

ICFP Programming Contest 2012

Addition: Beards and Razors

ICFP Programming Contest Organising Team

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We have made our surveying equipment more sensitive, and we are now beginning to find some growth underground which is hampering Robot movement. In order to continue mining operations, we are providing Robots with tools to combat this growth. You may now find the following in mines:



Wadler's Beard (w in ASCII)



Hutton's Razor (! in ASCII)

Wadler's Beard is associated with a *growth rate*, g . Every g updates, a Beard will grow into all Empty cells immediately adjacent to it (all 8 — that is, diagonally as well as straight). More precisely, a Beard is associated with a value, initially $g - 1$. During map update, this value is decremented. If, before decrementing, this value is 0, the value at the cell is reset to $g - 1$ and the Beard grows into each surrounding Empty cell with an initial value of $g - 1$. In all other respects, Beards behave exactly like Walls.

To combat growth, the Robot can apply Hutton's Razor. On applying Hutton's Razor, with the command S, any Beard in a surrounding cell (that is, the 8 cells surrounding the Robot) will become Empty. A limited number of razor applications are available.

Razors can appear on the input map — stepping onto the same cell as a Razor increases the number of applications available, and removes the Razor from the map. In all other respects a Razor behaves exactly like Earth. A map description may also specify the number of Razors initially carried by the Robot, and the Beard growth rate, as part of the metadata after a blank line:

```
#####
#***...R.....#
#***... ..*..#
#\!\!.. ..\!\!#
#..... ..*..#
#.. .. ..#
#.... .. ..#
#.... .. ..#
#.. . ! ..#
#...*.. .. ..#
#.... .. ..#
#.\!.. .. ..*#
#..... .. ..#
#!..... W ..#
#####L#
```

```
Growth 25
Razors 1
```

If the growth rate is not specified, the default is 25. If the number of Razors available is not specified, the default is 0. The above map can be solved with the route

```
DDDDLLLLLLLURRRRRRRRRRRRRRRDDDDLLLLLLLLDDDDLLLLLLLLDRRRRRRRRRUUURRRRDLDSRRD.
```

Note: Remember that update rules are applied to each cell in left to right, bottom to top order.