

Trabalho de IA (Busy Police)

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Modelagem (objetos)

```
% ladrao  
ladrao([10, 5]).
```

```
% paredes  
paredes(0, 11).
```

```
% tetos  
tetos(0, 6).
```

```
% carrinhos  
carrinho(8, 1).  
carrinho(3, 2).  
carrinho(4, 3).  
carrinho(3, 5).  
carrinho(4, 5).
```

```
% escadas  
escada(2, 1).  
escada(9, 1).  
escada(5, 2).  
escada(3, 3).  
escada(8, 3).  
escada(10, 3).  
escada(1, 4).  
escada(6, 4).
```

Modelagem (“andando para a direita”)

```
s([X, Y], [NX, Y]) :-
```

```
    NX is X + 1,
```

```
    pode_direita(sim, [X, Y]).
```

Modelagem (verificação)

```
pode_pular_direita(nao, [X, Y]) :-
```

```
    D is X + 1, not(carrinho(D, Y)), !;
```

```
    D is X + 2, paredes(_, D), !;
```

```
    D is X + 2, carrinho(D, Y), !;
```

```
    D is X + 2, escada(D, Y), !;
```

```
    D is X + 2, NY is Y - 1, escada(D, NY), !;
```

```
    D is X + 2, ladrao([D, Y]), !.
```

```
pode_pular_direita(sim, [X, Y]) :- not(pode_pular_direita(nao, [X, Y])).
```

Busca em largura

```
busca([[Estado|Caminho]|_], [Estado|Caminho]) :- ladrao(Estado).
```

```
busca([Primeiro|Outros], Solucao) :-
```

```
    estende(Primeiro, Sucessores),
```

```
    concatena(Outros, Sucessores, NovaFronteira),
```

```
    busca(NovaFronteira, Solucao).
```

Busca em largura

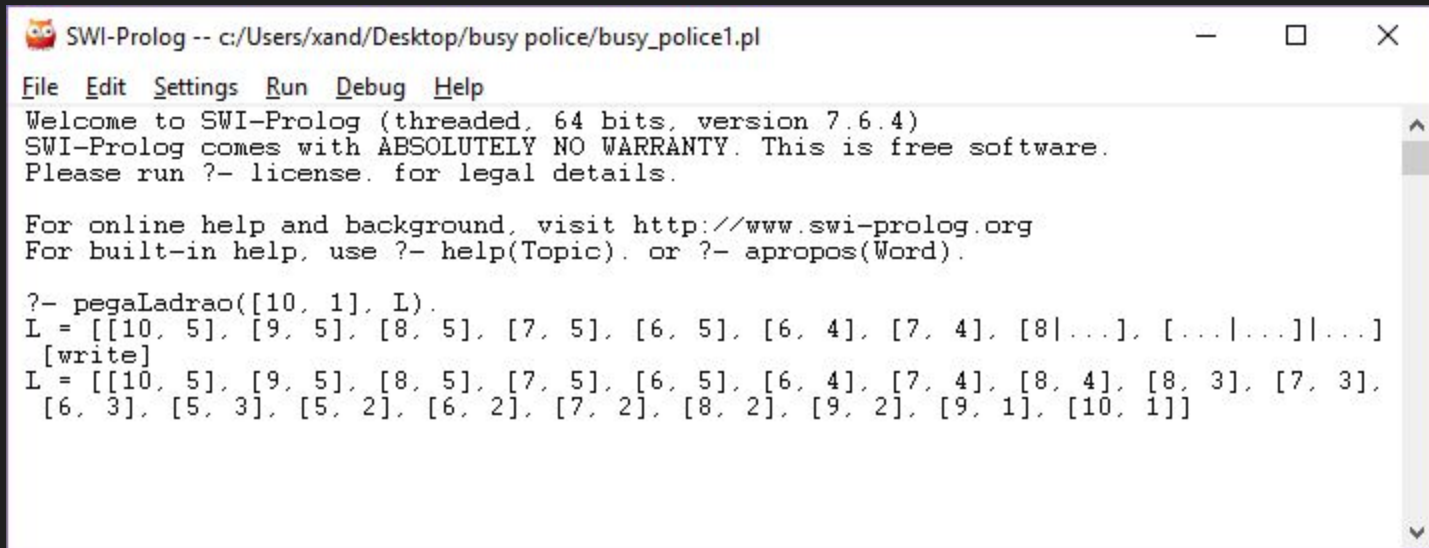
```
estende([Estado|Caminho], ListaSucessores) :-
```

```
bagof([Sucessor, Estado|Caminho],
```

```
(s(Estado, Sucessor), not(pertence(Sucessor, [Estado|Caminho]))),  
ListaSucessores), !.
```

```
estende(_, []).
```

Ambiente 1



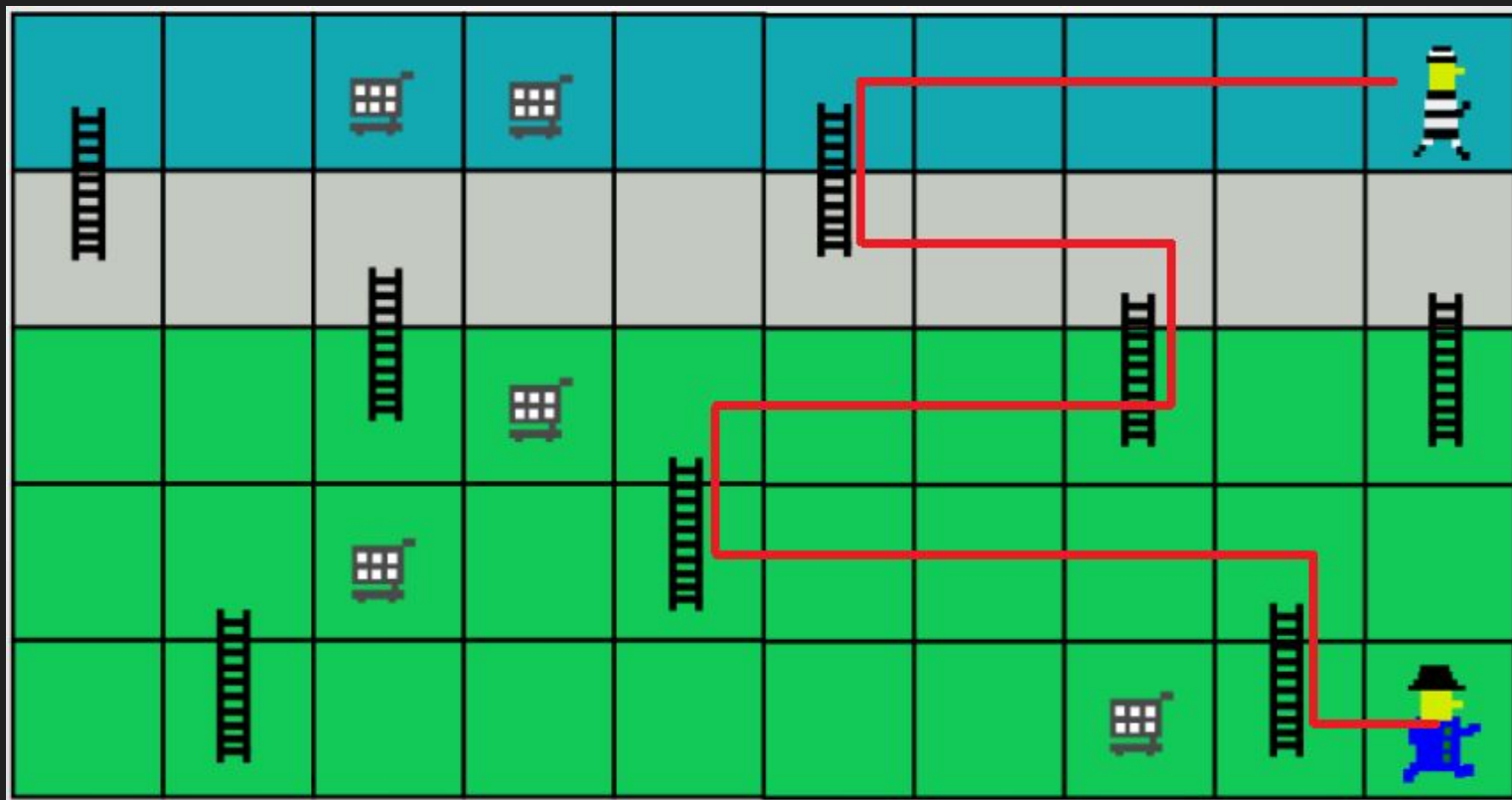
A screenshot of a SWI-Prolog window. The title bar reads "SWI-Prolog -- c:/Users/xand/Desktop/busy police/busy_police1.pl". The menu bar includes "File", "Edit", "Settings", "Run", "Debug", and "Help". The main text area displays the following content:

```
Welcome to SWI-Prolog (threaded, 64 bits, version 7.6.4)
SWI-Prolog comes with ABSOLUTELY NO WARRANTY. This is free software.
Please run ?- license. for legal details.

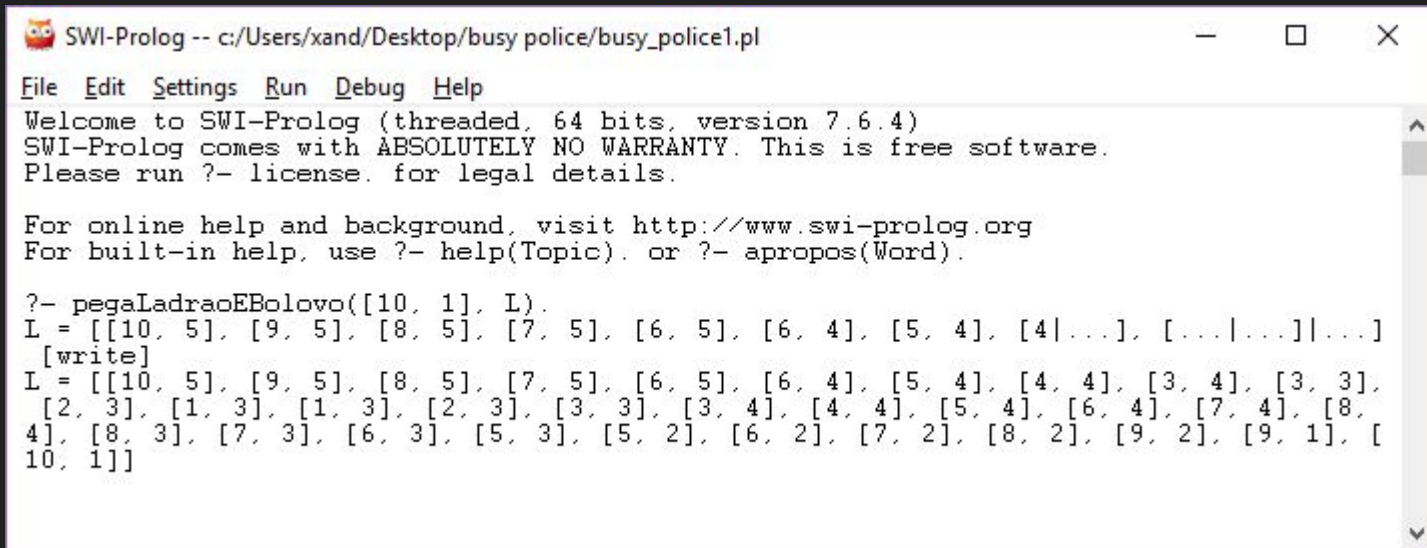
For online help and background, visit http://www.swi-prolog.org
For built-in help, use ?- help(Topic). or ?- apropos(Word).

?- pegaLadrao([10, 1], L).
L = [[10, 5], [9, 5], [8, 5], [7, 5], [6, 5], [6, 4], [7, 4], [8|...], [...|...]|...]
[write]
L = [[10, 5], [9, 5], [8, 5], [7, 5], [6, 5], [6, 4], [7, 4], [8, 4], [8, 3], [7, 3],
[6, 3], [5, 3], [5, 2], [6, 2], [7, 2], [8, 2], [9, 2], [9, 1], [10, 1]]
```

Ambiente 1 (resolvido)



Ambiente 1 Bonus Game



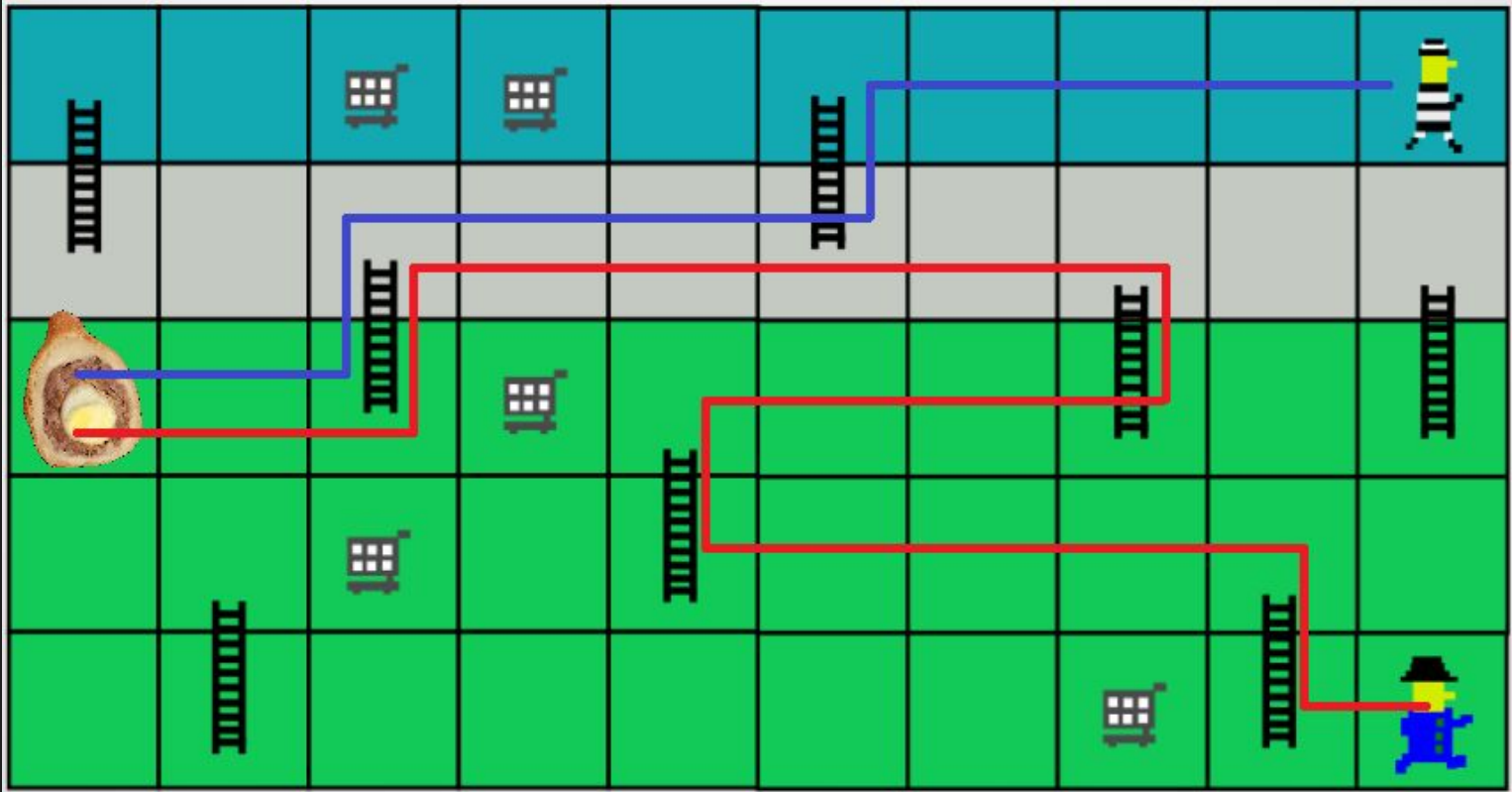
A screenshot of a SWI-Prolog window. The title bar reads "SWI-Prolog -- c:/Users/xand/Desktop/busy police/busy_police1.pl". The menu bar includes "File", "Edit", "Settings", "Run", "Debug", and "Help". The main text area contains the following text:

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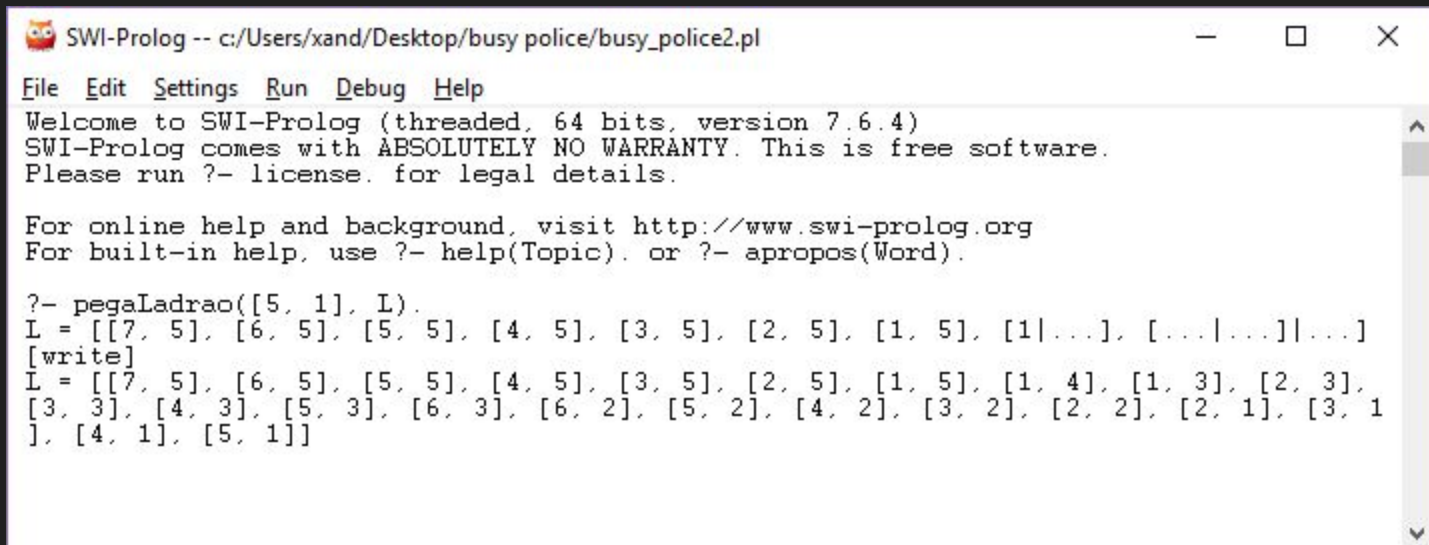
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For built-in help, use ?- help(Topic). or ?- apropos(Word).

?- pegaLadraoEBolovo([10, 1], L).
L = [[10, 5], [9, 5], [8, 5], [7, 5], [6, 5], [6, 4], [5, 4], [4|...], [...|...]|...]
[write]
L = [[10, 5], [9, 5], [8, 5], [7, 5], [6, 5], [6, 4], [5, 4], [4, 4], [3, 4], [3, 3],
[2, 3], [1, 3], [1, 3], [2, 3], [3, 3], [3, 4], [4, 4], [5, 4], [6, 4], [7, 4], [8,
4], [8, 3], [7, 3], [6, 3], [5, 3], [5, 2], [6, 2], [7, 2], [8, 2], [9, 2], [9, 1], [
10, 1]]
```

Ambiente 1 (Bonus Game resuelto)



Ambiente 2

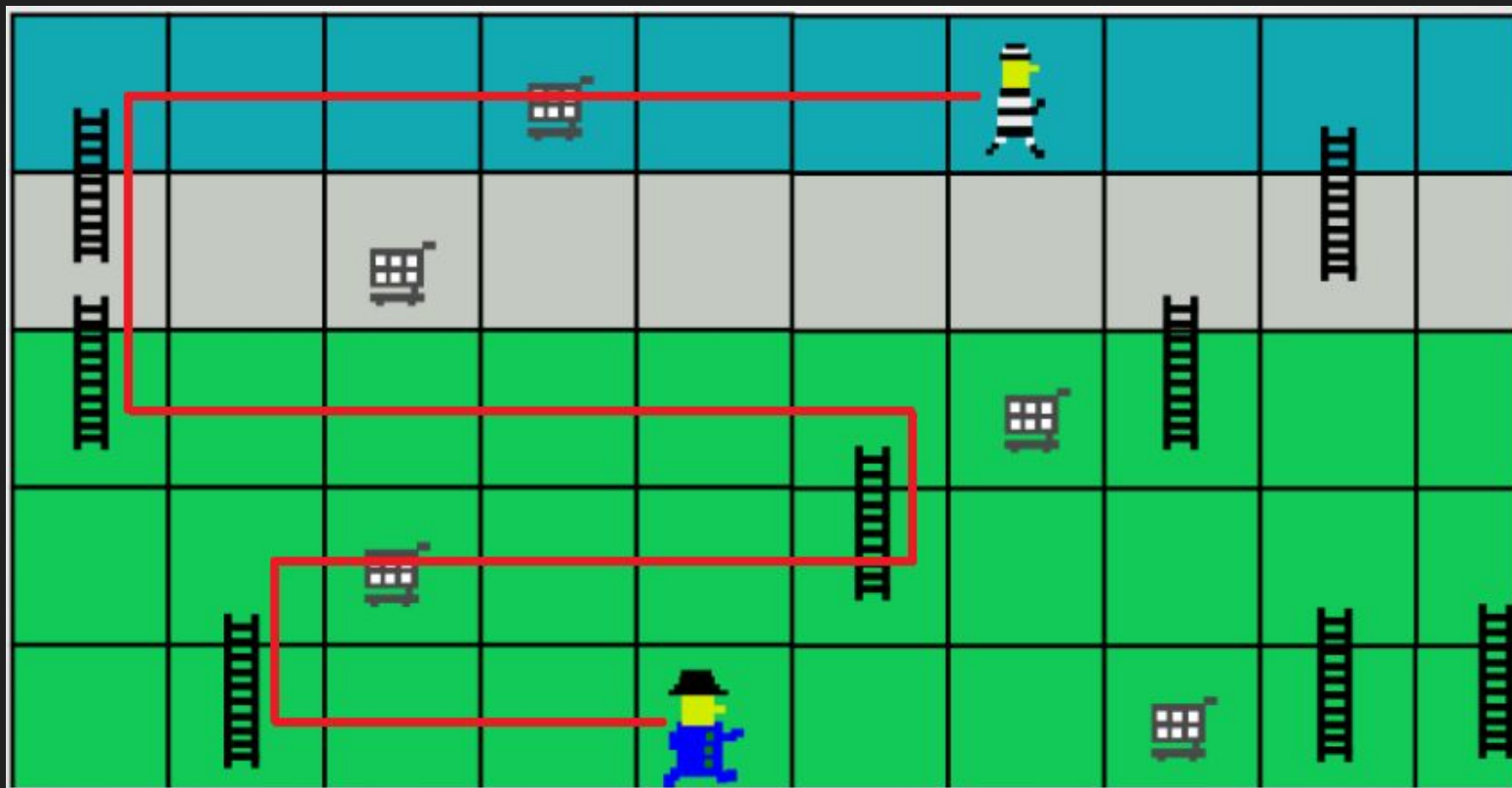
A screenshot of a SWI-Prolog window. The title bar shows the SWI-Prolog logo and the file path "c:/Users/xand/Desktop/busy police/busy_police2.pl". The menu bar includes "File", "Edit", "Settings", "Run", "Debug", and "Help". The main text area contains a welcome message, a license notice, and a Prolog query. The query is "?- pegaLadrao([5, 1], L).", which has been executed, resulting in the variable L being assigned a list of 15 pairs of numbers. The list is displayed in two lines, with a "[write]" command on the first line. The window has standard Windows window controls (minimize, maximize, close) in the top right corner.

```
SWI-Prolog -- c:/Users/xand/Desktop/busy police/busy_police2.pl
File Edit Settings Run Debug Help
Welcome to SWI-Prolog (threaded, 64 bits, version 7.6.4)
SWI-Prolog comes with ABSOLUTELY NO WARRANTY. This is free software.
Please run ?- license. for legal details.


For online help and background, visit http://www.swi-prolog.org
For built-in help, use ?- help(Topic). or ?- apropos(Word).

?- pegaLadrao([5, 1], L).
L = [[7, 5], [6, 5], [5, 5], [4, 5], [3, 5], [2, 5], [1, 5], [1|...], [...|...]|...]
[write]
L = [[7, 5], [6, 5], [5, 5], [4, 5], [3, 5], [2, 5], [1, 5], [1, 4], [1, 3], [2, 3],
[3, 3], [4, 3], [5, 3], [6, 3], [6, 2], [5, 2], [4, 2], [3, 2], [2, 2], [2, 1], [3, 1],
[4, 1], [5, 1]]
```

Ambiente 2 (resolvido)



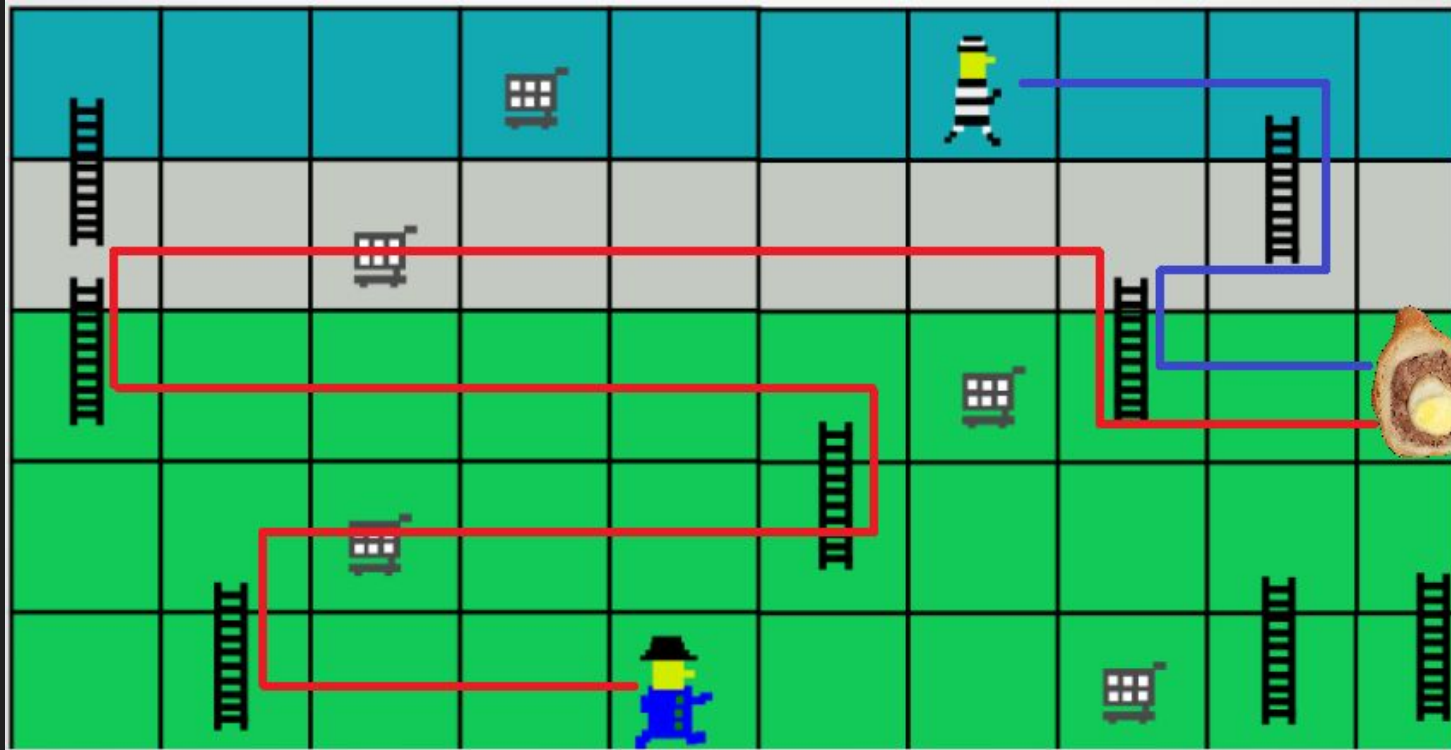
Ambiente 2 Bonus Game

 SWI-Prolog -- c:/Users/xand/Desktop/busy police/busy_police2.pl
File Edit Settings Run Debug Help
Welcome to SWI-Prolog (threaded, 64 bits, version 7.6.4)
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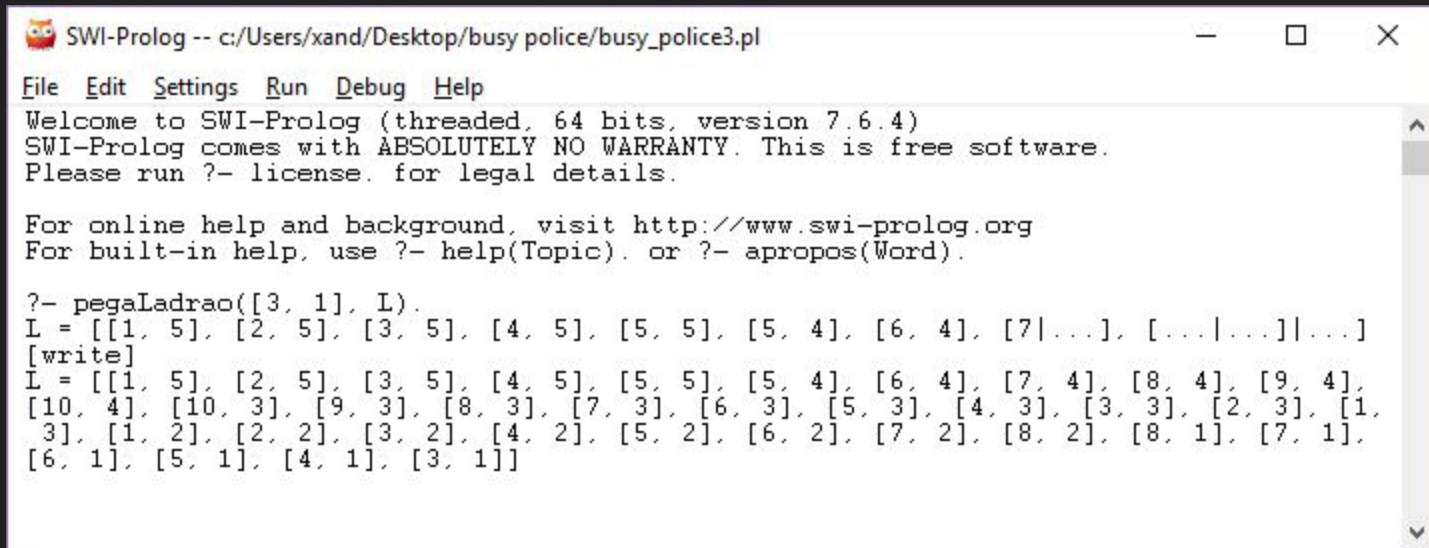
For online help and background, visit <http://www.swi-prolog.org>
For built-in help, use ?- help(Topic). or ?- apropos(Word).

?- pegaLadraoEBolovo([5, 1], L).
L = [[7, 5], [8, 5], [8, 4], [8, 3], [9, 3], [10, 3], [10, 3], [9|...], [...|...]|...]
[write]
L = [[7, 5], [8, 5], [8, 4], [8, 3], [9, 3], [10, 3], [10, 3], [9, 3], [8, 3], [8, 4],
[7, 4], [6, 4], [5, 4], [4, 4], [3, 4], [2, 4], [1, 4], [1, 3], [2, 3], [3, 3], [4,
3], [5, 3], [6, 3], [6, 2], [5, 2], [4, 2], [3, 2], [2, 2], [2, 1], [3, 1], [4, 1],
[5, 1]]

Ambiente 2 (Bonus Game resolvido)



Ambiente 3

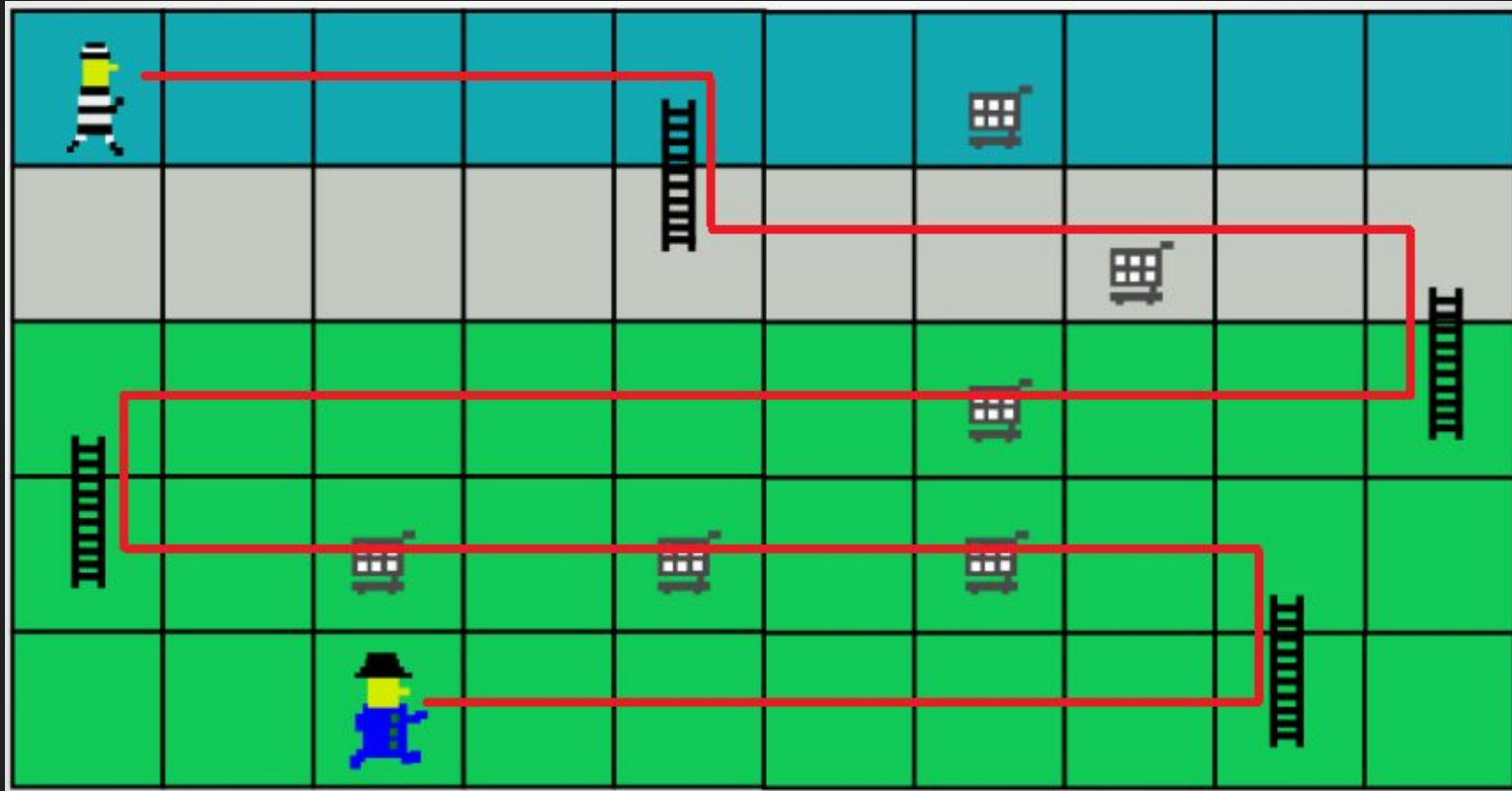
A screenshot of a SWI-Prolog window. The title bar reads "SWI-Prolog -- c:/Users/xand/Desktop/busy police/busy_police3.pl". The menu bar includes "File", "Edit", "Settings", "Run", "Debug", and "Help". The main text area contains a welcome message, help instructions, and the execution of a Prolog query. The query is "?- pegaLadrao([3, 1], L).", which returns a list L of 25 pairs of numbers. The window has standard Windows window controls (minimize, maximize, close) in the top right corner.

```
SWI-Prolog -- c:/Users/xand/Desktop/busy police/busy_police3.pl
File Edit Settings Run Debug Help
Welcome to SWI-Prolog (threaded, 64 bits, version 7.6.4)
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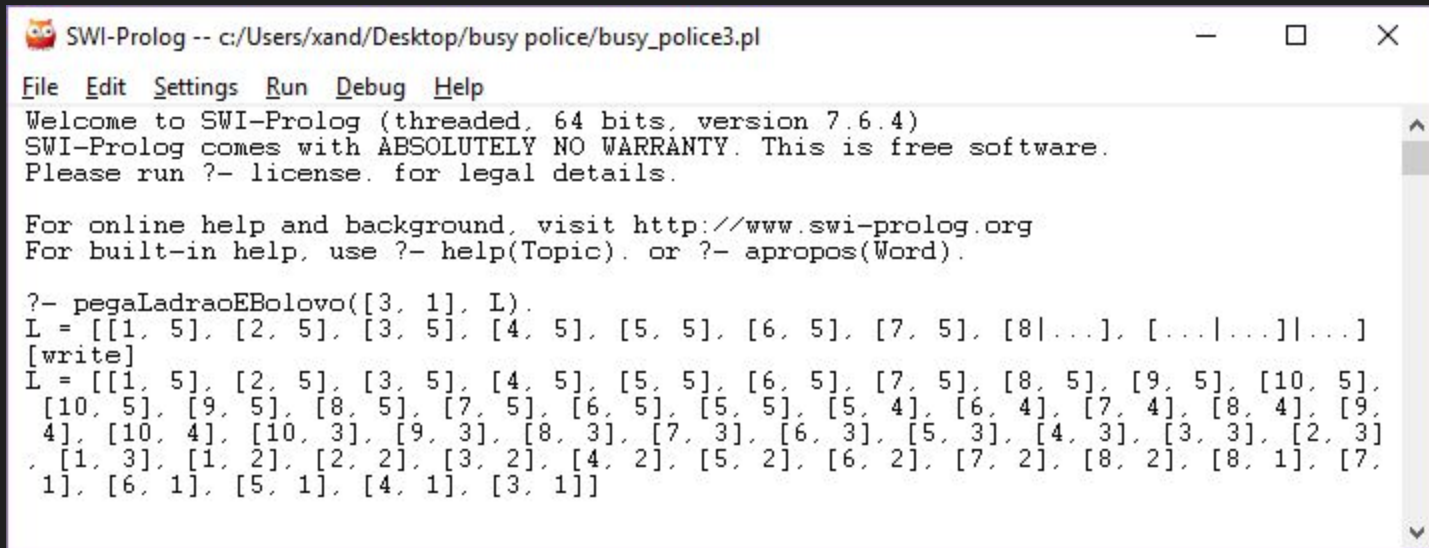
For online help and background, visit http://www.swi-prolog.org
For built-in help, use ?- help(Topic). or ?- apropos(Word).

?- pegaLadrao([3, 1], L).
L = [[1, 5], [2, 5], [3, 5], [4, 5], [5, 5], [5, 4], [6, 4], [7, 4], [8, 4], [9, 4],
[10, 4], [10, 3], [9, 3], [8, 3], [7, 3], [6, 3], [5, 3], [4, 3], [3, 3], [2, 3], [1,
3], [1, 2], [2, 2], [3, 2], [4, 2], [5, 2], [6, 2], [7, 2], [8, 2], [8, 1], [7, 1],
[6, 1], [5, 1], [4, 1], [3, 1]]
```

Ambiente 3 (resolvido)



Ambiente 3 Bonus Game



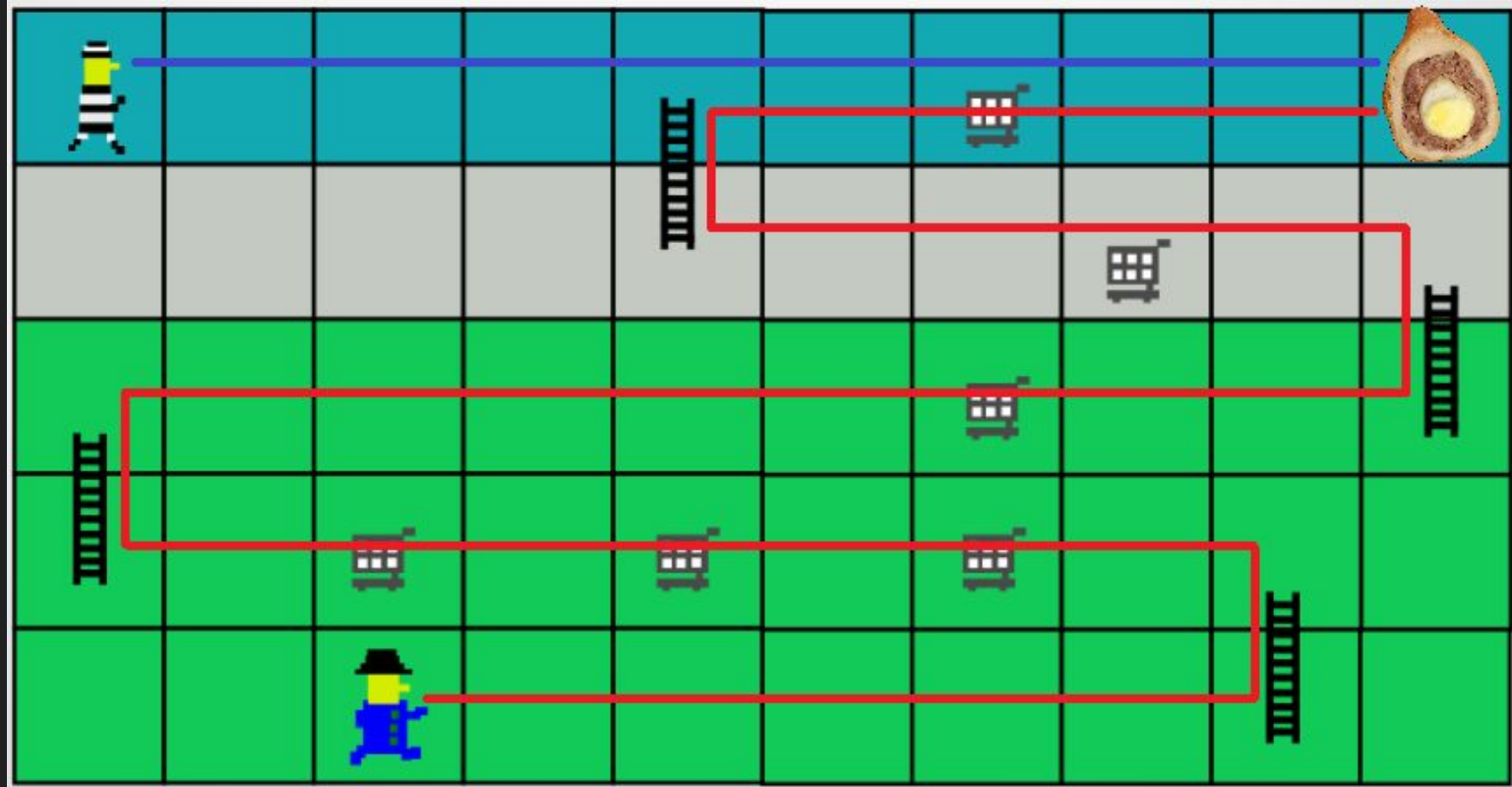
A screenshot of a SWI-Prolog window. The title bar reads "SWI-Prolog -- c:/Users/xand/Desktop/busy police/busy_police3.pl". The menu bar includes "File", "Edit", "Settings", "Run", "Debug", and "Help". The main text area contains the following content:

```
Welcome to SWI-Prolog (threaded, 64 bits, version 7.6.4)
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For online help and background, visit http://www.swi-prolog.org
For built-in help, use ?- help(Topic). or ?- apropos(Word).

?- pegaLadraoEBolovo([3, 1], L).
L = [[1, 5], [2, 5], [3, 5], [4, 5], [5, 5], [6, 5], [7, 5], [8|...], [...|...]|...]
[write]
L = [[1, 5], [2, 5], [3, 5], [4, 5], [5, 5], [6, 5], [7, 5], [8, 5], [9, 5], [10, 5],
     [10, 5], [9, 5], [8, 5], [7, 5], [6, 5], [5, 5], [5, 4], [6, 4], [7, 4], [8, 4], [9,
     4], [10, 4], [10, 3], [9, 3], [8, 3], [7, 3], [6, 3], [5, 3], [4, 3], [3, 3], [2, 3],
     [1, 3], [1, 2], [2, 2], [3, 2], [4, 2], [5, 2], [6, 2], [7, 2], [8, 2], [8, 1], [7,
     1], [6, 1], [5, 1], [4, 1], [3, 1]]
```

Ambiente 3 (Bonus Game resolvido)



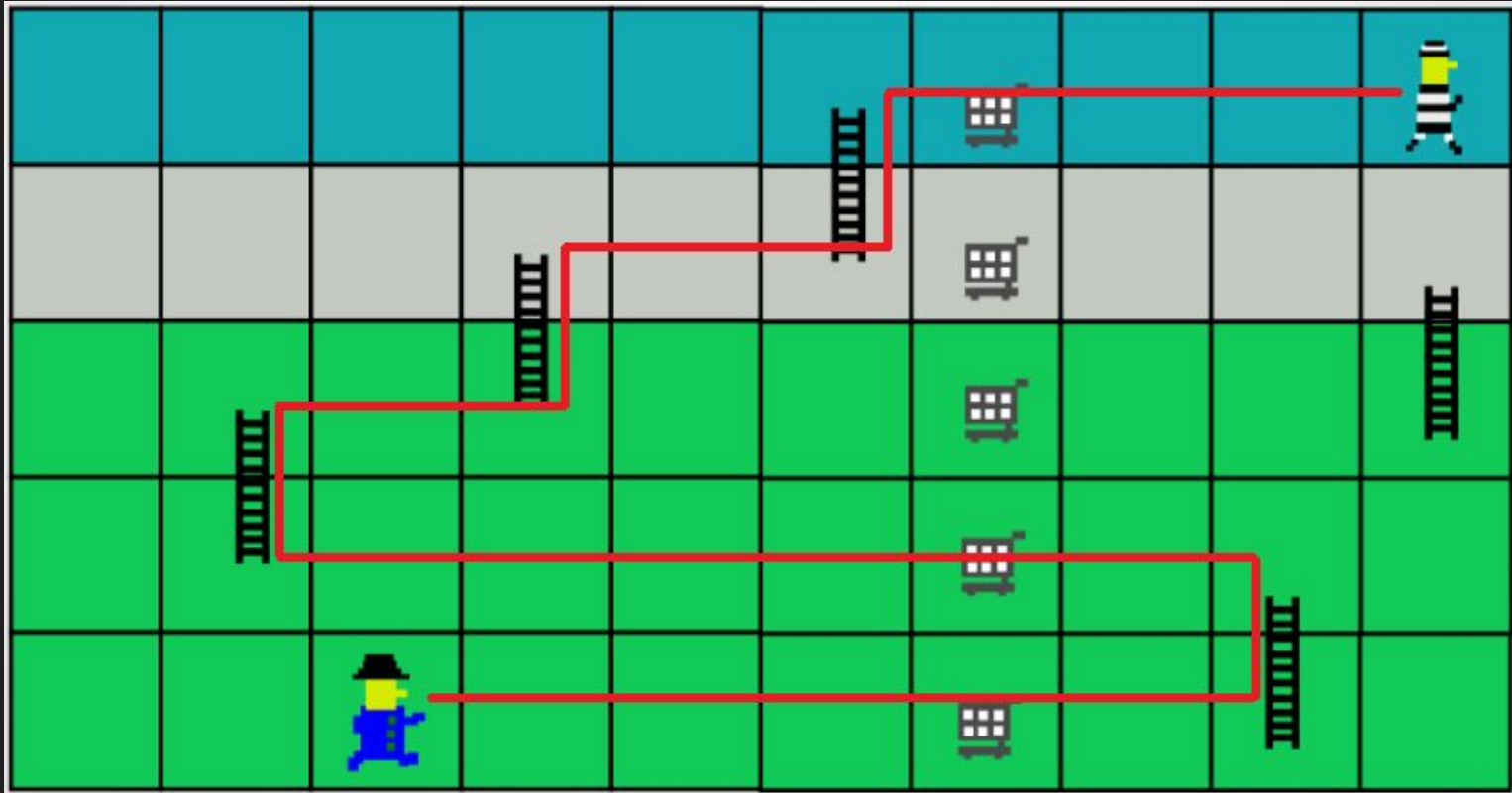
Ambiente 4

 SWI-Prolog -- c:/Users/xand/Desktop/busy police/busy_police4.pl
File Edit Settings Run Debug Help
Welcome to SWI-Prolog (threaded, 64 bits, version 7.6.4)
SWI-Prolog comes with ABSOLUTELY NO WARRANTY. This is free software.
Please run ?- license. for legal details.


For online help and background, visit <http://www.swi-prolog.org>
For built-in help, use ?- help(Topic). or ?- apropos(Word).

?- pegaLadrao([3, 1], L).
L = [[10, 5], [9, 5], [8, 5], [7, 5], [6, 5], [6, 4], [5, 4], [4|...], [...|...]|...]
[write]
L = [[10, 5], [9, 5], [8, 5], [7, 5], [6, 5], [6, 4], [5, 4], [4, 4], [4, 3], [3, 3],
[2, 3], [2, 2], [3, 2], [4, 2], [5, 2], [6, 2], [7, 2], [8, 2], [9, 2], [9, 1], [8,
1], [7, 1], [6, 1], [5, 1], [4, 1], [3, 1]]

Ambiente 4 (resolvido)



Ambiente 4 Bonus Game

 SWI-Prolog -- c:/Users/xand/Desktop/busy police/busy_police4.pl
File Edit Settings Run Debug Help
Welcome to SWI-Prolog (threaded, 64 bits, version 7.6.4)
SWI-Prolog comes with ABSOLUTELY NO WARRANTY. This is free software.
Please run ?- license. for legal details.

For online help and background, visit <http://www.swi-prolog.org>
For built-in help, use ?- help(Topic). or ?- apropos(Word).

?- pegaLadraoEBolovo([3, 1], L).
L = [[10, 5], [9, 5], [8, 5], [7, 5], [6, 5], [6, 4], [5, 4], [4|...], [...|...]|...]
[write]
L = [[10, 5], [9, 5], [8, 5], [7, 5], [6, 5], [6, 4], [5, 4], [4, 4], [4, 3], [5, 3],
[6, 3], [7, 3], [8, 3], [9, 3], [10, 3], [10, 4], [9, 4], [8, 4], [8, 4], [7, 4], [6,
4], [5, 4], [4, 4], [4, 3], [3, 3], [2, 3], [2, 2], [3, 2], [4, 2], [5, 2], [6, 2],
[7, 2], [8, 2], [9, 2], [9, 1], [8, 1], [7, 1], [6, 1], [5, 1], [4, 1], [3, 1]]

Ambiente 4 (Bonus Game resuelto)

