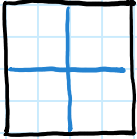


# Mazemake

Sunday, November 3, 2019 3:59 PM

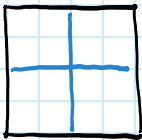
Assume a maze of  $2 \times 2$ .

Thus,  where the internal walls are coloured blue.

Quantity of internal walls:

$$N = \underbrace{((N_{\text{cols}} - 1) \times N_{\text{rows}})}_{\text{vertical}} + \underbrace{((N_{\text{rows}} - 1) \times N_{\text{cols}})}_{\text{horizontal}}$$

Make pair of all cells w/ internal wall between them. "cell wall  $[N][Z]$ "



int  $k = 0$ ;

FOR EVERY CELL @  $i, j$  ... except in last column

$WALL[k][0] = \text{cell}(i, j)$ ; // CURRENT

$WALL[k][1] = \text{cell}(i+1, j)$ ; // RIGHT

$k++$ ;

FOR EVERY CELL @  $i, j$  ... except in last row



$WALL[k][0] = \text{cell}(i, j)$ ; // CURRENT

$WALL[k][1] = \text{cell}(i, j+1)$ ; // BELOW

$k++$ ;

Thus  $WALL[k][N]$  is:

$k \backslash N$	0	1
0	(0, 0)	(1, 0)
1	(0, 1)	(1, 1)

Pairs w/ wall between

			Pairs w/ wall between
1	(0, 1)	(1, 1)	
2	(0, 0)	(0, 1)	
3	(1, 0)	(1, 1)	

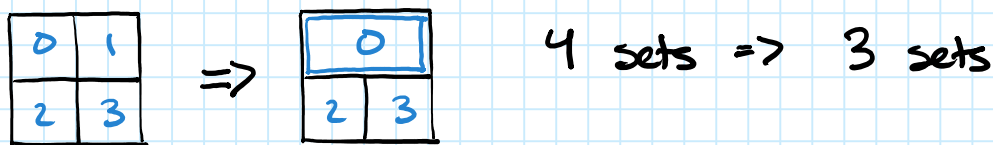
Shuffle via randperm handout  
 (you use regular "rand" w/ "srand(time(NULL))")

Call "dset ds" of size  $N_{row} \times N_{col}$  (NOT  $N$ ).

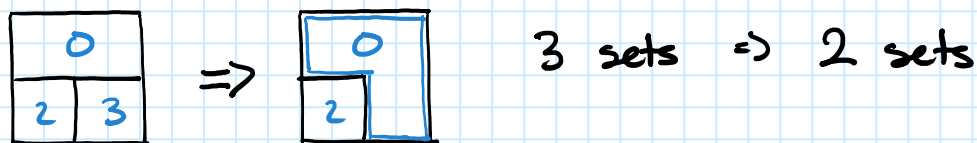
Thus, ds is as follows:

0	1
2	3

OBSERVE: If we merge 0 + 1,  
 we "break" the wall between  
 them.







If we did 1 (in 0) + 3 next...



With this in mind, just keep merging  
 until there is **one** set left.

Which cells do we merge? Let's let  
 wall help. Assume it's **unshuffled**.

k \ N	0	1	
0	(0, 0)	(1, 0)	
1	(0, 1)	(1, 1)	
2	(0, 0)	(0, 1)	
3	(1, 0)	(1, 1)	

### ALGORITHM

```

FOR i FROM 0 TO N ... {
  // Convert 2D to 1D
  ii = WALL[i][0].x + (WALL[i][0].y * Ncol);
  jj = SAME AS ^ BUT w/ WALL[i][1]

  // If not already merged...
  IF (DS.FIND(ii) != DS.FIND(jj))
    DS.MERGE(ii, jj);
  ELSE
    // Can't merge, so there's a wall
    PRINT WALL[i] 0 + 1

  IF (DS.SIZE() == 1)
    BREAK;
}

i++; // Just do it... Seriously
  
```

//Print out remaining walls from i to N  
 For i From i to N  
 PRINT //Same as above

(Ex

0	1
2	3

$i = 0.$  WALL[i] =  
 $(0, 0) + (1, 0)$

NOT in same set. MERGE

0	
2	3

$i = 1.$  WALL[i] =  
 $(0, 1) + (1, 1)$

NOT in same set. MERGE

0	
2	

$i = 2.$  WALL[i] =  
 $(0, 0) + (0, 1)$

NOT in same set. MERGE

0	

$i = 3.$  WALL[i] =  
 $(1, 0) + (1, 1)$

ARE in same set. PRINT

Oh, also if you do  $(x, y)$ , flip when printing.

That example was with wall unshuffled. Just shuffle after you get this working.

Should write this:

```
MAZE 2 2  
0 1 1 1
```

Always 1 wall in a  $2 \times 2$  maze.