Bob and Ben, after having squared Bob's age and raising Ben's age to the power of the children involved in this puzzle, you still get Tom's age squared. How old are the three children?

3 `seats` (25%)

The city council is holding a gala, but some of the guests have special needs, so both reception and seating need to be extra-careful. With three available tables (one with 5 seats and two with 6 seats), the city council is looking to avoid interest conflicts by following some constraints:

- The Pharaoh's family (Dad, mom and two children) can't be near the Priest. The family kids are intrigued by the Robot, so they want to be on the same table.
- Demis, Vangelis and Mikis (the Greek) need to be on the same table.
- Wilson and Akerfeldt want to be seated with the Greek, but don't want to be in the same table than Parsons.

- Parsons and Gilmour prefer to be with one another.
- Dickinson, Harris, Dio and Summers—the metal-heads—are easy-going, so they don't have any restriction whatsoever. They just want beer.
- The Priest prefers to be far from the metal-heads and the Robot.

Write a program in Prolog to find any valid seating distribution. For this problem it is suggested that you use variables. **Hint**: Include an additional restriction that considers the sum of all values that variables can take. How many seats are there available for Table 1? Take advantage of the numeric nature of the problem.

4 `spaceship` (30%)

The crew of a derelict spaceship is asleep in the cryo-chambers. In the meantime, the MUL-T robot unit is preparing the uniforms and tools prior to landing, but a complete description of whom uses which tool is not provided. Instead, there are pieces of information scattered through the ship. The information reads:

- The Commando has a shotgun.
- The Engineer wears purple while the Loader prefers yellow.
- The Mercenary has a blue suit.
- Someone uses a white robe and a Kyaro's ring.
- The Huntress wears red and has a bow.
- The crew member with orange clothing holds a shotgun.
- Two tactical turrets are the tools of the crew member who wears purple.
- The katana belongs to the crew member in blue.
- The Artificer uses a Kyaro's ring.
- The crew member with a yellow vest uses a reinforced armor.

Write a program in prolog to generate a full description of the uniforms and tools of all six crew members.

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.