```
Script started on Tue Mar  6 21:03:17 2012
bash-3.2$ cat -n map\007coloring.pl
     1  % $Id: mapcoloring.pl,v 1.4 2011-05-19 19:53:59-07 - - $ */
     2
     3  %
     4  % Map coloring.
     5  %
     6  % Given an adjacency matrix, find a coloring of the map such
     7  % that no two adjacent nodes have the same color.  The four
     8  % color theorem says this is always possible with four colors.
     9  %
    10
    11  not( X ) :- X, !, fail.
    12  not( _ ).
    13
    14  %
    15  % Specification of the nodes in the graph and the paths.
    16  %
    17
    18  graph( [1,2,3,4,5] ).
    19  path( 1, 2 ).
    20  path( 1, 3 ).
    21  path( 1, 4 ).
    22  path( 2, 3 ).
    23  path( 2, 4 ).
    24  path( 3, 4 ).
    25  path( 4, 5 ).
    26
    27  %
    28  % Undirected graph, ajacency is bidirectional.
    29  %
    30
    31  adjacent( Node1, Node2 ) :- path( Node1, Node2 ).
    32  adjacent( Node1, Node2 ) :- path( Node2, Node1 ).
    33
    34  %
    35  % Specifications of possible colors for the nodes.
    36  %
    37
    38  color( red ).
    39  color( green ).
    40  color( blue ).
    41  color( white ).
    42
    43  %
    44  % Find a coloring with no conflicts.
    45  %
    46
    47  findcoloring( [], [] ).
    48  findcoloring( [Node | Nodes], [Coloring | Colorings] ) :-
    49     findcoloring( Nodes, Colorings ),
    50     Coloring = color( Node, Color ),
    51     color( Color ),
    52     noconflict( Coloring, Colorings ).
    53
    54  noconflict( _, [] ).
    55  noconflict( Coloring1, [Coloring2 | Colorings] ) :-
    56     not( conflict( Coloring1, Coloring2 )),
    57     noconflict( Coloring1, Colorings ).
    58
    59  conflict( color( Node1, Color ), color( Node2, Color )) :-
    60     adjacent( Node1, Node2 ).
    61
    62  %
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   65:     63  % Trace the relevant relations.
   66:     64  %
   67:     65
   68:     66  traceon :-
   69:     67     trace( adjacent ),
   70:     68     trace( color ),
   71:     69     trace( findcoloring ),
   72:     70     trace( noconflict ),
   73:     71     trace( conflict ).
   74:     72
   75:     73  writeallcolorings :-
   76:     74     writeanycoloring,
   77:     75     fail.
   78:     76
   79:     77  writeanycoloring :-
   80:     78     findanycoloring( Coloring ),
   81:     79     write( Coloring ), nl.
   82:     80
   83:     81  findanycoloring( Coloring ) :-
   84:     82     graph( Graph ),
   85:     83     findcoloring( Graph, Coloring ).
   86:     84
   87:     85  % TEST: writeallcolorings.
   88: bash-3.2$ gprolog
   89: GNU Prolog 1.3.1
   90: By Daniel Diaz
   91: Copyright (C) 1999-2009 Daniel Diaz
   92: | ?- [mapcoloring].
   93: compiling /afs/cats.ucsc.edu/courses/cmps112-wm/Languages/prolog/Examples/mapcol
oring.pl for byte code...
   94: /afs/cats.ucsc.edu/courses/cmps112-wm/Languages/prolog/Examples/mapcoloring.pl c
ompiled, 85 lines read - 4687 bytes written, 12 ms
   95:
   96: yes
   97: | ?- writeallcolorings.
   98: [color(1,white),color(2,blue),color(3,red),color(4,green),color(5,red)]
   99: [color(1,blue),color(2,white),color(3,red),color(4,green),color(5,red)]
  100: [color(1,white),color(2,red),color(3,blue),color(4,green),color(5,red)]
  101: [color(1,red),color(2,white),color(3,blue),color(4,green),color(5,red)]
  102: [color(1,blue),color(2,red),color(3,white),color(4,green),color(5,red)]
  103: [color(1,red),color(2,blue),color(3,white),color(4,green),color(5,red)]
  104: [color(1,white),color(2,green),color(3,red),color(4,blue),color(5,red)]
  105: [color(1,green),color(2,white),color(3,red),color(4,blue),color(5,red)]
  106: [color(1,white),color(2,red),color(3,green),color(4,blue),color(5,red)]
  107: [color(1,red),color(2,white),color(3,green),color(4,blue),color(5,red)]
  108: [color(1,green),color(2,red),color(3,white),color(4,blue),color(5,red)]
  109: [color(1,red),color(2,green),color(3,white),color(4,blue),color(5,red)]
  110: [color(1,blue),color(2,green),color(3,red),color(4,white),color(5,red)]
  111: [color(1,green),color(2,blue),color(3,red),color(4,white),color(5,red)]
  112: [color(1,blue),color(2,red),color(3,green),color(4,white),color(5,red)]
  113: [color(1,red),color(2,blue),color(3,green),color(4,white),color(5,red)]
  114: [color(1,green),color(2,red),color(3,blue),color(4,white),color(5,red)]
  115: [color(1,red),color(2,green),color(3,blue),color(4,white),color(5,red)]
  116: [color(1,white),color(2,blue),color(3,green),color(4,red),color(5,green)]
  117: [color(1,blue),color(2,white),color(3,green),color(4,red),color(5,green)]
  118: [color(1,white),color(2,green),color(3,blue),color(4,red),color(5,green)]
  119: [color(1,green),color(2,white),color(3,blue),color(4,red),color(5,green)]
  120: [color(1,blue),color(2,green),color(3,white),color(4,red),color(5,green)]
  121: [color(1,green),color(2,blue),color(3,white),color(4,red),color(5,green)]
  122: [color(1,white),color(2,green),color(3,red),color(4,blue),color(5,green)]
  123: [color(1,green),color(2,white),color(3,red),color(4,blue),color(5,green)]
  124: [color(1,white),color(2,red),color(3,green),color(4,blue),color(5,green)]
  125: [color(1,red),color(2,white),color(3,green),color(4,blue),color(5,green)]
  126: [color(1,green),color(2,red),color(3,white),color(4,blue),color(5,green)]
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127: [color(1,red),color(2,green),color(3,white),color(4,blue),color(5,green)]
128: [color(1,blue),color(2,green),color(3,red),color(4,white),color(5,green)]
129: [color(1,green),color(2,blue),color(3,red),color(4,white),color(5,green)]
130: [color(1,blue),color(2,red),color(3,green),color(4,white),color(5,green)]
131: [color(1,red),color(2,blue),color(3,green),color(4,white),color(5,green)]
132: [color(1,green),color(2,red),color(3,blue),color(4,white),color(5,green)]
133: [color(1,red),color(2,green),color(3,blue),color(4,white),color(5,green)]
134: [color(1,white),color(2,blue),color(3,green),color(4,red),color(5,blue)]
135: [color(1,blue),color(2,white),color(3,green),color(4,red),color(5,blue)]
136: [color(1,white),color(2,green),color(3,blue),color(4,red),color(5,blue)]
137: [color(1,green),color(2,white),color(3,blue),color(4,red),color(5,blue)]
138: [color(1,blue),color(2,green),color(3,white),color(4,red),color(5,blue)]
139: [color(1,green),color(2,blue),color(3,white),color(4,red),color(5,blue)]
140: [color(1,white),color(2,blue),color(3,red),color(4,green),color(5,blue)]
141: [color(1,blue),color(2,white),color(3,red),color(4,green),color(5,blue)]
142: [color(1,white),color(2,red),color(3,blue),color(4,green),color(5,blue)]
143: [color(1,red),color(2,white),color(3,blue),color(4,green),color(5,blue)]
144: [color(1,blue),color(2,red),color(3,white),color(4,green),color(5,blue)]
145: [color(1,red),color(2,blue),color(3,white),color(4,green),color(5,blue)]
146: [color(1,blue),color(2,green),color(3,red),color(4,white),color(5,blue)]
147: [color(1,green),color(2,blue),color(3,red),color(4,white),color(5,blue)]
148: [color(1,blue),color(2,red),color(3,green),color(4,white),color(5,blue)]
149: [color(1,red),color(2,blue),color(3,green),color(4,white),color(5,blue)]
150: [color(1,green),color(2,red),color(3,blue),color(4,white),color(5,blue)]
151: [color(1,red),color(2,green),color(3,blue),color(4,white),color(5,blue)]
152: [color(1,white),color(2,blue),color(3,green),color(4,red),color(5,white)]
153: [color(1,blue),color(2,white),color(3,green),color(4,red),color(5,white)]
154: [color(1,white),color(2,green),color(3,blue),color(4,red),color(5,white)]
155: [color(1,green),color(2,white),color(3,blue),color(4,red),color(5,white)]
156: [color(1,blue),color(2,green),color(3,white),color(4,red),color(5,white)]
157: [color(1,green),color(2,blue),color(3,white),color(4,red),color(5,white)]
158: [color(1,white),color(2,blue),color(3,red),color(4,green),color(5,white)]
159: [color(1,blue),color(2,white),color(3,red),color(4,green),color(5,white)]
160: [color(1,white),color(2,red),color(3,blue),color(4,green),color(5,white)]
161: [color(1,red),color(2,white),color(3,blue),color(4,green),color(5,white)]
162: [color(1,blue),color(2,red),color(3,white),color(4,green),color(5,white)]
163: [color(1,red),color(2,blue),color(3,white),color(4,green),color(5,white)]
164: [color(1,white),color(2,green),color(3,red),color(4,blue),color(5,white)]
165: [color(1,green),color(2,white),color(3,red),color(4,blue),color(5,white)]
166: [color(1,white),color(2,red),color(3,green),color(4,blue),color(5,white)]
167: [color(1,red),color(2,white),color(3,green),color(4,blue),color(5,white)]
168: [color(1,green),color(2,red),color(3,white),color(4,blue),color(5,white)]
169: [color(1,red),color(2,green),color(3,white),color(4,blue),color(5,white)]
170:
171: no
172: | ?-
173:
174: bash-3.2$ exit
175:
176: Script done on Tue Mar  6 21:03:41 2012
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