WORKSHOP 8

Prolog

CSX3004 Programming Languages
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ACTIVITY: EXPLORING PARAMETER PASSING TECHNIQUES

Time Limit: 60 minutes

Individual work

TASK 1: BACKTRACKING EXPLORATION

```
likes(alice, salad).
likes(james, pizza).
likes(mary, pizza).
likes(mary, pasta).
likes(peter, salad).
```

1. List all possible answers of the query
   ?- likes(mary, X).
2. Discuss how Prolog use backtracking to find multiple solutions.

TASK 2: DEFINING FACTS AND RULES

1. Model a course prerequisite system in Prolog. For example:
   - CSX3001 is a prerequisite for CSX3002.
   - CSX3001 is a prerequisite for CSX3006.
   - CSX3002 is a prerequisite for CSX3003.
   - CSX3002 is a prerequisite for CSX4107.
   - CSX3003 is a prerequisite for CSX3009.
   - CSX3001 and ITX2007 are prerequisites for CSX4202.
   - CSX3005 is a prerequisite for CSX4306.
   - CSX3006 is a prerequisite for CSX4211.
2. Write rules to determine if one course is an indirect prerequisite of another.
3. Submit your code (task2.pl file)

TASK 3: SUM OF ELEMENTS

Write a Prolog rule sum_list(List, Sum) that computes the sum of all numbers in a list.

Example Queries:

?- sum_list([1,2,3,4], X).

X = 10.

Submit your prolog code (task3.pl).

TASK 4: PATH FINDING

1. Represent a small map as facts:

```
edge(a, b).
edge(b, c).
edge(c, d).
edge(a, d).
```

2. Write a recursive rule path(X, Y) that succeeds if there is a path from X to Y.

Sample Query:

```
?- path(a, c).

true.
```

Submit your prolog code (task4.pl).

TASK 5: LOGIC PUZZLE

There are three houses in a row.

- The red house is left of the green house.
- The person in the red house owns a cat.
- The person in the middle house drinks tea.
- The person in the green house drinks coffee.

Represent these facts in Prolog and write queries to answer the following questions.

- Who owns the cat?
- Who drinks coffee?

Submit your prolog code (task5.pl).