School of Computer Science and Engineering

CZ3005 - Artificial Intelligence

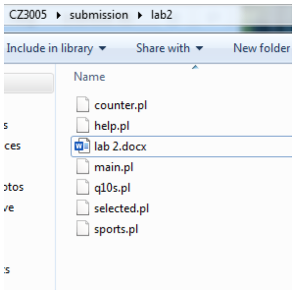
Lab 2 TSP4

Done By:

Ching Jia Chin U1620237E

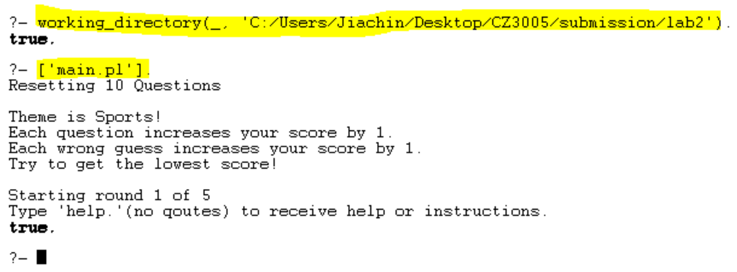
Setup:

1. Add all files, “counter.pl, help.pl, main.pl, q10s.pl, selected.pl and sports.pl”, to a folder.



Files inside lab2 folder

2. Inside Prolog, change working directory to folder.
3. Load main.pl. CMD is “[‘main.pl’].”

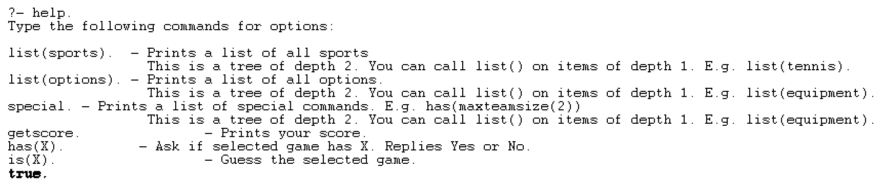


```
?- working_directory(_, 'C:/Users/Jiachin/Desktop/CZ3005/submission/lab2').
true.

?- ['main.pl'].
Resetting 10 Questions

Theme is Sports!
Each question increases your score by 1.
Each wrong guess increases your score by 1.
Try to get the lowest score!

Starting round 1 of 5
Type 'help.'(no qoutes) to receive help or instructions.
true.

?- █
```

Loading main.pl

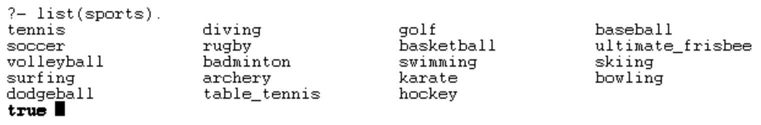
How to play:

1. Type “help.” to see available commands.



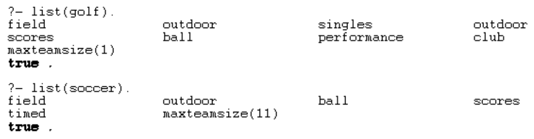
```
?- help.
Type the following commands for options:

list(sports).  - Prints a list of all sports
                 This is a tree of depth 2. You can call list() on items of depth 1. E.g. list(tennis).
list(options). - Prints a list of all options.
                 This is a tree of depth 2. You can call list() on items of depth 1. E.g. list(equipment).
special. - Prints a list of special commands. E.g. has(maxteamsize(2))
                 This is a tree of depth 2. You can call list() on items of depth 1. E.g. list(equipment).
getscore.              - Prints your score.
has(X).         - Ask if selected game has X. Replies Yes or No.
is(X).                 - Guess the selected game.
true.
```

1.1. Type “list(sports).” To see a list of sports.



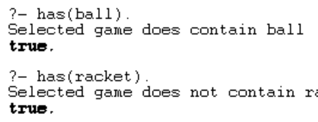
```
?- list(sports).
tennis              diving              golf                baseball
soccer              rugby               basketball          ultimate_frisbee
volleyball          badminton           swimming            skiing
surfing             archery             karate              bowling
dodgeball           table_tennis        hockey
true █
```

1.2. Type “list(soccer)” to see the contents of soccer.



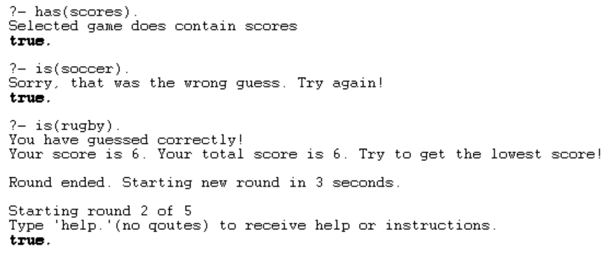
```
?- list(golf).
field               outdoor             singles             outdoor
scores              ball                performance         club
maxteamsize(1)
true .

?- list(soccer).
field               outdoor             ball                scores
timed               maxteamsize(11)
true .
```

2. Use “has(myquestion).” to ask a question.



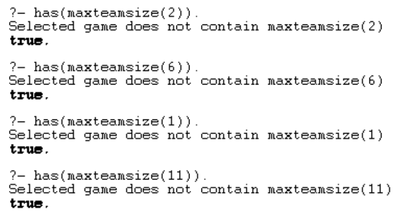
```
?- has(ball).
Selected game does contain ball
true.

?- has(racket).
Selected game does not contain racket
true.
```

3. Use “is(myguess).” to guess the answer.

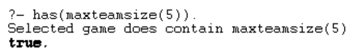


```
?- has(scores).
Selected game does contain scores
true.

?- is(soccer).
Sorry, that was the wrong guess. Try again!
true.

?- is(rugby).
You have guessed correctly!
Your score is 6. Your total score is 6. Try to get the lowest score!

Round ended. Starting new round in 3 seconds.

Starting round 2 of 5
Type 'help.'(no qoutes) to receive help or instructions.
true.
```

3.1. Use “Has(maxteamsize(2))” to ask if game has max team size of a 2.



```
?- has(maxteamsize(2)).
Selected game does not contain maxteamsize(2)
true.

?- has(maxteamsize(6)).
Selected game does not contain maxteamsize(6)
true.

?- has(maxteamsize(1)).
Selected game does not contain maxteamsize(1)
true.

?- has(maxteamsize(11)).
Selected game does not contain maxteamsize(11)
true.
```



```
?- has(maxteamsize(5)).
Selected game does contain maxteamsize(5)
true.
```

How it works:

<u>Counters</u>

Since prolog is a declarative language, it does not have variables. Instead, counters must be implemented in a declarative way. How I implemented counters is by declaring counters as 1 initially. Every time I wish to increment counter, I must increment 1 to 2, retract previous declaration that counter equals 1, and declare counter as 2. This repeats each time increment is called. The other counters such as rounds and scores are implemented the same way.

<u>Has()</u>

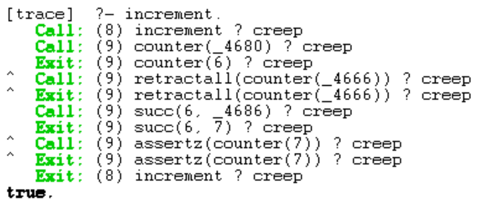
Has(X) was implemented by comparing X with every item in the selected sport. If X matches an item, it will return true. This is done in Prolog by recursively checking every item in a list in sequence. If the end of the list is reached without finding a match, it returns false.

Is()

Is(X) was implemented by comparing X with the selected game. If they are the same, return true.

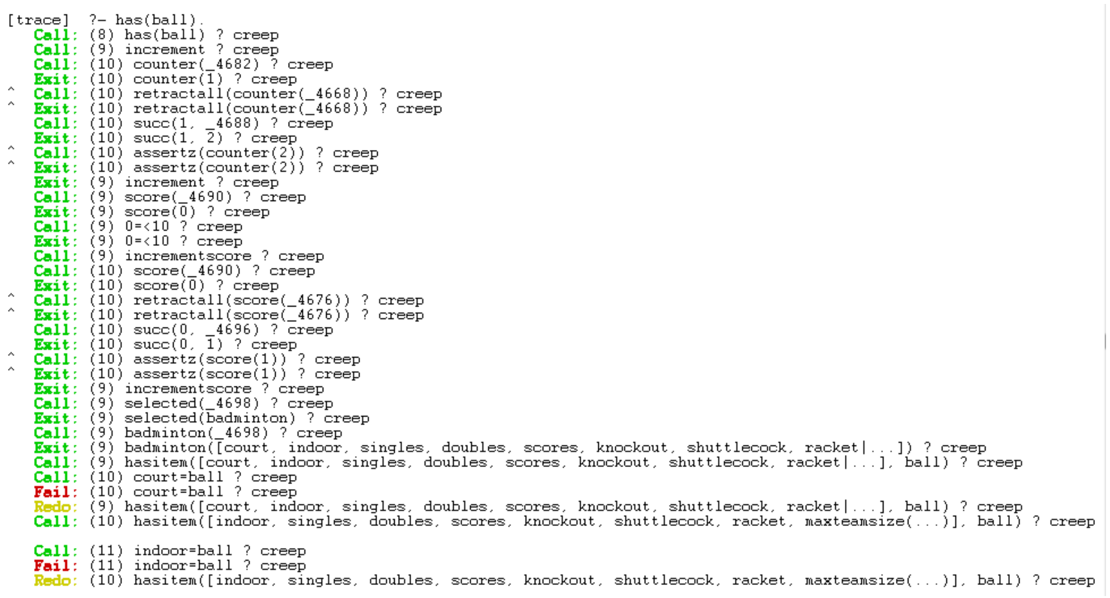
Traces:

<u>Counter()</u>

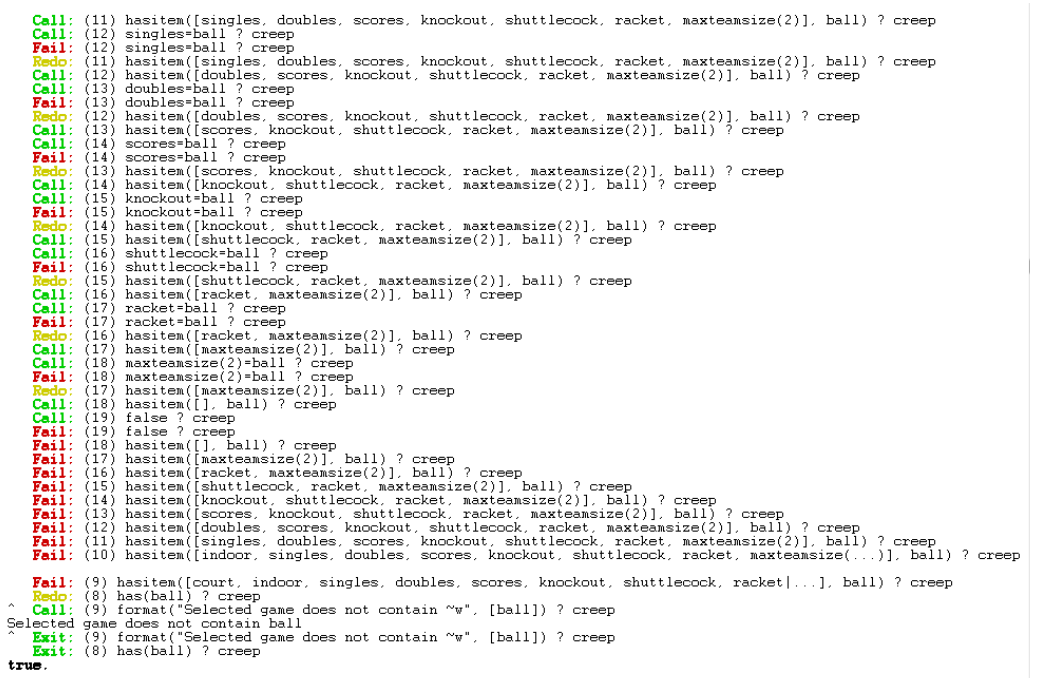


```
[trace]  ?- increment.
   Call: (8) increment ? creep
   Call: (9) counter(_4680) ? creep
   Exit: (9) counter(6) ? creep
^  Call: (9) retractall(counter(_4666)) ? creep
^  Exit: (9) retractall(counter(_4666)) ? creep
   Call: (9) succ(6, _4686) ? creep
   Exit: (9) succ(6, 7) ? creep
^  Call: (9) assertz(counter(7)) ? creep
^  Exit: (9) assertz(counter(7)) ? creep
   Exit: (8) increment ? creep
true.
```

<u>Has()</u>

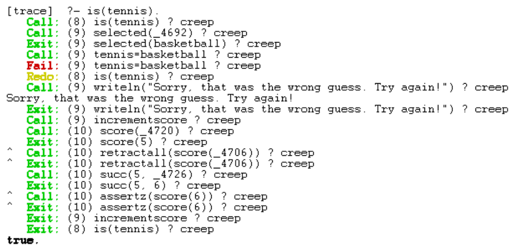


```
[trace]  ?- has(ball).
   Call: (8) has(ball) ? creep
   Call: (9) increment ? creep
   Call: (10) counter(_4682) ? creep
   Exit: (10) counter(1) ? creep
^  Call: (10) retractall(counter(_4668)) ? creep
^  Exit: (10) retractall(counter(_4668)) ? creep
   Call: (10) succ(1, _4688) ? creep
   Exit: (10) succ(1, 2) ? creep
^  Call: (10) assertz(counter(2)) ? creep
^  Exit: (10) assertz(counter(2)) ? creep
   Exit: (9) increment ? creep
   Call: (9) score(_4690) ? creep
   Exit: (9) score(0) ? creep
   Call: (9) 0=<10 ? creep
   Exit: (9) 0=<10 ? creep
   Call: (9) incrementscore ? creep
   Call: (10) score(_4690) ? creep
   Exit: (10) score(0) ? creep
^  Call: (10) retractall(score(_4676)) ? creep
^  Exit: (10) retractall(score(_4676)) ? creep
   Call: (10) succ(0, _4696) ? creep
   Exit: (10) succ(0, 1) ? creep
^  Call: (10) assertz(score(1)) ? creep
^  Exit: (10) assertz(score(1)) ? creep
   Exit: (9) incrementscore ? creep
   Call: (9) selected(_4698) ? creep
   Exit: (9) selected(badminton) ? creep
   Call: (9) badminton(_4698) ? creep
   Exit: (9) badminton([court, indoor, singles, doubles, scores, knockout, shuttlecock, racket|...]) ? creep
   Call: (9) hasitem([court, indoor, singles, doubles, scores, knockout, shuttlecock, racket|...], ball) ? creep
   Call: (10) court=ball ? creep
   Fail: (10) court=ball ? creep
   Redo: (9) hasitem([court, indoor, singles, doubles, scores, knockout, shuttlecock, racket|...], ball) ? creep
   Call: (10) hasitem([indoor, singles, doubles, scores, knockout, shuttlecock, racket, maxteamsize(...)], ball) ? creep

   Call: (11) indoor=ball ? creep
   Fail: (11) indoor=ball ? creep
   Redo: (10) hasitem([indoor, singles, doubles, scores, knockout, shuttlecock, racket, maxteamsize(...)], ball) ? creep
```



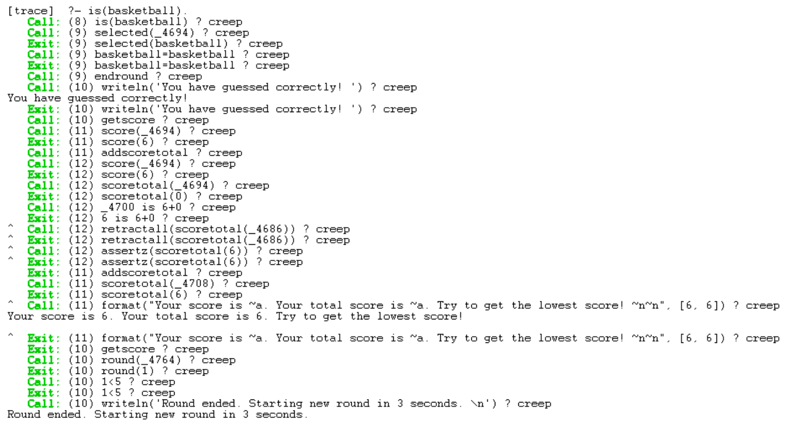
```
   Call: (11) hasitem([singles, doubles, scores, knockout, shuttlecock, racket, maxteamsize(2)], ball) ? creep
   Call: (12) singles=ball ? creep
   Fail: (12) singles=ball ? creep
   Redo: (11) hasitem([singles, doubles, scores, knockout, shuttlecock, racket, maxteamsize(2)], ball) ? creep
   Call: (12) hasitem([doubles, scores, knockout, shuttlecock, racket, maxteamsize(2)], ball) ? creep
   Call: (13) doubles=ball ? creep
   Fail: (13) doubles=ball ? creep
   Redo: (12) hasitem([doubles, scores, knockout, shuttlecock, racket, maxteamsize(2)], ball) ? creep
   Call: (13) hasitem([scores, knockout, shuttlecock, racket, maxteamsize(2)], ball) ? creep
   Call: (14) scores=ball ? creep
   Fail: (14) scores=ball ? creep
   Redo: (13) hasitem([scores, knockout, shuttlecock, racket, maxteamsize(2)], ball) ? creep
   Call: (14) hasitem([knockout, shuttlecock, racket, maxteamsize(2)], ball) ? creep
   Call: (15) knockout=ball ? creep
   Fail: (15) knockout=ball ? creep
   Redo: (14) hasitem([knockout, shuttlecock, racket, maxteamsize(2)], ball) ? creep
   Call: (15) hasitem([shuttlecock, racket, maxteamsize(2)], ball) ? creep
   Call: (16) shuttlecock=ball ? creep
   Fail: (16) shuttlecock=ball ? creep
   Redo: (15) hasitem([shuttlecock, racket, maxteamsize(2)], ball) ? creep
   Call: (16) hasitem([racket, maxteamsize(2)], ball) ? creep
   Call: (17) racket=ball ? creep
   Fail: (17) racket=ball ? creep
   Redo: (16) hasitem([racket, maxteamsize(2)], ball) ? creep
   Call: (17) hasitem([maxteamsize(2)], ball) ? creep
   Call: (18) maxteamsize(2)=ball ? creep
   Fail: (18) maxteamsize(2)=ball ? creep
   Redo: (17) hasitem([maxteamsize(2)], ball) ? creep
   Call: (18) hasitem([], ball) ? creep
   Call: (19) false ? creep
   Fail: (19) false ? creep
   Fail: (18) hasitem([], ball) ? creep
   Fail: (17) hasitem([maxteamsize(2)], ball) ? creep
   Fail: (16) hasitem([racket, maxteamsize(2)], ball) ? creep
   Fail: (15) hasitem([shuttlecock, racket, maxteamsize(2)], ball) ? creep
   Fail: (14) hasitem([knockout, shuttlecock, racket, maxteamsize(2)], ball) ? creep
   Fail: (13) hasitem([scores, knockout, shuttlecock, racket, maxteamsize(2)], ball) ? creep
   Fail: (12) hasitem([doubles, scores, knockout, shuttlecock, racket, maxteamsize(2)], ball) ? creep
   Fail: (11) hasitem([singles, doubles, scores, knockout, shuttlecock, racket, maxteamsize(2)], ball) ? creep
   Fail: (10) hasitem([indoor, singles, doubles, scores, knockout, shuttlecock, racket, maxteamsize(...)], ball) ? creep

   Fail: (9) hasitem([court, indoor, singles, doubles, scores, knockout, shuttlecock, racket|...], ball) ? creep
   Redo: (8) has(ball) ? creep
^  Call: (9) format("Selected game does not contain ~w", [ball]) ? creep
Selected game does not contain ball
^  Exit: (9) format("Selected game does not contain ~w", [ball]) ? creep
   Exit: (8) has(ball) ? creep
true.
```

Is()



```
[trace]  ?- is(tennis).
   Call: (8) is(tennis) ? creep
   Call: (9) selected(_4692) ? creep
   Exit: (9) selected(basketball) ? creep
   Call: (9) tennis=basketball ? creep
   Fail: (9) tennis=basketball ? creep
   Redo: (8) is(tennis) ? creep
   Call: (9) writeln("Sorry, that was the wrong guess. Try again!") ? creep
Sorry, that was the wrong guess. Try again!
   Exit: (9) writeln("Sorry, that was the wrong guess. Try again!") ? creep
   Call: (9) incrementscore ? creep
   Call: (10) score(_4720) ? creep
   Exit: (10) score(5) ? creep
^  Call: (10) retractall(score(_4706)) ? creep
^  Exit: (10) retractall(score(_4706)) ? creep
   Call: (10) succ(5, _4726) ? creep
   Exit: (10) succ(5, 6) ? creep
^  Call: (10) assertz(score(6)) ? creep
^  Exit: (10) assertz(score(6)) ? creep
   Exit: (9) incrementscore ? creep
   Exit: (8) is(tennis) ? creep
true.
```

Failed Is()



```
[trace]  ?- is(basketball).
   Call: (8) is(basketball) ? creep
   Call: (9) selected(_4694) ? creep
   Exit: (9) selected(basketball) ? creep
   Call: (9) basketball=basketball ? creep
   Exit: (9) basketball=basketball ? creep
   Call: (9) endround ? creep
   Call: (10) writeln('You have guessed correctly! ') ? creep
You have guessed correctly!
   Exit: (10) writeln('You have guessed correctly! ') ? creep
   Call: (10) getscore ? creep
   Call: (11) score(_4694) ? creep
   Exit: (11) score(6) ? creep
   Call: (11) addscoretotal ? creep
   Call: (12) score(_4694) ? creep
   Exit: (12) score(6) ? creep
   Call: (12) scoretotal(_4694) ? creep
   Exit: (12) scoretotal(0) ? creep
   Call: (12) _4700 is 6+0 ? creep
   Exit: (12) 6 is 6+0 ? creep
^  Call: (12) retractall(scoretotal(_4686)) ? creep
^  Exit: (12) retractall(scoretotal(_4686)) ? creep
^  Call: (12) assertz(scoretotal(6)) ? creep
^  Exit: (12) assertz(scoretotal(6)) ? creep
   Exit: (11) addscoretotal ? creep
   Call: (11) scoretotal(_4708) ? creep
   Exit: (11) scoretotal(6) ? creep
^  Call: (11) format("Your score is ~a. Your total score is ~a. Try to get the lowest score! ~n~n", [6, 6]) ? creep
Your score is 6. Your total score is 6. Try to get the lowest score!

^  Exit: (11) format("Your score is ~a. Your total score is ~a. Try to get the lowest score! ~n~n", [6, 6]) ? creep
   Exit: (10) getscore ? creep
   Call: (10) round(_4764) ? creep
   Exit: (10) round(1) ? creep
   Call: (10) 1<5 ? creep
   Exit: (10) 1<5 ? creep
   Call: (10) writeln('Round ended. Starting new round in 3 seconds. \n') ? creep
Round ended. Starting new round in 3 seconds.
```

Successful is()