

# CSE 3302/5307 Programming Language Concepts

## Homework 12 - Fall 2024

Due Date: Nov.18, 2024, 11:59p.m. Central Time

### Problem 1 - 40%

```
bigger(elephant, horse).  
bigger(horse, donkey).  
bigger(donkey, dog).  
bigger(donkey, monkey).
```

We try to get familiar with the usage of SWI-Prolog and basic operations in this problem. Feel free to use other tools and follow the same steps.

- Download SWI-Prolog and install (as well as the VSCode extension if needed).
- Consult the file *animals.pl* (shown above) in SWI-Prolog. If there is an error, point out the line in which it occurs and fix it.
- Re-consult the file. Enter the query as follows:

```
?- bigger(elephant, horse).  
?- bigger(elephant, monkey).
```

- Show the result of queries. For the second query, do we have the transitivity of bigger-relation as expected?
- Add rules called *is\_bigger* to make sure the bigger-relation is transitive. An example output:

```
?- is_bigger(elephant, monkey).  
true
```

**Remark:** Submit one PDF report that includes the code and screenshot for the output.

## Problem 2 - 60%

Read about the ELIZA chatbot and find a simple Prolog implementation here. Use comments to explain each rule in the code. Moreover, for each rule, write a unique query that would trigger the rule specifically (seven in total) and show the output. Extend the chatbot system so that it can answer one more type of question.

**Remark:** Submit in the same PDF report as above the commented code and a screenshot for the output that shows (i), the output from invoking each of the seven queries that are meant to uniquely trigger a specific rule (should include the queries in the screenshots) and (ii), three queries for the eliza rule, one for each type of question and show their outputs.