Red, Green, Refactor

Creating the Game of Life with Test-Driven Development

By Ken Snyder

Workshop Format

1. Work in pairs
2. Take turns writing tests / code
3. This PPT at http://intel.to/golppt

3-Minute Setup

- Go to http://intel.to/gol
- Download or git checkout the repository
- Follow the instructions in README.md

About the Game of Life

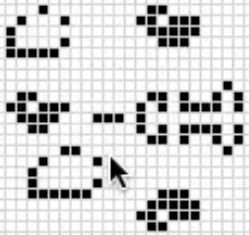
- The Game of Life is a cellular simulation created by British mathematician **John Horton Conway**.
- After defining an initial state, **cells evolve** into still lifes, gliders, and long-lived patterns of chaos.
- Cells are **placed on a grid** according to a given starting state. In each generation, the rules for cell birth and survival are governed by two rules

Video 1 – Random Board

Why the Game of Life?

- Architecture is not immediately obvious
- New to many programmers
- It's interesting!
- Play at ConwayJS.com or download Golly

Video 2 – Slow Puffer



2 Reasons To Live

1. Any live cell with 2 or 3 live neighbors survives to the next generation.
2. Any dead cell with exactly 3 live neighbors is born in the next generation.

Other cells die.

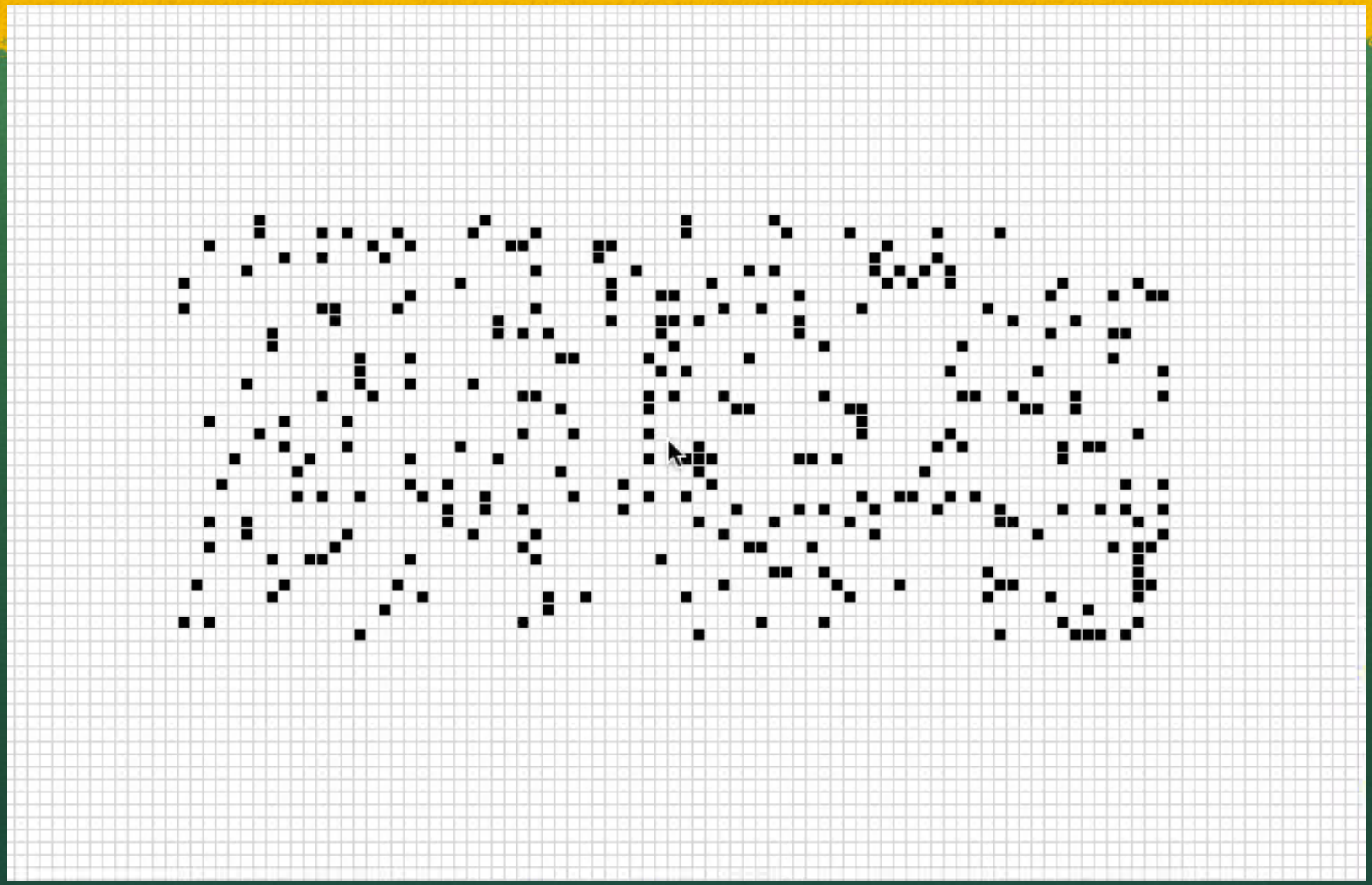
(This ruleset is notated by 23/3)

Metaphor for dying cells

Overcrowding

Underpopulation

Video 3 – Maze Rules (12345/3)



QUnit

http://qunitjs.com
OR
$ npm install grunt-contrib-qunit

```
test("Test Name", function() {
	strictEqual(actual, expected, [message]);
	deepEqual(actual, expected, [message]);
	throws(function, [expected], [message]);
	expect(numAssertions);
});
```

QUnit

http://qunitjs.com
OR
$ npm install grunt-contrib-qunit

```
test("Test Name", function() {
      strictEqual(actual, expected, [message]);
      deepEqual(actual, expected, [message]);
      throws(function, [expected], [message]);
      expect(numAssertions);
});
```

NodeUnit

```
$ npm install nodeunit
OR
$ npm install grunt-contrib-nodeunit
```

```
exports["Test Name"] = function(test) {
      test.strictEqual(actual, expected, [message]);
      test.deepEqual(actual, expected, [message]);
      test.throws(function, [expected], [message]);
      test.expect(numAssertions);
};
```

Other Frameworks

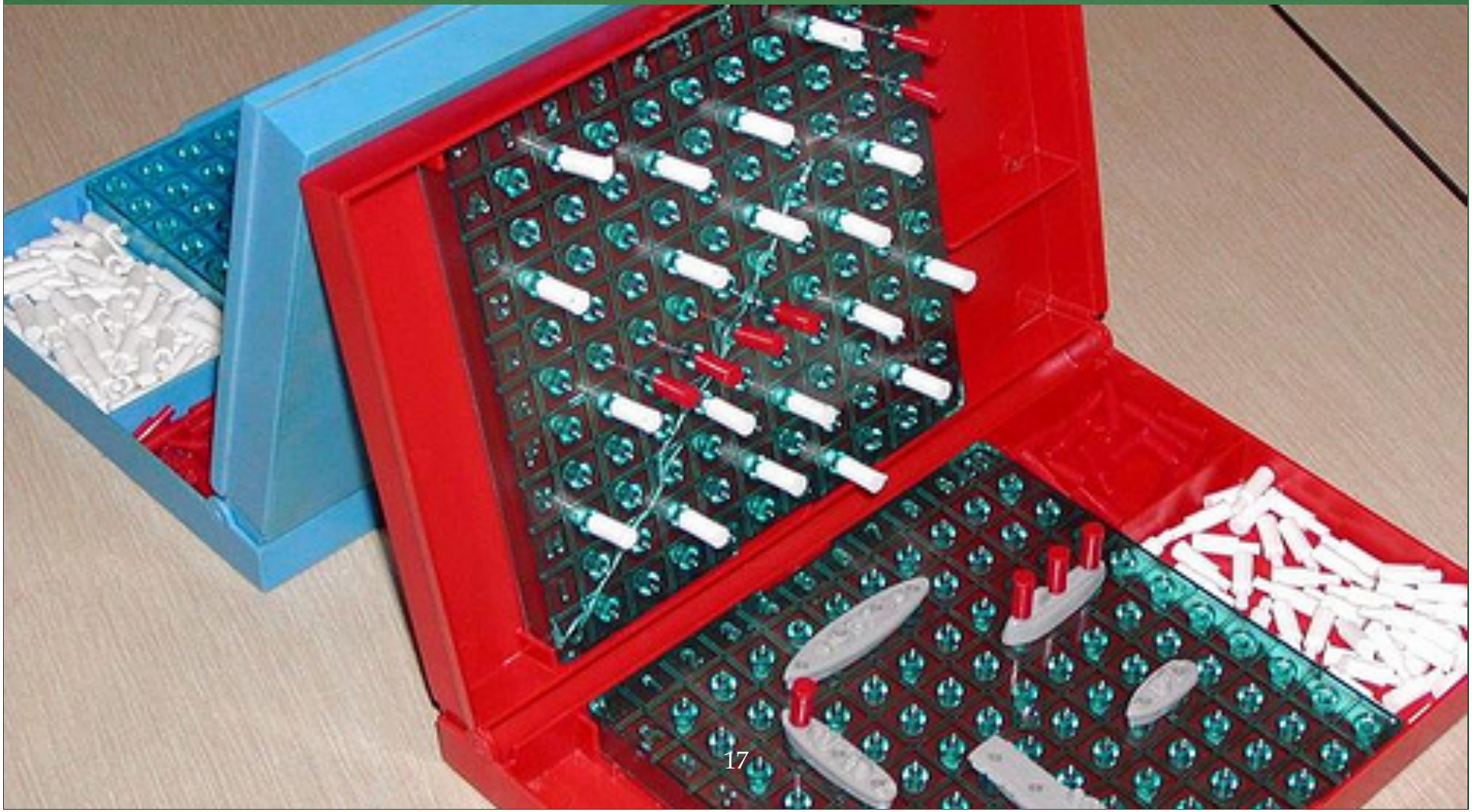
1. Mocha
2. Jasmine
3. jsUnity
4. Testem

The Grid

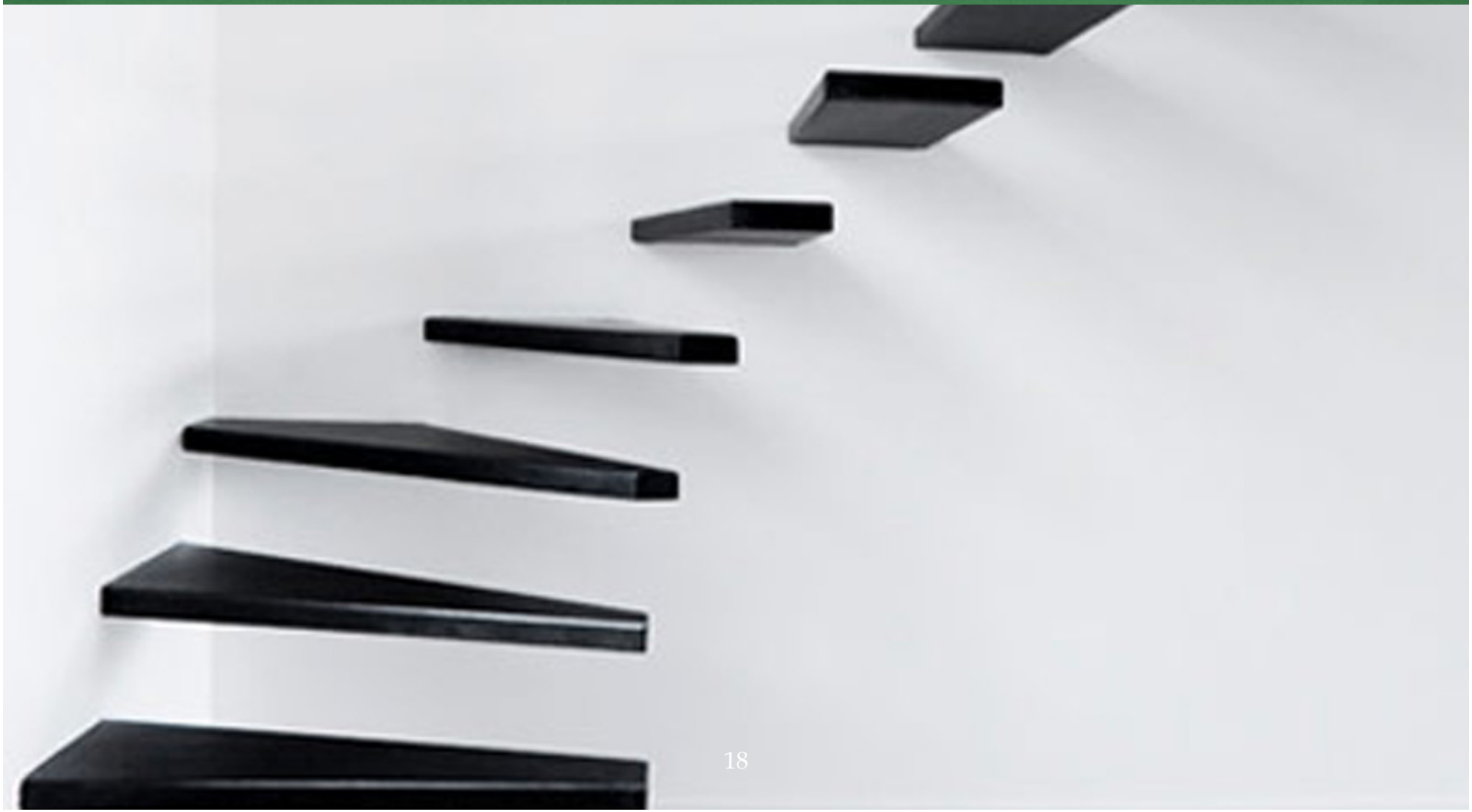
	-1,-1	0,-1	1,-1	2,-1	3,-1
	-1,0	0,0	1,0	2,0	3,0
	-1,1	0,1	1,1	2,1	3,1
	-1,2	0,2	1,2	2,2	3,2
	-1,3	0,3	1,3	2,3	3,3

Red includes Thinking

1f: Call functions before they exist



1p: Write as little code as possible



1p: Write documentation first

2p: Delay implementation

3p: Start with a naïve implementation

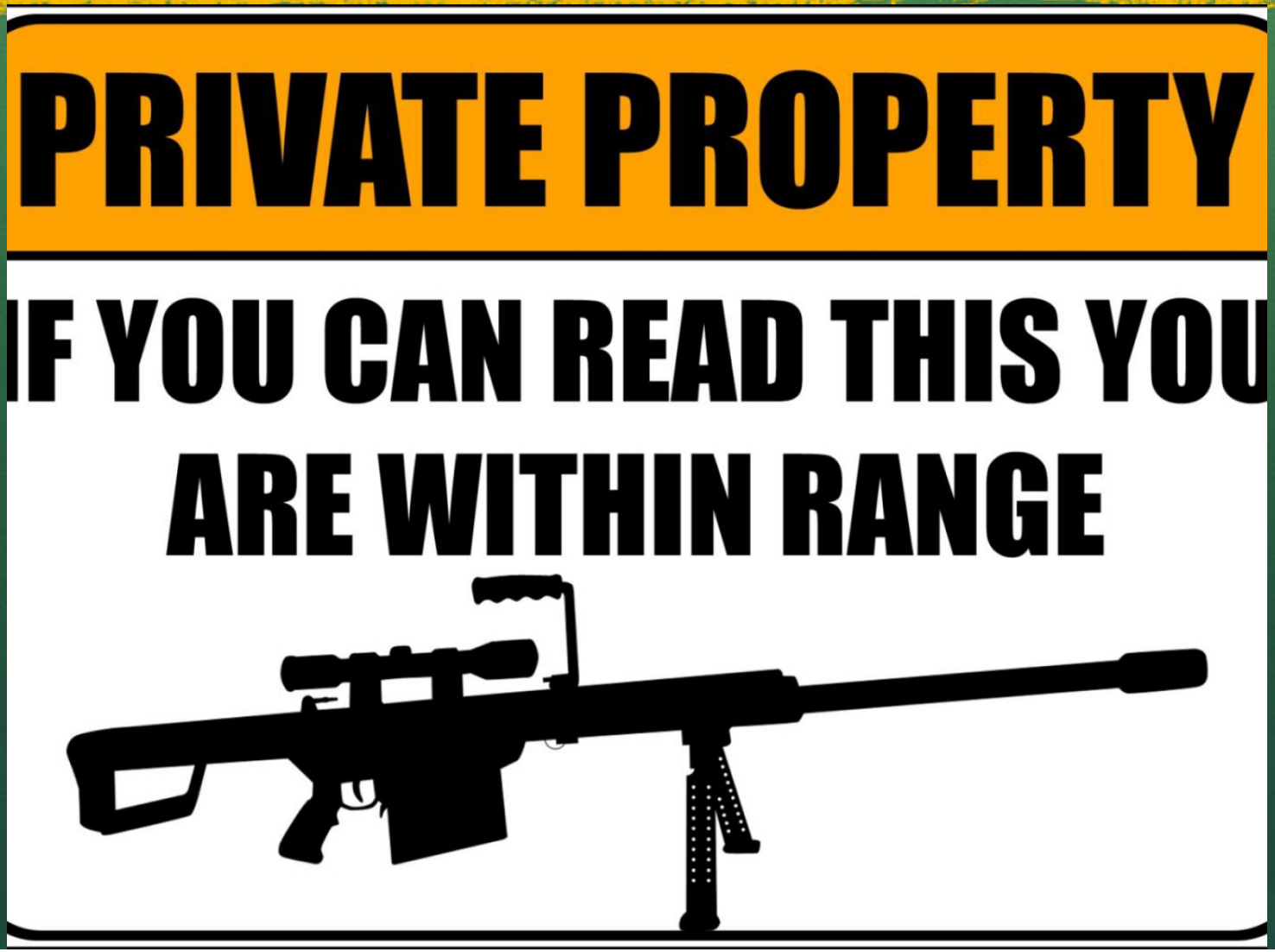
3p: Avoid architecture too early

4p: Write code for one case at a time

6f: Reset test conditions often

8af: Don’t be afraid to switch gears

8af: Write API to be publicly testable



11f: Using properties is not wrong

12p: Refactor duplication

Other reasons to refactor

- Divide code into smaller pieces
- Divide responsibility intelligently
- Improve readability
- Code review

BUT:

Don’t get refactoring confused with architecture

Summary

- (1f) Call functions before they exist
- (1p) Write as little code as possible!
- (1p) Write documentation first
- (2p) Delay implementation
- (3p) Start with a naïve implementation
- (3p) Avoid architecture too early
- (4p) Write code for one case at a time

Summary (cont'd)

- (6f) Reset test conditions often
- (8af) Don't be afraid to switch gears
- (8af) Write API to be publicly testable
- (11f) Using properties is not wrong
- (12p) Refactor duplication, etc.

Thanks for Participating