

CS 330 Formal Methods and Models

Assignment 1 - Prolog (Spring 2016)

Professor: Carlotta Domeniconi

Due April 4, 2016 by Midnight

This assignment is governed by the GMU Honor Code. The program you turn in must be your sole work. Team work in **NOT** allowed. Help may be obtained from the instructor and the TA to understand the description of the problem, but the solution must be the student's own work. Any deviation from this is considered a Honor Code violation.

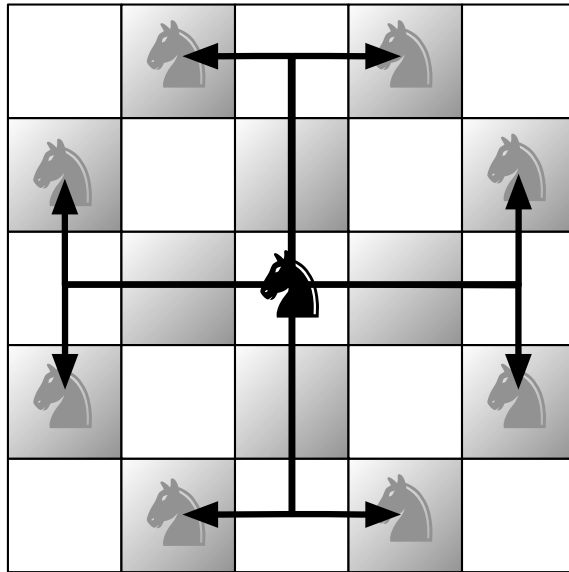


Figure 1: All possible knight jumps from a given starting position.

Problem 1

Let the squares of the chessboard be represented by pairs of their coordinates of the form $[X, Y]$, where both X and Y are between 1 and 8.

(a) Define the relation $jump(Square1, Square2)$ according to the knight jump on the chessboard. Assume that $Square1$ is always instantiated to a square while $Square2$ can be uninstantiated. For example:

?- $jump([1, 1], S)$.

$S = [3, 2];$

$S = [2, 3];$

no

Figure 1 provides all possible knight jumps from a given starting position.

(b) Define the relation $knightpath(Path)$ where $Path$ is a list of squares that represent a legal path of a knight on the empty chessboard.

(c) Using this $knightpath$ relation, write a question to find any knight's path of length 4 moves from square $[2, 1]$ to the opposite edge of the board ($Y = 8$) that goes through square $[5, 4]$ after the second move. Figure 2 provides an example of such a path.

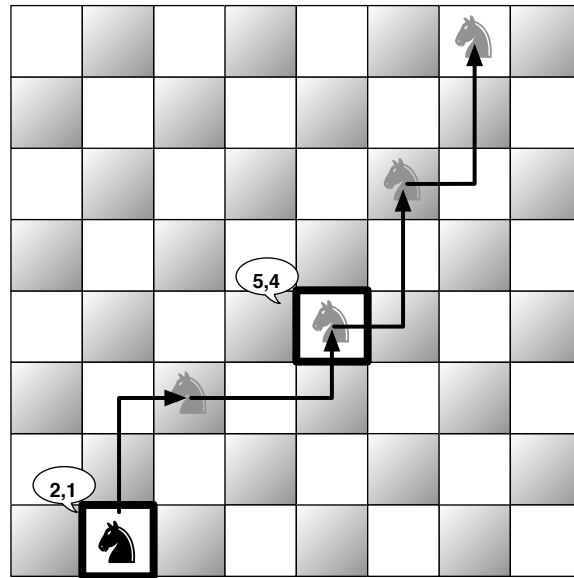


Figure 2: Example of a path of length 4 from square $[2, 1]$ to the opposite edge of the board ($Y = 8$) that goes through square $[5, 4]$ after the second move.

SUBMISSION: PLEASE READ CAREFULLY! Submit two (ascii) files as an attachment to an email to me (carlotta@cs.gmu.edu) and to the TA Xiaosheng Li (xli22@masonlive.gmu.edu). The subject of your email should be: *CS 330 Prolog submission*. The email should be sent from your *mason* account. If you deviate from these instructions you may lose points. The first file should contain your program which will include your rules for questions (a) and (b). The second file should contain the query for question (c) and all corresponding answers. In addition, the second file should contain ten more queries, and corresponding answers. These queries should demonstrate that you tested your program on different cases. Your second file should be readable, containing the queries on separate lines.