

# Implementing Value Iteration

1. Make it work
  2. Make it right
  3. Make it fast
- 
- ```
graph LR; A[Problem 4] --> B[2. Make it right]; A --> C[3. Make it fast]; D[1. Make it work]
```

First step for making it fast (in any language, not just julia):

Find out what is slow (by profiling)!

# Bellman Operator

$$U' = B[U]$$

$$B[U](s) = \max_a \underbrace{\left( R(s, a) + \gamma \sum_{s'} T(s' | s, a) U(s') \right)}_{Q(s, a)}$$

$i$  = index of  $s$ ;  $j$  = index of  $s'$

$$y = Mx$$

Naive implementation:

$$y[i] = \sum_j M[i, j]x[i]$$

$$U'[i] = \max_a \left( R[a][i] + \gamma \sum_j T[a][i, j]U[j] \right)$$