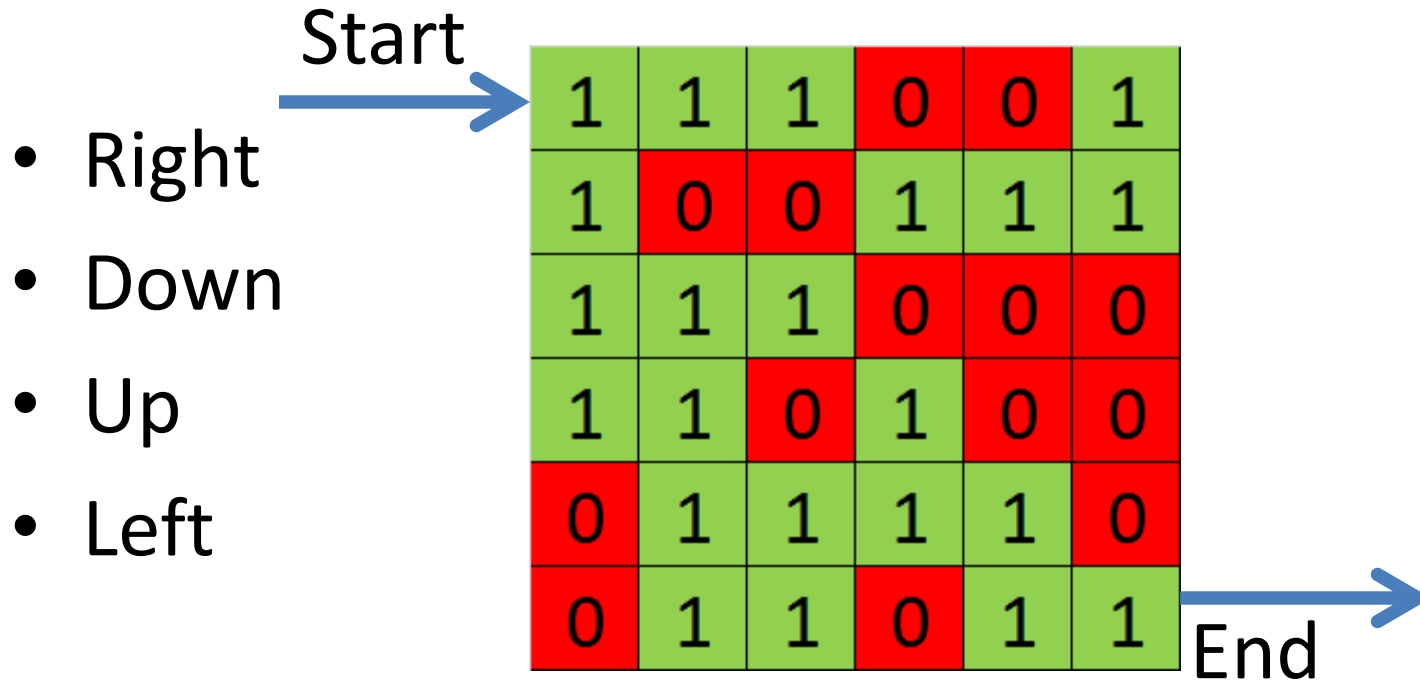


# Solving the Mazes using Stacks

Also known as Rat in a Maze Problem



- 1 = movement allowed
- 0 = blockage (movement not allowed)

- R
- D
- U
- L

|   |   |   |   |   |   |
|---|---|---|---|---|---|
| 1 | 1 | 1 | 0 | 0 | 1 |
| 1 | 0 | 0 | 1 | 1 | 1 |
| 1 | 1 | 1 | 0 | 0 | 0 |
| 1 | 1 | 0 | 1 | 0 | 0 |
| 0 | 1 | 1 | 1 | 1 | 0 |
| 0 | 1 | 1 | 0 | 1 | 1 |

- Stack: <R>

- R
- D
- U
- L

|   |   |   |   |   |   |
|---|---|---|---|---|---|
| 1 | 1 | 1 | 0 | 0 | 1 |
| 1 | 0 | 0 | 1 | 1 | 1 |
| 1 | 1 | 1 | 0 | 0 | 0 |
| 1 | 1 | 0 | 1 | 0 | 0 |
| 0 | 1 | 1 | 1 | 1 | 0 |
| 0 | 1 | 1 | 0 | 1 | 1 |

- Stack: <R, R>

- R
- D
- U
- L

|   |   |   |   |   |   |
|---|---|---|---|---|---|
| 1 | 1 | 1 | 0 | 0 | 1 |
| 1 | 0 | 0 | 1 | 1 | 1 |
| 1 | 1 | 1 | 0 | 0 | 0 |
| 1 | 1 | 0 | 1 | 0 | 0 |
| 0 | 1 | 1 | 1 | 1 | 0 |
| 0 | 1 | 1 | 0 | 1 | 1 |

- Stack: <R, R, R>
- Moving to Right, Up and Down not possible
- Now, backtrack (POP) and move in reverse direction

|   |   |    |   |   |   |
|---|---|----|---|---|---|
| 1 | 1 | -1 | 0 | 0 | 1 |
| 1 | 0 | 0  | 1 | 1 | 1 |
| 1 | 1 | 1  | 0 | 0 | 0 |
| 1 | 1 | 0  | 1 | 0 | 0 |
| 0 | 1 | 1  | 1 | 1 | 0 |
| 0 | 1 | 1  | 0 | 1 | 1 |

- Stack: <R, R>
- Note that moved in **Left** Direction
- Blocked that position to avoid re-visit

|   |   |    |   |   |   |
|---|---|----|---|---|---|
| 1 | 1 | -1 | 0 | 0 | 1 |
| 1 | 0 | 0  | 1 | 1 | 1 |
| 1 | 1 | 1  | 0 | 0 | 0 |
| 1 | 1 | 0  | 1 | 0 | 0 |
| 0 | 1 | 1  | 1 | 1 | 0 |
| 0 | 1 | 1  | 0 | 1 | 1 |

- Stack: <R, R>
- Moving to Right, Up and Down not possible
- Now, backtrack (POP) and move in reverse direction

|   |    |    |   |   |   |
|---|----|----|---|---|---|
| 1 | -1 | -1 | 0 | 0 | 1 |
| 1 | 0  | 0  | 1 | 1 | 1 |
| 1 | 1  | 1  | 0 | 0 | 0 |
| 1 | 1  | 0  | 1 | 0 | 0 |
| 0 | 1  | 1  | 1 | 1 | 0 |
| 0 | 1  | 1  | 0 | 1 | 1 |

- Stack: <R>
- Note that moved in **Left** Direction
- Blocked that position to avoid re-visit



- R
- D
- U
- L

|   |    |    |   |   |   |
|---|----|----|---|---|---|
| 1 | -1 | -1 | 0 | 0 | 1 |
| 1 | 0  | 0  | 1 | 1 | 1 |
| 1 | 1  | 1  | 0 | 0 | 0 |
| 1 | 1  | 0  | 1 | 0 | 0 |
| 0 | 1  | 1  | 1 | 1 | 0 |
| 0 | 1  | 1  | 0 | 1 | 1 |

- Stack: <R>
- Note that now moving **Right** not possible
- Move **Down** Now

- R
- **D**
- U
- L

|   |    |    |   |   |   |
|---|----|----|---|---|---|
| 1 | -1 | -1 | 0 | 0 | 1 |
| 1 | 0  | 0  | 1 | 1 | 1 |
| 1 | 1  | 1  | 0 | 0 | 0 |
| 1 | 1  | 0  | 1 | 0 | 0 |
| 0 | 1  | 1  | 1 | 1 | 0 |
| 0 | 1  | 1  | 0 | 1 | 1 |

- Stack: <R, D>

- R
- **D**
- U
- L

|   |    |    |   |   |   |
|---|----|----|---|---|---|
| 1 | -1 | -1 | 0 | 0 | 1 |
| 1 | 0  | 0  | 1 | 1 | 1 |
| 1 | 1  | 1  | 0 | 0 | 0 |
| 1 | 1  | 0  | 1 | 0 | 0 |
| 0 | 1  | 1  | 1 | 1 | 0 |
| 0 | 1  | 1  | 0 | 1 | 1 |

- Stack: <R, D, D>

- R
- D
- U
- L

|   |    |    |   |   |   |
|---|----|----|---|---|---|
| 1 | -1 | -1 | 0 | 0 | 1 |
| 1 | 0  | 0  | 1 | 1 | 1 |
| 1 | 1  | 1  | 0 | 0 | 0 |
| 1 | 1  | 0  | 1 | 0 | 0 |
| 0 | 1  | 1  | 1 | 1 | 0 |
| 0 | 1  | 1  | 0 | 1 | 1 |

- Stack: <R, D, D, R>

- R
- D
- U
- L

|   |    |    |   |   |   |
|---|----|----|---|---|---|
| 1 | -1 | -1 | 0 | 0 | 1 |
| 1 | 0  | 0  | 1 | 1 | 1 |
| 1 | 1  | 1  | 0 | 0 | 0 |
| 1 | 1  | 0  | 1 | 0 | 0 |
| 0 | 1  | 1  | 1 | 1 | 0 |
| 0 | 1  | 1  | 0 | 1 | 1 |

- Stack: <R, D, D, R, R>

|   |    |    |   |   |   |
|---|----|----|---|---|---|
| 1 | -1 | -1 | 0 | 0 | 1 |
| 1 | 0  | 0  | 1 | 1 | 1 |
| 1 | 1  | -1 | 0 | 0 | 0 |
| 1 | 1  | 0  | 1 | 0 | 0 |
| 0 | 1  | 1  | 1 | 1 | 0 |
| 0 | 1  | 1  | 0 | 1 | 1 |

- Stack: <R, D, D, R>

- R
- **D**
- U
- L

|   |    |    |   |   |   |
|---|----|----|---|---|---|
| 1 | -1 | -1 | 0 | 0 | 1 |
| 1 | 0  | 0  | 1 | 1 | 1 |
| 1 | 1  | -1 | 0 | 0 | 0 |
| 1 | 1  | 0  | 1 | 0 | 0 |
| 0 | 1  | 1  | 1 | 1 | 0 |
| 0 | 1  | 1  | 0 | 1 | 1 |

- Stack: <R, D, D, R, D>

|   |    |    |   |   |   |
|---|----|----|---|---|---|
| 1 | -1 | -1 | 0 | 0 | 1 |
| 1 | 0  | 0  | 1 | 1 | 1 |
| 1 | 1  | -1 | 0 | 0 | 0 |
| 1 | 1  | 0  | 1 | 0 | 0 |
| 0 | 1  | 1  | 1 | 1 | 0 |
| 0 | 1  | 1  | 0 | 1 | 1 |

- Stack: <R, D, D, R, D, D, R, R, R, D, R>